



Parks Canada Agency

Requisition No. _____

MERX I.D. No. _____

SPECIFICATIONS
for

Waterton Remediation and Abatement – 11 Sites

Waterton Lakes National Park, Alberta

Project No. _____ February 2020

APPROVED BY:

Regional Manager ES

Date

Construction Safety Coordinator

Date

TENDER:

Project Manager

Date

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A handwritten signature in black ink is written over a circular professional seal. The seal features a stylized figure of a person standing on a pedestal, with the text "PROFESSIONAL ENGINEER OF ALBERTA" around the top and "C.E.T.P. 1908" around the bottom.

1. PART 1 - GENERAL

1.1. Introduction

- 1.1.1. Work of this Contract comprises of, but is not limited to, provision of all labour, material, and equipment as necessary to complete remediation of contaminated soil and associated burnt hazardous and non-hazardous building materials and/or the abatement of hazardous building materials at 11 sites located in Waterton Lakes National Park for Parks Canada Authority (PCA).
- 1.1.2. The 11 sites shown in the table below comprise Park operations and recreational facilities, structures and campgrounds that were affected by the 2017 wildfire.

SITE NO.	SITE NAME
Crandell Backcountry Campground	
2.1	Kitchen Shelter
2.2	4 Campsites
Goat Lake Backcountry Campground	
4.1	4 Campsites
4.2	Outhouse
4.3	Picnic Tables
Waterton Golf Course	
5.1	Golf Course Reservoir
5.2	Lightning Shelter Shed
Bear's Hump	
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Red Rock Parkway	
8.3	Indigenous History Viewpoint
Akamina Parkway	
9.1	McNealy's Day Use Area
9.2	Little Prairie Day Use Area

- 1.1.1. The locations of the 11 sites are shown on Drawing 1 and are located at the coordinates provided in Appendix A.
- 1.1.2. The following sites and structures are not part of this contract and any work will be completed by PCA:
- 1.1.2.1. All sites within the Crandell Campground (sites 1.1 to 1.21)
 - 1.1.2.2. Crandell Backcountry Campground Outhouse (site 2.3)
 - 1.1.2.3. Melted Roadside Markers along the Red Rock Parkway (site 5.1)
 - 1.1.2.4. The intact picnic shelter at the Little Prairie Day Use Area

1.2. Definitions

- 1.2.1. Action level: employee exposure, without regard to use of respirators, to airborne concentration of lead of 50 micrograms per cubic metre of air (50 ug/m³) calculated as 8-hour time-weighted average (TWA). Minimum precautions for lead abatement are based on airborne lead concentrations less than 0.05 milligrams per cubic metre of air for removal of lead-based paint by methods noted In RARMP / 02 83 10 and 02 83 11.
- 1.2.2. Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow thorough wetting of fibres.
- 1.2.3. Asbestos-Containing Materials (ACMs): any materials that is identified as containing asbestos.
- 1.2.4. Asbestos Work Area: area where work takes place which will, or may, disturb ACMs.
- 1.2.5. Authorized Visitors: Departmental Representatives or designated representatives, and representatives of regulatory agencies.
- 1.2.6. BMPs: Best Management Practices.
- 1.2.7. BIA: Basic Impact Analysis.
- 1.2.8. Certificate of Completion: see General Conditions.
- 1.2.9. Change Order: PCA form issued by the Departmental Representative to the Contractor as per the relevant Contemplated Change Notice.
- 1.2.10. Competent worker: in relation to specific work, means a worker who:
 - 1.2.10.1. Is qualified because of knowledge, training and experience to perform the work.
 - 1.2.10.2. Is familiar with the Alberta laws and with the provisions of the regulations that apply to the work.
 - 1.2.10.3. Has knowledge of all potential or actual danger to health or safety in the work.
- 1.2.11. Confirmation Samples: soil and sediment 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.
- 1.2.12. Contaminated Material: soil and other 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. Does not include Hazardous Material/Debris, Non-Contaminated Material or Refuse. Relevant regulations, unless otherwise in accordance with the Contract or as instructed by the Departmental Representative, include:
 - 1.2.12.1. For all sites: Canadian Council of Ministers of the Environment (CCME) *Canadian Environmental Quality Guidelines* and CCME *Canada-Wide Standards*.
- 1.2.13. Contaminated Soil Extents: lateral and vertical extents of Contaminated Material to be remediated to meet remediation objectives (see Appendix C). Extents on Drawings are approximate and may vary based on field observations or Delineation Samples.

- 1.2.14. Contemplated Change Notice: PCA form issued by the Departmental Representative to the Contractor requesting Contractor to provide a quote, which may result in a Change Order.
- 1.2.15. Contract: see General Conditions.
- 1.2.16. Contract Amount: see General Conditions.
- 1.2.17. Contractor: Contractor: Firm or representative retained to conduct the Works as per this Specification.
- 1.2.18. Debris Extents: lateral and vertical extents of Debris are to be removed to meet objectives. Extents on Drawings are approximate and may vary based on field observations and changes since the assessment.
- 1.2.19. Demolition: rapid destruction of building following removal of Hazardous Substances.
- 1.2.20. Departmental Representative: Within the context of these Specifications the term Departmental Representative refers to the person exercising the roles and attributes of Canada under the Contract.
- 1.2.21. Disposal Facility: a facility specifically used to introduce waste into the environment for the purpose of final burial.
- 1.2.22. Dispersible: A friable paint that can be reduced by grinding in a mortar and pestle to a particle size that can pass through a 9.5mm mesh opening
- 1.2.23. 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.
- 1.2.24. 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.
- 1.2.25. 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 Prevention Plan and Spill Response Plan.
- 1.2.26. Extension of Time: see General Conditions.
- 1.2.27. Extension of Time on Contracts: PCA form requesting an Extension of Time.
- 1.2.28. Friable material: means material that:
 - 1.2.28.1. When dry, can be crumbled, pulverized or powdered by hand pressure, or
 - 1.2.28.2. is crumbled, pulverized or powdered.
- 1.2.29. Hazardous Materials/Debris: building materials or other debris that contain but are not limited to lead, asbestos or PCB at concentrations that exceed applicable federal or provincial standards.
- 1.2.30. Hazardous Waste: Contaminated Material which meets the regulatory definition of Hazardous Waste.

- 1.2.31. 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.
- 1.2.32. Land Surveyor: a person working for the Contractor who is a qualified, registered land surveyor licensed to practice in relevant jurisdiction.
- 1.2.33. Landfill: an existing offsite facility located in Canada that is 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.
- 1.2.34. Lead dust: wipe sampling on vertical surfaces 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.
- 1.2.35. 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.
- 1.2.36. Non-Contaminated Soil: soil which meets the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines and CCME Canada-Wide Standards.
- 1.2.37. Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- 1.2.38. Non-Hazardous Refuse and Debris: general waste, rubbish and building debris that does not contain hazardous building materials. Not including soil.
- 1.2.39. Occupied Area: any area of the building or work site that is outside Asbestos Work Area.
- 1.2.40. On Site Instruction: instructions or other communications issued by the Departmental Representative to the Contractor.
- 1.2.41. On Site Notice: notice or other communication issued by the Contractor to the Departmental Representative.
- 1.2.42. Overburden: Non-Contaminated Material excavated incidentally that is not Topsoil.
- 1.2.43. 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.
- 1.2.44. Progress Payment: see General Conditions.
- 1.2.45. PCA: Parks Canada Agency. Representative of Canada with control of the Site.
- 1.2.46. Qualified Professional: a person working for the Contractor who is registered in relevant jurisdiction with his or her appropriate professional association, acts under that professional association's code of ethics, and is subject to disciplinary action by that professional association, and through suitable education, experience, accreditation and knowledge can be reasonably relied on to provide advice within his or her area of expertise.
- 1.2.47. Quote: Contractor's cost estimate issued to the Departmental Representative as per the relevant Contemplated Change Notice via an On-Site Notice.
- 1.2.48. Remediation by Excavation: complete excavation of Contaminated Material and incidental Non-Contaminated Material to the Site boundaries for the purpose of remediating the Site to meet numerical standards. Includes full treatment and disposal. Does not include risk assessment or risk management of material onsite. Does not include encapsulation or solidification in place.

- 1.2.49. Recyclable Materials: non-hazardous and non-contaminated materials that can be segregated and diverted from the non-hazardous refuse and debris waste stream for recycling or re-use. Inclusive of concrete.
- 1.2.50. Site: work area available to Contractor according to Drawings. Property on which the Works will be conducted.
- 1.2.51. Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for work.
- 1.2.52. Submit/Submittals: documents from the Contractor to the Departmental Representative as: required by Contract; stipulated in permit, certificate, approval, or any other form of authorization; by convention or industry practice. Submittals are final only after review and accepted in writing by Departmental Representative.
- 1.2.53. TCLP: Toxicity characteristic leaching procedure (TCLP) is a soil sample extraction method for chemical analysis employed as an analytical method to simulate leaching through a landfill.
- 1.2.54. Topsoil: non-contaminated soil excavated incidentally that is a surface organic layer to facilitate vegetation growth.
- 1.2.55. Waste: Non-Contaminated Material that is not soil. Includes cleared and grubbed vegetation, litter, rubbish, debris, cobbles, boulders, excess construction material, lumber, steel, plastic, concrete, and asphalt.
- 1.2.56. Waste Oversize Debris: Waste that is required to be excavated and is: larger than 1 cubic metre or larger 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).
- 1.2.57. Waste Quality: soil or other material that is not suitable for industrial, commercial, urban park, residential, agricultural, wildlands or any other land use specified in the CCME.
- 1.2.58. Waste Reduction Plan: a written report which addresses opportunities for reduction, reuse or recycling of materials.
- 1.2.59. Working Day: see 1.14.
- 1.2.60. Works: Scope of work as detailed and described in this Specification.

1.3. Work Covered by Contract Documents

- 1.3.1. Contractor must provide personnel with appropriate experience in remediating contaminated soil, abating hazardous building materials and removing debris in sensitive environmental areas.
- 1.3.2. The work required by the drawings and specifications are summarized as follows:
 - 1.3.2.1. Excavation and disposal of contaminated soil from 8 sites (specifically sites 2.1, 2.2, 5.1, 5.2, 6.1, 8.3, 9.1 and 9.2), as identified in Appendix C.
 - 1.3.2.2. Excavation and disposal/recycling of burnt and unburnt non-hazardous refuse/debris from 8 sites (specifically sites 2.1, 2.2, 4.1, 4.2, 4.3, 5.1, 5.2, and 8.3). No hazardous materials are known to be present at these sites. Volumes of the materials for removal and disposal are defined in the site-specific remediation and abatement plans presented within the RARMP report in Appendix C. Photographs are presented in Appendix E. Note that PCA have

indicated that salvageable/re-usable infrastructure will have been removed from site prior to commencement of the contract. Materials specified for removal in Appendix C may vary from site conditions and it is recommended that the Contractor conducts an inspection of actual site conditions prior to mobilisation.

- 1.3.2.3. Segregation, excavation and disposal of mixed burnt and unburnt hazardous material/debris and non-hazardous refuse/debris from 2 sites (specifically site 9.1 and 9.2). Volumes of the materials for removal and disposal are defined in the site-specific remediation and abatement plans presented within the RARMP report in Appendix C and the EHSP report in Appendix D;
 - 1.3.2.4. Excavation and disposal of concrete foundations from 7 sites (specifically sites 2.1, 5.1, 5.2, 6.1, 8.3, 9.1 and 9.2), as defined in Appendix C;
 - 1.3.2.5. Abatement/removal of hazardous materials including ACM and dispersible lead-based paint from the burnt and semi-intact structure at 1 site (specifically site 6.1) as identified in Appendices C and D, and subsequent demolition of the structure. Building photographs are presented in Appendix D. The contractor is responsible for selecting the appropriate abatement method.
 - 1.3.2.6. Backfilling of excavations at 3 sites (specifically 5.1, 9.1 and 9.2) including compaction and grading at sites identified in Appendix C.
 - 1.3.2.7. Placing topsoil at 2 sites (specifically 5.1 and 5.2), as defined in Appendix C.
 - 1.3.2.8. Grading and contouring excavated areas to match surrounding grades at sites 2.1, 2.2, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 8.3, 9.1 and 9.2, and re-seeding disturbed areas at sites 2.1, 2.2, 4.1, 4.2, 4.3, 5.1, 5.2, 9.1 and 9.2 as defined in Appendix C and on drawings.
- 1.3.3. Work to be performed under the Contract includes, but is not limited to, the following items covered further in the Contract:
- 1.3.3.1. Management of Site Safety, including:
 - 1.3.3.1.1. Responsibility for Site Safety
 - 1.3.3.1.2. Development of Site-Specific Safety Plan.
 - 1.3.3.1.3. Coordinating and Leading Pre-Job Safety Meeting and Daily On-Site Safety Meetings.
 - 1.3.3.1.4. Spill Prevention Plan and Spill Response Plan.
 - 1.3.3.1.5. Emergency Response Plan
 - 1.3.3.2. Environmental Protection Plan. Submit site-specific project Environmental Protection Plan within 10 working days of award.
 - 1.3.3.3. Locate and protect all known and unknown buried services on and adjacent to the site. PCA has indicated that there are no documented underground electric, communications or natural gas lines on the site.
 - 1.3.3.4. All required design activities to complete Work.
 - 1.3.3.5. Pre-mobilization Submittals including identifying suitable disposal facilities and backfill sources, completion of PCA required permitting and provision of an environmental protection plan.

- 1.3.3.6. Prepare Site for Work, including installing fencing, clearing site as required, protect areas of sensitive vegetation/exclusion zones (to be identified in the Basic Impact Assessment BIA/BMP that will be provided as an addendum to these specifications), and provision of onsite temporary office, equipment storage and sanitary facilities.
- 1.3.3.7. Identify areas of work with the Departmental Representative prior to mobilisation. All work should remain within established work boundaries.
- 1.3.3.8. Plan and set up area(s) for soil/debris management, waste segregation and stockpiling (Soil and Debris Management Facility), including helicopter staging areas.
- 1.3.3.9. Completion of all works under the supervision of the Departmental Representative.
- 1.3.3.10. Completion of remediation, debris and concrete removal and abatement activities including debris/soil excavation and operation of the Soil and Debris Management Facility/Facilities. Volumes of anticipated wastes are presented in Appendix C and on Drawings.
- 1.3.3.11. Disposal of Contaminated Soil, Hazardous Material/Debris, Non-Hazardous Refuse and Debris, and Recyclable Materials (upon approval from the Departmental Representative) at an appropriately licensed facility.
- 1.3.3.12. Where required, backfill excavations with clean imported fill material, from a source to be approved by PCA. The Contractor will be responsible for identifying a suitable backfill source, transporting the backfill from the source and within the site to the backfill areas, and placement and compaction of the backfill onsite.
- 1.3.3.13. Compact and blade backfill, grade and contour excavations to match surrounding grade.
- 1.3.3.14. Complete site restoration activities including placing topsoil and or seeding disturbed areas as defined in Appendix C.
- 1.3.3.15. Final Site inspection after completion of work covered under the contract will be completed by the Departmental Representative.
- 1.3.3.16. All ancillary activities required to complete Work.
- 1.3.3.17. It is strongly encouraged that potential contractors attend the optional site bidders meeting (date to be confirmed) to gain an understanding of the project scope of work.

1.4. Contract Method

- 1.4.1. Construct work under combined lump sum and unit price contract.

1.5. Project/Site Conditions

- 1.5.1. Work at the site will be completed within Waterton Lakes National Park, located in the south-west corner of Alberta and part of the Canadian Rocky Mountains, as shown on Drawing 1. Site features relevant to the Contract are as follows:

- 1.5.1.1. 2 of the sites (2.1 and 2.2) are located within the Crandell Backcountry Campground as shown on Drawing 1. Crandell Backcountry Campground is accessed via a 1.5 km hiking trail or helicopter.
- 1.5.1.2. 3 of the sites (4.1, 4.2 and 4.3) are located within the Goat Lake Backcountry Campground as shown on Drawing 1. Goat Lake Backcountry Campground is accessed via a 7 km hiking trail or helicopter.
- 1.5.1.3. 2 of the sites (5.1 and 5.2) are located within the Waterton Golf Course. The sites are not directly accessible by paved/gravel road and some movement of vehicles over the greens will be required. The Contractor will be required to implement measures to ensure that the greens are not damaged by vehicular access.
- 1.5.1.4. 1 of the sites (6.1) is located in a natural area in the vicinity of the Bear's Hump hiking trail. The site is accessible via a 700 m hiking trail that is wide enough for an ATV or tracked wheelbarrow.
- 1.5.1.5. 1 of the sites (8.3) is located at a roadside viewpoint along the paved Red Rock Parkway. The site is accessible by vehicle over soil and vegetation. The Red Rock Parkway is open to the public during the summer months.
- 1.5.1.6. Sites 9.1 and 9.2 are day use area located on the paved Akamina Parkway.
- 1.5.1.7. The Akamina Parkway is a narrow road frequented by visitors to the Park.
- 1.5.1.8. The sites are currently not secured against visitor access and will require fencing.
- 1.5.1.9. Wildlife frequent all sites.
- 1.5.1.10. Strong winds are frequent at Waterton Lakes National Park, with wind speeds often reaching 90 kmph. The Contractor should plan accordingly, and no standby time will be paid for weather conditions.
- 1.5.1.11. All sites are within previously developed areas of WLNP.
- 1.5.1.12. A summary of conditions at the individual sites are outlined in the RARMP report presented in Appendix C.
- 1.5.2. Work at Site will potentially involve contact with contaminated materials and hazardous building materials, requiring appropriate health and safety and environmental protection procedures.
- 1.5.3. Complete list of potential hazardous building materials and soil contaminants including associated concentration levels on the Site available separately in the attached assessment reports/Drawings.
- 1.5.4. Work at site will be within environmentally sensitive areas and all work will comply with the Basic Impact Assessment BIA/BMP that will be included as an addendum to these specifications.
- 1.5.5. Work will be completed in wildlife corridors and areas of high wildlife activity, requiring appropriate health and safety procedures, training, and work practices.
- 1.5.6. The Red Rock and Akamina Parkways, and hiking trails to Goat Lake, Crandell Lake and the Bear's Hump may be open to the general public during duration of the Contract. The remainder of the sites will be restricted access.
- 1.5.7. **No standby due to weather conditions.** High winds are common in Waterton Lakes National Park.

- 1.5.8. Existing conditions on the Sites are shown on the Drawings and Site Photographs in Appendix E.
- 1.5.9. There are no utilities/services available to the Contractor on Site.
- 1.5.10. Cell phone service at the sites is poor and cannot be relied upon. Alternate communication methods will be required for emergency response.

1.6. Site Examination

- 1.6.1. Contractor shall compare plans and specifications with existing conditions, to fully satisfy themselves as to all data and matters required for the completion of the Contract.
- 1.6.2. Failure of Contractor to acquaint themselves fully with all available information concerning conditions affecting the work shall not relieve the Contractor of the responsibility for estimating the difficulties and costs of satisfactory performing the work.
- 1.6.3. Commencement of mobilization shall constitute acceptance of existing conditions, and verification of dimensions.
- 1.6.4. Claims for additional costs will not be entertained with respect to conditions which would reasonably have been ascertained by an inspection of the site prior to mobilization.

1.7. Construction Organization and Start Up

- 1.7.1. Within 7 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- 1.7.2. Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors to be in attendance.
- 1.7.3. Agenda to include:
 - 1.7.3.1. Appointment of official representative of participants in the Work.
 - 1.7.3.2. Schedule of Work: in accordance with Section 01 32 16.07 – Construction Progress Schedules – Bar Chart.
 - 1.7.3.3. Requirements for temporary facilities, site signage, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 – Construction Facilities.
 - 1.7.3.4. Site security in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.
 - 1.7.3.5. Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
 - 1.7.3.6. Health and Safety Requirements in accordance with Section 01 35 29.14 – Health and Safety for Contaminated Sites.
 - 1.7.3.7. Environmental protection requirements in accordance with Section 01 35 43 – Environmental Procedures.
 - 1.7.3.8. Proposed backfill and topsoil sources in accordance with Section 02 61 00.02 - Soil Remediation
 - 1.7.3.9. Closeout procedures and submittals in accordance with Section 01 77 00 – Closeout Procedures and 01 78 00 – Closeout Submittals.
 - 1.7.3.10. Other Business.

- 1.7.4. During construction, coordinate use of site and facilities through Departmental Representative.

1.8. Submittals

- 1.8.1. Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- 1.8.2. Submit, within 10 days of Contract Award, Environmental Protection Plan detailing management of waste (waste streams and disposal locations), backfill sources, Emergency Response Plan and Health and Safety Plan, in accordance with Section 01 35 29.14- Health and Safety for Contaminated Sites and Section 01 35 43 - Environmental Procedures.
- 1.8.3. Site Layout: within 10 days prior to mobilization to site, submit site layout drawings showing existing conditions and facilities, construction facilities and temporary controls provided by Contractor including the following:
 - 1.8.3.1. Equipment and personnel decontamination areas.
 - 1.8.3.2. Means of ingress, egress and temporary traffic control facilities (as required).
 - 1.8.3.3. Equipment and material staging areas, including helicopter staging areas.
 - 1.8.3.4. Exclusion Zones, Contamination Reduction Zones and other zones specified in Contractor's site-specific Health and Safety Plan
- 1.8.4. Submit documentation verifying that employees have been trained, tested and certified to safely and effectively carry out their assigned duties in accordance with Section 01 35 29.14 - Health and Safety for Contaminated Sites.

1.9. Work Sequence

- 1.9.1. Construct Work in stages to accommodate overall project schedule, including mobilization with 15 days of Contract Award.

1.10. Other Contracts

- 1.10.1. Other contracts are currently in progress at Site.
- 1.10.2. Other contracts are:
 - 1.10.2.1. Environmental and other consultants.
 - 1.10.2.2. Site users as identified in Contract.
 - 1.10.2.3. Redevelopment of the Crandell Campground.
 - 1.10.2.4. Hazard Tree removal in Crandell Campground.
- 1.10.3. Further contracts may be awarded while the Contract is in progress.
- 1.10.4. Cooperate with other contractors in carrying out their respective works and carry out instructions from Departmental Representative.
- 1.10.5. 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.

1.11. Contractor's Use of Site

1.11.1. Use of Site:

- 1.11.1.1. For the sole benefit of Canada.
 - 1.11.1.2. Exclusive and only for completion of the execution of Work.
 - 1.11.1.3. Assume responsibility for assigned premises for performance of this Work.
 - 1.11.1.4. Be responsible for coordination of all Work activities onsite, including the Work of other contractors engaged by the Departmental Representative.
- 1.11.2. Portions of the Site are potential habitat for sensitive species and therefore equipment storage, temporary material handling areas, routes for equipment and vehicle travel, proposed helicopter usage etc. on the Site must comply with the conditions of the BIA/BMP and be approved by the Departmental Representative in order that the impact to these areas be minimized.
- 1.11.3. Perform Work in accordance with Contract. Ensure Work is carried out in accordance with schedule accepted by Departmental Representative.
- 1.11.4. Do not unreasonably encumber Site with material or equipment.
- 1.11.5. Accommodate common areas with other Site users, including roadways.
- 1.11.6. Segregate Contractor's work area from common areas to prevent unintentional multiple employer worksite, as required.
- 1.11.7. Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate Owner usage of adjacent areas. In the event of a conflict the Contractor must accommodate changes to their operations to minimize interference with Owner operations.
- 1.11.8. Maintain fire access/control.

1.12. Permit Requirements

1.12.1. Permit requirements are:

- 1.12.1.1. Restricted Activity Permit
- 1.12.1.2. Parks Canada Business License
- 1.12.1.3. Additional Permits will be outlined in the BIA/BMP.

1.13. Schedule Requirements

- 1.13.1. Work to be initiated: within 5 Working Days of Contract Award.
- 1.13.2. Pre-Mobilization Submittals: within 10 days of Contract Award.
- 1.13.3. Mobilization: within 15 days of Contract Award.
- 1.13.4. Site Works: Final Completion no later than 15 days following mobilization.

- 1.13.5. Completion of the Work: 30 days following completion of Site Works. Includes all final Submittals including as-built documents, the Certificate of Completion, and the Statutory Declaration at Final Completion.

1.14. Hours of Work

- 1.14.1. Restrictive as follows:

- 1.14.1.1. Working Day work hours are unrestricted.

- 1.14.2. Obtain consent from Departmental Representative for all proposed work at weekends and holidays.

- 1.14.2.1. Proceed only as instructed by the Departmental Representative.

1.15. Furnished Items

- 1.15.1. Site Owner Responsibilities:

- 1.15.1.1. Providing safety requirements, and any site-specific work policies (e.g. permit and BIA requirements/conditions).

- 1.15.2. Contractor Responsibilities:

- 1.15.2.1. Designate submittals and delivery date for each product in progress schedule.

- 1.15.2.2. Review information and drawings provided. Submit to Departmental Representative notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.

- 1.15.2.3. Receive and unload products at site.

- 1.15.2.4. Inspect deliveries; record shortages, and damaged or defective items.

- 1.15.2.5. Handle products at site, including uncrating and storage.

- 1.15.2.6. Protect products from damage.

- 1.15.2.7. Provide installation inspections required by public authorities.

- 1.15.2.8. Repair or replace items damaged by Contractor or subcontractor onsite (under their control).

1.16. Alterations, Additions or Repairs to Existing Structures/Services

- 1.16.1. Execute work with least possible interference or disturbance to existing structures, services, wildlife and sensitive habitats on the property unless otherwise indicated in this contract or by the Departmental Representative.

1.17. Unknown and Existing Services

- 1.17.1. Locate all utility lines within and immediately surrounding the work areas. There are no known underground communications, natural gas or electric lines in the vicinity of

- the working areas but completeness and accuracy of any available utility information is not guaranteed, and the Contractor is responsible for confirming locations of all utilities.
- 1.17.2. Notify the Departmental Representative and utility companies of intended interruption of services and obtain required permission. If work requires breaking into or connecting to existing services, the Contractor must submit a request to the Departmental Representative a minimum of 5 working days prior to the event. The Contractor must not proceed until approval has been granted. PCA will make every effort to accommodate the request; however, PCA will NOT accept delay charges should the request not be accepted.
 - 1.17.3. Minimize duration of interruptions, and where required, provide temporary services to maintain critical systems.
 - 1.17.4. Provide traffic control for personnel and vehicular traffic when work impacts established transportation routes in accordance with Section 01 35 00.06 – Special Procedures for Traffic Control. Maintain and protect traffic on all routes during construction period except as otherwise specifically directed by the Departmental Representative.
 - 1.17.5. Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
 - 1.17.6. Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
 - 1.17.7. Provide adequate bridging over trenches to permit normal traffic.
 - 1.17.8. Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
 - 1.17.9. Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
 - 1.17.10. Record locations of maintained, re-routed and abandoned service lines. The Contractor must complete an as-built drawing upon project completion.
 - 1.17.11. Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.18. Waste Disposal Quantities

- 1.18.1. Contractor to provide summary of all wastes disposed including quantities, disposal locations, and original scale tickets, as applicable. Waste quantities to be reconciled daily in writing with the Department Representative, including the provision of original waste manifests.

1.19. Documents Required/Submittals

- 1.19.1. Refer to:
 - 1.19.1.1. 01 33 00 Submittal Procedures
 - 1.19.1.2. 01 52 00 Construction Facilities

1.20. Measurement Procedures

- 1.20.1. Pre-mobilization Submittals will be paid in accordance with the lump sum price established for all Preconstruction Meetings, final design, planning, health and safety, permits 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.
- 1.20.2. Mobilization will be paid in accordance with the lump sum price established for mobilizing all necessary equipment, materials, supplies, facilities, and personnel associated with the Works to the Site. Includes initial insurance, bonding, and permits. Additional insurance, bonding, and permits due to changes in scope, cost, and schedule as accepted by the Departmental Representative will be included in Contract amendments.
- 1.20.3. Site Facilities Provision and Operation will be paid in accordance with the 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, site security, environmental protection measures required by the BIA/BMP, set up and operation of Soil and Debris Management area(s), access, security fencing, federal signage, sanitary facilities, maintenance of access and egress routes, road maintenance stormwater management infrastructure, and utility installation. Also includes ongoing services including project management, equipment decontamination, management of materials in Soil and Debris Management Facility, helicopter staging areas, security, surveying, utilities, project meetings, inspections, progress Submittals, traffic control, health and safety, Environmental Protection and cleaning (including road and access/egress route maintenance). Also, includes living out allowances, travel and room and board. Note that the Contractor will not be allowed to camp on site.
- 1.20.4. Site Preparation will be paid in accordance with the lump sum price established to prepare the Site for planned construction works. Includes establishing exclusion zones or “no work” zones, any environmental protection measures required by the BIA/BMP, installing sediment control measures, clearing and grubbing, temporary removal of existing infrastructure, utility location, rerouting, and protection. Also includes removal of any incidental or generated material. Also includes Preconstruction Precondition Survey and Preconstruction As-Built Documents.
- 1.20.5. 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 the Departmental Representative. **Will not include standby time related to weather conditions.** 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. Reviews, sampling, or other work conducted by the Departmental Representative with time

- allowances in accordance with the Contract will result in no increase to the Contract Amount nor Extension of Time for completion of the Work.
- 1.20.6. Abatement will be paid in accordance with the lump sum price per site established for time to remove asbestos and dispersible lead-based paint from structures according to Drawings and Appendix C and D. Includes all equipment, manpower and materials to remove asbestos and lead-based paint. Including any special monitoring/handling requirements, PPE and equipment.
- 1.20.7. Excavation will be paid in accordance with unit rate price established for volume of material removed to excavate to Contaminated Material, Hazardous Material/Debris, Non-Hazardous Refuse/Debris and Concrete Foundations as detailed in Drawings and Appendix C. Measurement as recorded in-situ Excavation volume of final Contaminated Material, Debris and Concrete Extents as Surveyed by Departmental Representative. In-situ volume of soil is simple dimensions of excavation and includes ex-situ bulking (expansion or swell) and in-situ compaction (densifying) factors. Volume of mixed debris and concrete are simple dimensions of extent of uncrushed and uncompacted materials. Includes incidental Contaminated Material and Non-Contaminated Material immediately above Contaminated Material (e.g. Topsoil, Overburden). Includes all handling, loading, hauling to stockpile area using appropriate vehicles selected by the contractor based on site accessibility, unloading, segregation of waste streams and stockpiling. Material to be stockpiled within work area as directed by Departmental Representative. Contractors will not be paid for standby time associated with analytical turnaround time.
- 1.20.8. Backfill – Imported granular backfill and topsoil will be paid in accordance with unit rate price established per volume of material imported for use as Backfill for Excavation. Measurement as recorded in-situ Imported Backfill volume of final Contaminated Soil Extents and overlying incidental material as Surveyed by Departmental Representative. In-situ volume is simple dimensions of excavation and includes ex-situ bulking (expansion or swell) and in-situ compaction (densifying) factors. Includes analytical testing and inspections to demonstrate compliance with Contract, provision, all handling, loading, hauling, unloading, placing, grading and compacting.
- 1.20.9. Contaminated Soil Transport and Disposal will be paid in accordance with unit rate price established for weight of material transported as recorded on Disposal Facility weigh scale certified by Measurement Canada and results provided to Departmental Representative. Includes loading, hauling, interim storage, handling and disposal for all material transported from Site.
- 1.20.10. Transport and Disposal of Lead Containing Hazardous Materials/Debris and Asbestos-Containing Hazardous Materials will be paid in accordance with unit rate price established for volume of material to be removed according to weight of material removed as recorded on Landfill weigh scale certified by Measurement Canada and results provided to Departmental Representative. Includes all special monitoring/handling, decontamination requirements, loading, hauling, waste segregation, interim storage, manifesting, and off-site disposal.
- 1.20.11. Non-Hazardous Refuse/Debris Transport and Disposal will be paid in accordance with unit rate price established for weight of material removed as recorded on Landfill weigh scale certified by Measurement Canada and results provided to Departmental

Representative. Includes loading, hauling, interim storage, and handling for all material transported from Site.

- 1.20.12. Recyclable Debris Transport and Disposal will be paid in accordance with unit rate price established for weight of material removed as recorded on disposal facility weigh scale certified by Measurement Canada and results provided to Departmental Representative. Includes loading, hauling, interim storage, and handling for all material transported from Site.
- 1.20.13. Site Closure will be paid in accordance with the lump sum price established to restore the Site to make suitable for post-Work use as instructed by the Departmental Representative. Includes seeding disturbed areas, conducting a final site survey, deconstructing and removal from Site all temporary facilities including removal of any incidental or generated material.
- 1.20.14. Demobilization will be paid in accordance with lump sum price established for mobilization and demobilizing all equipment and personnel associated with the Works to and from the Site. Includes decontaminating all equipment prior to removal from Site.
- 1.20.15. Closeout Submittals will be paid in accordance with lump sum price established for Final Site Inspection (for Certificate of Completion purposes), Closeout Meetings, provision of final as-built documents and completion documents as instructed by the Departmental Representative.

END OF SECTION

1. PART 1 – GENERAL

1.1. Access and Egress

1.1.1. Access to the Sites as follows:

- 1.1.1.1. Sites 5.1, 5.2 and 8.3 will be accessed via established paved or gravel roads with short traverses over vegetated areas (see Drawings).
- 1.1.1.2. Sites 2.1, 2.2, 4.1, 4.2 and 4.3 will be accessed via helicopter or on foot via hiking trails.
- 1.1.1.3. Site 6.1 will be accessed via a short hiking trail accessible by small ATV or tracked wheelbarrow.
- 1.1.1.4. Sites 9.1 and 9.2 will be accessed via established paved or gravel roads.
- 1.1.2. Provide for personnel, pedestrian and vehicular traffic in accordance with Section 01 35 00.06 – Special Procedures for Traffic Control.
- 1.1.3. Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- 1.1.4. Design, construct and maintain temporary "access to" and "egress from" work areas in accordance with relevant municipal, provincial and other regulations.
- 1.1.5. The location of the access and egress routes and on-site hauling routes must be established in consultation with the Departmental Representative prior to remediation in the form of a truck route plan to minimize disturbance to sensitive habitat in WLNP. The truck route plan must be submitted as part of the Environmental Protection Plan (Section 01 35 43 - Environmental Procedures).
- 1.1.6. Equipment must stay on designated access and egress routes only, must keep within limits of work, and must not travel over or park on vegetation unless within limits of work, as specified by the BIA/BMP.
- 1.1.7. Vehicles must not travel off paved or gravel roadways without the prior approval of the Departmental Representative.

1.2. Use of Site and Facilities

- 1.2.1. Execute work with least possible interference or disturbance to the Site. Make arrangements with Departmental Representative to facilitate work as stated.
- 1.2.2. Provide for adequate personnel and vehicle access to the Site.
- 1.2.3. Where security is reduced by work, provide temporary means to maintain security.
- 1.2.4. Contractor to provide sanitary facilities and will be responsible for upkeep of these facilities.
- 1.2.5. Closures: protect work temporarily until permanent enclosures are completed.

1.3. Alterations, Additions or Repairs to Existing Services

1.3.1. Refer to Section 1.16 - 01 11 00 Summary of Work.

1.4. Special Requirements

- 1.4.1. All personnel must check in with the site supervisor prior to entering the Site and must be wearing high-visibility vests and other required PPE at all times while on site.
- 1.4.2. Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the Site.
- 1.4.3. Secure site, work areas and excavation at nighttime to protect site against entry by people and wildlife.
- 1.4.4. All sites to be protected from access by the public while work is in progress.
- 1.4.5. All work to comply with environmental protection measures presented in the BIA/BMP.
- 1.4.6. All equipment brought to the Site must be cleaned prior to use (debris, dirt, vegetation) to the satisfaction of the Departmental Representative to minimize the potential for introduction of invasive species.
- 1.4.7. The lowest impact equipment that can complete the work must be utilized in the work areas to minimize disturbance to sensitive species and their habitat.
- 1.4.8. The Contractor must take into account that the work is to be conducted in an area containing sensitive wildlife habitat, areas of high wildlife activity, areas of sensitive vegetation, and potential archaeological resources.
- 1.4.9. The Departmental Representative will complete archaeological surveys prior to work commencing but may also provide archaeological monitoring during excavation work. At sites where monitoring is required (as identified in the Basic Impact Assessment BIA/BMP that will be provided as an addendum to these specifications) excavation cannot commence until an archaeological monitor is present.
- 1.4.10. Equipment cannot be operated off the roadways outside of designated work areas or in exclusion zones determined by PCA and the Departmental Representative.
- 1.4.11. Equipment and/or personnel cannot enter any surface water bodies.
- 1.4.12. Work is to be conducted under the review of the Department Representative as indicated in Section 01 11 00.
- 1.4.13. Ensure that Contractor personnel employed on-site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- 1.4.14. Smoking is not permitted on-site.

END OF SECTION

1. PART 1 – GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

- 1.3.1. Submittals: in accordance with Section 01 33 00 Submittal Procedures
- 1.3.2. Preconstruction Meeting Minutes: within 2 Working Days of the Preconstruction Meeting, Submit meeting minutes.
- 1.3.3. Progress Meeting Minutes: within 2 Working Days of a Progress Meeting, Submit meeting minutes.
- 1.3.4. Information for Progress Meetings: at least 24 hours prior to scheduled Progress Meetings, Submit all information in accordance with the Contract for Progress Meetings. Include:
 - 1.3.4.1. Agenda for the proposed Progress Meeting.
 - 1.3.4.2. Updated progress schedule detailing activities. Include review of progress with respect to previously established dates for starting and stopping various stages of Work, major problems and action taken, injury reports, equipment breakdown, and material removal.
 - 1.3.4.3. Copies of transport manifests and disposal receipts for all materials removed from Site.
 - 1.3.4.4. Other information as instructed by the Departmental Representative or relevant to agenda for upcoming progress meeting.
- 1.3.5. Final Site Inspection: within 2 Working Days of the Final Site Inspection, Submit meeting minutes.
- 1.3.6. 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 weekly 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 3 Working Days in advance of meeting date as instructed by the Departmental Representative.

- 1.4.4. Provide physical space and make arrangements for meetings, or arrange for teleconference meetings, as instructed 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. Contractor will reproduce and distribute copies of the minutes within 2 working days after meetings and transmit to meeting participants, PCA, Departmental Representative and affected parties not in attendance.
- 1.4.8. Maintain records of meeting minutes for a minimum of 2 years after Work is completed.
- 1.4.9. 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 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. Senior representatives of PCA and PCA, Departmental Representative, Contractor, major Subcontractors, and field inspectors will 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 PCA Departmental Representative.
 - 1.5.4.2. Schedule of Work: in accordance with Section 01 32 16.07 Construction Progress Schedules - Bar Chart.
 - 1.5.4.3. Schedule of Submittals. Submit submittals in accordance with Section 01 33 00 Submittal Procedures.
 - 1.5.4.4. Requirements for temporary facilities: in accordance with Section 01 52 00 Construction Facilities.
 - 1.5.4.5. Site security.
 - 1.5.4.6. Delivery schedule of specified equipment and materials.
 - 1.5.4.7. Change orders, procedures, approvals required, administrative requirements.
 - 1.5.4.8. Monthly Progress Payments, administrative procedures, hold backs.
 - 1.5.4.9. Appointment of inspection and testing agencies or firms.
 - 1.5.4.10. 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. Notify parties minimum 5 working days prior to meetings.
- 1.6.4. Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 2 working days after meeting.
- 1.6.5. Agenda to include:
 - 1.6.5.1. Review and acceptance of minutes of previous meeting.
 - 1.6.5.2. Review health and safety, including incidents, near misses, and corrective measures.
 - 1.6.5.3. Review Environmental Protection, including incidents, near misses, and corrective measures.
 - 1.6.5.4. Review of Work progress since previous meeting.
 - 1.6.5.5. Field observations, problems, conflicts.
 - 1.6.5.6. 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.
 - 1.6.5.7. Problems which impede construction schedule.
 - 1.6.5.8. Corrective measures and procedures to regain projected schedule.
 - 1.6.5.9. Revision to construction schedule.
 - 1.6.5.10. Progress schedule, during succeeding Work period.
 - 1.6.5.11. Review submittal schedules: expedite as required.
 - 1.6.5.12. Maintenance of quality standards.
 - 1.6.5.13. Quantities of material transported, treated, and disposed.
 - 1.6.5.14. Review proposed changes for effect on construction schedule and on Final Completion date.
 - 1.6.5.15. Other business.

1.7. Toolbox Meetings

- 1.7.1. During the course of the Work, schedule daily toolbox 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 environmental consultants. Departmental Representative may attend.

1.7.3. Agenda to include:

- 1.7.3.1. Planned Work activities and environmental considerations for that shift.
- 1.7.3.2. Coordination activities required between Contractor, Subcontractor(s), Departmental Representative, and other contractor(s) including environmental consultant.
- 1.7.3.3. Health and Safety items.
- 1.7.3.4. Environmental Protection items.

1.8. Final Site Inspection

- 1.8.1. Within 5 Working Days of completion of Site Works but prior to Demobilization, the Contractor shall request a meeting on Site to review the Site.
- 1.8.2. Departmental Representative, Contractor, Superintendent, major Subcontractor(s), field inspectors and supervisors must be in attendance.
- 1.8.3. Establish time and location of meeting subject to approval by Departmental Representative and notify parties concerned at least 3 Working Days before meeting.
- 1.8.4. Agenda to include:
 - 1.8.4.1. Inspect removal of all temporary equipment, materials, supplies, and facilities.
 - 1.8.4.2. Inspect permanent facilities for performance and damage.
 - 1.8.4.3. Document all damage, deficiencies, missing items, and non-conformance.
- 1.8.5. 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.

1.9. Closeout Meeting

- 1.9.1. Within 10 Working Days of completion of the Work, request a meeting to review the project.
- 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. Review Certificate of Completion.
- 1.9.4.2. Review final payment.
- 1.9.4.3. Identify lessons learned.
- 1.9.4.4. 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. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

- 1.3.1. Submittals: in accordance with Section 01 33 00 Submittal Procedures
- 1.3.2. Submit to Departmental Representative within 5 working days of Award of Contract Schedule as Bar Chart for planning, monitoring and reporting of project progress.
- 1.3.3. 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.
- 1.3.4. Project Schedule and Updates: with Progress Payment, Submit a Project Schedule update as appropriate. Progress Payment submission is incomplete without an updated Project Schedule acceptable to Departmental Representative.

1.4. Requirements

- 1.4.1. Ensure Project Schedules is practical and remains within specified Contract duration.
- 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 10 Working Days, to allow for progress reporting.

1.5. Project Schedule

- 1.5.1. Structure schedule to allow orderly planning, organizing, and execution of Work as Bar Chart.
- 1.5.2. Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - 1.5.2.1. Award.
 - 1.5.2.2. Permits including record of licensed waste management facility acceptance of demolition waste and impacted soil from Site.

- 1.5.2.3. All submittals as specified in Section 01 33 00 - Submittal Procedures including but not limited to health and safety plan, environmental protection plan, emergency response plan, and site layout drawings.
- 1.5.2.4. Completion of utility locates.
- 1.5.2.5. Mobilization.
- 1.5.2.6. Site preparation.
- 1.5.2.7. Selective demolition.
- 1.5.2.8. Impacted soil excavation.
- 1.5.2.9. Abatement of Hazardous Building Materials
- 1.5.2.10. Off-site disposal of impacted soil and Hazardous Materials at licensed waste management facility.
- 1.5.2.11. Final backfilling.
- 1.5.2.12. Final grading and site restoration.
- 1.5.2.13. Final inspection.
- 1.5.2.14. Deficiency corrections.
- 1.5.2.15. Demobilization.
- 1.5.2.16. All other items identified on the Unit Price Table

1.6. Project Schedule Reporting

- 1.6.1. Update Project Schedule on monthly basis reflecting activity changes and completions, as well as activities in progress and submit to the Departmental Representative for review.
- 1.6.2. 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. Project Meetings

- 1.7.1. 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 approved dates shown on baseline schedule.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

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Construction Progress

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. General

- 1.3.1. 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 not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- 1.3.2. Do not proceed with Work until relevant Submittals are finalized and have been accepted.
- 1.3.3. Present product data and samples in SI Metric units.
- 1.3.4. Where items or information is not produced in SI Metric units, converted values are acceptable.
- 1.3.5. 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.
- 1.3.6. Notify Departmental Representative in writing at time of Submittals, identifying deviations from requirements of Contract and stating reasons for deviations.
- 1.3.7. Contractor's responsibility for errors and omissions in Submittals is not relieved by the Departmental Representative's review of Submittals.
- 1.3.8. 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.
- 1.3.9. Make any changes in Submittals which Departmental Representative requires to be in accordance with the Contract and resubmit as instructed by the Departmental Representative.
- 1.3.10. Notify Departmental Representative in writing, when resubmitting, of any revisions other than those instructed by the Departmental Representative.
- 1.3.11. Verify field measurements and affected adjacent Work are coordinated.
- 1.3.12. 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. If adjustments result in an increase to the Contract Amount or an Extension of Time for completion of the Work, notify Departmental Representative and receive approval prior to proceeding with Work.
- 1.3.13. Keep one final copy of each Submittal onsite.

1.4. Submission Requirements

- 1.4.1. Coordinate each Submittal with the requirements of the Work and the Contract.
Individual Submittals will not be reviewed until:

- 1.4.1.1. Submittals are complete.
- 1.4.1.2. All related information is available.

- 1.4.2. Allow 10 Working Days for Departmental Representative's review of each Submittal, unless otherwise specified.

- 1.4.3. All Submittals are to be sent to Departmental Representative in duplicate in electronic format compatible with Departmental Representative's software.

- 1.4.4. Accompany Submittals with On Site Notification:

- 1.4.4.1. Date.
- 1.4.4.2. Project title and number.
- 1.4.4.3. Contractor's name and address.
- 1.4.4.4. Identification and quantity of each shop drawing, product data and sample.
- 1.4.4.5. Other pertinent data.

- 1.4.5. Submittals must include:

- 1.4.5.1. Date and revision dates.
- 1.4.5.2. Project title and number.
- 1.4.5.3. Name and address of:

- 1.4.5.3.1. Subcontractor.
- 1.4.5.3.2. Supplier.
- 1.4.5.3.3. Manufacturer.

- 1.4.5.4. Signature of Superintendent, certifying approval of Submittals, verification of field measurements and in accordance with the Contract.
- 1.4.5.5. Qualified Professional to sign and seal Submittals in accordance with the Contract.

- 1.4.5.5.1. Details of appropriate portions of Work as applicable.

1.5. Manifests

- 1.5.1. A copy of all manifests and/or truck weigh scale documents and/or truck counts for material brought onto, transported on to, or removed from the site are to be provided to the Departmental Representative.

- 1.5.2. Manifest and/or weigh scale documents are to be completed in accordance with applicable federal and provincial regulations.

1.6. Project Technical Submittal List - Prior to Project Initiation

Waterton Remediation and Abatement – 11 Sites

1013599.002-February 2020

01 33 00

Submittal Procedures

#	Contractor's Submission	Submitted to PCA	Submitted when
1	Health & Safety Plan, Emergency Procedures, SDS (Section 01 35 29.14,	Departmental Representative	Within 10 days of Contract Award
2	Preconstruction Meeting Material (01 31 19)	Departmental Representative	2 days prior to scheduled meetings
3	Progress Meeting Material (01 31 19)	Departmental Representative	24 hours prior to scheduled meetings
4	Bar Chart (Section 01 32 16.07)	Departmental Representative	Within 10 days of Contract Award
5	All Meeting Minutes (Section 01 31 19)	Departmental Representative	Within 2 days of scheduled meeting
6	Excavation and Backfilling Plan (see Section 31 23 33.01)	Departmental Representative	Within 10 days of Contract Award
7	Project Schedule and Work Sequencing Plan (Section 01 32 16.07 and 02 61 00.01)	Departmental Representative	Bar Chart acceptance plus 5 days
8	Site Layout Drawings (Section 01 35 13.43)	Departmental Representative	Within 10 days of Contract Award
9	Contaminated Material and Non-Contaminated Material Management Plan (see Section 01 35 13.43)	Departmental Representative	Within 10 days of Contract Award
10	Equipment and Personnel Decontamination Area Design (see section (Section 01 35 13.43)	Departmental Representative	Within 10 days of Contract Award
11	Documentation Verifying Hazardous Materials Employees are Trained / Certified (Section 01 35 13.43, 02 82 00.02)	Departmental Representative	Within 10 days of Contract Award
12	Environmental Protection Plan (Section 01 35 43)	Departmental Representative	Within 10 days of Contract Award
13	Construction Facility Site Plan (Section 01 52 00)	Departmental Representative	Within 10 days of Contract Award
14	Truck Route Plan (Sections 01 35 43 and 01 35 00.06)	Departmental Representative	Within 10 days of Contract Award
15	Traffic Control Plan (Sections 01 35 43 and 01 35 00.06)	Departmental Representative	Within 10 days of Contract Award
16	Proposed Disposal Facilities and Hazardous Waste Permit (Section 02 61 00 01, 02 82 00.02)	Departmental Representative	Within 10 days of Contract Award
17	Proof of licensing for the transporter of contaminated soil and hazardous materials (Section 02 61 00 01, 02 82 00.03)	Departmental Representative	Within 10 days of Contract Award
18	Imported fill material and topsoil source and analytical results (Section 02 61 00 01)	Departmental Representative	Within 5 Days of Material Import
19	Notification of signs visible to the public (see 01 52 00)	Departmental Representative	At least 5 working days prior to posting
20	Transport manifests (Section 01 35 13.43)	Departmental Representative	Within 5 working days of material transport to disposal facility
21	Contractor's Asbestos Liability Insurance (02 82 00.03)	Departmental Representative	Within 10 days of Contract Award

Waterton Remediation and Abatement – 11 Sites

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01 33 00

Submittal Procedures

#	Contractor's Submission	Submitted to PCA	Submitted when
22	Provide proof that asbestos abatement personnel have undergone respirator fitting and testing (02 82 00.03).	Departmental Representative	Within 10 days of Contract Award

1.7. Project Technical Submittal List - Closeout Submittals

#	Contractor's Submission	Submitted to PCA	Submitted when
1	Copies of all landfill acceptance certificates (certificates of disposal), manifests and/or truck weigh scale documents and/or truck counts for material brought onto, transported on to, or removed from the site. (Section 01 77 00)	Departmental Representative	Transport Manifests - Within 5 working days of material transport to disposal facility Remaining Documents - At completion of work
2	Certificate of Completion (Section 01 77 00)	Departmental Representative	At completion of work
3	Final Site Inspection Meeting Minutes (01 31 19)	Departmental Representative	Within 2 days of the Final Site Inspection
4	Project Closeout Meeting Minutes (01 31 19)	Departmental Representative	Within 2 days of the Closeout Meeting

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. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. References (Latest Edition)

1.3.1. Manual of Uniform Traffic Control Devices (MUTCD) published by Transport Canada.

1.3.2. Traffic Accommodation in Work Zones Manual, 2018, published by Alberta Transportation

1.4. Submittals

1.4.1. Submittals: in accordance with Section 01 33 00 Submittal Procedures

1.4.2. Truck route plan as outlined in Section 01 35 43 - Environmental Procedures.

1.4.2.1. Truck route plan is to be submitted for review by Departmental Representative within 10 working days of Contract award.

1.4.3. Traffic control plan as outlined in Section 01 35 43 - Environmental Procedures.

1.4.3.1. Traffic control plan is to be submitted for review by Departmental Representative within 10 working days of Contract award.

1.5. Protection and Maintenance of Traffic

1.5.1. 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, including any required permits or authorizations. Obtain such permits and authorizations.

1.5.2. Protect travelling public from damage to person and property.

1.5.3. Provide traffic control for personnel and vehicular traffic when work impacts established transportation routes (e.g. Red Rock and Akamina Parkways). Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by the Departmental Representative. At minimum one lane must be kept open for traffic flow at all times.

1.5.4. When working on travelled way:

- 1.5.4.1. Place equipment in position to present minimum of interference and hazard to travelling public.
- 1.5.4.2. Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
- 1.5.4.3. Do not leave equipment on travelled way overnight.
- 1.5.5. Do not close any lanes of road without approval of the Departmental Representative. Before re-routing traffic erect suitable signs and devices in accordance with instructions contained in applicable legislation or bylaws or permits.
- 1.5.6. Maintain travelled way to existing condition and of sufficient width for required number of lanes of traffic. Maintain access routes in a tidy condition, free from accumulation of waste products and debris, or as requested by the Departmental Representative.
- 1.5.7. Provide access and temporary relocated roads as necessary to maintain traffic.
- 1.5.8. Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- 1.5.9. Traffic routes must be maintained at all times during the completion of the project work. The Contractor must provide access and temporary relocated roads as necessary to maintain traffic.
- 1.5.10. Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- 1.5.11. Maintain access and egress routes.
- 1.5.12. If ground disturbance of on-site access and egress routes is anticipated or observed, the Departmental Representative may stop work until mitigation measures are implemented. The Departmental Representative must provide approval for implementation of appropriate measures to prevent or repair disturbance or damage. Please note that gravel cannot be used to maintain the on-site access/egress routes and the Contractor must employ temporary access mats (or other suitable measures approved by Departmental Representative where use of access mats is not practicable) in those circumstances.
- 1.5.13. The lowest impact equipment that can complete the work must be utilized in the work areas to minimize disturbance. Equipment is to be placed to minimize or eliminate impacts to areas outside of the active remediation and restoration activities.
- 1.5.14. In order to minimize impacts to wildlife and vegetation, access and egress routes for equipment must be established prior to remediation and equipment must not travel off of the designated routes or in areas designated as exclusion zones.
- 1.5.15. Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic and protection of equipment.
- 1.5.16. Dust control: adequate to ensure safe operation at all times.

- 1.5.17. Provide adequate bridging over trenches to permit normal traffic if and where required.
- 1.5.18. Lighting: to assure full and clear visibility for work areas during night work operations.
- 1.5.19. Provide snow removal if required, during period of work.

1.6. Informational and Warning Devices

- 1.6.1. Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.
- 1.6.2. Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in Traffic Accommodation in Work Zones Manual, 2018, published by Alberta Transportation.
- 1.6.3. Place signs and other devices in locations recommended in Traffic Accommodation in Work Zones Manual, 2018, published by Alberta Transportation.
- 1.6.4. Meet with Departmental Representative prior to commencement of work to prepare list of signs and other devices required for project. If situation on-site changes, revise list to approval of Departmental Representative.
- 1.6.5. Continually maintain traffic control devices in use by:
 - 1.6.5.1. Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
 - 1.6.5.2. Removing or covering signs which do not apply to conditions existing from day to day.

1.7. Control of Public Traffic

- 1.7.1. Provide competent flag persons, trained in accordance with, and properly equipped as specified in Traffic Accommodation in Work Zones Manual, 2018, published by Alberta Transportation in following situations:
 - 1.7.1.1. When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.
 - 1.7.1.2. When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.
 - 1.7.1.3. When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
 - 1.7.1.4. Where temporary protection is required while other traffic control devices are being erected or taken down.

- 1.7.1.5. For emergency protection when other traffic control devices are not readily available.
 - 1.7.1.6. In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
 - 1.7.1.7. Delays to public traffic due to contractor's operators to be minimized as much as possible and conducted in accordance with provincial guidance and regulations.
- 1.7.2. Where roadway, carrying two-way traffic, is restricted to one lane, for 24 hours each day, provide portable traffic signal system. Adjust, as necessary, and regularly maintain system during period of restriction. Signal system to meet requirements of Traffic Accommodation in Work Zones Manual, 2018, published by Alberta Transportation.

1.8. Operational Requirements

- 1.8.1. Maintain existing conditions for traffic throughout period of contract except when required for construction under contract and when measures have been taken as specified and approved by Departmental Representative to protect and control public traffic.
- 1.8.2. Maintain existing conditions for traffic crossing right-of-way.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Submittals: in accordance with Section 01 33 00 Submittal Procedures, Section 01 31 19 – Project Meetings, and Section 01 78 00 – Closeout Submittals.

1.3.2. Site Layout: within 10 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 including following:

- 1.3.2.1. Equipment and personnel decontamination areas.
- 1.3.2.2. Means of ingress, egress and temporary traffic control facilities. Refer to Section 01 56 00 Temporary Barriers and Enclosures for traffic control.
- 1.3.2.3. Equipment and material staging areas.
- 1.3.2.4. Soil/debris management and stockpile area(s) construction details, including base preparation and water control features.
- 1.3.2.5. Haul road from the excavation areas to the staging area(s).
- 1.3.2.6. Exclusion Zones, and other zones specified in Contractor's site-specific Health and Safety Plan, Environmental Protection Plan and Parks Canada permits.
- 1.3.2.7. Excavation, backfill, compaction, grading, and restoration areas.

1.3.3. Contaminated Material and Non-Contaminated Material Management Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit plan detailing management of Contaminated Material and Non-Contaminated Material. Include:

- 1.3.3.1. Sequence, methods and means to ensure different categories of waste are segregated.
- 1.3.3.2. Sequence, methods and means to handle, transport, and store Contaminated Material and Non-Contaminated Material onsite.
- 1.3.3.3. Sequence, methods and means to transport Contaminated Material and Non-Contaminated Material offsite. Include name, vehicle type, and licenses of transporters. Include name, location, provincial or

territorial authorizations, and evidence of compliance with municipal zoning and bylaws of all transfer stations and interim storage facilities.

- 1.3.4. Transport Manifests: within 5 Working Days of offsite transport, submit documentation to the Departmental Representative verifying that material has been transported appropriately. Include:
 - 1.3.4.1. Method of transport.
 - 1.3.4.2. Name of transport company.
 - 1.3.4.3. Weigh scale receipt including location, date, and weight of loading.
 - 1.3.4.4. Weigh scale receipt including location, date, and weight of unloading.
- 1.3.5. Certificate of Disposal: within 30 Working Days of disposal at Disposal Facility, submit documentation to the Departmental Representative verifying that materials have been disposed by Contractor. Include:
 - 1.3.5.1. Issued by the Disposal Facility.
 - 1.3.5.2. On company letterhead.
 - 1.3.5.3. Name and location of facility where the material is being disposed.
 - 1.3.5.4. Date and weight for each shipment received and total weight received at the Disposal Facility.
 - 1.3.5.5. Identification of final ownership of material.
 - 1.3.5.6. Signed by identified authorized disposal company representative.
- 1.3.6. Equipment and Personnel Decontamination Areas: submit equipment and personnel decontamination area design to Departmental Representative for review prior to commencing construction.
- 1.3.7. Submit documentation verifying that any hazardous materials abatement personnel have been trained, tested, and certified to safely and effectively carry out their assigned duties in accordance with Section 01 35 29.14 Health and Safety for Contaminated Sites.

1.4. Sequencing and Scheduling

- 1.4.1. Do not commence Work involving contact with potentially contaminated materials until all applicable Environmental Protection procedures (including those identified in Contaminated Material and Non-Contaminated Material Management Plan and Environmental Protection Plan [see Section 01 35 43]) and facilities (including those identified in Site Layout) are operational and accepted by Departmental Representative.
- 1.4.2. Plan work sequencing and traffic patterns to prevent contamination of clean areas due to traffic or debris.

1.5. Soil/Debris Management and Stockpiling Area(s)

- 1.5.1. For excavated Contaminated Soil, Hazardous Materials/Debris, Non-Hazardous Refuse/Debris and Recyclable Materials provide, maintain, and operate temporary storage/stockpiling facilities as per Contractor's Site Layout which is to be approved by the Departmental Representative. Locate temporary stockpile areas as to minimize handling and maximize efficiency.
- 1.5.2. Segregate Contaminated Soil, Hazardous Materials/Debris, Non-Hazardous Refuse/Debris and Recyclable Materials into separate stockpiles/bins to prevent cross-contamination.
- 1.5.3. Prevent precipitation from infiltrating or from directly running off stockpiled materials. Cover stockpiled materials with an impermeable cover during periods of Work stoppage including at end of each Working Day and as instructed by the Departmental Representative.
- 1.5.4. Securely fasten covers over stockpiled material until material is loaded for offsite transport.
- 1.5.5. Store excavated Recyclable Materials only on non-contaminated surface areas. Ensure no contact between excavated Recyclable Materials and drainage of Contaminated Water or Contaminated Soil/ Hazardous Materials/Debris.
- 1.5.6. Due to proposed small volumes, store Hazardous Materials/Debris in bins.
- 1.5.7. Store excavated Contaminated Soil, Non-Hazardous Refuse/Debris and Recyclable Materials in temporary stockpiles.
 - 1.5.7.1. Install impermeable liner (e.g. minimum 20 mil (0.5 mm) polyethylene) below proposed Contaminated Soil and Non-Hazardous Refuse and Debris stockpile locations to prevent contact between stockpile material and ground.
 - 1.5.7.2. Cover stockpiled material when not being worked or sampled to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation from material.
 - 1.5.7.3. Prevent Non-Contaminated Water, such as surface water, from coming into contact with Contaminated Soil and Non-Hazardous Refuse/Debris stockpiles.
- 1.5.8. Segregate Contaminated Soil, Hazardous Materials/Debris, Non-Hazardous Refuse/Debris and Recyclables into different treatment/disposal streams, including at a minimum:
 - 1.5.8.1. Hazardous Waste
 - 1.5.8.2. Class II waste
 - 1.5.8.3. General Refuse
 - 1.5.8.4. Recyclables

- 1.5.9. Segregate different suspect material in discrete stockpiles to facilitate ex-situ characterization as instructed by the Departmental Representative.
- 1.5.10. Assist Departmental Representative in collection of stockpile samples for ex-situ characterization. Ex-situ characterization may take up to 5 Working Days, not counting the day the sample is collected. No Standby Time charges or increases to Contract Amount or Extension of Time for completion of the Work can be incurred for Confirmation Sample results provided within 5 Working Days, not counting the day the sample is collected.
- 1.5.11. Do not remove Contaminated Soil or Hazardous Materials/Debris, or Non-Hazardous Refuse/Debris from stockpiles or bins until ex-situ characterization completed and as instructed by Departmental Representative.

1.6. Equipment Decontamination

- 1.6.1. Equipment decontamination to be carried out in area designated by the Departmental Representative.
- 1.6.2. At minimum, perform following steps during equipment decontamination: mechanically remove packed soil, 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.
 - 1.6.2.1. Collect decontamination sediment which accumulate in decontamination location. Manage decontamination sediment as Hazardous Waste.
 - 1.6.2.2. Collect all scraped and/or brushed material for off-site disposal at designated facility as approved by the Departmental Representative.
- 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 (If Required)

- 1.7.1. Decontaminate equipment after working in potentially contaminated Work areas and prior to subsequent Work or travel on clean areas.
- 1.7.2. Perform decontamination as specified to satisfaction of Departmental Representative. Departmental Representative will direct Contractor to perform additional decontamination if required.

1.8. Final Decontamination (If Required)

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

1.9. Drums (If Required)

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

1.10. Vehicular Access and Parking

1.10.1. Maintenance and Use:

- 1.10.1.1. Prevent contamination of access roads or other areas of the site not within the work area as defined by the Contractor and Departmental Representative in accordance with Section 02 61 00.01 – Soil Remediation.
- 1.10.1.2. Contractor will not load trucks in a manner that causes spillage onto the loading area.
- 1.10.1.3. Contractor will not load trucks with soil such that spillage occurs onto the loading area during transport.
- 1.10.1.4. Immediately scrape up debris or material on access roads which is suspected to be contaminated as determined Departmental Representative; transport and place into designated area accepted by Departmental Representative. Clean access roads at least once per shift.
- 1.10.1.5. Departmental Representative may collect soil samples for chemical analyses from traveling surfaces of constructed and existing access routes prior to, during, and upon completion of Work. Excavate and dispose of clean soil contaminated by Contractor's activities at no additional cost to PCA.
- 1.10.1.6. Departmental Representative may inspect the condition of the access road with the Contractor prior work and immediately after work to determine if damage has occurred.

1.11. Dust and Particulate Control

- 1.11.1. Execute Work by methods to minimize raising dust from Work operations.
- 1.11.2. Implement and maintain dust and particulate control measures as determined necessary by the Departmental Representative.

- 1.11.3. Provide positive means to prevent airborne dust from dispersing into atmosphere. Use water for dust and particulate control.
- 1.11.4. Use chemical means for water misting system for dust and particulate control only with Departmental Representative's prior written approval.
- 1.11.5. As minimum, use appropriate covers on trucks hauling fine or dusty material. Use watertight vehicles to haul wet materials.
- 1.11.6. Prevent dust from spreading to adjacent properties.
- 1.11.7. Departmental Representative will stop work at any time when Contractor's control of dusts and particulates is inadequate for wind conditions present at site.
- 1.11.8. If Contractor's dust and particulate control is not sufficient for controlling dusts and particulates into atmosphere, the Departmental Representative will stop work. Contractor must discuss procedures with Departmental Representative that Contractor proposes to resolve problem. Make necessary changes to operations prior to resuming excavation, handling, processing, or other work that may cause release of dusts or particulates.

1.12. Pollution Control

- 1.12.1. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious toxic substances and pollutants produced by Work, as outlined in the Spill Prevention and Spill Response Plan.
- 1.12.2. Be prepared to intercept, clean up, and dispose of spills or releases that may occur whether on land or water. Maintain materials and equipment required for cleanup of spills or releases readily accessible onsite.
- 1.12.3. Promptly report spills and releases potentially causing damage to environment to:
 - 1.12.3.1. Authority having jurisdiction or interest in spill or release including conservation authority, water supply authorities, drainage authority, road authority, and fire department.
 - 1.12.3.2. Departmental Representative.
- 1.12.4. Contact manufacturer of pollutant if known and ascertain hazards involved, precautions required, and measures used in cleanup or mitigating action.
- 1.12.5. Take immediate action using available resources to contain and mitigate effects on environment and persons from spill or release.
- 1.12.6. Provide spill response materials including, containers, adsorbent, shovels, and personal protective equipment. Make spill response materials available at all times in which hazardous materials or wastes are being handled or transported. Spill response materials: compatible with type of material being handled.

1.13. Removal and Disposal

- 1.13.1. Remove surplus materials and temporary facilities from site.

- 1.13.2. Dispose of wastes as outlined in Section 02 61 00.01 – Soil Remediation and in this section.
- 1.13.3. Do not burn or bury rubbish and waste materials onsite.
- 1.13.4. Ensure general site waste and litter does not act as an animal attractant and is stored in animal proof bins.
- 1.13.5. Do not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner on to the property.
- 1.13.6. Do not discharge wastes, hazardous wastes or volatile materials, such as mineral spirits, oil or paint thinner, into waterways, storm or sanitary sewers.
- 1.13.7. Dispose of following materials at appropriate off-site facility identified by Contractor and accepted by the Departmental Representative:
 - 1.13.7.1. Contaminated Soil
 - 1.13.7.2. Hazardous Materials/Debris
 - 1.13.7.3. Non-Hazardous Refuse/Debris
 - 1.13.7.4. All Recyclable Materials
 - 1.13.7.5. Non-contaminated litter and rubbish.
 - 1.13.7.6. Disposable PPE worn during final cleaning.
- 1.13.8. Minimize generation of hazardous waste during remediation activities (i.e. from operations) to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes. Take necessary precautions to avoid mixing of contaminated materials, waste and/or non-contaminated materials
- 1.13.9. Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
 - 1.13.9.1. Hazardous wastes recycled in manner constituting disposal.
 - 1.13.9.2. Lead-acid battery recycling.
- 1.13.10. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

1.14. Contaminated Soil, Hazardous Materials/Debris, Non-Hazardous Refuse/Debris, and Recyclable Material Management

- 1.14.1. Segregate, excavate, handle, stockpile, load, transport and dispose all Contaminated Soil, Hazardous Material/Debris, Non-Hazardous Refuse/Debris, and Recyclable Materials within work areas as outlined in this section and in Section 01 35 43 – Environmental Procedures, Section 02 61 00.01 – Soil Remediation and Section 31 23 33.01 – Excavating, Trenching and Backfilling.
- 1.14.2. Minimize generation of Contaminated Soil, Hazardous Material/Debris, Non-Hazardous Refuse/Debris, and Recyclable Materials to greatest extent practicable.

- 1.14.3. Material characterization additional to information provided in Contract required by transport or Disposal Facility is the responsibility of Contractor.

1.15. Contaminated Soil, Hazardous Materials/Debris, Non-Hazardous Refuse/Debris, and Recyclable Material Disposal

- 1.15.1. Contaminated Soil, Hazardous Material/Debris, Non-Hazardous Refuse/Debris, and Recyclable Materials Disposal: dispose at Disposal Facility identified by Contractor and accepted by the Departmental Representative. Submit identification of the Disposal Facility(s) that will be used to treat and/or dispose of each of the categories of materials identified within 10 working days of contract award.
- 1.15.2. Disposal Facility requirements:
 - 1.15.2.1. Be an existing off-site facility located in Canada.
 - 1.15.2.2. 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.
 - 1.15.2.3. Hold a valid and subsisting permit, certificate, approval, or any other form of authorization issued by a province for the disposal of soil/sediment, general refuse, construction/demolition waste or other material requiring disposal.
 - 1.15.2.4. Comply with applicable municipal zoning, bylaws, and requirements.
- 1.15.3. If proposed Disposal Facility is not acceptable to Departmental Representative, identify an alternate Disposal Facility that is acceptable.
- 1.15.4. Dispose material as soon as practical.
- 1.15.5. With the exception of recyclable materials, material sent to a Disposal Facility must be permanently stored at that facility.
- 1.15.6. Submit Certificates of Disposal for all material disposed off-site.

1.16. Contaminated Soil, Hazardous Materials/Debris, Non-Hazardous Refuse/Debris, and Recyclable Material Transport

- 1.16.1. The Contractor shall assume ownership of, and be responsible for, Contaminated Soil, Hazardous Material/Debris, Non-Hazardous Refuse/Debris, and Recyclable Materials once it is loaded on a vehicle for transport off-site. Do not unreasonably stockpile material onsite.
- 1.16.2. Transport material as outlined in Section 02 61 00.01 – Soil Remediation.

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. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

- 1.3.1. Submittals: in accordance with Section 01 33 00 Submittal Procedures
- 1.3.2. Submit to Departmental Representative Submittals listed for review within 10 days of contract award prior to the commencement of work.
- 1.3.3. Work affected by Submittal must not proceed until review is complete.
- 1.3.4. Submit the following:
 - 1.3.4.1. Health and Safety Plan.
 - 1.3.4.2. Copies of reports or directions issued by federal and provincial health and safety inspectors.
 - 1.3.4.3. Copies of incident and accident reports.
 - 1.3.4.4. Complete set of Safety Data Sheets (SDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
 - 1.3.4.5. Emergency Procedures.
- 1.3.5. The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures and provide comments to the Contractor within 5 Working Days after receipt of the plan.
- 1.3.6. If changes are required, revise the plan as appropriate and resubmit to Departmental Representative within 5 Working Days.
- 1.3.7. Submittal of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It will not:
 - 1.3.7.1. Be construed to imply approval by the Departmental Representative.
 - 1.3.7.2. Be interpreted as a warranty of being complete, accurate and legislatively compliant.
 - 1.3.7.3. Relieve the Contractor of his legal obligations for the provision of health and safety on the 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.
- 1.4.1.3. Health Canada/Workplace Hazardous Materials Information System (WHMIS) – Safety Data Sheets (SDS).

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. Canadian Standards Association (CSA) as amended:

- 1.4.3.1. CSA Z797-2009 Code of Practice for Access Scaffold.
- 1.4.3.2. CSA S269.1-1975 (R2003) Falsework for Construction Purposes.
- 1.4.3.3. CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.

1.4.4. National Fire Code of Canada 2010 (as amended):

- 1.4.4.1. Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
- 1.4.4.2. FCC No. 302, Standard for Welding and Cutting.

1.4.5. Province of Alberta:

- 1.4.5.1. Workers Compensation Act.
- 1.4.5.2. Occupational Health and Safety Act, - Updated 2016.

1.5. Regulatory Requirements

- 1.5.1. Comply with codes, acts, bylaws, standards and regulations applicable to the performance of the Work in accordance with the Contract to ensure safe operations at Site.
- 1.5.2. 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 instruct on the course of action to be followed.

1.6. Worker's Compensation Board Coverage

- 1.6.1. Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the Final Completion of the Work.
- 1.6.2. Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.7. Compliance with Regulations

- 1.7.1. PCA may terminate the Contract without liability to PCA where the Contractor, in the opinion of PCA, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- 1.7.2. It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the Work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.8. Responsibility

- 1.8.1. Assume responsibility as the Prime Contractor for Work under this Contract.
 - 1.8.1.1. The Contractor shall be responsible for health and safety of persons onsite, safety of property onsite and for protection of persons adjacent to Site and environment to extent that they may be affected by conduct of Work.
 - 1.8.1.2. Comply with and enforce compliance by employees with safety requirements of Contract, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.9. Health and Safety Coordinator

- 1.9.1. The Health and Safety Coordinator must:
 - 1.9.1.1. Be responsible for completing all health and safety training and ensuring that personnel that do not successfully complete the required training are not permitted to enter the Site to perform Work.
 - 1.9.1.2. Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.
 - 1.9.1.3. Be on Site during execution of Work.

1.10. General Conditions

- 1.10.1. Provide safety barricades and lights around Site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- 1.10.2. Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the Site:
 - 1.10.2.1. Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

1.11. Project/Site Conditions

- 1.11.1. Work at Site will involve contact with contaminants identified in Specifications and environmental reports.
- 1.11.2. Work at site will be within bear habitat. Bears frequent the Red Rock Parkway and backcountry areas in summer/fall.
- 1.11.3. Work will involve work at remote sites accessible only by foot or helicopter.

1.12. Work Permits

- 1.12.1. Obtain specialty permits related to project before start of Work.

1.13. Health and Safety Plan

- 1.13.1. Conduct a site-specific hazard assessment based on review of Contract, required Work, and project Site. Identify any known and potential health risks and safety hazards.
- 1.13.2. Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
 - 1.13.2.1. Primary requirements:
 - 1.13.2.1.1. Contractor's safety policy.
 - 1.13.2.1.2. Identification of applicable compliance obligations.
 - 1.13.2.1.3. Definition of responsibilities for project safety/organization chart for project.
 - 1.13.2.1.4. General safety rules for project.
 - 1.13.2.1.5. Job-specific safe work, procedures.
 - 1.13.2.1.6. Inspection policy and procedures.
 - 1.13.2.1.7. Incident reporting and investigation policy and procedures.
 - 1.13.2.1.8. Occupational Health and Safety Committee/Representative procedures.
 - 1.13.2.1.9. Occupational Health and Safety meetings.

- 1.13.2.1.10. Occupational Health and Safety communications and record keeping procedures.
 - 1.13.2.2. 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 Work.
 - 1.13.2.3. List hazardous materials to be brought onsite as required by Work.
 - 1.13.2.4. Indicate engineering and administrative control measures to be implemented at the Site for managing identified risks and hazards.
 - 1.13.2.5. Identify personal protective equipment (PPE) to be used by workers.
 - 1.13.2.6. Identify personnel and alternates responsible for site safety and health.
 - 1.13.2.7. Identify personnel training requirements and training plan, including site orientation for new workers.
 - 1.13.2.8. Identify risks related to wildlife encounters and control measures to mitigate risks (for example, bear awareness training).
- 1.13.3. 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.
- 1.13.4. Revise and update Health and Safety Plan as required and re-submit to the Departmental Representative.
- 1.13.5. Departmental Representative's review: the review of Health and Safety Plan by PCA will not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract.

1.14. Emergency Procedures

- 1.14.1. 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:
 - 1.14.1.1. Designated personnel from own company.
 - 1.14.1.2. Regulatory agencies applicable to Work and as per legislated regulations.
 - 1.14.1.3. Local emergency resources.
 - 1.14.1.4. Departmental Representative and site staff.
- 1.14.2. Include the following provisions in the emergency procedures:
 - 1.14.2.1. Notify workers and the first-aid attendant, of the nature and location of the emergency.
 - 1.14.2.2. Evacuate all workers safely.
 - 1.14.2.3. Check and confirm the safe evacuation of all workers.

- 1.14.2.4. Notify the fire department or other emergency responders.
- 1.14.2.5. Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
- 1.14.2.6. Notify Departmental Representative and Site staff.
- 1.14.3. Provide written rescue/evacuation procedures as required for, but not limited to:
 - 1.14.3.1. Work at high angles.
 - 1.14.3.2. Work in confined spaces or where there is a risk of entrapment.
 - 1.14.3.3. Work with hazardous substances.
 - 1.14.3.4. Underground work.
 - 1.14.3.5. Work on, over, under and adjacent to water.
 - 1.14.3.6. Workplaces where there are persons who require physical assistance to be moved.
- 1.14.4. Design and mark emergency exit routes to provide quick and unimpeded exit.
- 1.14.5. Revise and update emergency procedures as required and re-submit to the Departmental Representative.

1.15. Hazardous Products

- 1.15.1. 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 Safety Data Sheets (SDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
- 1.15.2. Where use of hazardous and toxic products cannot be avoided:
 - 1.15.2.1. Notify Departmental Representative beforehand of the product(s) intended for use. Submit applicable SDS and WHMIS documents as required.
 - 1.15.2.2. In conjunction with Departmental Representative, schedule to carry out Work during "off hours" when tenants have left the building.
 - 1.15.2.3. Provide adequate means of ventilation as required.

1.16. Unforeseen Hazards

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

1.17. Posted Documents

- 1.17.1. Post legible versions of the following documents onsite:

- 1.17.1.1. Health and Safety Plan.
- 1.17.1.2. Sequence of Work.
- 1.17.1.3. Emergency procedures.
- 1.17.1.4. Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
- 1.17.1.5. Floor plans or Site plans.
- 1.17.1.6. Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the Site for review by employees and workers.
- 1.17.1.7. Workplace Hazardous Materials Information System (WHMIS) documents.
- 1.17.1.8. Safety Data Sheets (SDS).
- 1.17.1.9. List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

- 1.17.2. Post all Safety Data Sheets (SDS) onsite, 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.
- 1.17.3. 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 accepted by the Departmental Representative.

1.18. Meetings

- 1.18.1. Attend health and safety preconstruction meeting and all subsequent meetings called by the Departmental Representative.
- 1.18.2. Ensure all site personnel attend a health and safety toolbox meeting at the beginning of each shift, which must include:
 - 1.18.2.1. Sign-in of all attendees.
 - 1.18.2.2. Planned Work activities and environmental considerations for that shift.

- 1.18.2.3. Hazards associated with these Work activities, including environmental hazards (e.g. potential for hypothermia, heat exhaustion, heat stroke).
 - 1.18.2.4. Appropriate job-specific safe work procedures.
 - 1.18.2.5. Required personal protective equipment (PPE).
 - 1.18.2.6. Appropriate emergency procedures.
 - 1.18.2.7. Review recent accidents on Site, including near misses.
- 1.18.3. 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.

1.19. Correction of Non-Compliance

- 1.19.1. Immediately address health and safety non-compliance issues identified by the Departmental Representative.
- 1.19.2. Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.
- 1.19.3. The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time.
- 1.19.4. Correct non-compliance.

1.20. Hazardous Occurrence Investigation and Reporting

- 1.20.1. Hazard includes:
- 1.20.1.1. 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 Annex 3 of the Standard on Hazard Prevention Program.
- 1.20.2. Hazardous Occurrence includes:
- 1.20.2.1. An event occurring at a PCA 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.

1.20.3. Hazardous Occurrence Investigation and Reporting Procedures:

- 1.20.3.1. Includes information regarding the person involved and the basic circumstances surrounding the hazardous occurrence.
- 1.20.3.2. Provides a detailed and thorough description of the hazardous occurrence and the sequence of events.
- 1.20.3.3. Indicates corrective measures that have been taken since the occurrence.
- 1.20.3.4. Requires the appointment of a qualified investigator.
- 1.20.3.5. Provides recommendations for additional corrective measures, if required.

1.20.4. Fatal or Serious Accidents Procedures:

- 1.20.4.1. Call 911 to advise the police organization having jurisdiction to secure the scene and investigate the matter.
- 1.20.4.2. Advise the Departmental Representative of the fatality or serious accident within 1 hour.
- 1.20.4.3. No investigation will be conducted at the scene until the police service having jurisdiction has released the scene.
- 1.20.4.4. No person shall, unless authorized to do so, 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.

1.21. Utility Clearance

- 1.21.1. The Contractor is solely responsible for utility clearance.
- 1.21.2. The Contractor will not rely upon Drawings or other information provided with utility locations.

1.22. Personal Protective Equipment Program

- 1.22.1. Submit Personal Protective Equipment (PPE) program to the Departmental Representative addressing:
 - 1.22.1.1. Donning and doffing procedures.
 - 1.22.1.2. PPE selection based upon Site hazards.

- 1.22.1.3. PPE use and limitations of equipment.
- 1.22.1.4. Work mission duration, PPE maintenance and storage.
- 1.22.1.5. PPE decontamination and disposal.
- 1.22.1.6. PPE inspection procedures prior to, during, and after use.
- 1.22.1.7. Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.
- 1.22.1.8. Medical surveillance requirements for personnel assigned to work at Site.
- 1.22.1.9. 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.
- 1.22.1.10. 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.
- 1.22.1.11. Decontamination procedures for both personnel and equipment.
- 1.22.1.12. 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, or federal agencies.
- 1.22.1.13. Written respiratory protection program for project activities.
- 1.22.1.14. Procedures dealing with heat and/or cold stress.
- 1.22.1.15. Spill containment program if waste material is generated, excavated, stored, or managed onsite.

1.23. Offsite Contingency and Emergency Response Plan

- 1.23.1. Prior to commencing Work involving handling of hazardous materials, develop offsite Contingency and Emergency Response Plan.
- 1.23.2. 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.

1.24. Personnel Health, Safety, And Hygiene

- 1.24.1. Training: ensure personnel entering Site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer.
- 1.24.2. Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity.
- 1.24.3. Personal Protective Equipment:
 - 1.24.3.1. Furnish site personnel with appropriate PPE. Ensure that safety equipment and protective clothing is kept clean and maintained.
- 1.24.4. Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:
 - 1.24.4.1. Ensure prescription eyeglasses worn are safety glasses and do not permit contact lenses onsite within work zones.
 - 1.24.4.2. Ensure footwear is steel-toed safety shoes or boots and is covered by rubber overshoes when entering or working in potentially contaminated work areas.
 - 1.24.4.3. Dispose of or decontaminate PPE worn onsite at end of each workday.
 - 1.24.4.4. Decontaminate reusable PPE before reissuing.
 - 1.24.4.5. Ensure site personnel have passed respirator fit test prior to entering potentially contaminated work areas.
 - 1.24.4.6. Ensure facial hair does not interfere with proper respirator fit.
- 1.24.5. Respiratory Protection:
 - 1.24.5.1. 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.
 - 1.24.5.2. Develop, implement, and maintain respirator program.
 - 1.24.5.3. Monitor, evaluate, and provide respiratory protection for site personnel.
 - 1.24.5.4. Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified onsite.
 - 1.24.5.5. In absence of additional air monitoring information or substance identification, retain an industrial hygiene specialist to determine minimum levels of respiratory protection required.
 - 1.24.5.6. Immediately notify Departmental Representative when level of respiratory protection required increases.
 - 1.24.5.7. Ensure appropriate respiratory protection during Work activities. As minimum requirement ensures that persons entering potentially

contaminated work areas are supplied with and use appropriate respiratory protection.

- 1.24.6. Heat Stress/Cold Stress: implement heat stress or cold stress monitoring program as applicable and include in site-specific Health and Safety Plan.
- 1.24.7. Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows:
 - 1.24.7.1. Suitable containers for storage and disposal of used disposable PPE.
 - 1.24.7.2. Potable water and suitable sanitation facility.
- 1.24.8. Emergency and First-Aid Equipment:
 - 1.24.8.1. 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.
- 1.24.9. Site Communications:
 - 1.24.9.1. Post emergency numbers near site telephones.
 - 1.24.9.2. Cell phone service at the site is unreliable. Alternate means of communication will be required for emergencies.
 - 1.24.9.3. Ensure personnel use of "buddy" system and develop hand signal system appropriate for site activities.
 - 1.24.9.4. Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary.
 - 1.24.9.5. Furnish selected personnel with 2-way radios.
 - 1.24.9.6. 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. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. References and Codes

1.3.1. Perform Works in accordance with all applicable codes and standards including all amendments and other codes of Federal, Provincial, Municipal or local application, provided that in case of conflict or discrepancy more stringent requirements apply.

1.3.2. Meet or exceed requirements of:

1.3.2.1. Contract documents.

1.3.2.2. Specified standards, codes and referenced documents.

1.3.2.3. Meet or exceed the governing codes, standards and guidelines, and regulations applicable to Work and issued under the authority of the Government of Canada and Alberta as follows but not limited to:

1.3.2.3.1. National Building Code of Canada, 2010.

1.3.2.3.2. National Fire Code of Canada, 2010.

1.3.2.3.3. Canada Labour Code Part 11- Occupational Health and Safety (R.S. 1985, c.L-2).

1.3.2.3.4. CCME, Canadian Environmental Quality Guidelines, <http://st-ts.ccme.ca/>.

1.3.2.3.5. PN1398, Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in soil – User Guidance

1.3.2.3.6. Canadian Environmental Protection Act. (CEPA), 1999, c.33.

1.3.2.3.7. Canadian Environmental Assessment Act (CEAA), (2012).

1.3.2.3.8. Canada Species at Risk Act, (2002).

1.3.2.3.9. Canada Fisheries Act, (1985).

1.3.2.3.10. Canada National Parks Act, (2000).

1.3.2.3.11. Transportation of Dangerous Goods Regulation, SOR/2001-286, Canada Gazette Part II, August 2001.

1.4. Action and Informational Submittals

1.4.1. Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

1.4.2. Prior to commencing construction activities or delivery of materials to site, submit within 10 working days of Contract Award an Environmental Protection

Plan (EPP) for review and acceptance by the Departmental Representative. The EPP is to present comprehensive overview of known or potential environmental issues, which must be addressed during Work and should address requirements outlined in the BIA/BMP.

- 1.4.3. Address topics at level of detail commensurate with environmental issue and required work tasks as outlined in the RARMP (Appendix C).
- 1.4.4. The Departmental Representative will review the Contractor's EPP and provide comments to the Contractor within three business days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.
- 1.4.5. The contractor must have an EPP in place prior to initiating work. The EPP must contain all environmental mitigation measures required by permits and authorizations for the project. The EPP must include but is not limited to the following:
 - 1.4.5.1. Comprehensive overview of known or potential environmental issues to be addressed during Work.
 - 1.4.5.2. Identify requirements that plan complies with. Includes: permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract.
 - 1.4.5.3. Names and qualifications of persons responsible for ensuring adherence to Environmental Protection Plan. Completion of Contractor Evaluation Form provided in Appendix B.
 - 1.4.5.4. Names and qualifications of persons responsible for manifesting material to be removed from Site.
 - 1.4.5.5. Names and qualifications of persons responsible for training Site personnel.
 - 1.4.5.6. Description of Environmental Protection personnel training program.
 - 1.4.5.7. Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
 - 1.4.5.8. Drawings showing locations of proposed temporary excavations or embankments for haul roads, helicopter staging areas, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials onsite.
 - 1.4.5.9. Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Ensure plans include measures to prevent mud transported onto public roads by vehicles or runoff, and mitigation measures if mud is transported onto public roads by vehicles or runoff. Vehicles and vehicle traffic must comply with all federal, provincial, and municipal laws and regulations.

- 1.4.5.10. Contamination Prevention Plan identifying hazardous, deleterious or regulated substances to be used onsite; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with federal, provincial, and municipal laws and regulations for storage and handling of these materials.
- 1.4.5.11. Spill Prevention and Spill Response Plan including procedures, instructions, and reports to be used in event of spill of hazardous, deleterious or regulated substances. Identify locations and contents of spill kits.
- 1.4.5.12. Communications Plan 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 instructed by the Departmental Representative; and federal, provincial, and municipal emergency contacts.
- 1.4.5.13. Air Pollution Control Plan detailing provisions to assure that contaminants, dust, debris, materials, and trash, are contained onsite.
- 1.4.5.14. Waste Disposal Plan identifying methods and locations for solid waste disposal including clearing waste. Include name, location, provincial or territorial authorizations, and evidence of compliance with municipal zoning and bylaws of Landfill.

1.5. Fires

- 1.5.1. Fires and burning of rubbish onsite not permitted.
- 1.5.2. Comply with all PCA requirements and restrictions during times of high and extreme forest fire risk.

1.6. Disposal of Wastes

- 1.6.1. Dispose of wastes as outlined in Sections 01 35 13.43 – Special Project Procedures for Contaminated Sites, and Section 02 61 00.01 – Soil Remediation.
- 1.6.2. Do not bury rubbish and waste materials on-site.
- 1.6.3. Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways.

1.7. Cleaning

- 1.7.1. Refer to section 01 74 11.

1.8. Site Clearing and Plant Protection

- 1.8.1. Minimize stripping of Topsoil and vegetation.

- 1.8.2. Restrict tree and plant removal to areas indicated by the Departmental Representative. Protect all other trees and plants onsite and offsite.
- 1.8.3. 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.

1.9. Work Adjacent to Waterways

- 1.9.1. Do not dump excavated fill, waste material or debris in waterways.

1.10. Maintenance of Public Roads

- 1.10.1. Prevent tracking or spilling of debris or material onto public roads.
- 1.10.2. Immediately sweep or scrape up debris or material on public roads.
- 1.10.3. Clean public roads within a 200 m radius of the Site entrance at least once per shift.

1.11. Pollution Control

- 1.11.1. 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.
- 1.11.2. Provide sequence, methods and means, and facilities to prevent spills or releases in a Spill Prevention and Spill Response Plan.
 - 1.11.2.1. Maintain temporary pollution control features installed under this contract.
 - 1.11.2.2. Do not store fuel onsite other than tanks forming part of the equipment.
 - 1.11.2.3. Control emissions from equipment to meet applicable authorities' emission requirements.
 - 1.11.2.4. Contractor to regularly inspect all machinery on the Site to ensure it is in good repair and free of leaks.
- 1.11.3. Inadequate procedures:
 - 1.11.3.1. Stop relevant Work if procedures are inadequate to prevent spills or other releases, or when monitoring indicates that release equals or exceeds regulated or levels in accordance with the Contract.
 - 1.11.3.2. Submit procedures proposed to resolve problem.
 - 1.11.3.3. Make necessary changes to operations prior to resuming excavation, handling, processing, or other Work that can cause spills or other releases.

- 1.11.3.4. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate to prevent spills or other releases, or when monitoring indicates that release equals or exceeds regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.
- 1.11.4. Be prepared to intercept, cleanup, and dispose of spills or other releases that can occur whether on land or water.
- 1.11.5. Spill kits and containment are to be maintained onsite and ready for deployment in the event of spills or other releases.
 - 1.11.5.1. Spill kits are to include sufficient quantities of absorbent material, containers, booms, shovels and other tools, and personal protective equipment.
 - 1.11.5.2. Spill response materials must be compatible with type of equipment being used or type of material being handled.
 - 1.11.5.3. Spill kits are to be in close proximity to machinery.
 - 1.11.5.4. During the Work there are to be trained and qualified personnel available that are ready to deploy spill kits when necessary.
- 1.11.6. Take immediate action using available resources to contain and mitigate effects on environment and persons from spill or release.
- 1.11.7. Promptly report spills and releases potentially causing damage to environment to:
 - 1.11.7.1. Authority having jurisdiction or interest in spill or other release including conservation authority, water supply authorities, drainage authority, road authority, and fire department.
 - 1.11.7.2. Contractor emergency response team including Superintendent
 - 1.11.7.3. Departmental Representative and other contractor(s) and individuals as instructed by the Departmental Representative.
- 1.11.8. 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.
- 1.11.9. Remediation of soil, sediment or water contaminated by Contractor's activities.
 - 1.11.9.1. Remediate all soil, sediment or water contaminated by Contractor's activities associated with the Work onsite and offsite.
 - 1.11.9.2. 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.

- 1.11.9.3. Submit procedures for remediating soil, sediment or water contaminated by Contractor's activities.
- 1.11.9.4. Remediate as instructed by the Departmental Representative.
- 1.11.9.5. Contractor is responsible for any additional investigation, testing, and assessments required as acceptable to the Departmental Representative.

1.12. Historical / Archaeological Control

- 1.12.1. PCA will complete archaeological surveys prior to work commencing (if required).
- 1.12.2. Work with an archaeological monitor provided by PCA (if required).
- 1.12.3. Identify and protect historical, archaeological, cultural resources and biological resources encountered during work.
- 1.12.4. All artifacts of historical or cultural value will remain the property of the Crown.

1.13. Wildlife and Vegetation Protection

- 1.13.1. The Site is located within a National Park with known Species-at-Risk Act listed species in the area. If sensitive species are identified in the work areas the Departmental Representative will in turn instruct the Contractor to stop work until mitigative measures have been discussed with Parks Canada. No standby time will be granted for stoppage due to identification of sensitive species in the work area.
- 1.13.2. Do not harass or disturb any wildlife present on site or adjacent lands. Notify the Department Representative immediately upon identification of wildlife.
- 1.13.3. Comply with wildlife restrictions and requirements provided in the BIA/BMP.
- 1.13.4. All equipment brought to the Site must be cleaned prior to use (debris, dirt, vegetation) to minimize the potential for introduction of invasive species.
- 1.13.5. The seed mix required for site restoration to be identified in the Basic Impact Assessment BIA/BMP that will be provided as an addendum to these specifications. Any changes to the mix should be included in the EPP and approved by the Departmental Representative prior to use.
- 1.13.6. Allow PCA or their representative to conduct vegetation and/or wildlife protection activities prior to and during excavation and debris removal activities.

1.14. Dust and Particulate Control

- 1.14.1. Execute Work by methods to minimize raising dust from construction operations.
- 1.14.2. Provision of a water truck to maintain dust and particulate control. Other control measures may be directed by the Departmental Representative.
- 1.14.3. Prevent fugitive dust from the Site from interfering with onsite and offsite uses.
- 1.14.4. Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads, excavations, and stockpiles.

Cover stockpiled materials as outlined in Section 01 35 13.43 - Special Project Procedures for Contaminated Sites.

- 1.14.5. As minimum, use appropriate covers on trucks hauling fine or dusty material. Use watertight vehicles to haul wet materials.
- 1.14.6. If the Departmental Representative deems the Contractor's dust and particulate control is not sufficient for controlling dusts and particulates into atmosphere the Departmental Representative may instruct the Contractor to stop work. Contractor must discuss procedures with Departmental Representative that Contractor proposes to resolve problem. Make necessary changes to operations prior to resuming excavation, handling, processing, or other work that may cause release of dusts or particulates.

1.15. Water Control

- 1.15.1. Prevent precipitation from infiltrating or from directly running off stockpiled materials at the off-site Soil and Debris Management Facility. Cover stockpiled materials as outlined in Section 01 35 13.43 - Special Project Procedures for Contaminated Sites.

1.16. Erosion and Sediment Control

- 1.16.1. Plan and execute construction by methods to control surface drainage from excavations, from stockpiles, staging areas, and other Work areas. Prevent erosion and sedimentation.
- 1.16.2. Minimize amount of bare soil or sediment exposed at one time. Stabilize disturbed soil or sediment as quickly as practical. Strip vegetation, regrade, or otherwise develop to minimize erosion. Remove accumulated sediment resulting from construction activity from adjoining surfaces, drainage systems, and water courses, and repair damage caused by soil erosion and sedimentation as instructed by the Departmental Representative.
- 1.16.3. Minimize exposure of stockpiles to the wind. Cover stockpiles and ensure covers are secure.
- 1.16.4. Provide and maintain temporary erosion and sediment control measures.
- 1.16.5. Temporary erosion and sediment control measures are required to prevent erosion and migration of silt, mud, sediment, and other debris offsite or to other areas of Site where damage might result or that might otherwise be required by laws and regulations.
- 1.16.6. Temporary erosion and sediment control measures are required to prevent runoff containing a high sediment load resulting from construction activity from entering adjacent waterbodies.
- 1.16.7. Unless instructed by the Departmental Representative, remove temporary erosion and sediment control devices upon Final Completion of Work. Temporary erosion and sediment control devices once removed become property of Contractor.

- 1.16.8. Whenever sedimentation is caused by stripping vegetation, regrading, or other development, remove it from adjoining surfaces, drainage systems, and watercourses, notify the Departmental Representative and repair damage as quickly as possible.
- 1.16.9. If soil, sediment and debris from Site accumulate in low areas, storm sewers, roadways, gutters, ditches, or other areas where it is undesirable, remove accumulation and restore area to original condition, as instructed by the Departmental Representative.

1.17. Noncompliance and Notification

- 1.17.1. The Departmental Representative will audit the Contractor's compliance with the EPP.
- 1.17.2. Departmental Representative will notify Contractor in writing of observed non-compliance with Federal, Provincial, or Municipal environmental laws or regulations, permits, the contract specification, and other elements of Contractor's Environmental Protection Plan.
- 1.17.3. Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action accepted by Departmental Representative.
- 1.17.4. Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- 1.17.5. No time extensions granted, or equitable adjustments allowed to Contractor for such suspensions.

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. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Not Used.

1.4. References

1.4.1. Government of Canada:

- 1.4.1.1. Canada Labour Code - Part II. Occupational Health and Safety (R.S. 1985, c.L-2)
- 1.4.1.2. Canada Occupational Health and Safety Regulations.
- 1.4.1.3. Health Canada/Workplace Hazardous Materials Information System (WHMIS) – Safety Data Sheets (SDS).
- 1.4.1.4. CCME, Canadian Environmental Quality Guidelines, <http://sts.ccme.ca/>
- 1.4.1.5. PN1398, Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in soil – User Guidance
- 1.4.1.6. Canadian Environmental Protection Act. (CEPA), 1999, c.33.
- 1.4.1.7. Canadian Environmental Assessment Act (CEAA), (2012)
- 1.4.1.8. Health Canada/Workplace Hazardous Materials Information System (WHMIS)

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. Canadian Standards Association (CSA) as amended:

- 1.4.3.1. CSA Z797-2009 Code of Practice for Access Scaffold.
- 1.4.3.2. CSA S269.1-1975 (R2003) Falsework for Construction Purposes.
- 1.4.3.3. CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.
- 1.4.3.4. CAN/CGSB-1.205-94, Sealer for Application of Asbestos Fibre Releasing Materials.

1.4.4. National Fire Code of Canada 2010 (as amended):

- 1.4.4.1. Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
- 1.4.4.2. FCC No. 302, Standard for Welding and Cutting.

1.4.5. Transportation of Dangerous Goods Regulation, SOR/2001-286, Canada Gazette Part II, August 2001.

1.4.6. Province of Alberta:

- 1.4.6.1. Workers Compensation Act.
- 1.4.6.2. Occupational Health and Safety Act, - Updated 2016.
- 1.4.6.3. Alberta Waste Control Regulation.
- 1.4.6.4. Work Safe Alberta Guidelines for the Safe Clean-up of Structurally Compromised Structures

1.4.7. EPA 747-R-95-007-[1995] , Sampling House Dust for Lead.

1.4.8. U.S. Department of Health and Human Services/Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (NIOSH)

- 1.4.8.1. NIOSH 94-113 - NIOSH Manual of Analytical Methods (NMAM), 4th Edition (1994).

1.4.9. U.S. Department of Labour - Occupational Safety and Health Administration (OSHA) - Toxic and Hazardous Substances

- 1.4.9.1. Lead in Construction Regulation - 29 CFR 1926.62-[1993].

1.5. Laws, Regulations, Permits

- 1.5.1. Generally, provincial and municipal laws, regulations, bylaws and other requirements do not apply on federal lands, activities or undertakings. Soil and other materials that are removed from federal lands may become subject to provincial or municipal laws and regulations.
- 1.5.2. Provincial 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 or municipal laws and regulations apply on Federal lands, activities or undertakings.

- 1.5.3. Comply with certificates, licenses and other permits enforced at the location concerned required by regulatory federal, provincial or municipal authorities to complete the Work that have already been obtained.
- 1.5.4. Obtain and pay for certificates, licenses and other permits enforced at the location concerned required by regulatory federal, provincial or municipal authorities to complete the Work that have not already been obtained or that are required to be amended.
- 1.5.5. Provide applicable authorities with plans and information required for issue of acceptance certificates.
- 1.5.6. Furnish inspection certificates in evidence that the Work installed conforms with the requirements of the authority having jurisdiction.

1.6. Codes, Bylaws, Standards

- 1.6.1. Meet or exceed requirements of Contract, standards, and codes applicable to the performance of the Work and referenced documents.
- 1.6.2. In any case of conflict or discrepancy, the most stringent requirements will apply.
- 1.6.3. Perform Work in accordance with the *National Building Code* of Canada (NBC), and other requirements or codes in accordance with the Contract, construction standards and/or any other code or bylaw applicable to the performance of the Work.
- 1.6.4. Certificates, licenses and other permits enforced at the location concerned required by regulatory federal, provincial or municipal authorities to complete the Work: see Section 01 11 00.
- 1.6.5. Comply with all attachments, references, and reports relevant to Work, including environmental protection.

1.7. Smoking Environment

- 1.7.1. Smoking on the Site is not permitted.

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. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.3.2. Submit construction facilities layout drawing as indicated in Section 01 35 13.43 – Special Project Procedures for Contaminated Sites within 10 working days of Contract award. Include:

1.3.2.1. Location of all temporary facilities including: office trailers, parking, storage, above ground and underground utilities, and temporary facilities and roads.

1.3.3. Signs: at least 5 Working Days prior to posting, Submit any signs viewable by public.

1.4. Utilities

1.4.1. See 01 11 00.

1.4.2. Any utilities not present at the site must be provided at the Contractor's expense.

1.5. Fire Protection

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

1.6. Access and Delivery

1.6.1. Only the designated entrance in accordance with the Contract can be used for access to Site.

1.6.1.1. Maintain for duration of Contract.

1.6.1.2. Make good damage resulting from Contractor's use.

1.6.2. Use of the Site will be granted to the Contractor through the Departmental Representative.

1.7. Installation and Removal

- 1.7.1. Prepare site plan indicating proposed location and dimensions of areas 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.
- 1.7.2. Indicate use of supplemental or other staging area.
- 1.7.3. Provide construction facilities in order to execute work expeditiously.
- 1.7.4. Provide temporary utilities in order to execute Work expeditiously.
- 1.7.5. Do not use site for overnight accommodations of workers.
- 1.7.6. Remove from Site all such Work after use.

1.8. Construction Parking

- 1.8.1. Acceptable parking areas will be determined and agreed upon by Departmental Representative prior to initiation of work.
- 1.8.2. Provide and maintain adequate access to project site.

1.9. Security

- 1.9.1. Control access to Site and maintain a log of all personnel onsite. No non-Work visitors allowed without prior written consent of Departmental Representative

1.10. Departmental Representative and Consultant Offices

- 1.10.1. Provide office space heated to 20 degrees C, lighted, ventilated, of sufficient size to accommodate site meetings and furnished with drawings laydown table.
- 1.10.2. Provide office space heated to 20 degrees C, lighted, ventilated and with 110V power made available for the Departmental Representative and up to three other individuals (in addition to the Contractor's personnel) to use as a work space, including at minimum a table and chairs for the Departmental Representative's use.
- 1.10.3. Subcontractors to provide their own offices as necessary. Direct location of these offices to Departmental Representative for approval.
- 1.10.4. Clean as outlined in Section 01 74 11 - Cleaning.
- 1.10.5. Maintain at site office one record copy of:
 - 1.10.5.1. General Conditions
 - 1.10.5.2. All Permits, Authorizations and Approvals for the proposed works.
 - 1.10.5.3. Utility Plans.
 - 1.10.5.4. Contract Drawings.
 - 1.10.5.5. Specifications.
 - 1.10.5.6. Addenda.
 - 1.10.5.7. Change Orders and other modifications to Contract.
 - 1.10.5.8. Reviewed shop drawings, product data, and samples.
 - 1.10.5.9. List of Outstanding Shop Drawings.
 - 1.10.5.10. One set of record drawings and Specifications for "as-built" purposes.
 - 1.10.5.11. Field test records.
 - 1.10.5.12. Inspection certificates.
 - 1.10.5.13. Manufacturer's certificates.

- 1.10.5.14. Field and Laboratory Test Reports.
- 1.10.5.15. Copy of Accepted Project Schedule.
- 1.10.5.16. Health and Safety Plan and Other Safety Related Documents including daily toolbox or tailgate meetings.
- 1.10.5.17. Daily work records to be completed by end of each shift which include:
 - 1.10.5.17.1. Quantities for each Description of Work identified in the Unit Price Table and Change Orders.
 - 1.10.5.17.2. Description of Work performed.
 - 1.10.5.17.3. Current Site conditions.
 - 1.10.5.17.4. General information including: date, time shift started and ended, Subcontractor(s) on-site, Health and Safety items, and Environmental Protection items.
 - 1.10.5.17.5. Records of on-site (within site) movement of soil.
 - 1.10.5.17.6. Records of all material movement onto and off the Site, including records (manifests) of waste movement and disposition, and analytical records as need be.
 - 1.10.5.17.7. Signature of Superintendent and Departmental Representative.
 - 1.10.5.18. Environmental Protection Plan.
 - 1.10.5.19. Reviewed and accepted submittals.
 - 1.10.5.20. Manufacturers' installation and application instructions (as appropriate).
 - 1.10.5.21. National Building Code of Canada (as appropriate).
 - 1.10.5.22. Current construction standards of workmanship listed in technical Sections (as appropriate).
 - 1.10.5.23. Final Meeting Minutes, Agendas and associated Attachments.
 - 1.10.5.24. Other documents as specified by the Departmental Representative.
- 1.10.6. Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
- 1.10.7. Label record documents and file in accordance with Section number listings in List of Contents of this project specification. Label each document "PROJECT RECORD" in neat, large, printed letters.
- 1.10.8. Maintain record documents in clean, dry and legible condition in site office. Do not use record documents for construction purposes.
- 1.10.9. Keep record documents and samples available for inspection the Departmental Representative.
- 1.11. First Aid**
 - 1.11.1. Provide marked and fully stocked first aid case in a readily available location.
- 1.12. Equipment, Tools and Materials Storage**
 - 1.12.1. Provide and maintain, in clean and orderly condition, lockable weatherproof sheds or trailers for storage of tools, equipment and materials.
 - 1.12.2. Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.13. Sanitary Facilities

- 1.13.1. Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- 1.13.2. Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.14. Construction Signage

- 1.14.1. Provide and erect project signs within 5 Working Days of mobilization in a location designated by Departmental Representative.
- 1.14.2. Locate project identification sign as directed by Departmental Representative
- 1.14.3. Direct requests for approval to erect Contractor signboard to Departmental Representative. For consideration general appearance of Contractor signboard must conform to project identification site sign. Wording in both official languages.
- 1.14.4. Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- 1.14.5. Maintain approved signs and notices in good condition for duration of project and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.15. Clean-Up

- 1.15.1. Complete cleaning as outlined in Section 01 74 11 - Cleaning.

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. See 01 11 00.

1.2. Definitions

- 1.2.1. See 01 11 00.

1.3. Installation and Removal

- 1.3.1. The Sites are currently accessible to the general public. Other contractors and Parks Canada staff may be working in the vicinity of all works areas.
- 1.3.2. Provide fencing around any excavations that are unsafe for entry due to location, steepness of sides or depth.
- 1.3.3. Provide fencing around construction facilities, staging areas, waste stockpile areas.
- 1.3.4. Provide temporary controls in order to execute Work expeditiously.
- 1.3.5. Remove from site all such work after use.
- 1.3.6. Ensure all fencing, barriers or hoarding will stand up to strong winds or will allow wind to pass through.

1.4. Hoarding

- 1.4.1. Provide barriers around environmentally sensitive areas or trees and plants designated to remain in accordance with Section 01 35 43 - Environmental Procedures or as directed by PCA. Protect from damage by equipment and construction procedures.

1.5. Guard Rails and Barricades

- 1.5.1. If required, provide secure, rigid guard rails and barricades around work areas as required by Alberta OH&S regulations.

1.6. Access to Site

- 1.6.1. Provide and maintain access routes for access to Work. If necessary, temporary access mats (or other suitable measures approved by the Departmental Representative) are to be utilized to provide access to Work.

1.7. Fire Routes

- 1.7.1. Maintain access to property including overhead clearances for use by emergency response vehicles.

1.8. Protection for Off-Site and Public Property

- 1.8.1. Protect surrounding private and public property from damage during performance of Work.
- 1.8.2. Be responsible for damage incurred.

END OF SECTION

1. PART 1 GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Project Cleanliness

- 1.3.1. Maintain project area in tidy condition, free from accumulation of waste products and debris, or as requested by the Departmental Representative.
- 1.3.2. Provide on-site containers for collection of waste materials, packaging material and debris.
- 1.3.3. Remove construction debris, waste materials and packaging material from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Waste materials, packaging materials and debris are to be disposed in accordance with Section 01 35 13.43 – Special Project Procedures for Contaminated Sites.
- 1.3.4. Clean interior areas of temporary construction facilities prior to, during and following work.
- 1.3.5. Ensure sanitary facilities are maintained in a hygienic manner.
- 1.3.6. Store volatile waste in covered metal containers and remove from premises at end of each working day.

1.4. Final Cleaning

- 1.4.1. When Work is substantially performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- 1.4.2. Remove waste products and debris other than that caused by others and leave Work clean and suitable for occupancy.
- 1.4.3. Prior to final inspection by Departmental Representative and as per Section 01 77 00 Closeout Procedures remove surplus products, tools, construction machinery and equipment.
- 1.4.4. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- 1.4.5. Rake clean other surfaces of ground.
- 1.4.6. Clean dirt or mud tracked onto paved or surfaced roadways.
- 1.4.7. Final cleaning will be subject to inspection by the Departmental Representative.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Inspection and Declaration

1.3.1. Contractor's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

1.3.1.1. Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and submit verification that corrections have been made.

1.3.2. Attend final onsite Owner Inspection to confirm final site condition and work completed according to the contract documents.

1.3.3. Owner Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Any deficiencies reported by the Departmental Representative will be corrected by the Contractor at their cost.

1.3.4. Completion: submit written certificate that the following have been performed as follows:

1.3.4.1. Work has been completed and inspected for compliance with Contract Documents.

1.3.4.2. The Departmental Representative has confirmed that the final limits of all excavations have been sampled and remedial objectives have been met to the satisfaction of the Departmental Representative.

1.3.4.3. Defects have been corrected and deficiencies have been completed.

1.3.4.4. Work is complete and ready for final inspection.

1.3.5. Final Inspection

1.3.5.1. When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.

1.3.5.2. When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

- 1.3.6. Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance.
- 1.3.7. The Contractor must remove all temporary construction facilities (office, sanitary facilities, equipment storage sheds, Soil and Debris Management Facility, etc.) upon completion of the work and at the direction of the Departmental Representative.
- 1.3.8. The Contractor must remove any temporary erosion control measures and temporary fencing upon completion of the work and at the direction of the Departmental Representative.

1.4. Final Payment

- 1.4.1. When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
- 1.4.2. When Work deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

1.5. Submittals

- 1.5.1. Submittals: in accordance with Section 01 78 00 –Closeout Submittals.
- 1.5.2. Submit as instructed by the Departmental Representative, a written certificate that the following have been performed:
 - 1.5.2.1. Work has been completed and inspected by the Departmental Representative in accordance with the Contract.
 - 1.5.2.2. Disposal of soils has been completed.
 - 1.5.2.3. Disposal of hazardous and non-hazardous building materials has been completed.
 - 1.5.2.4. Disposal of recyclable materials has been completed.
 - 1.5.2.5. 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.
 - 1.5.2.6. Qualified Professional report documenting backfilling has met all requirements of the Contract.
 - 1.5.2.7. Sites have been restored as directed by the Departmental Representative.
 - 1.5.2.8. Work is complete and ready for Final Site Inspection.
- 1.5.3. Defective products will be rejected, regardless of previous inspections. Replace defective products.

- 1.5.4. Prepare all documentation required as part of any permits or other authorizations obtained or otherwise the responsibility of the Contractor.

1.6. Cleaning

- 1.6.1. In accordance with Section 01 74 11 - Cleaning.

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. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.4. Completion Documents

1.4.1. Submit as instructed by the Departmental Representative, a written certificate that the following have been performed:

- 1.4.1.1. Work has been completed and inspected by the Departmental Representative in accordance with the Contract.
- 1.4.1.2. Disposal of all debris and soils has been completed.
- 1.4.1.3. Site restoration, including backfilling (if required), grading to match existing contours, topsoil placement and seeding (if required) has been completed.
- 1.4.1.4. 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.
- 1.4.1.5. Work is complete and ready for Final Site Inspection.

1.4.2. 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. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Summary

- 1.3.1. Contractor is responsible for the complete demolition and removal of the building and all man-made infrastructure at site 6.1, including mechanical and electrical equipment, exterior envelope, foundation, and structure.
- 1.3.2. Photos of the building and infrastructure at site 6.1 are provided in Appendix D and footprint dimensions are shown on Drawings. The building and foundation contain lead-based paint and asbestos-containing materials, which will require abatement during the demolition activities.
- 1.3.3. The foundations of all buildings burnt structures and portions thereof are to be completely removed, and any services (water, sewage, etc.) are to be removed and/or capped.
- 1.3.4. Re-grade the site to match adjacent landscaped areas.
- 1.3.5. This section does not include for the removal of Hazardous Substances or asbestos abatement, or selective demolition of interior building components and finishes. Refer to Sections 02 82 00.03 – Asbestos Abatement Maximum Procedures, 02 83 10 Lead-Based Paint – Minimum Procedures and 02 83 11 Lead-Based Paint – Intermediate Procedures.

1.4. Reference Standards

1.4.1. CSA Group (CSA)

- 1.4.1.1. CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

1.4.2. Department of Justice Canada (Jus)

- 1.4.2.1. Canadian Environmental Assessment Act (CEAA), 2012.
- 1.4.2.2. Canadian Environmental Protection Act (CEPA), 2012.
 - 1.4.2.2.1. SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
 - 1.4.2.2.2. SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations.

1.4.2.2.3. Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.4.2.2.4. Motor Vehicle Safety Act (MVSA), 1995

1.4.2.2.5. Hazardous Substances Information Review Act, 1985

1.4.3. National Fire Protection Association (NFPA)

1.4.3.1. NFPA 241-13, Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.4.4. National Research Council Canada (NRC)

1.4.4.1. National Building Code of Canada 2015 (NBC).

1.4.5. U.S. Environmental Protection Agency (EPA)

1.4.5.1. EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles.

1.4.5.2. EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles.

1.5. Administrative Requirements

1.5.1. Coordination: Coordinate with Departmental Representative for the material ownership as follows:

1.5.1.1. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Departmental Representative property, demolished materials shall become the Contractor's property and shall be removed from Project site.

1.5.1.2. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Departmental Representative that may be encountered during demolition remain Departmental Representative's property:

1.5.1.2.1. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Departmental Representative.

1.5.1.2.2. Coordinate with Departmental Representative's, who will establish special procedures for removal and salvage operations.

1.5.2. Pre-Demolition Meetings:

- 1.5.2.1. Convene pre-demolition meeting 1 week prior to beginning work with Departmental Representative in accordance with Section 01 31 19- Project Meetings to:

- 1.5.2.1.1. Verify project requirements.
- 1.5.2.1.2. Verify existing site conditions adjacent to demolition work.
- 1.5.2.1.3. Co-ordination with other construction subtrades.
- 1.5.2.2. Hold project meetings every week.
- 1.5.2.3. Departmental Representative will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

1.5.3. Scheduling:

- 1.5.3.1. Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.
- 1.5.3.1.1. In event of unforeseen delay notify Departmental Representative in writing.

1.6. Action and Informational Submittals

- 1.6.1. Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- 1.6.2. Submit copies of weigh bills, bills of lading or receipts from authorized disposal sites and reuse and recycling facilities for material removed from site on a weekly basis or upon request of Departmental Representative.

1.7. Quality Assurance

- 1.7.1. Regulatory Requirements: Ensure Work is performed in compliance with TDGA, CEPA, CEAA, and applicable Provincial regulations.
 - 1.7.1.1. Comply with hauling and disposal regulations of Authority Having Jurisdiction.
- 1.7.2. Regulatory Requirements: Perform work of this Section in accordance with the following:
 - 1.7.2.1. Alberta Workers' Compensation Board.
 - 1.7.2.2. Alberta Occupational Health and Safety Standards and Programs, Government of Canada, Labour Program: Workplace Safety.

1.8. Site Conditions

1.8.1. Environmental protection:

- 1.8.1.1. Ensure Work is done in accordance with Section 01 35 43-Environmental Procedures.
- 1.8.1.2. Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
- 1.8.1.3. Fires and burning of waste or materials is not permitted on site.
- 1.8.1.4. Do not bury rubbish waste materials.
- 1.8.1.5. Do not dispose of waste volatile materials including but not limited to: mineral spirits, oil, petroleum-based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
- 1.8.1.6. Ensure proper disposal procedures are maintained throughout project.

1.8.2. Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.

1.8.3. Control disposal or runoff of water containing suspended materials or other harmful substances.

1.8.4. Protect trees, plants and foliage on site and adjacent properties where indicated.

1.8.5. Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.

1.8.6. Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

1.8.7. Conduct structure demolition so operations will not be disrupted:

- 1.8.7.1. Provide not less than 72 hours' notice to Departmental Representative of activities that will affect operations.
- 1.8.7.2. Maintain access to existing walkways, exits, and other adjacent occupied or used facilities:

1.8.7.2.1. Do not close or obstruct walkways, exits, or other occupied or used facilities without written permission from Departmental Representative.

1.8.8. Departmental Representative assumes no responsibility for buildings and structures being demolished:

- 1.8.8.1. Conditions existing at time of inspection for bidding purpose will be maintained by Departmental Representative as far as practical.
- 1.8.8.2. Remove, protect and store salvaged items as directed by the Departmental Representative before structure demolition.
- 1.8.8.3. Deliver to Departmental Representative as directed.

1.9. Existing Conditions

- 1.9.1. Existing Conditions: Condition of materials identified as being demolished are based on their observed condition at time of site examination before tendering.
- 1.9.2. Existing Hazardous Substances: Departmental Representative has performed a hazardous substances assessment and identified materials requiring abatement as follows:
 - 1.9.2.1. Hazardous substances are as defined in the Hazardous Products Act.
 - 1.9.2.2. Hazardous substances are documented in Appendix C and D.
 - 1.9.2.3. Hazardous substances will be removed by the Contractor as a part of the Contract prior to demolition in accordance with work results described in Related Requirements listed above.
- 1.9.3. Discovery of Hazardous Substances: Immediately notify Departmental Representative if materials suspected of containing hazardous substances that are not already documented are encountered and perform the following activities:
 - 1.9.3.1. Hazardous substances will be as defined in the Hazardous Products Act.
 - 1.9.3.2. Stop work in the area of the suspected hazardous substances.
 - 1.9.3.3. Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.
 - 1.9.3.4. Hazardous substances will be removed by Departmental Representative under a separate contract or as a change to the Work.
 - 1.9.3.5. Proceed only after written instructions have been received from Departmental Representative.

2. PART 2 – PRODUCTS

2.1. Equipment

- 2.1.1. Equipment and heavy machinery:
 - 2.1.1.1. Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

3. PART 3 – EXECUTION

3.1. Examination

- 3.1.1. Survey existing conditions and correlate with requirements indicated to determine extent of structure demolition required.

- 3.1.2. Review Project Record Documents of existing construction provided by the Departmental Representative.
- 3.1.3. Departmental Representative does not guarantee that existing conditions are the same as those indicated in Project Record Documents.
- 3.1.4. Inventory and record the condition of items being removed.
- 3.1.5. When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element.
- 3.1.6. Promptly submit a written report to Departmental Representative.
- 3.1.7. Verify that Hazardous Substances have been remediated before proceeding with structure demolition operations.

3.2. Preparation

3.2.1. Surface Preparation:

- 3.2.1.1. Disconnect and re-route electrical and telephone service lines entering buildings to be demolished.
 - 3.2.1.1.1. Post warning signs on electrical lines and equipment which must remain energized to serve other properties during period of demolition.
- 3.2.1.2. Disconnect and cap designated mechanical services.
 - 3.2.1.2.1. Natural gas supply lines: remove in accordance with gas company requirements.
 - 3.2.1.2.2. Sewer and water lines: remove in accordance with authority having jurisdiction.
 - 3.2.1.2.3. Other underground services: remove and dispose of to property line.
- 3.2.1.3. Do not disrupt active or energized utilities traversing premises.

3.3. Demolition

- 3.3.1. Protect demolition work in accordance with CSA S350, unless otherwise specified.
- 3.3.2. Blasting operations not permitted during demolition.
- 3.3.3. Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.
- 3.3.4. Prior to start of Work remove contaminated or hazardous materials as directed by Departmental Representative and remove from site and dispose of at designated disposal facilities in safe manner and in accordance with Sections 02 82 00, 02 83 10 and 02 83 11.
- 3.3.5. Demolish structures and services to the structures.

- 3.3.6. Demolish foundation, walls and footings.
- 3.3.7. At end of each day's work, leave Work in safe and stable condition.
- 3.3.8. Demolish to minimize dusting.
- 3.3.9. Remove structural framing.
- 3.3.10. Contain fibrous materials to minimize release of airborne fibres while being transported within facility.
- 3.3.11. Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.
- 3.3.12. Use natural lighting to do Work where possible.
 - 3.3.12.1. Shut off lighting except those required for security purposes at end of each day.

3.4. Site Restoration

- 3.4.1. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes.
- 3.4.2. Provide a smooth transition between adjacent existing grades and new grades.

3.5. Cleaning

- 3.5.1. Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- 3.5.2. Leave work area clean at the end of each day.
- 3.5.3. Remove debris, trim surfaces and leave work area clean upon completion of work.
- 3.5.4. Use cleaning solution and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or groundwater.
- 3.5.5. Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Related Sections

- 1.3.1. Section 01 11 00 – Summary of Work.
- 1.3.2. Section 01 33 00 - Submittal Procedures.
- 1.3.3. Section 01 35 13.43 – Special Project Procedures for Contaminated Sites
- 1.3.4. Section 01 35 43 – Environmental Procedures
- 1.3.5. Section 01 77 00 - Closeout Procedures.
- 1.3.6. Section 31 23 33.01 - Excavation, Trenching and Backfilling.

1.4. References

- 1.4.1. CCME (Canadian Council of Ministers of the Environment) Contaminated Sites, Contaminated Soil and Groundwater, and Remediation of Contaminated Sites most current publications.
- 1.4.2. Transportation of Dangerous Goods Act, 1992 (TDGA).
- 1.4.3. Alberta Waste Control Regulation.
- 1.4.4. RARMP Report (Appendix C)

1.5. Action and Informational Submittals

- 1.5.1. Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- 1.5.2. Provide evidence of appropriate licensing for transport of Contaminated Soil, Hazardous Materials/Debris, Non-Hazardous Refuse/Debris and Recyclable Materials (including for any subcontractor retained to transport such materials).
- 1.5.3. Identify the location of the Soil/Debris Management and Stockpiling Area(s) as outlined in Section 01 35 13.43 – Special Project Procedures for Contaminated Sites. Work must NOT proceed until the Departmental Representative has approved the location of the Soil/Debris Management and Stockpiling Area(s) and is satisfied the facility is technically appropriate for the short-term handling and storage of the excavated materials.
- 1.5.4. Provide environmental protection in accordance with the Environmental Protection Plan - Section 01 35 43 - Environmental Procedures
- 1.5.5. Identify the facility(s) that are to be used to treat and/or dispose of each of the categories of materials identified as outlined in Section 01 35 13.43 – Special

Project Procedures for Contaminated Sites. Provide evidence that they are authorized and/or licensed to accept, treat and dispose of the specific category of material. Work must NOT proceed until the Departmental Representative has approved facility(s) and is satisfied the receiving facilities are appropriately qualified and have the required permits and approvals and is technically appropriate for the disposal of the material.

1.5.6. 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.

1.5.7. Work Sequencing: within 10 Working Days of Contract award and prior to mobilization to Site, Submit Work sequencing description and schedule.
Includes:

- 1.5.7.1. Work Sequencing description must describe sequence, methods and means to perform each major task.
- 1.5.7.2. 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.
- 1.5.7.3. Major tasks include: pre-mobilization Work, Mobilization, Site Preparation, installation of temporary facilities, excavation in each area, excavating grading and contouring, backfilling, offsite transportation, offsite disposal, Site Restoration, site closure and Demobilization.
- 1.5.7.4. Must comply with requirements in Section 01 32 16 07 Construction Progress Schedule.

1.5.8. Import Fill Material Quality: at least 5 Working Days prior to bringing material onsite, submit documentation verifying that material is acceptable for import and intended use. Include:

- 1.5.8.1. Location of the source.
- 1.5.8.2. Grain-size distribution information.
- 1.5.8.3. Chemical analyses for Potential Contaminants of Concern, including metals, PAH, BTEX and petroleum hydrocarbon fractions F1-F4.
- 1.5.8.4. Import fill materials must meet the Canadian Council of Ministers of the Environment Soil Quality Guidelines for Residential/Parkland and Agricultural Land Uses.
- 1.5.8.5. Testing to be performed by a Qualified Professional at sufficient frequency to characterize all material imported to Site. Test using appropriate guidelines and practices.

2. PART 2 – DELIVERY, STORAGE AND HANDLING

2.1. Project/Site Conditions

2.1.1. Existing Conditions.

- 2.1.1.1. Review the proposed excavation areas on the Drawings that summarize the approximate areal extent of known Contaminated Soil, Hazardous Materials/Debris, Non-Hazardous Refuse/Debris and Recyclable Materials.
- 2.1.1.2. The Contaminated Soil excavations will extend to approximately 0.3 metres below grade unless otherwise specified on the Drawings
- 2.1.1.3. The limits of the excavations and extents of debris will be identified in the field by the Departmental Representative as a starting point for the Contractor.
- 2.1.1.4. Buried services to be addressed as outlined in Section 31 23 33.01 - Excavating, Trenching and Backfilling.

2.2. Sequencing

- 2.2.1. All remediation works are to be completed within the work windows described in Section 01 11 00 – Summary of Work.
- 2.2.2. All other work must be sequenced in consultation with the Departmental Representative.

3. PART 3 - PRODUCTS

3.1. Materials

- 3.1.1. Do not import backfill material until Departmental Representative has reviewed analytical results. 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). For bidding purposes please allow one day for sampling, and a two working-day turnaround for completion of analysis. The two-day period will start the day following sampling.
- 3.1.2. Import fill materials to meet the following minimum requirements:
 - 3.1.2.1. 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. The aggregate particles must be uniform in quality and free from clay lumps, wood and free from an excess of flat or elongated pieces.

- 3.1.2.2. Be free of weeds and invasive species.
- 3.1.2.3. Import fill materials must originate from a clean source, and meet the Canadian Council of Ministers of the Environment *Soil Quality Guidelines for Residential/Parkland and Agricultural Land Uses*.
- 3.1.2.4. Any import fill material which has a discrete sample exceeding the standards or guidelines specified must be removed from the Site and replaced, including relevant placed material, as instructed by the Departmental Representative, and an alternate source of backfill must be provided, with no increases to Contract Amount or Extension of Time for completion of the Work.
- 3.1.3. Departmental Representative will inspect import fill material and will not allow import of fill material that varies from Submittal samples.
- 3.1.4. Import fill material additional testing:
 - 3.1.4.1. Perform additional testing as instructed by the Departmental Representative.
 - 3.1.4.2. Facilitate testing by the Departmental Representative.
 - 3.1.4.3. Backfill according to Section 31.23.33.01 - Excavating, Trenching and Backfilling.

4. PART 4 - EXECUTION

4.1. Preparation

- 4.1.1. Complete activities required to facilitate remediation activities as outlined in Section 01 56 00 - Temporary Barriers and Enclosures and Section 01 35 13.43 - Special Project Procedures for Contaminated Sites.
- 4.1.2. Complete plant protection as outlined in Section 01 35 13.43 - Special Project Procedures for Contaminated Sites and Section 01 35 43 - Environmental Procedures.
- 4.1.3. Establish Soil/Debris Management and Stockpile Area(s) per Section 01 35 13.43 - Special Project Procedures for Contaminated Sites.

4.2. Excavation

- 4.2.1. Where required, provide water control as outlined in Section 01 35 43- Environmental Procedures.
- 4.2.2. Complete excavation in accordance with requirements of Section 31 23 33.01 - Excavating, Trenching and Backfilling, Section 01 35 13 43 - Special Project Procedures for Contaminated Sites and Section 01 35 43 - Environmental Procedures.

4.3. Stockpiling

- 4.3.1. In accordance with the Contaminated Material and Non-Contaminated Material Management Plan. Section 01 35 13 43 - Special Project Procedures for Contaminated Sites
- 4.3.2. Following separation of Contaminated Soil, Hazardous Materials/Debris, Non-Hazardous Refuse/Debris and Recyclable Materials at the Soil/Debris Management and Stockpile Area(s), Wastes and Recyclables are to be stockpiled in the Soil/Debris Management and Stockpile Area(s) according to the classification provided by the Departmental Representative or as directed by the Departmental Representative while awaiting final disposal.

4.4. Transport

- 4.4.1. In accordance with the Contaminated Material and Non-Contaminated Material Management Plan. Section 01 35 13 43 - Special Project Procedures for Contaminated Sites all excavated Contaminated Soil and Hazardous Materials/Debris must be removed from the Site and be transported to a facility permitted to receive the material quality (based on classification provided by Departmental Representative) being disposed of or treated.
- 4.4.2. All Non-Hazardous Refuse/Debris and general rubbish (i.e. Waste) must be removed from the Site and be transported to a facility permitted to receive the material being disposed of.
- 4.4.3. All Recyclable Materials must be removed from the Site and be transported to a facility licensed and authorized to accept such materials.
- 4.4.4. Cover material while being transported to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation from material.
- 4.4.5. Use watertight truck bodies for transporting excavated materials. Do not allow excess water in excavated materials to flow out of vehicle during transport.
- 4.4.6. Stabilize soil or other material as necessary.
- 4.4.7. Transport material by appropriately licensed and equipped vehicles and operators.
- 4.4.8. Manifest and correlate weights of all material transported from site documenting weight at removal from site, movement, transfer stations, interim storage, and weight of material at final disposal facility. Manifests to contain all information specified in Section 01 35 13 43 - Special Project Procedures for Contaminated Sites.
- 4.4.9. Submit all manifests, as instructed by the Departmental Representative.
- 4.4.10. Resolve discrepancies in manifests for material transported as required by regulations and as acceptable to the Departmental Representative. Discrepancies include:
 - 4.4.10.1. No manifest or an incomplete manifest.

- 4.4.10.2. The material transported does not match the description in the manifest.
- 4.4.10.3. The amount transported differs by more than 5% in the manifest.
- 4.4.10.4. The material transported is in a hazardous condition.
- 4.4.11. Load and transport soil in a manner as to prevent contamination of the Site and transportation routes. See Special Project Procedures for Contaminated Sites (Vehicular access and parking).
- 4.4.12. Clean access and transport roads as outlined in Section –01 35 00.06 – Special Procedures for Traffic Control.
- 4.4.13. Departmental Representative may collect soil samples for chemical analyses from traveling surfaces of constructed and existing access routes prior to, during, and upon completion of Work. Excavate and dispose of clean soil contaminated by Contractor's activities at no additional cost to PCA.

4.5. Backfilling

- 4.5.1. Complete backfilling in accordance with requirements of Section 31 23 33.01 - Excavating, Trenching and Backfilling, Section 01 35 13 43 - Special Project Procedures for Contaminated Sites and Section 01 35 43 - Environmental Procedures.

4.6. Restoration

- 4.6.1. Compact and grade excavation backfill where required in Appendix C.
- 4.6.2. Place imported topsoil where required in Appendix C.
- 4.6.3. Where backfill and topsoil placement is not required rough grade and contour excavations at sites as identified on Drawings.
- 4.6.4. Final site grades must follow the existing land contours present before Work commenced, unless otherwise specified
- 4.6.5. Seed disturbed areas with a seed mix that will be specified in the BIA/BMP
- 4.6.6. 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.
- 4.6.7. Clean permanent access roads of contamination resulting from project activity as required or as instructed of Departmental Representative, with no increases to Contract Amount or Extension of Time for completion of the Work

4.7. Equipment Decontamination

- 4.7.1. Decontaminate equipment used during the remediation and remove from site at end of remediation activities. Refer to Section 01 35 13 43 Special Project Procedures for Contaminated Sites.

4.8. Demobilization

- 4.8.1. Do not demobilize until instructed by Departmental Representative.
- 4.8.2. Demobilize all necessary equipment, materials, and personnel from Site in an orderly and efficient manner.

END OF SECTION

1. PART 1 – GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Summary

1.3.1. Comply with requirements of this Section when performing following Work:

- 1.3.1.1. Remove and dispose of the asbestos-containing materials as identified in the RARMP report in Appendix C, D and Drawings. The scope of work is to include, but not be limited to, materials identified in the RARMP report and as directed by the Departmental Representative. Work will also include the removal and disposal of all settled dust and debris and other identified asbestos-containing or potentially contaminated materials.
- 1.3.1.2. The Contractor is responsible for all quantity determinations of asbestos-containing materials to be removed.
- 1.3.1.3. Refer to the Drawing List for the location and quantities of asbestos containing materials.

1.3.2. Due to the remote location of the work site, modification to the presented requirements for containment construction and decontamination may be applicable. Alternative procedures must comply with the intent of the Section directives to isolate the work area, protect the workers, minimize fibre release and ensure proper cleanup and decontamination. Any modifications to the requirements must be approved by the Departmental Representative prior to implementation. Public access around the work site must also be accounted for in any modified procedures.

1.4. Reference Standards

1.4.1. Canadian General Standards Board (CGSB)

- 1.4.1.1. CAN/CGSB-1.205-94, Sealer for Application of Asbestos Fibre Releasing Materials.

1.4.2. Department of Justice Canada (Jus)

- 1.4.2.1. Canadian Environmental Protection Act, 1999 (CEPA).
- 1.4.3. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - 1.4.3.1. Safety Data Sheets (SDS).
- 1.4.4. Transport Canada (TC)
 - 1.4.4.1. Transportation of Dangerous Goods Act, 1992 (TDGA).
- 1.4.5. Underwriters' Laboratories of Canada (ULC)
- 1.4.6. Alberta OH&S Act, Regulations and Code
 - 1.4.6.1. Alberta Asbestos Abatement Manual.

1.5. Action and Informational Submittals

- 1.5.1. Submittals in accordance with Section 01 33 00- Submittal Procedures.
- 1.5.2. Submit proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of asbestos containing waste in accordance with requirements of authority having jurisdiction.
- 1.5.3. Submit proof of Contractor's Asbestos Liability Insurance.
- 1.5.4. Submit to Departmental Representative necessary permits for transportation and disposal of asbestos containing waste and proof that asbestos containing waste has been received and properly disposed.
- 1.5.5. Submit proof satisfactory to Departmental Representative that all asbestos workers have attended asbestos abatement course, of not less than two days duration, approved by Departmental Representative.
- 1.5.6. Submit proof that supervisory personnel have attended asbestos abatement course, of not less than two days duration, approved by Departmental Representative. Minimum of one supervisor for every ten workers.
- 1.5.7. Submit layout of proposed enclosures and decontamination facilities to Departmental Representative for review.
- 1.5.8. Submit documentation including test results for sealer proposed for use.
- 1.5.9. Submit Alberta Notice of Project form.
- 1.5.10. Submit Worker's Compensation Board status and transcription of insurance.
- 1.5.11. Submit documentation including test results, fire and flammability data, and Safety Data Sheets (SDS) for chemicals or materials including:
 - 1.5.11.1. Encapsulants;
 - 1.5.11.2. Amended water;
 - 1.5.11.3. Slow drying sealer.

- 1.5.12. Submit proof satisfactory to Departmental Representative that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.

1.6. Quality Assurance

- 1.6.1. Regulatory Requirements: comply with Federal, Provincial and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at the time work is performed.
- 1.6.2. Health and Safety:
- 1.6.2.1. Do construction occupational health and safety in accordance with Section 01 35 29.14- Health and Safety for Contaminated Sites.
 - 1.6.2.2. Safety Requirements: worker and visitor protection.
 - 1.6.2.3. Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:
 - 1.6.2.3.1. Powered air purifying respirator (PAPR) with N-100, R-100 or P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.
 - 1.6.2.3.2. Disposable type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area. The protective clothing to consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing. It

includes suitable footwear. Protective clothing is to be repaired or replaced if torn. Requirements for each worker:

- 1.6.2.3.2.1. Remove street clothes in clean change room and put on respirator with new filters or reusable filters that have been tested as satisfactory, clean coveralls and head covers before entering Equipment and Access Rooms or Asbestos Work Area. Store street clothes, uncontaminated footwear, towels, and similar uncontaminated articles in clean change room.
- 1.6.2.3.2.2. Remove gross contamination from clothing before leaving work area then proceed to Equipment and Access Room and remove clothing except respirators. Place contaminated work suits in receptacles for disposal with other asbestos - contaminated materials. Leave reusable items except respirator in Equipment and Access Room. Still wearing the respirator proceed naked to showers. Using soap and water wash body and hair thoroughly. Clean outside of respirator with soap and water while showering; remove respirator; remove filters and wet them and dispose of filters in container provided for purpose; and wash and rinse inside of respirator. When not in use in work area, store work footwear in Equipment and Access Room. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from work area or from Equipment and Access Room.
- 1.6.2.3.2.3. After showering and drying off, proceed to clean change room and dress in street clothes at end of each day's work, or in clean coveralls before eating, smoking, or drinking. If re-entering work area, follow procedures outlined in paragraphs above.
- 1.6.2.3.2.4. Enter unloading room from outside dressed in clean coveralls to remove waste containers and equipment from Holding Room of Container and Equipment Decontamination Enclosure system. Workers must not use this system as means to leave or enter work area.
- 1.6.2.4. Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
- 1.6.2.5. Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual asbestos abatement.

- 1.6.2.6. Provide and post in Clean Change Room and in Equipment and Access Room the procedures described in this Section, in both official languages.
- 1.6.2.7. Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.
- 1.6.2.8. Visitor Protection:
 - 1.6.2.8.1. Provide protective clothing and approved respirators to Authorized Visitors to work areas.
 - 1.6.2.8.2. Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.
 - 1.6.2.8.3. Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

1.7. Waste Management and Disposal

- 1.7.1. Separate waste materials for recycling or non-hazardous waste streams in accordance with Section 01 35 13.43 – Special Procedures for contaminated sites, and 02 61 00.00 – Soil remediation.
- 1.7.2. Remove from site and dispose of packaging materials at appropriate recycling facilities.
- 1.7.3. Separate for recycling and place in designated containers metal waste in accordance with Waste Management Plan.
- 1.7.4. Place materials defined as hazardous or toxic in designated containers that have appropriate warning labels.
- 1.7.5. Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- 1.7.6. Fold up metal banding, flatten and place in designated area for recycling.
- 1.7.7. Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 mils bags or leak proof drums. Label containers with appropriate warning labels.
- 1.7.8. Provide manifests describing and listing waste created. Transport containers by approved means to licenced landfill for burial.

1.8. Existing Conditions

- 1.8.1. Information pertaining to ACMs to be handled, removed, or otherwise disturbed and disposed of during this Project are bound into this specification in Appendix D and the Drawing List.
- 1.8.2. Notify Departmental Representative of friable material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do

not disturb such material pending instructions from Departmental Representative.

- 1.8.3. A copy of the Hazardous Materials Assessment is presented in Appendix D.

1.9. Personnel Training

- 1.9.1. Before beginning Work, provide Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene including dress and showers, in entry and exit from Asbestos Work Area, in aspects of work procedures including glove bag procedures, and in use, cleaning, and disposal of respirators and protective clothing.
- 1.9.2. Instruction and training related to respirators includes the following minimum requirements:
- 1.9.2.1. Fitting of equipment.
 - 1.9.2.2. Inspection and maintenance of equipment.
 - 1.9.2.3. Disinfecting of equipment.
 - 1.9.2.4. Limitations of equipment.
- 1.9.3. Instruction and training must be provided by competent, qualified person.
- 1.9.4. Supervisory personnel to complete required training.

2. PART 2 – PRODUCTS

2.1. Materials

- 2.1.1. Polyethylene: minimum 0.15 mm thick unless otherwise specified; in sheet size to minimize joints.
- 2.1.2. FR polyethylene: minimum 0.15 mm thick, woven fibre reinforced fabric bonded both sides with polyethylene.
- 2.1.3. Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under both dry conditions and wet conditions using amended water.
- 2.1.4. Wetting agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether, or other material approved by Departmental Representative, mixed with water in

concentration to provide adequate penetration and wetting of asbestos containing material.

2.1.5. Waste Containers: contain waste in two separate containers.

- 2.1.5.1. Inner container: 0.15 mm thick sealable polyethylene bag or where glove bag method is used, glove bag itself.
- 2.1.5.2. Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
- 2.1.5.3. Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site. Label containers in accordance with Asbestos Regulations 29 CFR 1910.1001. Label in both official languages.

2.1.6. Glove bag:

- 2.1.6.1. Acceptable materials: safe-T-Strip products in configuration suitable for Work, or Alternative material approved by addendum during tendering period in accordance with Instructions to Tenderers.
- 2.1.6.2. The glove bag to be equipped with:
 - 2.1.6.2.1. Sleeves and gloves that are permanently sealed to the body of the bag to allow the worker to access and deal with the insulation and maintain a sealed enclosure throughout the work period.
 - 2.1.6.2.2. Valves or openings to allow insertion of a vacuum hose and the nozzle of a water sprayer while maintaining the seal to the pipe, duct or similar structure.
 - 2.1.6.2.3. A tool pouch with a drain.
 - 2.1.6.2.4. A seamless bottom and a means of sealing off the lower portion of the bag.
 - 2.1.6.2.5. A high strength double throw zipper and removable straps, if the bag is to be moved during the removal operation.
- 2.1.7. Tape: tape suitable for sealing polyethylene to surfaces under both dry and wet conditions using amended water.
- 2.1.8. Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.

3. PART 3 – EXECUTION

3.1. PREPARATION

- 3.1.1. Do construction occupational health and safety in accordance with Section 01 35 29.06- Health and Safety Requirements.
- 3.1.2. Work Areas:
 - 3.1.2.1. Omitted – Not applicable
 - 3.1.2.2. Clean proposed work areas using, where practicable, HEPA vacuum cleaning equipment. If not practicable, use wet cleaning method. Do not use methods that raise dust, such as dry sweeping, or vacuuming using other than HEPA vacuum equipment.
 - 3.1.2.3. The spread of dust from the work area to be prevented by:
 - 3.1.2.3.1. Using enclosures of polyethylene or other suitable material that is impervious to asbestos (including, if the enclosure material is opaque, one or more transparent window areas to allow observation of the entire work area from outside the enclosure), if the work area is not enclosed by walls.
 - 3.1.2.3.2. Using curtains of polyethylene sheeting or other suitable material that is impervious to asbestos, fitted on each side of each entrance or exit from the work area.
 - 3.1.2.4. Put negative pressure system in operation and operate continuously from time first polyethylene sheet is installed to seal openings until final completion of work including final cleanup. Provide continuous monitoring of pressure difference using automatic recording instrument. The system to maintain a negative air pressure of 0.02 inches of water, relative to the area outside the enclosed area. The system to be inspected and maintained by a competent person prior each use to ensure that there is no air leakage, and if the filter is found to be damaged or defective, it to be replaced before the ventilation system is used.
 - 3.1.2.5. Seal off openings such as corridors, doorways, windows, skylights, ducts, grilles, and diffusers, with polyethylene sheeting sealed with tape.
 - 3.1.2.6. Cover floor and wall surfaces with polyethylene sheeting sealed with tape. Cover floors first so that polyethylene extends at least 300 mm up walls then cover walls to overlap floor sheeting.
 - 3.1.2.7. Build airlocks at entrances to and exits from work areas so that work areas are always closed off by one curtained doorway when workers enter or exit.
 - 3.1.2.8. At each 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:

"CAUTION ASBESTOS HAZARD AREA (25 mm) NO UNAUTHORIZED ENTRY (19 mm) WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)".

- 3.1.2.9. Omitted – Not Applicable
- 3.1.2.10. Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Authority having jurisdiction.
- 3.1.2.11. Where application of water is required for wetting asbestos containing materials, 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.
- 3.1.2.12. After preparation of work areas and Decontamination Enclosure Systems, for the removal of all other asbestos containing materials, remove within work area and dispose of as contaminated waste in specified containers. Spray asbestos debris and immediate work area with amended water to reduce dust, as work progresses.

3.1.3. Worker Decontamination Enclosure System:

- 3.1.3.1. Worker Decontamination Enclosure System includes Equipment and Access Room, Shower Room, and Clean Room, as follows:
 - 3.1.3.1.1. Equipment and Access Room: build Equipment and Access Room between Shower Room and work areas, with two curtained doorways, one to Shower Room and one to work areas. Install portable toilet, waste receptor, and storage facilities for workers' shoes and protective clothing to be reworn in work areas. Build Equipment and Access Room large enough to accommodate specified facilities, other equipment needed, and at least one worker allowing him /her sufficient space to undress comfortably.
 - 3.1.3.1.2. Shower Room: build Shower Room between Clean Room and Equipment and Access Room, with two curtained doorways, one to Clean Room and one to Equipment and Access Room. Provide one shower for every five workers. Provide constant supply of hot and cold or warm water. Provide soap, clean towels, and appropriate containers for disposal of used respirator filters.
 - 3.1.3.1.3. Clean Room: build Clean Room between Shower Room and clean areas outside of enclosures, with two curtained doorways, one to outside of enclosures and one to

Shower Room. 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.

3.1.4. Container and Equipment Decontamination Enclosure System:

3.1.4.1. Container and Equipment Decontamination Enclosure System consists of Staging Area within work area, Washroom, Holding Room, and Unloading Room. Purpose of system is to provide means to decontaminate waste containers, scaffolding, waste and material containers, vacuum and spray equipment, and other tools and equipment for which Worker Decontamination Enclosure System is not suitable.

3.1.4.1.1. Staging Area: designate Staging Area in work area for gross removal of dust and debris from waste containers and equipment, labelling and sealing of waste containers, and temporary storage pending removal to Washroom. Equip Staging Area with curtained doorway to Washroom.

3.1.4.1.2. Washroom: build Washroom between Staging Area and Holding Room with two curtained doorways, one to Staging Area and one to Holding Room. Provide high pressure, low volume sprays for washing of waste containers and equipment. Pump waste water through 5 micrometre filter system before directing into drains. Provide piping and connect to water sources and drains.

3.1.4.1.3. Holding Room: build Holding Room between Washroom and Unloading Room, with two curtained doorways, one to Washroom and one to Unloading Room. Build Holding Room sized to accommodate at least two waste containers and largest item of equipment used.

3.1.4.1.4. Unloading Room: build Unloading Room between Holding Room and outside, with two curtained doorways, one to Holding Room and one to outside.

3.1.5. Construction of Decontamination Enclosures:

3.1.5.1. Build suitable framing for enclosures or use existing rooms where convenient, and line with polyethylene sheeting sealed with tape

- 3.1.5.2. Build curtained doorways between enclosures so that when people move through or when waste containers and equipment are moved through doorway, one of two closures comprising doorway always remains closed.

3.1.6. Separation of Work Areas from Occupied Areas:

- 3.1.6.1. Separate parts of building required to remain in use as indicated from parts of building used for asbestos abatement by means of airtight barrier system constructed as follows:
 - 3.1.6.1.1. Build suitable floor to ceiling lumber or metal stud framing, cover with polyethylene sheeting sealed with tape, and apply 9 mm minimum thick plywood. Seal joints between plywood sheets and between plywood and adjacent materials with surface film forming type sealer, to create airtight barrier.
 - 3.1.6.1.2. Cover plywood barrier with polyethylene sealed with tape, as specified for work areas.

3.1.7. Maintenance of Enclosures:

- 3.1.7.1. Maintain enclosures in tidy condition.
- 3.1.7.2. Ensure that barriers and polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery.
- 3.1.7.3. Visually inspect enclosures at beginning of each working period.
- 3.1.7.4. Use smoke methods to test effectiveness of barriers when directed by Departmental Representative.

3.1.8. Do not begin Asbestos Abatement work until:

- 3.1.8.1. Arrangements have been made for disposal of waste.
- 3.1.8.2. For wet stripping techniques, arrangements have been made for containing, filtering, and disposal of waste water.
- 3.1.8.3. Work areas and decontamination enclosures and parts of building required to remain in use are effectively segregated.
- 3.1.8.4. Tools, equipment, and materials waste containers are on hand.
- 3.1.8.5. Arrangements have been made for building security.
- 3.1.8.6. Warning signs are displayed where access to contaminated areas is possible.
- 3.1.8.7. Notifications have been completed and other preparatory steps have been taken.

3.2. SUPERVISION

- 3.2.1. Minimum of one Supervisor for every ten workers is required.
- 3.2.2. Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos containing materials.

3.3. ASBESTOS REMOVAL

- 3.3.1. Before removing asbestos:
 - 3.3.1.1. Prepare site.
 - 3.3.1.2. Spray asbestos material with water containing specified wetting agent, using airless spray equipment capable of providing "mist" application to prevent release of fibres. Saturate asbestos material sufficiently to wet it to substrate without causing excess dripping. Spray asbestos material repeatedly during work process to maintain saturation and to minimize asbestos fibre dispersion.
- 3.3.2. Remove saturated asbestos material in small sections. Do not allow saturated asbestos to dry out. As it is being removed pack material in sealable plastic bags 0.15 mm minimum thick and place in labelled containers for transport.
- 3.3.3. Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers to decontamination Washroom. Wash containers thoroughly in decontamination Washroom, and store in Holding Room pending removal to Unloading Room and outside. Ensure that containers are removed from Holding Room by workers who have entered from uncontaminated areas dressed in clean coveralls.
- 3.3.4. After completion of stripping work, wire brush and wet sponge surfaces from which asbestos has been removed to remove visible material. During this work keep surfaces wet.
- 3.3.5. After wire brushing and wet sponging to remove visible asbestos, wet clean entire work area including Equipment and Access Room, and equipment used in process. After 24 hour period to allow for dust settling, wet clean these areas and objects again. During this settling period no entry, activity, or ventilation will be permitted. After inspection by Departmental Representative apply continuous coat of slow drying sealer to surfaces of work area. Allow at least 16 hours with no entry, activity, ventilation, or disturbance other than operation of negative pressure units during this period.

- 3.3.6. Work is subject to visual inspection and air monitoring. Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
- 3.3.7. Cleanup:
 - 3.3.7.1. Frequently during Work and immediately after completion of work, clean up dust and asbestos containing waste using HEPA vacuum or by damp mopping.
 - 3.3.7.2. Place dust and asbestos containing waste in sealed dust tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste and wet and fold to contain dust and then place in waste bags.
 - 3.3.7.3. Immediately before their removal from Asbestos Work Area and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.
 - 3.3.7.4. Seal and remove double bagged waste from site. Dispose of in accordance with requirements of Provincial/Territorial and Federal authority having jurisdiction. Supervise disposal and ensure that the landfill operator is fully aware of hazardous nature of material to be disposed and that guidelines and regulations for asbestos disposal are followed.
 - 3.3.7.5. Perform final thorough clean-up of Asbestos Work Areas and adjacent areas affected by Work using HEPA vacuum.

3.4. FINAL CLEANUP

- 3.4.1. Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum visible asbestos containing particles observed during cleanup, immediately, using HEPA vacuum equipment.
- 3.4.2. Place polyethylene seals, tape, cleaning material, clothing, and other contaminated waste in plastic bags and sealed labelled waste containers for transport.
- 3.4.3. Include in clean-up Work areas, Equipment and Access Room, Washroom, Shower Room, and other contaminated enclosures.
- 3.4.4. Include in clean-up sealed waste containers and equipment used in Work and remove from work areas, via Container and Equipment Decontamination Enclosure System, at appropriate time in cleaning sequence.

- 3.4.5. Conduct final check to ensure that no dust or debris remains on surfaces as result of dismantling operations and carry out air monitoring again to ensure that asbestos levels in building do not exceed 0.01 fibres per cubic centimetre (f/cc). Repeat cleaning using HEPA vacuum equipment, or wet cleaning methods where feasible, in conjunction with sampling until levels meet these criteria.
- 3.4.6. As work progresses, and to prevent exceeding available storage capacity on site, remove sealed and labelled containers containing asbestos waste and dispose of to authorized disposal area in accordance with requirements of disposal authority. Ensure that each shipment of containers transported to the landfill is accompanied by Contractor's representative to ensure that disposal is done in accordance with governing regulations.

3.5. RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

- 3.5.1. When cleanup is complete:
 - 3.5.1.1. Repair or replace objects damaged in course of work to their original state or better, as directed by Departmental Representative.

3.6. AIR MONITORING

- 3.6.1. From beginning of Work until completion of cleaning operations, Departmental Representative to take air samples on daily basis outside of work area enclosure in accordance with Health Canada recommendations.
 - 3.6.1.1. Contractor will be responsible for monitoring inside enclosure in accordance with applicable Provincial Occupational Health and Safety Regulations.
- 3.6.2. Use results of air monitoring inside work area to establish type of respirators to be used. Workers may be required to wear sample pumps for up to full-shift periods.
 - 3.6.2.1. If fibre levels are above safety factor of respirators in use, stop abatement, apply means of dust suppression, and use higher safety factor in respiratory protection for persons inside enclosure.
 - 3.6.2.2. 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 areas.
- 3.6.3. During course of Work, Departmental Representative to measure fibre content of air outside work areas by means air samples analyzed by Phase Contrast Microscopy (PCM).

- 3.6.3.1. Stop Work when PCM measurements exceed 0.05 f/cc and correct procedures.
- 3.6.4. Final air monitoring to be conducted as follows: After Asbestos Work Area has passed visual inspection and acceptable coat of lock-down agent has been applied to surfaces within enclosure, and appropriate setting period has passed, Departmental Representative will perform air monitoring within Asbestos Work Area by aggressive methods, where provincial regulations require.
 - 3.6.4.1. Final air monitoring results must show fibre levels of less than 0.01 f/cc.
 - 3.6.4.2. If air monitoring results show fibre levels in excess of 0.01 f/cc, re-clean work area and apply another acceptable coat of lock-down agent to surfaces.
 - 3.6.4.3. Repeat as necessary until fibre levels are less than 0.01 f/cc.

3.7. INSPECTION

- 3.7.1. Perform inspection of Asbestos Work Area to confirm compliance with specification and governing authority requirements. Deviations from these requirements that have not been approved in writing by Departmental Representative may result in Work stoppage, at no cost to Departmental Representative.
- 3.7.2. Departmental Representative will inspect Work for:
 - 3.7.2.1. Adherence to specific procedures and materials.
 - 3.7.2.2. Final cleanliness and completion.
 - 3.7.2.3. No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.
- 3.7.3. When asbestos leakage from Asbestos Work Area has occurred or is likely to occur Departmental Representative may order Work shutdown.
 - 3.7.3.1. No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

END OF SECTION

1. PART 1 – GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Summary

1.3.1. Comply with requirements of this Section when performing following Work:

- 1.3.1.1. Removal of dispersible lead-containing coatings or materials using a power tool with an effective dust collection system equipped with a HEPA filter on structures as indicated on drawings and in Appendices C and D.
- 1.3.1.2. Removal of dispersible lead-containing coatings or materials with non-powered hand tools, other than manual scraping and sanding on structures as indicated on drawings and in Appendix D.

1.4. Related Requirements

1.4.1. For lead abatement projects that may require greater precautions, refer to Sections 02 83 11 - Lead-Base Paint Abatement - Intermediate Precautions

1.5. Reference Standards

1.5.1. Work Safe Alberta

- 1.5.1.1. Guidelines for the Safe Clean-up of Structurally Compromised Structures

1.5.2. Department of Justice Canada

- 1.5.2.1. Canadian Environmental Protection Act, 1999 (CEPA).

1.5.3. Health Canada

- 1.5.3.1. Workplace Hazardous Materials Information System (WHMIS), Safety Data Sheets (SDS).

1.5.4. Human Resources and Social Development Canada (HRSDC)

- 1.5.4.1. Canada Labour Code Part II, - SOR 86-304 - Occupational Health and Safety Regulations.

1.5.5. Transport Canada (TC)

- 1.5.5.1. Transportation of Dangerous Goods Act, 1992 (TDGA).

1.5.6. U.S. Environmental Protection Agency (EPA)

- 1.5.6.1. EPA 747-R-95-007-[1995] , Sampling House Dust for Lead.

1.5.7. U.S. Department of Health and Human Services/Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (NIOSH)

- 1.5.7.1. NIOSH 94-113 - NIOSH Manual of Analytical Methods (NMAM), 4th Edition (1994).

1.5.8. U.S. Department of Labour - Occupational Safety and Health Administration (OSHA) - Toxic and Hazardous Substances

- 1.5.8.1. Lead in Construction Regulation - 29 CFR 1926.62-[1993].

1.5.9. Underwriters' Laboratories of Canada (ULC)

1.6. Action and Informational Submittals

- 1.6.1. Provide submittals in accordance with Section 01 33 00- Submittal Procedures.

- 1.6.2. 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.

- 1.6.3. Provide proof of Contractor's General Insurance.

- 1.6.4. Quality Control:

- 1.6.4.1. Provide Departmental Representative necessary permits for transportation and disposal of lead-based paint waste and proof that lead-based paint waste has been received and properly disposed.
- 1.6.4.2. Provide proof satisfactory to Departmental Representative that employees have had instruction on hazards of lead exposure, respirator use, dress, and aspects of work procedures and protective measures.
- 1.6.4.3. 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.

1.7. Quality Assurance

- 1.7.1. Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to lead paint, provided that in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.
- 1.7.2. Health and Safety:
 - 1.7.2.1. Do construction occupational health and safety in accordance with Section 01 35 29.14- Health and Safety for Contaminated Sites.
 - 1.7.2.2. Safety Requirements: worker and visitor protection.
 - 1.7.2.2.1. Protective equipment and clothing to be worn by workers and visitors in Work Area includes:
 - 1.7.2.2.1.1. Respirator NIOSH approved and equipped with filter cartridges with assigned protection factor of 10, acceptable to Authority having jurisdiction. Suitable for type of lead and level of lead dust exposure in Lead Work Area. Provide sufficient filters so workers can install new filters following disposal of used filters and before re-entering contaminated areas.
 - 1.7.2.2.1.2. Disposable type protective clothing that does not readily retain or permit skin contamination, consisting of full body covering including head covering with snug fitting cuffs at wrists, ankles, and neck.
 - 1.7.2.2.2. Requirements for workers:
 - 1.7.2.2.2.1. Remove street clothes in clean change room and put on respirator with new filters or reusable filters, clean coveralls and head covers before entering Equipment and Access Rooms or Work Area. Store street clothes, uncontaminated footwear, towels, and similar uncontaminated articles in clean change room.
 - 1.7.2.2.2.2. Remove gross contamination from clothing before leaving work area. Place contaminated work suits in receptacles for disposal with other lead - contaminated materials. Leave reusable items except respirator in Equipment and Access Room. When not in use in Work Area, store work footwear in Equipment and Access Room. Upon completion of lead abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before

removing from Work Area or from Equipment and Access Room.

- 1.7.2.2.2.3. Enter unloading room from outside dressed in clean coveralls to remove waste containers and equipment from Holding Room of Container and Equipment Decontamination Enclosure system. Workers not to use this system as means to leave or enter work area.
- 1.7.2.2.3. Eating, drinking, chewing, and smoking are not permitted in Work Area.
- 1.7.2.2.4. Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual lead abatement.
- 1.7.2.2.5. Ensure workers wash hands and face when leaving Work Area. Facilities for washing to be located on site layout plan (see Section 01 35 29.14- Special Procedures for Contaminated Sites).
- 1.7.2.2.6. Provide and post in Clean Change Room and in Equipment and Access Room the procedures described in this Section, in both official languages.
- 1.7.2.2.7. Ensure no person required to enter Work Area has facial hair that affects seal between respirator and face.
- 1.7.2.2.8. Visitor Protection:
 - 1.7.2.2.8.1. Provide protective clothing and approved respirators to Authorized Visitors to Work Areas.
 - 1.7.2.2.8.2. Instruct Authorized Visitors in use of protective clothing, respirators and procedures.
 - 1.7.2.2.8.3. Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Work Area.

1.8. Waste Management and Disposal

- 1.8.1. Separate waste materials for recycling or non-hazardous waste streams in accordance with Section 01 35 13.43 – Special Procedures for contaminated sites, and 02 61 00.00 – Soil remediation.
- 1.8.2. For disposal of the lead waste representative samples of dispersible lead-based paint waste, and disposable PPE must be collected for Toxicity Characteristic Leaching Procedure analysis to determine the final waste disposal criteria.
- 1.8.3. Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- 1.8.4. Disposal of lead waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of lead waste in sealed double thickness 6 ml bags or leak proof drums. Label containers with appropriate warning labels.
- 1.8.5. Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.9. Existing Conditions

- 1.9.1. Reports and information pertaining to lead-based paint to be handled, removed, or otherwise disturbed and disposed of during this Project are shown on drawings and in Appendices C and D.
- 1.9.2. 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.

1.10. Scheduling

- 1.10.1. within 10 days of contract award notify following in writing:
 - 1.10.1.1. Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.
 - 1.10.1.2. Provincial Ministry of Labour.
 - 1.10.1.3. Disposal Authority.
- 1.10.2. Inform sub trades of presence of lead-containing materials identified in Existing Conditions.
- 1.10.3. Provide Departmental Representative copy of notifications prior to start of Work.

1.11. Personnel Training

- 1.11.1. Provide Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of lead exposure, in personal hygiene, in aspects of work procedures, and in use, cleaning, and disposal of respirators.
- 1.11.2. Instruction and training related to respirators includes, at minimum:
 - 1.11.2.1. Proper fitting of equipment.
 - 1.11.2.2. Inspection and maintenance of equipment.
 - 1.11.2.3. Disinfecting of equipment.
 - 1.11.2.4. Limitations of equipment.
- 1.11.3. Instruction and training must be provided by competent, qualified person.
- 1.11.4. Provide proof that supervisory personnel have attended lead abatement course, of not less than two days duration, approved by Departmental Representative.

2. PART 2 - PRODUCTS

2.1. Materials

- 2.1.1. Polyethylene 0.15 mm thick unless otherwise specified; in sheet size to minimize joints.
- 2.1.2. Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under dry conditions and wet conditions using amended water.
- 2.1.3. Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual lead paint residue.
- 2.1.4. Lead waste containers: fibre OR metal type acceptable to dump operator with tightly fitting covers and 0.15 mm thickness sealable polyethylene liners.
 - 2.1.4.1. Label containers with pre-printed bilingual cautionary Warning Lead clearly visible when ready for removal to disposal site.

3. PART 3 – EXECUTION

3.1. Supervision

- 3.1.1. One Supervisor for every ten workers is required.
- 3.1.2. Supervisor must remain within work area during disturbance, removal, or handling of lead-based paints.

3.2. Preparation

- 3.2.1. Remove and store items to be salvaged or reused.
 - 3.2.1.1. Protect and wrap items and transport and store in area specified by Departmental Representative.
- 3.2.2. Work Area:
 - 3.2.2.1. Pre-clean fixed casework and equipment within work area, using HEPA vacuum and cover and seal with polyethylene sheeting and tape.
 - 3.2.2.2. Clean work area using HEPA vacuum. If not practicable, use wet cleaning method. Do not raise dust.
 - 3.2.2.3. Seal off openings with polyethylene sheeting and seal with tape.
 - 3.2.2.4. Protect floor surfaces covered from wall to wall with polyethylene sheets.
 - 3.2.2.5. Maintain emergency fire exits or establish alternatives satisfactory to Authority having jurisdiction.

- 3.2.2.6. Where water application is required for wetting lead containing materials, provide temporary water supply appropriately sized for application of water as required.
- 3.2.2.7. 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 cables and equipment.
- 3.2.3. Do not start work until:
 - 3.2.3.1. Arrangements have been made for disposal of waste.
 - 3.2.3.2. Tools, equipment, and materials waste containers are on site.
 - 3.2.3.3. Arrangements have been made for building security.
 - 3.2.3.4. Notifications have been completed and preparatory steps have been taken.
- 3.3. Lead Abatement**
 - 3.3.1. Prior to starting work in areas exposed to wind, review weather forecast for upcoming periods of high wind.
 - 3.3.1.1. If wind is forecast or begins to gust at rates above 20 km per hour, as per the Guidelines for the Safe Clean-up of Structurally Compromised Structures, abatement must stop until the wind has abated or a protective structure is erected.
 - 3.3.2. Remove dispersible lead-based paint from portions of the buildings identified in Drawings and Appendices C and D using tools fitted with a HEPA filtered dust collection system.
 - 3.3.3. Remove dispersible lead-based paint in small sections and pack as it is being removed in sealable 0.15 mm plastic bags and place in labelled containers for transport.
 - 3.3.4. Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to staging area. Clean external surfaces thoroughly again by wet sponging. Wash containers thoroughly pending removal to outside. Ensure containers are removed by workers who have entered from uncontaminated areas dressed in clean coveralls.
 - 3.3.5. After completion of work, wire brush and wet sponge surface from which lead-based paint has been removed to remove visible material. During this work keep surfaces wet.
 - 3.3.6. After wire brushing and wet sponging to remove visible dispersible lead-based paint, and after encapsulating lead containing material that are well adhered to the substrate, wet clean entire work area, and equipment used in process. After inspection by Departmental Representative apply continuous coat of slow drying

sealer to surfaces of work area. Do not disturb work area for 8 hours no entry, activity, ventilation, or disturbance during this period.

3.4. Inspection

- 3.4.1. Perform inspection to confirm compliance with specification and governing authority requirements. Deviations from these requirements not approved in writing by Departmental Representative will result in work stoppage, at no cost to Owner.
- 3.4.2. Departmental Representative will inspect work for:
 - 3.4.2.1. Adherence to specific procedures and materials.
 - 3.4.2.2. Final cleanliness and completion.
 - 3.4.2.3. 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

- 3.5.1. Final lead surface sampling to be conducted as follows:
 - 3.5.1.1. After work area has passed a visual inspection for cleanliness approved and accepted by Departmental Representative. Apply coat of lock-down agent to surfaces within enclosure, and appropriate setting period of 8 hours has passed, Departmental Representative will perform lead wipe sampling.
 - 3.5.1.2. 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.
 - 3.5.1.3. If wipe sampling results show levels of lead 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.
 - 3.5.1.4. Repeat as necessary until surface concentrations are less than 40 micrograms per square foot.

3.6. Final Cleanup

- 3.6.1. Following cleaning and when lead wipe surfaces sampling are below acceptable concentrations, proceed with final cleanup.
- 3.6.2. 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.
- 3.6.3. Place polyethylene sheets, tape, cleaning material, clothing, and contaminated waste in plastic bags and sealed labelled waste containers for transport.

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

3.7. Re-Establishment of Objects and Systems

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

END OF SECTION

1. PART 1 – GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Summary

1.3.1. Comply with requirements of this Section when performing following Work:

1.3.1.1. Removal of dispersible lead-based paint as indicated on drawings and Appendices C and D by scraping or sanding using non-powered hand tools.

1.4. Related Requirements

1.4.1. For lead abatement projects requiring less stringent precautions, refer to Sections 02 83 10 - Lead - Base Paint Abatement - minimum Precautions

1.5. Reference Standards

1.5.1. Work Safe Alberta

1.5.1.1. Guidelines for the Safe Clean-up of Structurally Compromised Structures

1.5.2. Department of Justice Canada

1.5.2.1. Canadian Environmental Protection Act, 1999 (CEPA).

1.5.3. Health Canada

1.5.3.1. Workplace Hazardous Materials Information System (WHMIS), Safety Data Sheets (SDS).

1.5.4. Human Resources and Social Development Canada (HRSDC)

1.5.4.1. Canada Labour Code Part II, - SOR 86-304 - Occupational Health and Safety Regulations.

1.5.5. Transport Canada (TC)

1.5.5.1. Transportation of Dangerous Goods Act, 1992 (TDGA).

1.5.6. U.S. Environmental Protection Agency (EPA)

1.5.6.1. EPA 747-R-95-007-1995, Sampling House Dust for Lead.

1.5.7. U.S. Department of Health and Human Services/Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (NIOSH)

1.5.7.1. NIOSH 94-113 - NIOSH Manual of Analytical Methods (NMAM), 4th Edition (1994).

1.5.8. U.S. Department of Labour - Occupational Safety and Health Administration (OSHA) - Toxic and Hazardous Substances

1.5.8.1. Lead in Construction Regulation - 29 CFR 1926.62-[1993] .

1.5.9. Underwriters' Laboratories of Canada (ULC)

1.6. Action and Informational Submittals

1.6.1. Provide submittals in accordance with Section 01 33 00- Submittal Procedures.

1.6.2. 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.

1.6.3. Provide proof of Contractor's General and Environmental Liability Insurance.

1.6.4. Quality Control:

1.6.4.1. Provide Departmental Representative necessary permits for transportation and disposal of lead-based paint waste and proof that it has been received and properly disposed.

1.6.4.2. Provide proof satisfactory to Departmental Representative that employees have had instruction on hazards of lead exposure, respirator use, dress, entry and exit from Work Area, and aspects of work procedures and protective measures.

1.6.4.3. 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.

1.6.5. Product data:

- 1.6.5.1. Provide documentation including test results, fire and flammability data, and Material Safety Data Sheets (MSDS) for chemicals or materials including:

- 1.6.5.1.1. Encapsulants.
- 1.6.5.1.2. Amended water.
- 1.6.5.1.3. Slow drying sealer.

1.7. Quality Assurance

- 1.7.1. Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to lead paint, in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.

1.7.2. Health and Safety:

- 1.7.2.1. Do construction occupational health and safety in accordance with Section 01 35 29.14- Health and Safety for Contaminated Sites.
- 1.7.2.2. Safety Requirements: worker and visitor protection.

- 1.7.2.2.1. Protective equipment and clothing to be worn by workers and visitors in Work Area includes:

- 1.7.2.2.1.1. Respirator NIOSH approved and equipped with filter cartridges with assigned protection factor of 10, acceptable to Authority having jurisdiction. Suitable for type of lead and level of lead dust exposure in Lead Work Area. Provide sufficient filters so workers can install new filters following disposal of used filters and before re-entering contaminated areas.

- 1.7.2.2.1.2. Disposable type protective clothing that does not readily retain or permit skin contamination, consisting of full body covering including head covering with snug fitting cuffs at wrists, ankles, and neck.

- 1.7.2.2.2. Requirements for workers:

- 1.7.2.2.2.1. Remove street clothes in clean change room and put on respirator with new filters or reusable filters, clean coveralls and head covers before entering Equipment and Access Rooms or Work Area. Store street clothes, uncontaminated footwear, towels, and similar uncontaminated articles in clean change room.

- 1.7.2.2.2.2. Remove gross contamination from clothing before leaving work area.
Place contaminated work suits in receptacles for disposal with other lead - contaminated materials. Leave reusable items except respirator in Equipment and Access Room. When not in use in Work Area, store work footwear in Equipment and Access Room. Upon completion of lead abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from Work Area or from Equipment and Access Room.
- 1.7.2.2.2.3. Enter unloading room from outside dressed in clean coveralls to remove waste containers and equipment from Holding Room of Container and Equipment Decontamination Enclosure system. Workers not to use this system as means to leave or enter work area.
- 1.7.2.2.3. Eating, drinking, chewing, and smoking are not permitted in Work Area.
- 1.7.2.2.4. Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual lead abatement.
- 1.7.2.2.5. Ensure workers wash hands and face when leaving Work Area. Facilities for washing to be located on site layout plan (see Section 01 35 29.14- Special Procedures for Contaminated Sites).
- 1.7.2.2.6. Provide and post in Clean Change Room and in Equipment and Access Room the procedures described in this Section, in both official languages.
- 1.7.2.2.7. Ensure no person required to enter Work Area has facial hair that affects seal between respirator and face.
- 1.7.2.2.8. Visitor Protection:
 - 1.7.2.2.8.1. Provide protective clothing and approved respirators to Authorized Visitors to Work Areas.
 - 1.7.2.2.8.2. Instruct Authorized Visitors in use of protective clothing, respirators and procedures.
 - 1.7.2.2.8.3. Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Work Area.

1.8. Waste Management and Disposal

- 1.8.1. Separate waste materials for recycling or non-hazardous waste streams in accordance with Section 01 35 13.43 – Special Procedures for contaminated sites, and 02 61 00.00 – Soil remediation.
- 1.8.2. Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- 1.8.3. Disposal of lead waste generated by removal activities must comply with Federal and Provincial regulations. Dispose of lead waste in sealed double thickness 6 ml bags or leak proof drums. Label containers with appropriate warning labels.
- 1.8.4. Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.9. Existing Conditions

- 1.9.1. Reports and information pertaining to lead-based paint to be handled, removed, or otherwise disturbed and disposed of during this Project are available for inspection in the drawings and appendices C and D.
- 1.9.2. 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.

1.10. Scheduling

- 1.10.1. within 10 days of contract award notify the following in writing, where appropriate:
 - 1.10.1.1. Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.
 - 1.10.1.2. Provincial Ministry of Labour.
 - 1.10.1.3. Disposal Authority.
- 1.10.2. Inform sub trades of presence of lead-containing materials identified in Existing Conditions.
- 1.10.3. Provide Departmental Representative copy of notifications prior to start of Work.

1.11. Personnel Training

- 1.11.1. Provide Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of lead exposure, in personal hygiene, in aspects of work procedures, and in use, cleaning, and disposal of respirators.
- 1.11.2. Instruction and training related to respirators includes, at minimum:

- 1.11.2.1. Proper fitting of equipment.
- 1.11.2.2. Inspection and maintenance of equipment.
- 1.11.2.3. Disinfecting of equipment.
- 1.11.2.4. Limitations of equipment.
- 1.11.3. Instruction and training must be provided by competent, qualified person.
- 1.11.4. Provide proof that supervisory personnel have attended lead abatement course, of not less than two days duration, approved by Departmental Representative.

2. PART 2 - PRODUCTS

2.1. Materials

- 2.1.1. Polyethylene: 0.15 mm unless otherwise specified; in sheet size to minimize joints.
- 2.1.2. FR polyethylene: 0.15 mm woven fibre reinforced fabric bonded both sides with polyethylene.
- 2.1.3. Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under dry conditions and wet conditions using amended water.
- 2.1.4. 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.
- 2.1.5. Lead waste containers: fibre or metal type acceptable to dump operator with tightly fitting covers and 0.15 mm sealable polyethylene liners.
 - 2.1.5.1. Label containers with pre-printed bilingual cautionary Warning Lead clearly visible when ready for removal to disposal site.

3. PART 3 - EXECUTION

3.1. Supervision

- 3.1.1. One Supervisor for every ten workers is required.
- 3.1.2. Supervisor must remain within Lead Work Area during disturbance, removal, or handling of lead-based paints.

3.2. Preparation

- 3.2.1. Remove and wrap items to be salvaged or reused, and transport and store in area specified by Departmental Representative.
- 3.2.2. Work Area:

- 3.2.2.1. Pre-clean fixed casework, and equipment within work areas, using HEPA vacuum and cover with polyethylene sheeting sealed with tape.
 - 3.2.2.2. Clean work areas using HEPA vacuum. If not practicable, use wet cleaning method. Do not use methods that raise dust, such as dry sweeping, or vacuuming using other than HEPA vacuum.
 - 3.2.2.3. Seal off openings, corridors, doorways, windows, skylights, ducts, grilles, and diffusers, with polyethylene sheeting sealed with tape.
 - 3.2.2.4. Cover floor surfaces in work area from wall to wall with FR polyethylene drop sheets to protect existing floor during removal.
 - 3.2.2.5. 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.
 - 3.2.2.6. 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:
 - 3.2.2.6.1. CAUTION LEAD HAZARD AREA (25 mm).
 - 3.2.2.6.2. NO UNAUTHORIZED ENTRY (19 mm).
 - 3.2.2.6.3. WEAR ASSIGNED PROTECTIVE EQUIPMENT AND RESPIRATOR (19 mm).
 - 3.2.2.6.4. BREATHING LEAD CONTAMINATED DUST CAUSES SERIOUS BODILY HARM (7 mm).
 - 3.2.2.7. Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Authority having jurisdiction.
 - 3.2.2.8. 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.
 - 3.2.2.9. 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.
- 3.2.3. Worker Decontamination Enclosure System:
- 3.2.3.1. Worker Decontamination Enclosure System includes Equipment and Access Room and Clean Room, as follows:
 - 3.2.3.1.1. Equipment and Access Room: construct between exit and work areas, with two curtained doorways, one to the rest of suite, 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.
- 3.2.3.1.2. Clean Room: 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.
- 3.2.4. Construction of Decontamination Enclosures:
- 3.2.4.1. Construct framing for enclosures or use existing rooms. Line enclosure with polyethylene sheeting and seal with tape, apply two layers of FR polyethylene on floor.
- 3.2.4.2. Construct curtain doorways between enclosures so when people move through or waste containers and equipment are moved through doorway, one of two closures comprising doorway always remains closed.
- 3.2.5. Maintenance of Enclosures:
- 3.2.5.1. Maintain enclosures in clean condition.
- 3.2.5.2. Ensure barriers and polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately.
- 3.2.5.3. Visually inspect enclosures at beginning of each work day.
- 3.2.5.4. Use smoke test method to test effectiveness of barriers as directed by Departmental Representative.
- 3.3. Lead - Based Paint Abatement**
- 3.3.1. Prior to starting work in areas exposed to wind, review weather forecast for upcoming periods of high wind.
- 3.3.1.1. If wind is forecast or begins to gust at rates above 20 km per hour, as per the Guidelines for the Safe Clean-up of Structurally Compromised Structures, abatement must stop until the wind has abated or a protective structure is erected.
- 3.3.2. Removal of dispersible lead-based paint from portions of the buildings identified on Drawings and Appendices C and D to be performed by scraping or sanding using non-powered hand tools.
- 3.3.3. Remove dispersible lead-based paint in small sections and pack as it is being removed in sealable 0.15 mm plastic bags and place in labelled containers for transport.

- 3.3.4. Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers to decontamination Washroom. Wash containers thoroughly in decontamination Washroom, and store in Holding Room pending removal to Unloading Room and outside. Ensure containers are removed from Holding Room by workers who have entered from uncontaminated areas dressed in clean coveralls.
- 3.3.5. After completion of stripping work, wire brush and wet sponge surface from which lead-based paint has been removed to remove visible material. During this work keep surfaces wet.
- 3.3.6. After wire brushing and wet sponging to remove visible dispersible lead-based paint, and after encapsulating lead containing material impossible to remove, wet clean work area including equipment and access room, and equipment used in process. After inspection by Departmental Representative apply continuous coat of slow drying sealer to surfaces. Do not disturb work for 8 hours with no entry, activity, ventilation or disturbance during this period.
- 3.3.7. After enclosing lead painted surfaces, wet clean work area and equipment and access room. During settling period no entry, activity, or ventilation will be permitted.

3.4. Inspection

- 3.4.1. Perform inspection to confirm compliance with specification and governing authority requirements. Deviations from these requirements not approved in writing by Departmental Representative will result in work stoppage, at no cost to Owner.
- 3.4.2. Departmental Representative will inspect work for:
 - 3.4.2.1. Adherence to specific procedures and materials.
 - 3.4.2.2. Final cleanliness and completion.
 - 3.4.2.3. No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.
- 3.4.3. When lead dust leakage from Work Area occurs Departmental Representative may order Work shutdown.
 - 3.4.3.1. 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

3.5.1. Final lead surface sampling to be conducted as follows:

- 3.5.1.1. 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.
- 3.5.1.1.1. Final lead wipe sampling results from horizontal and vertical surfaces where lead-based paints have been removed must show lead levels of less than 40 micrograms of lead in dust per square foot. Samples must be collected and analyzed in accordance with EPA 747-R-95-007.
- 3.5.1.1.2. If wipe sampling results show levels of lead 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.
- 3.5.1.1.3. Repeat as necessary until fibre levels are less than 40 micrograms per square foot.

3.6. Final Cleanup

- 3.6.1. Following specified cleaning procedures, and when lead wipe sampling is below acceptable concentrations proceed with final cleanup.
- 3.6.2. 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 equipment.
- 3.6.3. Place polyethylene seals, tape, cleaning material, clothing, and other contaminated waste in plastic bags and sealed labelled waste containers for transport.
- 3.6.4. Clean-up Work Areas, Equipment and Access Room, and other contaminated enclosures.
- 3.6.5. Clean-up sealed waste containers and equipment used in Work and remove from work areas, via Container and Equipment Decontamination Enclosure System, at appropriate time in cleaning sequence.
- 3.6.6. Conduct final check to ensure no dust or debris remains on surfaces as result of dismantling operations.

3.7. Re-Establishment of Objects and Systems

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

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Related Sections

- 1.3.1. Section 01 11 00 – Summary of Work.
- 1.3.2. Section 01 33 00 - Submittal Procedures.
- 1.3.3. Section 01 35 13.43 – Special Project Procedures for Contaminated Sites
- 1.3.4. Section 01 35 43 - Environmental Procedures
- 1.3.5. Section 02 61 00.01 - Soil Remediation

1.4. Action and Informational Submittals

- 1.4.1. Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- 1.4.2. Excavation and Backfilling Plan: within 10 Working Days after Contract award and prior to mobilization to Site, submit documentation describing excavation Work. Include:
 - 1.4.2.1. Excavation design.
 - 1.4.2.2. 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.
 - 1.4.2.3. Procedures for excavations adjacent to utilities or other structures if the excavation has the potential to impact utilities or other structures.
 - 1.4.2.4. Monitoring and inspection requirements, including frequency or milestones when a Qualified Professional must inspect Works.
- 1.4.3. Excavation and Backfilling Plan must be signed and sealed by a Qualified Professional, as required by ground conditions, excavation depth, shoring type, or support type.
- 1.4.4. 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 a Qualified Professional. Include:

- 1.4.4.1. Imported fill material, including geotechnical and environmental quality.
- 1.4.4.2. Compaction testing results.
- 1.4.4.3. Environmental analytical results or other environmental testing.

2. PART 2 - PRODUCTS

2.1. Backfill Material

- 2.1.1. Backfill material is defined as earth material that is acceptable for use on Site by the Departmental Representative and is free from particle sizes greater than 150 mm, free from objectionable quantities of organic matter, frozen soil, stumps, trees, moss, and other unsuitable materials obtained from locations outside the Work area and required for construction of fill areas or for other portions of Work. Unsuitable backfill materials include:

- 2.1.1.1. Weak, chemically unstable or compressible materials.
- 2.1.1.2. Soils having a plasticity index greater than 30% performed in accordance with ASTM D4318-[05].
- 2.1.1.3. Frost susceptible materials: defined as fine grained soils with plasticity index less than 10 (ASTM D4318), and the following gradation (ASTM D4222, ASTM C136, CAN/CGSB-8.1):

Sieve Designation (mm)	% Passing By Mass
2.000	100
0.100	45 - 100
0.020	10 - 80
0.005	0 - 45

- 2.1.1.4. Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.
- 2.1.1.5. Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches and is not capable of being readily excavated.

3. PART 3 - EXECUTION

3.1. Preparation/Protection

- 3.1.1. Complete site preparation/protection activities as outlined in Section 01 35 13.43 - Special Project Procedures for Contaminated Sites, Section 01 35 43 -

Environmental Procedures, Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.

- 3.1.2. Remove obstructions from surfaces to be excavated within limits indicated.

3.2. Water Control

- 3.2.1. Protect open excavations against flooding and damage due to surface runoff.

3.3. Excavation

- 3.3.1. Conduct excavation activities in accordance with requirements of Section 01 35 13.43 - Special Project Procedures for Contaminated Sites, Section 01 35 43 - Environmental Procedures and Section 02 61 00.01 - Soil Remediation and in accordance with the Contractor's Excavation and Backfill Plan.
- 3.3.2. Excavate to lines, grades, elevations and dimensions according to Drawings or as directed by Departmental Representative.
- 3.3.3. Excavate all Contaminated Material laterally and vertically on the Site to Contaminated Material Extents in accordance with the Contract. Excavate additional Contaminated Material beyond Contaminated Material Extents in order to result in no residual contamination at the Site based on field observations or Confirmation Samples
- 3.3.4. Notify Departmental Representative at least 5 Working Days in advance of excavation operations.
- 3.3.5. Excavate as required to carry out work, in all materials met. Do not disturb soil or rock below bearing surfaces. Notify Departmental Representative when excavations are complete.
- 3.3.6. Excavation must not interfere with bearing capacity of adjacent foundations.
- 3.3.7. Grade excavation top perimeter to prevent surface water run-off into excavation.
- 3.3.8. Contaminated Material onsite classification will be based on available ex-situ characterization.
- 3.3.9. Remove Waste Oversize Debris. Break or cut oversize debris into manageable size.
- 3.3.10. Remove Contaminated Material to offsite Disposal Facility.
- 3.3.11. Bases of excavations to be undisturbed bedrock, soil or sediment, level, free from loose, soft or organic material. Final depths of excavations to be determined by the Departmental Representative based on actual field conditions.
- 3.3.12. Notify Departmental Representative when bottom of excavation is reached.
- 3.3.13. Following removal of designated material, the Departmental Representative will collect confirmatory samples to ensure that impacted materials have been removed as planned. The Contractor must make clean the bottom and walls of the excavation (including water and other waste material) and provide clear access for the Departmental Representative. In the event that contamination remains, additional material may need to be removed. Any additional work

must be approved by the Departmental Representative prior to the commencement of this work.

- 3.3.14. Departmental Representative will send samples for chemical analysis by a certified laboratory. Five working days (upon receipt at the laboratory) are required for standard analysis. Additional analysis required based on analytical results will require an additional five working day turnaround time. The Contractor must anticipate this and factor it into the unit price costing.
- 3.3.15. Obtain acceptance by Departmental Representative of completed excavation limits prior to commencing backfilling, grading and contouring work.

3.4. Backfill Types and Compaction

- 3.4.1. Use only Imported Backfill in accordance with the Contract and been previously accepted as a Submittal.
- 3.4.2. All fill material must meet the requirements outlined in Section 02 61 00.01 - Soil Remediation.
- 3.4.3. Contractor must not proceed with backfilling operations unless approved by Departmental Representative.
- 3.4.4. Compact material in accordance with the Contract to ensure no long term settlement and is suitable for planned post-remediation use.
- 3.4.5. Machine compact all fill materials unless otherwise shown on Drawings.

3.5. Backfilling

- 3.5.1. Do not proceed with backfilling operations until completion of following:
 - 3.5.1.1. 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, not including the day of sample collection. 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.
 - 3.5.1.2. Departmental Representative has inspected the excavation limits accepted by the Departmental Representative based on survey data and Confirmation Samples results.
 - 3.5.1.3. Departmental Representative has inspected and accepted backfill material.
 - 3.5.1.4. Proposed backfill material can be sampled and tested for geotechnical and environmental quality. Backfill material testing may take up to 5 Working Days not including day of sample collection.
 - 3.5.1.5. Departmental Representative has inspected and accepted compaction results for previous lift.
 - 3.5.1.6. Removal of shoring and bracing; backfilling of voids with satisfactory backfill material.

- 3.5.2. Areas to be backfilled to be free from debris, snow, ice, water and frozen ground to greatest extent practicable.
- 3.5.3. Do not use backfill material which is frozen or contains ice, snow or debris to greatest extent practicable.
- 3.5.4. 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 Qualified Professional and to a minimum of 95% of the Modified Proctor Maximum Dry Density (MPMDD) before placing succeeding layer.
- 3.5.5. Backfill compaction testing to be the responsibility of the Contractor.
- 3.5.6. Backfill compaction to be tested by a Qualified Professional in accordance with Excavation and Backfilling Plan to ensure no long term settlement and to ensure the compacted material is suitable for planned post-remediation use (replacement of washroom structures).
- 3.5.7. Notify Departmental Representative when final backfill grade is reached.
- 3.5.8. Do not begin subsequent Work until surveying has been completed by the Departmental Representative for documentation.

3.6. Transportation and Disposal

- 3.6.1. Transport wastes according to Section 01 35 13.43 and 02 61 00.01.

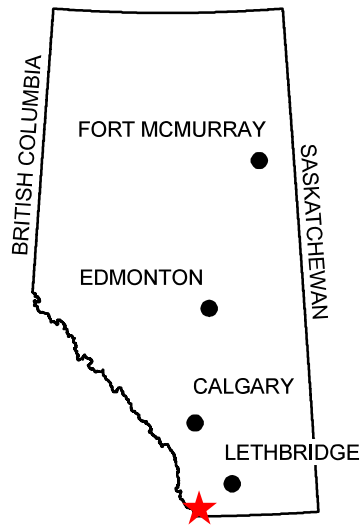
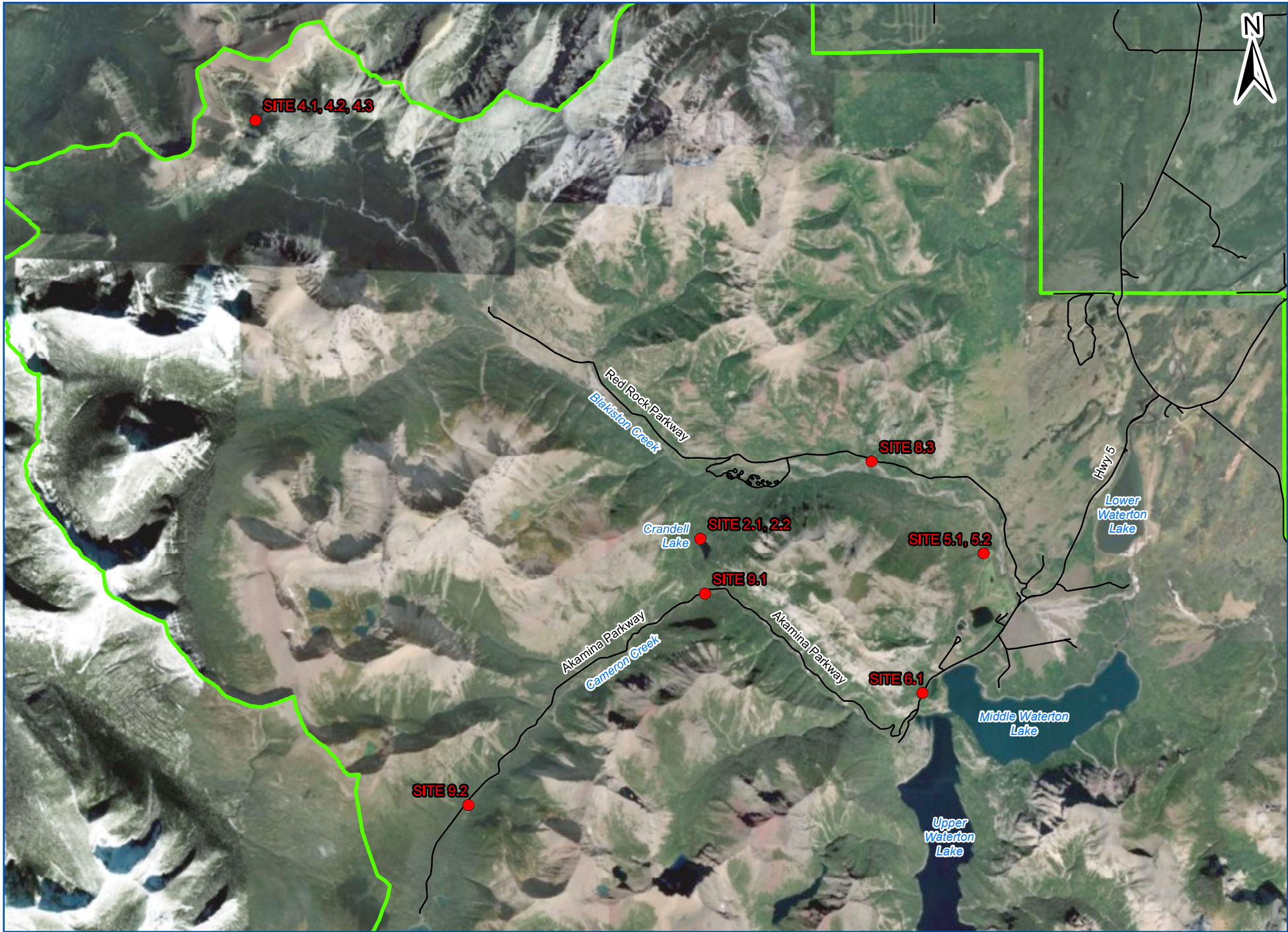
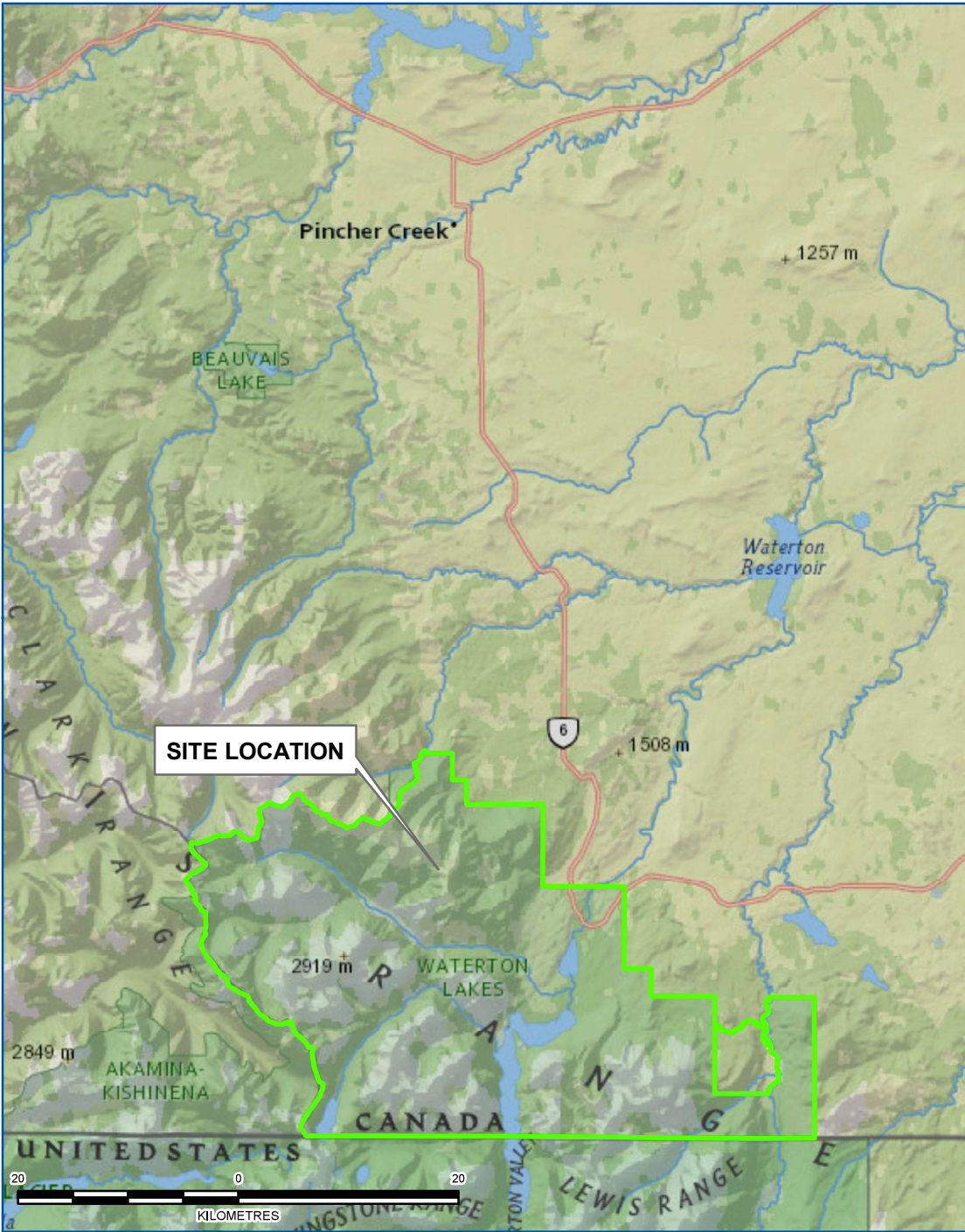
3.7. Site Restoration

- 3.7.1. Upon the completion of the excavation activities, complete restoration works as outlined in Section 02 61 00.02 - Soil Remediation.

END OF SECTION

DRAWINGS

N:\Calgary\GIS\Projects_GIS\WatertonPark\203_02356_Waterton_Remed\1.MXD\Raster\Map\1_203_02356_Tender_Location_non_prio.mxd



NOTES:

Basedata: Contains information licensed under the Open Government Licence – Alberta.
Imagery: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.
Topo Map: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

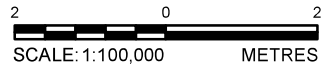
LEGEND



SITE LOCATION



WATERTON LAKES NATIONAL PARK BOUNDARY



SCALE: 1:100,000 METRES
WHEN PLOTTED CORRECTLY AT 11 x 17
WGS 1984 Web Mercator Auxiliary Sphere
THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL
LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

PARKS CANADA AGENCY
WATERTON LAKES NATIONAL PARK, ALBERTA

SPECIFICATIONS FOR REMEDIATION
- NON PRIORITY SITES

SITE LOCATION PLAN

November 15, 2019	Rev 0.0	Drawing No.
Project No.	203.02356.00000	1



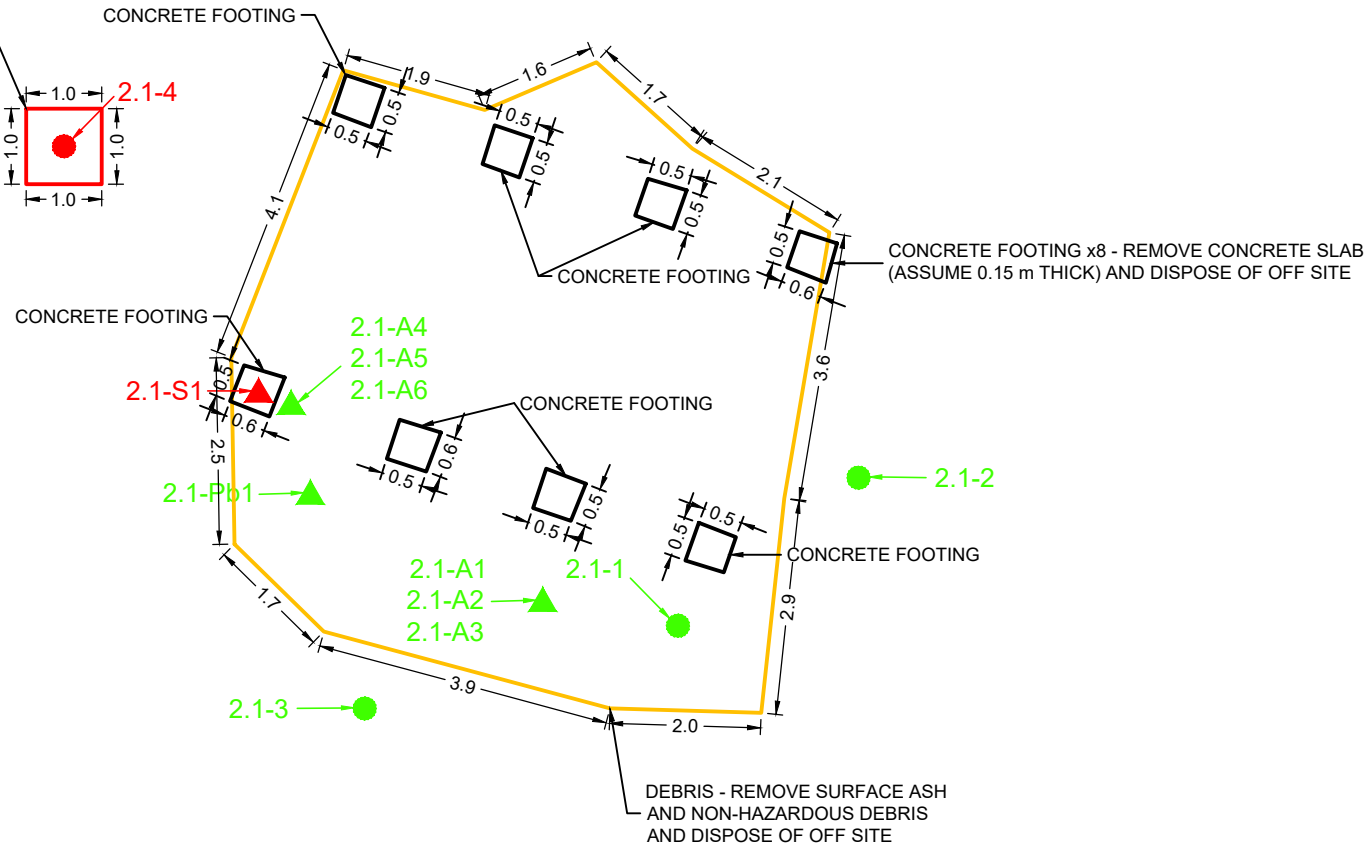
- APPROXIMATE VOLUME OF ASH AND NON-HAZARDOUS DEBRIS TO BE REMOVED AND DISPOSED OF OFF SITE. DEBRIS INCLUDES BUT IS NOT LIMITED TO ASH, WOODEN BEAMS, A METAL SOFFIT AND BURNT ASPHALT SHINGLES = 3 m³
- APPROXIMATE VOLUME OF IMPACTED SOIL TO BE REMOVED AND DISPOSED OF OFF SITE (EXCAVATION DEPTH OF 300 mm) = 0.3 m³
- APPROXIMATE VOLUME OF CONCRETE/FOUNDATION MATERIAL TO BE REMOVED AND DISPOSED OF OFF SITE = 3 m³
CONCRETE CONTAINS SILICA. CONTROL WORKER EXPOSURE TO SILICA DUST.

		LEAD
		mg/kg
CCME SOILQG TIER 1 AL		70
CCME SOILQG TIER 1 RL/PL		140
2.1-4	30-NOV-2018	120

SAMPLE EXCEEDS MOST STRINGENT OF CCME AL AND RL/PL SQG (COARSE GRAINED SOIL).



EXCAVATE CONTAMINATED SOIL TO 300 mm AND DISPOSE OF OFF SITE. GRADE AND SMOOTH THE EXCAVATION TO MATCH SURROUNDING GRADES AND SEED DISTURBED AREAS.



- LEGEND**
- SOIL SAMPLE LOCATION**
- CONCENTRATIONS OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES
 - CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES
- BUILDING MATERIAL SAMPLE LOCATION**
- DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES
 - DEBRIS SAMPLE BELOW REFERENCED GUIDELINES
- SITE FEATURE**
- PICNIC TABLE
 - FIRE PIT
 - SURVEYED SITE FEATURE
 - DEBRIS REMOVAL BOUNDARY
 - CONTAMINATED SOIL EXCAVATION BOUNDARY

1	Client Revisions	2020/02/14
0	Issued for Review	2019/12/17
Revision	Description	Date

Consultant's Name	Engineer's Stamp

	Parks Canada Agency	L'Agence Parcs Canada
	Western and Northern Region	Ouest et Nord du Canada

Project title

SPECIFICATIONS FOR REMEDIATION

WATERTON LAKES NATIONAL PARK ALBERTA

NON-PRIORITY SITES

Designed by KL	Drawn by JC
Approved by TW	Date 2019/11/26

Parks Canada Project Manager
LIZ BAKER

Drawing title

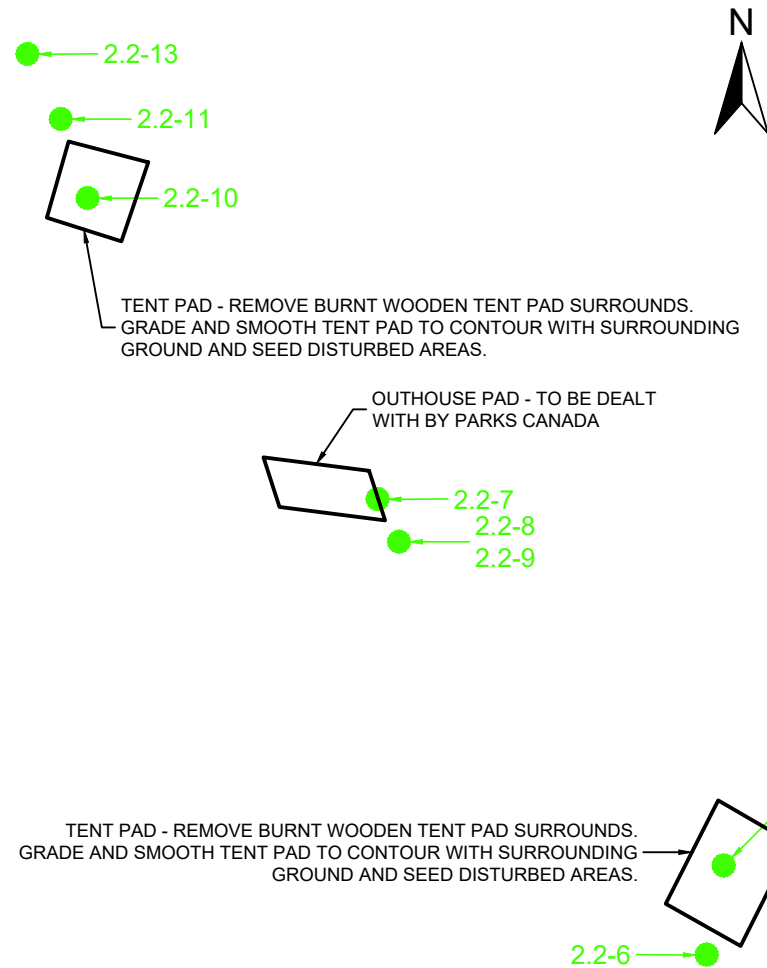
SITE 2.1: CRANDELL BACKCOUNTRY CAMPGROUND KITCHEN SHELTER PROPOSED REMEDIATION PLAN

Project no. 203.02356.00001	Sheet 1	Revision 1
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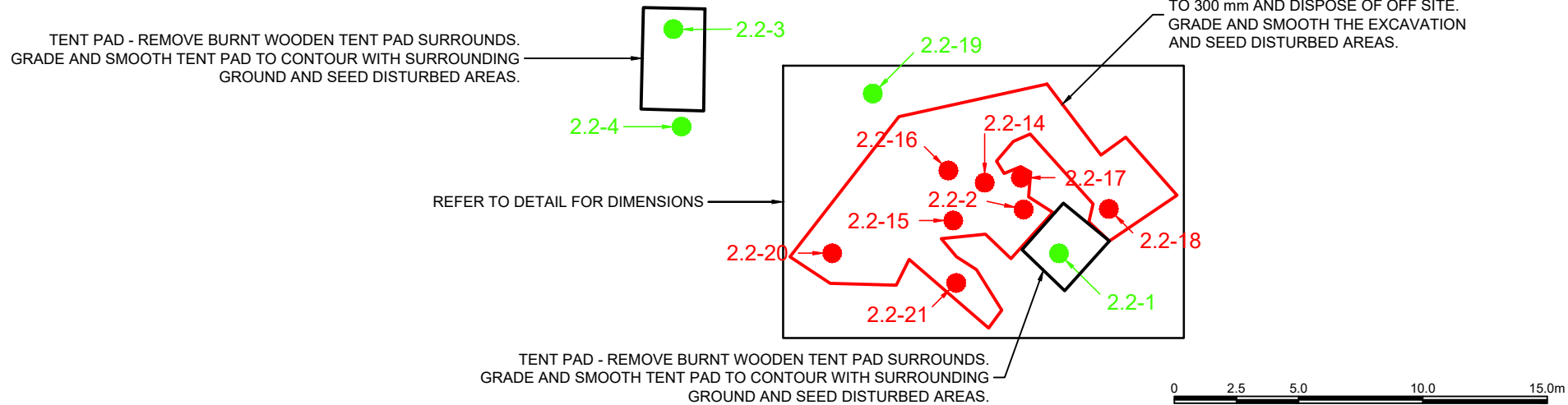
SOIL SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
2.1-1	5441539.8	283262.3
2.1-2	5441541.8	283264.7
2.1-3	5441538.7	283258.2
2.1-4	5441546.1	283254.2
2.1-6	5441547.0	283251.5
BUILDING SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
2.1-A1	5441540.1	283260.5
2.1-A2	5441540.1	283260.5
2.1-A3	5441540.1	283260.5
2.1-A4	5441542.7	283257.2
2.1-A5	5441542.7	283257.2
2.1-A6	5441542.7	283257.2
2.1-S1	5441542.9	283256.8
2.1-Pb1	5441541.5	283257.5



- APPROXIMATE VOLUME OF ASH AND NON-HAZARDOUS DEBRIS TO BE REMOVED AND DISPOSED OF OFF SITE. DEBRIS INCLUDES BUT IS NOT LIMITED TO ASH, WOODEN TENT PAD BORDERS AND METAL TIE DOWN BOLTS = 2 m³
- APPROXIMATE VOLUME OF IMPACTED SOIL TO BE REMOVED AND DISPOSED OF OFF SITE (EXCAVATION DEPTH OF 300 mm) = 20 m³



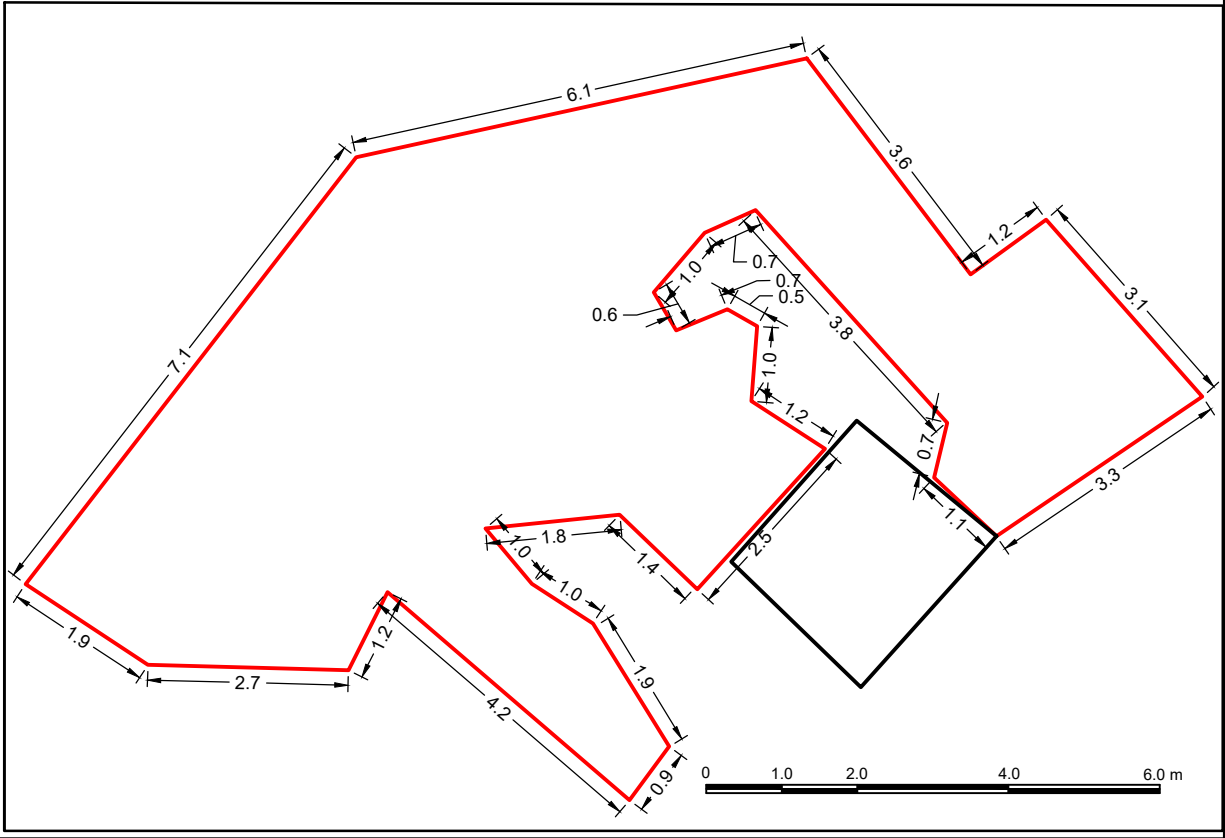
SOIL SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
2.2-1	5441551.4	283401.5
2.2-2	5441553.2	283400.1
2.2-3	5441560.5	283386.0
2.2-4	5441556.5	283386.3
2.2-5	5441573.9	283378.4
2.2-6	5441570.9	283377.8
2.2-7	5441586.0	283366.9
2.2-8	5441584.6	283367.6
2.2-9	5441584.6	283367.6
2.2-10	5441595.9	283357.3
2.2-11	5441598.5	283356.4
2.2-13	5441600.7	283355.3
2.2-14	5441554.3	283398.5
2.2-15	5441552.8	283397.3
2.2-16	5441554.8	283397.1
2.2-17	5441554.5	283400.0
2.2-18	5441553.2	283403.5
2.2-19	5441557.9	283394.0
2.2-20	5441551.4	283392.4
2.2-21	5441550.2	283397.4







		NAPHTHALENE	BARIUM (NON-BARITE)
		mg/kg	mg/kg
CCME SOILQG TIER 1 AL		0.013	750
CCME SOILQG TIER 1 RL/PL		0.013	500
REFERENCE VALUE		0.086	720
2.2-2	30-NOV-2018	0.03	1,000
2.2-3	30-NOV-2018	0.021	460
2.2-10	30-NOV-2018	<0.005	520
2.2-11	30-NOV-2018	<0.005	510
2.2-13	15-MAY-2019	<0.005	530
2.2-14	15-MAY-2019	0.039	1,400
2.2-15	07-AUG-2019	-	1,200
2.2-16	07-AUG-2019	-	810
2.2-17	07-AUG-2019	-	900
2.2-18	07-AUG-2019	-	2,400
2.2-19	07-AUG-2019	-	700
2.2-20	07-AUG-2019	-	1,200
2.2-21	07-AUG-2019	-	2,500


SAMPLE EXCEEDS MOST STRINGENT OF CCME AL AND RL/PL SQG (COARSE GRAINED SOIL), AND THE REFERENCE VALUE


DETAIL



- LEGEND**
- SOIL SAMPLE LOCATION**
-  CONCENTRATIONS OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES
 -  CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES
- SITE FEATURE**
-  SURVEYED SITE FEATURE
 -  CONTAMINATED SOIL EXCAVATION BOUNDARY

1	Client Revisions	2020/02/14
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Revision	Description	Date

Consultant's Name	Engineer's Stamp
	

	Parks Canada Agency	L'Agence Parcs Canada
	Western and Northern Region	Ouest et Nord du Canada

Project title

**SPECIFICATIONS FOR
REMEDIATION
WATERTON LAKES NATIONAL PARK
ALBERTA
NON-PRIORITY SITES**

Designed by KL	Drawn by JC
Approved by TW	Date 2019/12/04

Parks Canada Project Manager
LIZ BAKER

Drawing title

**SITE 2.2: CRANDELL
BACKCOUNTRY CAMPGROUND
CAMPSITES PROPOSED
REMEDIATION PLAN**

Project no.	Sheet	Revision
203.02356.00001	1	1

- APPROXIMATE VOLUME OF ASH AND NON-HAZARDOUS DEBRIS TO BE REMOVED AND DISPOSED OF OFF SITE. DEBRIS INCLUDES BUT IS NOT LIMITED TO ASH, BURNT WOODEN BEAMS, MINOR PLASTIC, GLASS AND METAL FRAGMENTS = 2 m³



LEGEND

SOIL SAMPLE LOCATION

CONCENTRATIONS OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES

CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

SITE FEATURE

SIGN

SURVEYED SITE FEATURE

0	Issued for Review	2019/12/17
Revision	Description	Date

Consultant's Name

Engineer's Stamp

SLR

global environmental solutions

Parks Canada Agency

L'Agence Parcs Canada

Western and Northern Region

Ouest et Nord du Canada

Project title

SPECIFICATIONS FOR REMEDIATION

WATERTON LAKES NATIONAL PARK ALBERTA

NON-PRIORITY SITES

Designed by KL	Drawn by JC
Approved by TW	Date 2019/12/03

Parks Canada Project Manager

LIZ BAKER

Drawing title

SITE 4.1: GOAT LAKE BACKCOUNTRY CAMPGROUND CAMPSITES PROPOSED REMEDIATION PLAN

Project no. 203.02356.00001	Sheet 1	Revision 0
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GRAVEL PAD - REMOVE AND DISPOSE OF BURNT WOODEN TENT PAD SURROUNDS. GRADE AND SMOOTH TENT PAD TO CONTOUR WITH SURROUNDING GROUND AND SEED DISTURBED AREAS

GRAVEL PAD - REMOVE AND DISPOSE OF BURNT WOODEN TENT PAD SURROUNDS. GRADE AND SMOOTH TENT PAD TO CONTOUR WITH SURROUNDING GROUND AND SEED DISTURBED AREAS

GRAVEL PAD - REMOVE AND DISPOSE OF BURNT WOODEN TENT PAD SURROUNDS. GRADE AND SMOOTH TENT PAD TO CONTOUR WITH SURROUNDING GROUND AND SEED DISTURBED AREAS

GRAVEL PAD - REMOVE AND DISPOSE OF BURNT WOODEN TENT PAD SURROUNDS. GRADE AND SMOOTH TENT PAD TO CONTOUR WITH SURROUNDING GROUND AND SEED DISTURBED AREAS

REMOVE AND DISPOSE OF SIGNS

REMOVE AND DISPOSE OF SIGNS

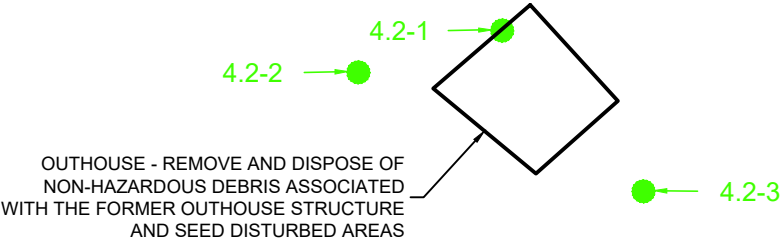
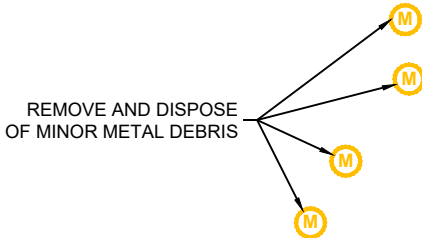
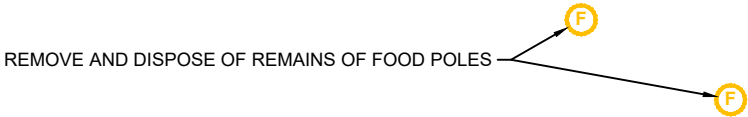
REMOVE AND DISPOSE OF SIGNS

REMOVE AND DISPOSE OF SIGNS

SOIL SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
4.1-1	5450334.4	274763.8
4.1-2	5450336.7	274765.0
4.1-3	5450350.5	274772.4
4.1-4	5450352.3	274773.7
4.1-5	5450354.5	274750.3
4.1-6	5450352.2	274751.0
4.1-7	5450345.6	274730.8
4.1-8	5450347.5	274731.0
4.1-9	5450352.1	274731.0
4.1-10	5450340.0	274765.4



- APPROXIMATE VOLUME OF ASH AND NON-HAZARDOUS DEBRIS TO BE REMOVED AND DISPOSED OF OFF SITE. DEBRIS INCLUDES BUT IS NOT LIMITED TO ASH, BURNT WOOD, GLASS AND METAL = 0.5 m³



SOIL SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
4.2-1	5450348.9	274703.5
4.2-2	5450348.3	274701.6
4.2-3	5450346.7	274705.3



LEGEND

SOIL SAMPLE LOCATION

CONCENTRATIONS OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES

CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

SITE FEATURE

F

FOOD POLE

M

METAL DEBRIS

1	Client Revisions	2020/02/14
0	Issued for Review	2019/12/17
Revision	Description	Date

Consultant's Name

Engineer's Stamp

SLR

global environmental solutions

Parks Canada Agency

L'Agence Parcs Canada

Western and Northern Region

Ouest et Nord du Canada

Project title

SPECIFICATIONS FOR REMEDIATION

WATERTON LAKES NATIONAL PARK ALBERTA

NON-PRIORITY SITES

Designed by KL	Drawn by JC
Approved by TW	Date 2019/12/03

Parks Canada Project Manager
LIZ BAKER

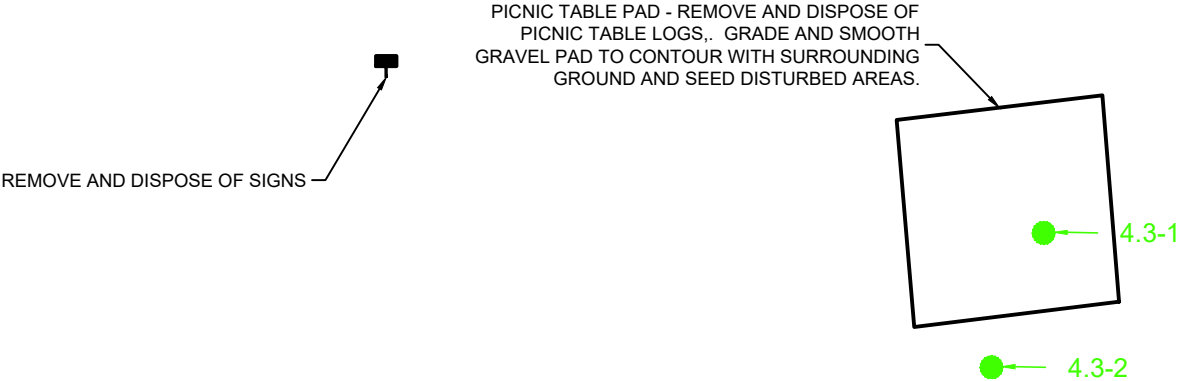
Drawing title

SITE 4.2: GOAT LAKE BACKCOUNTRY OUTHOUSE

PROPOSED REMEDIATION PLAN

Project no. 203.02356.00001	Sheet 1	Revision 1
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- APPROXIMATE VOLUME OF NON-HAZARDOUS DEBRIS TO BE REMOVED AND DISPOSED OF OFF SITE.
DEBRIS INCLUDES BUT IS NOT LIMITED TO BURNT WOOD = 2 m³



SOIL SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
4.3-1	5450319.6	274698.7
4.3-2	5450317.9	274698.0
4.3-3	5450305.7	274700.8
4.3-4	5450304.0	274701.1



LEGEND

SOIL SAMPLE LOCATION

CONCENTRATIONS OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES

CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

SITE FEATURE

SIGN

SURVEYED SITE FEATURE

0	Issued for Review	2019/12/17
Revision	Description	Date

Consultant's Name

Engineer's Stamp

Parks Canada Agency

L'Agence Parcs Canada

Western and Northern Region

Ouest et Nord du Canada

Project title

SPECIFICATIONS FOR REMEDIATION

WATERTON LAKES NATIONAL PARK ALBERTA

NON-PRIORITY SITES

Designed by KL	Drawn by JC
Approved by TW	Date 2019/12/03

Parks Canada Project Manager
LIZ BAKER

Drawing title

SITE 4.3: GOAT LAKE BACKCOUNTRY CAMPGROUND

PICNIC TABLES PROPOSED REMEDIATION PLAN

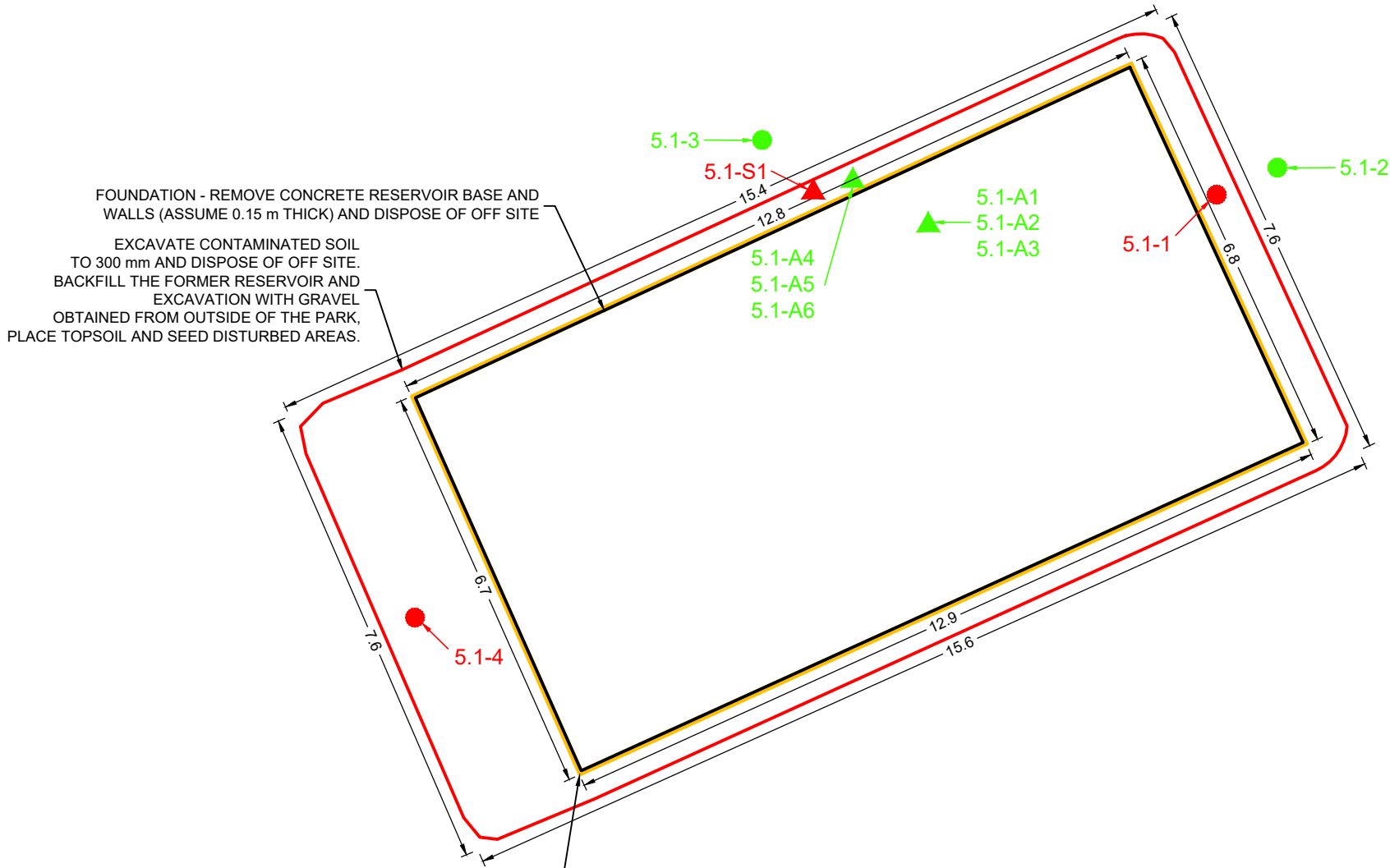
Project no. 203.02356.00001	Sheet 1	Revision 0
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- APPROXIMATE VOLUME OF ASH AND NON-HAZARDOUS DEBRIS TO BE REMOVED AND DISPOSED OF OFF SITE. DEBRIS INCLUDES BUT IS NOT LIMITED TO ASH, BURNT WOODEN BEAMS, A METAL LADDER, BURNT WIRE MESH AND PLASTIC MATERIAL = 1 m³
- APPROXIMATE VOLUME OF IMPACTED SOIL TO BE REMOVED AND DISPOSED OF OFF SITE (EXCAVATION DEPTH OF 300 mm) = 10 m³
- APPROXIMATE VOLUME OF CONCRETE/FOUNDATION MATERIAL TO BE REMOVED AND DISPOSED OF OFF SITE = 17 m³
CONCRETE CONTAINS SILICA. CONTROL WORKER EXPOSURE TO SILICA DUST.
- APPROXIMATE VOLUME OF CLEAN IMPORTED BACKFILL TO BE COMPACTED AND GRADED TO MATCH EXISTING GRADE, COVERED IN TOPSOIL AND SEEDED = 180 m³

		INDENO(1,2,3-C,D)PYRENE	NAPHTHALENE	BARIUM (NON-BARITE)	LEAD
		mg/kg	mg/kg	mg/kg	mg/kg
CCME SOILQG TIER 1 AL		0.1	0.013	750	70
CCME SOILQG TIER 1 RL/PL		1	0.013	500	140
REFERENCE VALUE		-	0.086	720	-
5.1-1	5-DEC-2018	0.009	0.32	600	610
5.1-4	5-DEC-2018	0.11	<0.05	180	40

SAMPLE EXCEEDS MOST STRINGENT OF CCME AL AND RL/PL SQG (COARSE GRAINED SOIL), AND THE REFERENCE VALUE

- LEGEND**
- SOIL SAMPLE LOCATION**
- CONCENTRATIONS OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES
 - CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES
- BUILDING MATERIAL SAMPLE LOCATION**
- ▲ DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES
 - ▲ DEBRIS SAMPLE BELOW REFERENCED GUIDELINES
- SITE FEATURE**
- SURVEYED SITE FEATURE
 - DEBRIS REMOVAL BOUNDARY
 - CONTAMINATED SOIL EXCAVATION BOUNDARY



SOIL SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
5.1-1	5440992.4	288909.3
5.1-2	5440992.9	288910.3
5.1-3	5440993.3	288902.0
5.1-4	5440985.6	288896.4
BUILDING SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
5.1-A1	5440991.9	288904.7
5.1-A2	5440991.9	288904.7
5.1-A3	5440991.9	288904.7
5.1-A4	5440992.6	288903.4
5.1-A5	5440992.6	288903.4
5.1-A6	5440992.6	288903.4
5.1-S1	5440992.5	288902.8

DEBRIS - REMOVE NON-HAZARDOUS DEBRIS FROM WITHIN THE RESERVOIR AND DISPOSE OF OFF SITE.

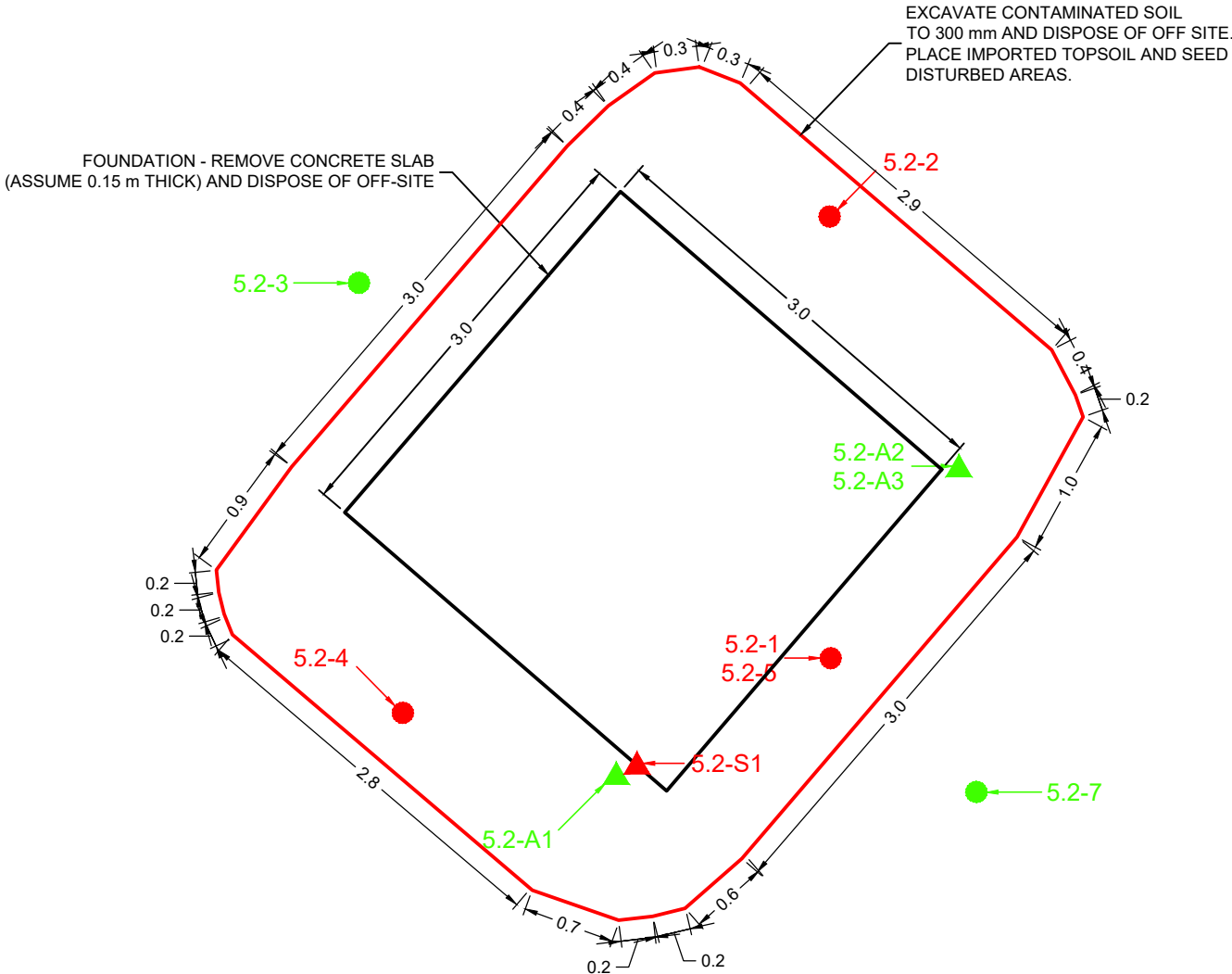


1	Client Revisions	2020/02/14
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Revision	Description	Date
Consultant's Name		Engineer's Stamp
		L'Agence Parcs Canada
Western and Northern Region		Ouest et Nord du Canada
Project title		
SPECIFICATIONS FOR REMEDIATION		
WATERTON LAKES NATIONAL PARK ALBERTA		
NON-PRIORITY SITES		
Designed by	KL	Drawn by
Approved by	TW	Date
Parks Canada Project Manager		
LIZ BAKER		
Drawing title		
SITE 5.1: WATERTON GOLF COURSE RESERVOIR		
PROPOSED REMEDIATION PLAN		
Project no.	Sheet	Revision
203.02356.00001	1	1

- APPROXIMATE VOLUME OF IMPACTED SOIL TO BE REMOVED AND DISPOSED OF OFF SITE (EXCAVATION DEPTH OF 300 mm) = 4 m³
- APPROXIMATE VOLUME OF CONCRETE/FOUNDATION MATERIAL TO BE REMOVED AND DISPOSED OF OFF SITE = 2 m³
CONCRETE CONTAINS SILICA. CONTROL WORKER EXPOSURE TO SILICA DUST.
- APPROXIMATE VOLUME OF CLEAN IMPORTED BACKFILL TO BE COMPACTED AND GRADED TO MATCH EXISTING GRADE, COVERED IN TOPSOIL AND SEEDED = 4 m³

		NAPHTHALENE	ARSENIC (INORGANIC)	CHROMIUM (III + VI)	COPPER	LEAD	ZINC
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
CCME SOILQG TIER 1 AL		0.013	12	64	63	70	250
CCME SOILQG TIER 1 RL/PL		0.013	12	64	63	140	250
REFERENCE VALUE		0.086	-	-	-	-	-
5.2-1	5-DEC-2018	0.017	27	48	29	170	140
5.2-5	5-DEC-2018	0.017	110	120	97	490	530
5.2-2	5-DEC-2018	<0.005	3.5	70	9.8	310	65
5.2-4	5-DEC-2018	<0.005	4.8	43	9.7	150	57

SAMPLE EXCEEDS MOST STRINGENT OF CCME AL AND RL/PL SQG (COARSE GRAINED SOIL), AND THE REFERENCE VALUE



SOIL SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
5.2-1	5440963.5	288989.8
5.2-2	5440966.6	288989.8
5.2-3	5440966.1	288986.4
5.2-4	5440963.1	288986.7
5.2-5	5440963.5	288989.8
5.2-7	5440962.5	288990.8
BUILDING SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
5.2-A1	5440962.6	288988.2
5.2-A2	5440964.8	288990.7
5.2-A3	5440964.8	288990.7
5.2-S1	5440962.7	288988.4



- LEGEND**
- SOIL SAMPLE LOCATION**
- CONCENTRATIONS OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES
 - CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES
- BUILDING MATERIAL SAMPLE LOCATION**
- ▲ DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES
 - ▲ DEBRIS SAMPLE BELOW REFERENCED GUIDELINES
- SITE FEATURE**
- SURVEYED SITE FEATURE
 - CONTAMINATED SOIL EXCAVATION BOUNDARY

1	Client Revisions	2020/02/14
0	Issued for Review	2019/12/17
Revision	Description	Date
Consultant's Name		Engineer's Stamp
		L'Agence Parcs Canada
Western and Northern Region		Ouest et Nord du Canada
Project title		
SPECIFICATIONS FOR REMEDIATION		
WATERTON LAKES NATIONAL PARK ALBERTA		
NON-PRIORITY SITES		
Designed by	KL	Drawn by
		JC
Approved by	TW	Date
		2019/07/25
Parks Canada Project Manager		
LIZ BAKER		
Drawing title		
SITE 5.2: WATERTON GOLF COURSE LIGHTNING SHELTER SHED PROPOSED REMEDIATION PLAN		
Project no.	Sheet	Revision
203.02356.00001	1	1

- APPROXIMATE VOLUME OF ASH AND NON-HAZARDOUS DEBRIS TO BE REMOVED AND DISPOSED OF OFF SITE. DEBRIS INCLUDES BUT IS NOT LIMITED TO ASH, METAL BENCH FRAME, A METAL SUPPORT FOR A SIGN, AND BURNT TIMBER = 2 m³
- APPROXIMATE VOLUME OF IMPACTED SOIL TO BE REMOVED AND DISPOSED OF OFF SITE (EXCAVATION DEPTH OF 300 mm) = 4.5 m³
- APPROXIMATE VOLUME OF CONCRETE/FOUNDATION MATERIAL TO BE REMOVED AND DISPOSED OF OFF SITE = 0.2 m³
CONCRETE CONTAINS SILICA. CONTROL WORKER EXPOSURE TO SILICA DUST.

	NAPHTHALENE	ARESENIC (INORGANIC)	COPPER
	mg/kg	mg/kg	mg/kg
CCME SOILQG TIER 1 AL	0.013	12	63
CCME SOILQG TIER 1 RL/PL	0.013	12	63
REFERENCE VALUE	0.086	-	-
8.3-1	29-NOV-2018	0.041	110
8.3-3	29-NOV-2018	0.03	22
8.3-6	13-MAY-2019	0.035	5.3

SAMPLE EXCEEDS MOST STRINGENT OF CCME AL AND RL/PL SQG (COARSE GRAINED SOIL), AND THE REFERENCE VALUE

LEGEND
SOIL SAMPLE LOCATION

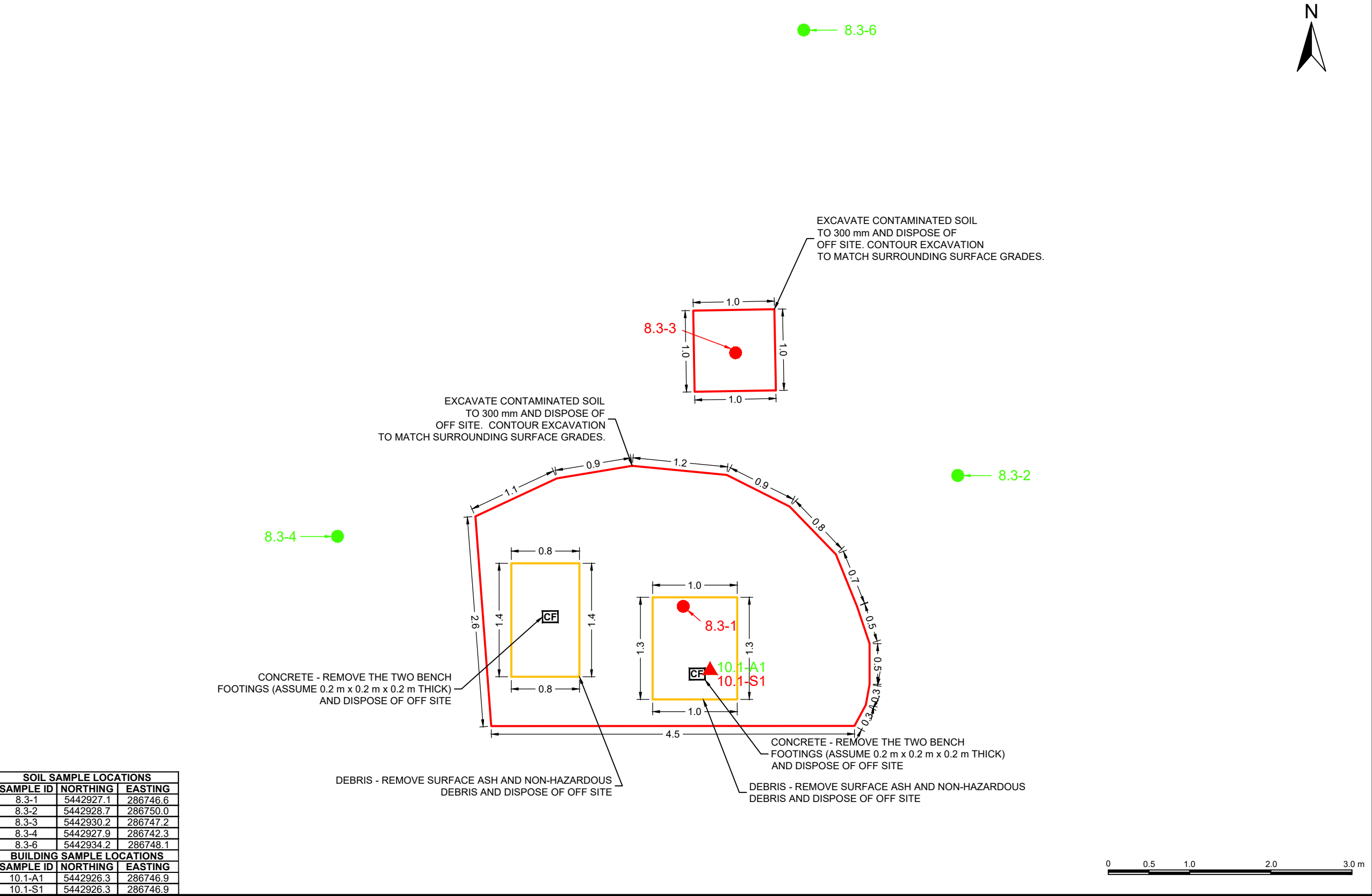
- CONCENTRATIONS OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES
- CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

BUILDING MATERIAL SAMPLE LOCATION

- ▲ DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES
- ▲ DEBRIS SAMPLE BELOW REFERENCED GUIDELINES

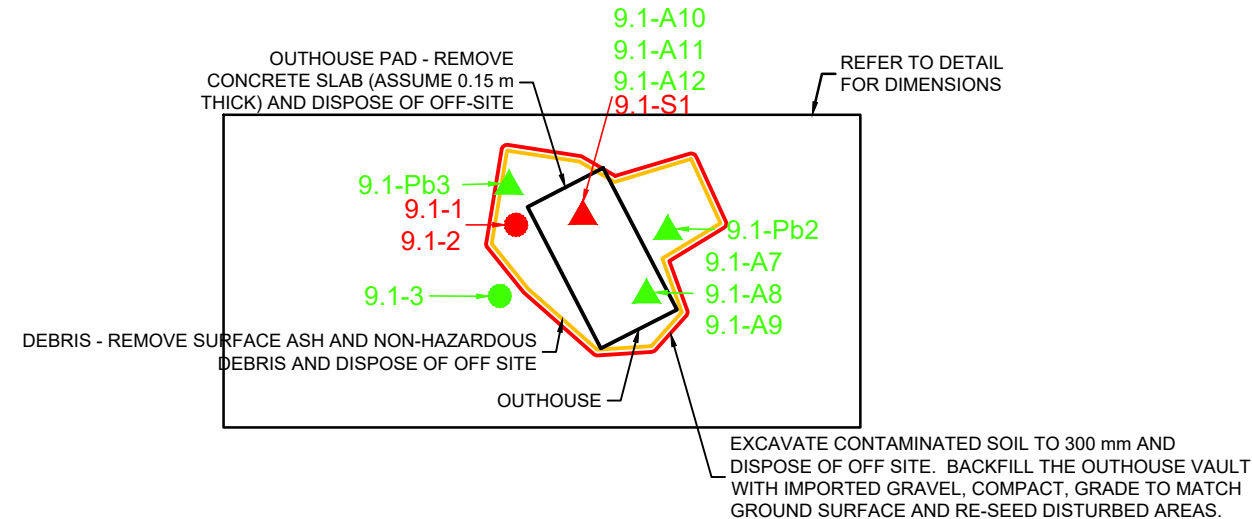
SITE FEATURE

- CF CONCRETE FOOTING
- SURVEYED SITE FEATURE
- DEBRIS REMOVAL BOUNDARY
- CONTAMINATED SOIL EXCAVATION BOUNDARY

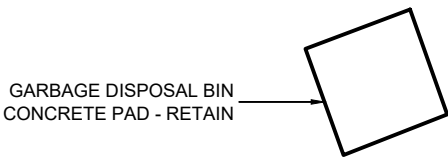


1	Client Revisions	2020/02/14
0	Issued for Review	2019/12/17
Revision	Description	Date
Consultant's Name		Engineer's Stamp
		
 Parks Canada Agency		L'Agence Parcs Canada
Western and Northern Region		Ouest et Nord du Canada
Project title		
SPECIFICATIONS FOR REMEDIATION		
WATERTON LAKES NATIONAL PARK ALBERTA		
NON-PRIORITY SITES		
Designed by KL	Drawn by JC	
Approved by TW	Date 2019/11/26	
Parks Canada Project Manager LIZ BAKER		
Drawing title		
SITE 8.3: INDIGENOUS HISTORY VIEWPOINT		
PROPOSED REMEDIATION EXTENTS		
Project no. 203.02356.00001	Sheet 1	Revision 1

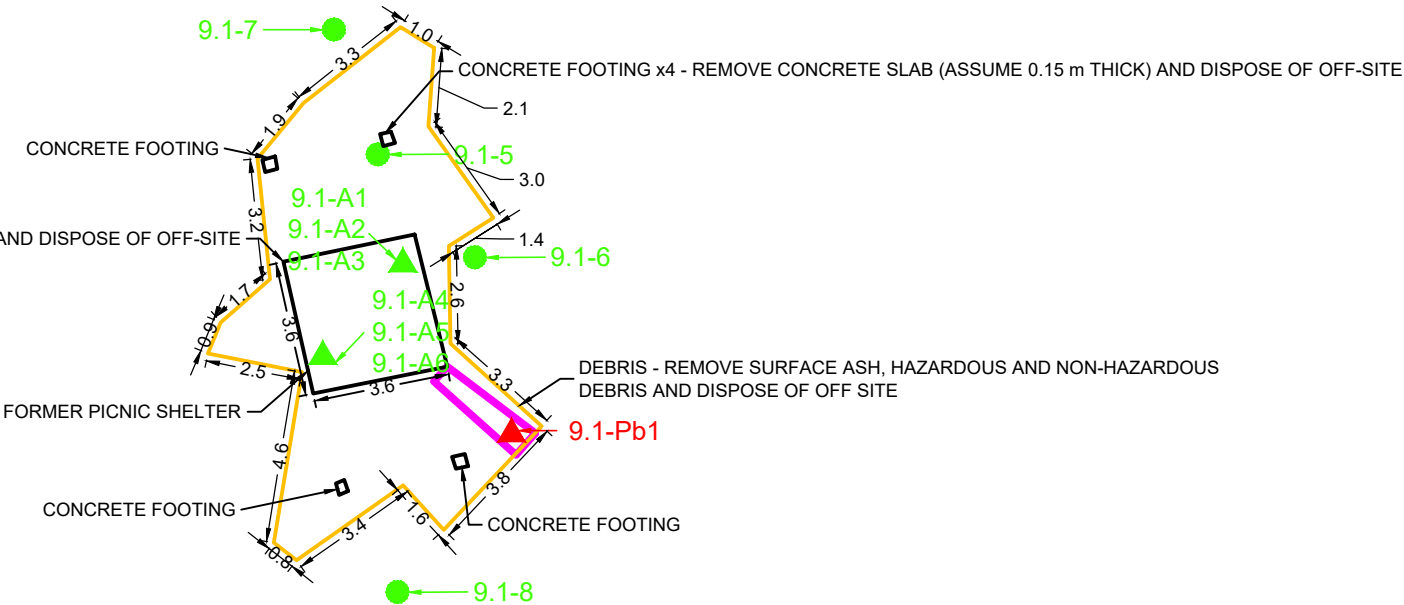
- APPROXIMATE VOLUME OF ASH AND NON-HAZARDOUS DEBRIS TO BE REMOVED AND DISPOSED OF OFF SITE. DEBRIS INCLUDES BUT IS NOT LIMITED TO ASH, A METAL STOVE, CONCRETE BLOCKS, METAL FRAMES OF TWO PICNIC TABLES, TWO UPRIGHT, BUT BURNT, TIMBER COLUMNS, BURNT WOODEN BEAMS, METAL, ONE METAL DOOR, CERAMIC TILES AND DRY WALL = 17 m³
- APPROXIMATE VOLUME OF IMPACTED SOIL TO BE REMOVED AND DISPOSED OF OFF SITE (EXCAVATION DEPTH OF 300 mm) = 4 m³
- APPROXIMATE VOLUME OF CONCRETE/FOUNDATION MATERIAL TO BE REMOVED AND DISPOSED OF OFF SITE = 7 m³
CONCRETE CONTAINS SILICA. CONTROL WORKER EXPOSURE TO SILICA DUST.
- APPROXIMATE VOLUME OF HAZARDOUS MATERIALS TO BE REMOVED AND DISPOSED OF OFF-SITE (INCLUDES BROWN PAINT IN POOR CONDITION ON THE PICNIC SHELTER BEAMS WHICH COVERS AN AREA OF APPROXIMATELY 1 m² IN TOTAL) = < 0.1 m³
- APPROXIMATE VOLUME OF CLEAN IMPORTED BACKFILL TO BE COMPACTED AND GRADED TO MATCH EXISTING GRADE = 5 m³



SOIL SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
9.1-1	5440443.3	283288.6
9.1-2	5440443.3	283288.6
9.1-3	5440441.4	283288.2
9.1-4	5440445.2	283292.9
9.1-5	5440424.6	283308.6
9.1-6	5440421.9	283311.2
9.1-7	5440427.9	283307.4
9.1-8	5440413.0	283309.1
BUILDING SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
9.1-A1	5440421.7	283309.3
9.1-A2	5440421.7	283309.3
9.1-A3	5440421.7	283309.3
9.1-A4	5440419.2	283307.1
9.1-A5	5440419.2	283307.1
9.1-A6	5440419.2	283307.1
9.1-A7	5440441.4	283292.0
9.1-A8	5440441.4	283292.0
9.1-A9	5440441.4	283292.0
9.1-A10	5440443.5	283290.3
9.1-A11	5440443.5	283290.3
9.1-A12	5440443.5	283290.3
9.1-S1	5440443.5	283290.3
9.1-Pb1	5440417.2	283312.1
9.1-Pb2	5440443.1	283292.6
9.1-Pb3	5440444.3	283288.4



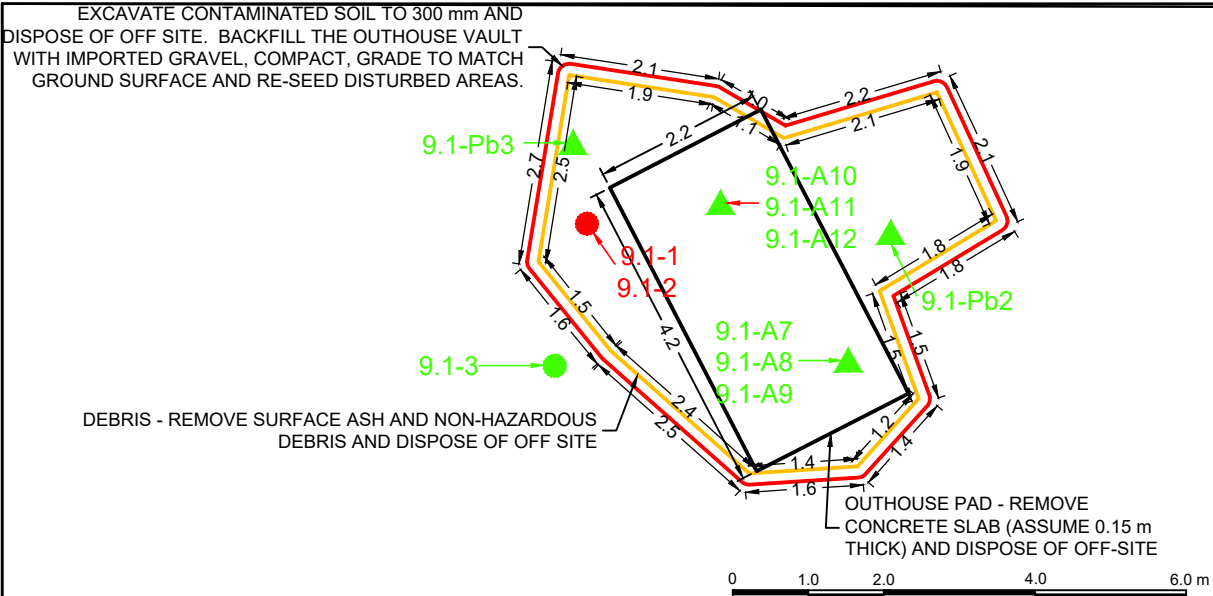
CONCRETE PAD - REMOVE CONCRETE SLAB AND DISPOSE OF OFF-SITE




		NAPHTHALENE	PHENANTHRENE	CHROMIUM (III + VI)	TIN
		mg/kg	mg/kg	mg/kg	mg/kg
CCME SOILQG TIER 1 AL		0.013	0.046	64	5
CCME SOILQG TIER 1 RL/PL		0.013	0.046	64	50
REFERENCE VALUE		0.086	-	-	-
9.1-1	30-NOV-2018	0.038	0.052	65	2.5
9.1-2	30-NOV-2018	0.13	0.042	40	6.5

SAMPLE EXCEEDS MOST STRINGENT OF CCME AL AND RL/PL SQG (COARSE GRAINED SOIL), AND THE REFERENCE VALUE

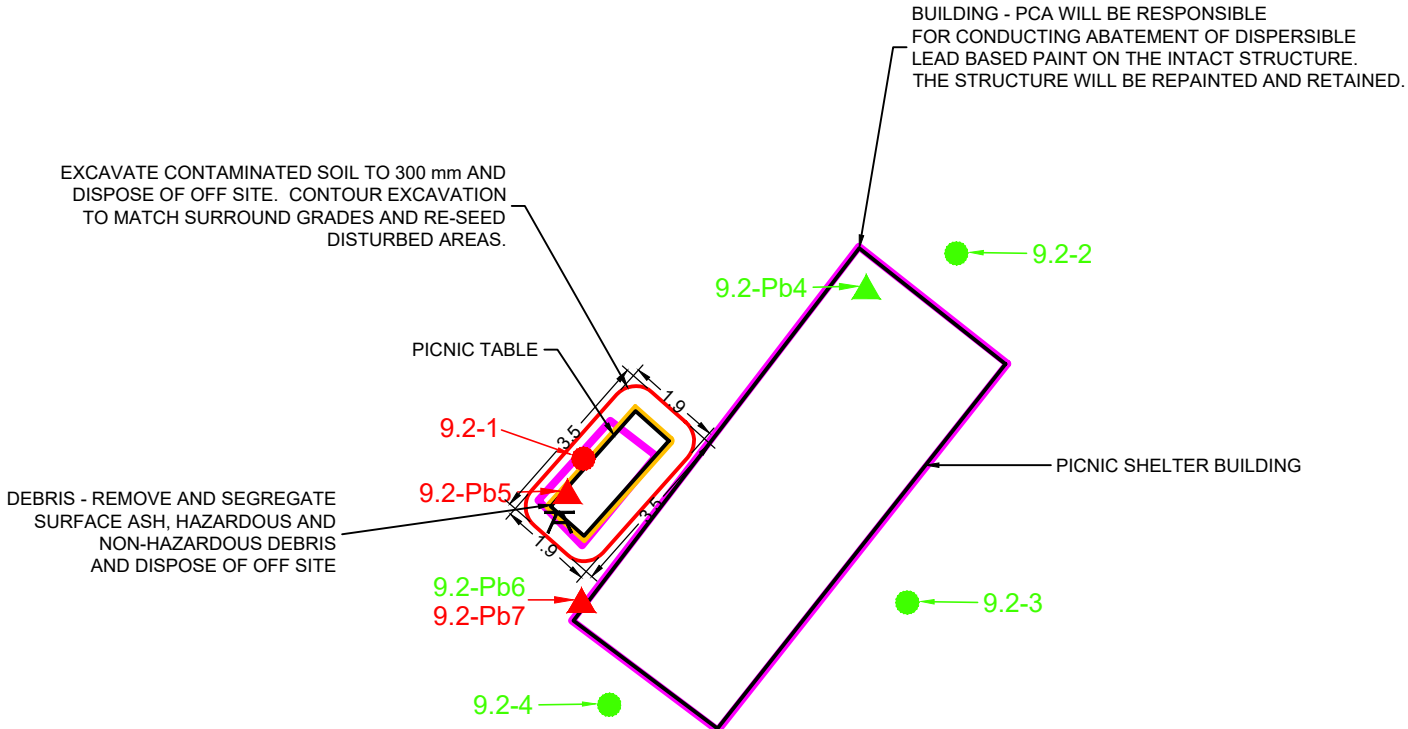
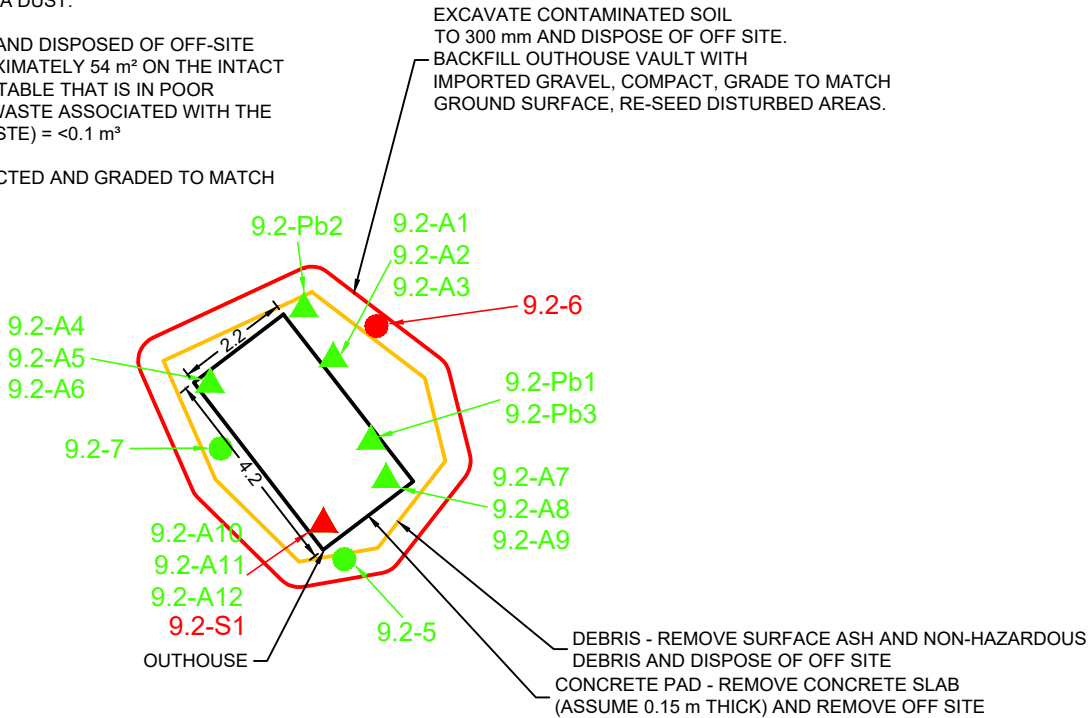
DETAIL



- LEGEND**
- SOIL SAMPLE LOCATION**
- CONCENTRATIONS OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES
 - CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES
- BUILDING MATERIAL SAMPLE LOCATION**
- DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES
 - DEBRIS SAMPLE BELOW REFERENCED GUIDELINES
- SITE FEATURE**
- SURVEYED SITE FEATURE
 - DEBRIS REMOVAL BOUNDARY
 - CONTAMINATED SOIL EXCAVATION BOUNDARY
 - AREA OF OBSERVED LEAD-BASED PAINT

1	Client Revisions	2020/02/14
0	Issued for Review	2019/12/17
Revision	Description	Date
Consultant's Name		Engineer's Stamp
		
 Parks Canada Agency		L'Agence Parcs Canada
Western and Northern Region		Ouest et Nord du Canada
Project title		
SPECIFICATIONS FOR REMEDATION WATERTON LAKES NATIONAL PARK ALBERTA NON-PRIORITY SITES		
Designed by KL	Drawn by JC	
Approved by TW	Date 2019/11/26	
Parks Canada Project Manager LIZ BAKER		
Drawing title		
SITE 9.1: McNEALY'S DAY USE AREA PROPOSED REMEDATION PLAN		
Project no. 203.02356.00001	Sheet 1	Revision 1

- APPROXIMATE VOLUME OF ASH AND NON-HAZARDOUS DEBRIS TO BE REMOVED AND DISPOSED OF OFF SITE. DEBRIS INCLUDES BUT IS NOT LIMITED TO ASH, A METAL DOOR, A METAL VENTILATION FAN, BURNT METAL, PVC PIPE, WOOD, CERAMIC TILES AND DRYWALL = 2 m³
- APPROXIMATE VOLUME OF IMPACTED SOIL TO BE REMOVED AND DISPOSED OF OFF SITE (EXCAVATION DEPTH OF 300 mm) = 7.5 m³
- APPROXIMATE VOLUME OF CONCRETE/FOUNDATION MATERIAL TO BE REMOVED AND DISPOSED OF OFF SITE = 2 m³
CONCRETE CONTAINS SILICA. CONTROL WORKER EXPOSURE TO SILICA DUST.
- APPROXIMATE VOLUME OF HAZARDOUS MATERIALS TO BE REMOVED AND DISPOSED OF OFF-SITE (INCLUDES GREEN LEAD-BASED PAINT COVERING AN AREA OF APPROXIMATELY 54 m² ON THE INTACT PICNIC SHELTER AND 1 m² OF BLACK PAINT ON THE ADJACENT PICNIC TABLE THAT IS IN POOR CONDITION. LEAD BASED PAINT THAT IS WELL BONDED TO WOODEN WASTE ASSOCIATED WITH THE PICNIC TABLE CAN BE DISPOSED OF AS GENERAL CONSTRUCTION WASTE) = <0.1 m³
- APPROXIMATE VOLUME OF CLEAN IMPORTED BACKFILL TO BE COMPACTED AND GRADED TO MATCH EXISTING GRADE = 5 m³



		NAPHTHALENE	ARESENIC (INORGANIC)	CHROMIUM (III + VI)	NICKEL
		mg/kg	mg/kg	mg/kg	mg/kg
CCME SOILOGG TIER 1 AL		0.013	12	64	45
CCME SOILOGG TIER 1 RL/PL		0.013	12	64	45
REFERENCE VALUE		0.086	-	-	-
9.2-1	4-DEC-2018	0.014	5.7	110	53
9.2-6	4-DEC-2018	<0.005	19	27	12

SAMPLE EXCEEDS MOST STRINGENT OF CCME AL AND RL/PL SQG (COARSE GRAINED SOIL), AND THE REFERENCE VALUE



LEGEND

SOIL SAMPLE LOCATION

CONCENTRATIONS OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES

CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

BUILDING MATERIAL SAMPLE LOCATION

DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES

DEBRIS SAMPLE BELOW REFERENCED GUIDELINES

SITE FEATURE

PICNIC TABLE

SURVEYED SITE FEATURE

DEBRIS REMOVAL BOUNDARY

CONTAMINATED SOIL EXCAVATION BOUNDARY

AREA OF OBSERVED LEAD-BASED PAINT

1	Client Revisions	2020/02/14
0	Issued for Review	2019/12/17
Revision	Description	Date
Consultant's Name		Engineer's Stamp
		L'Agence Parcs Canada
Western and Northern Region		Ouest et Nord du Canada

Project title

SPECIFICATIONS FOR
REMEDATION
WATERTON LAKES NATIONAL PARK
ALBERTA
NON-PRIORITY SITES

Designed by KL	Drawn by JC
Approved by TW	Date 2019/11/26

Parks Canada Project Manager
LIZ BAKER

Drawing title

SITE 9.2: LITTLE PRAIRIE
DAY USE AREA PROPOSED
REMEDATION EXTENTS

Project no. 203.02356.00001	Sheet 1	Revision 1
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SOIL SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
9.2-1	5436397.0	278386.8
9.2-2	5436401.1	278394.2
9.2-3	5436394.2	278393.2
9.2-4	5436392.2	278387.3
9.2-5	5436412.6	278376.9
9.2-6	5436417.3	278377.5
9.2-7	5436414.8	278374.4
BUILDING SAMPLE LOCATIONS		
SAMPLE ID	NORTHING	EASTING
9.2-A1	5436416.6	278376.7
9.2-A2	5436416.6	278376.7
9.2-A3	5436416.6	278376.7
9.2-A4	5436416.1	278374.2
9.2-A5	5436416.1	278374.2
9.2-A6	5436416.1	278374.2
9.2-A7	5436414.2	278377.7
9.2-A8	5436414.2	278377.7
9.2-A9	5436414.2	278377.7
9.2-A10	5436413.3	278376.5
9.2-A11	5436413.3	278376.5
9.2-A12	5436413.3	278376.5
9.2-Pb1	5436415.0	278377.4
9.2-Pb2	5436415.0	278377.4
9.2-Pb3	5436417.6	278376.1
9.2-Pb4	5436400.4	278392.4
9.2-Pb5	5436396.3	278386.5
9.2-Pb6	5436394.1	278386.7
9.2-Pb7	5436394.1	278386.7
9.2-S1	5436413.3	278376.5

APPENDIX A

Site Location Coordinates

Site	UTM83z12_E	UTM83z12_N	UTM83z11_E	UTM83z11_N	Long_DD	Lat_dd
SITE 2.1: CRANDELL BACKCOUNTRY CAMPGROUND KITCHEN SHELTER PROPOSED REMEDIATION EXTENTS	283253	5441537	721302	5441717	-113.968807	49.088479
SITE 2.2: CRANDELL BACKCOUNTRY CAMPGROUND CAMPSITES DEBRIS REMOVAL	283370	5441577	721416	5441766	-113.967219	49.088876
SITE 4.1: GOAT LAKE BACKCOUNTRY CAMPGROUND CAMPSITES DEBRIS REMOVAL	274751	5450340	712131	5449820	-114.089988	49.164502
SITE 4.2: GOAT LAKE BACKCOUNTRY CAMPGROUND OUTHOUSE DEBRIS REMOVAL	274692	5450355	712071	5449830	-114.090806	49.164614
SITE 4.3: GOAT LAKE BACKCOUNTRY CAMPGROUND PICNIC TABLES	274697	5450313	712079	5449789	-114.090718	49.164239
SITE 5.1: WATERTON GOLF COURSE RESERVOIR PROPOSED REMEDIATION EXTENTS	288896	5440985	726971	5441613	-113.891328	49.085479
SITE 5.2: WATERTON GOLF COURSE LIGHTNING SHELTER SHED PROPOSED REMEDIATION EXTENTS	288988	5440965	727065	5441600	-113.890052	49.085328
SITE 6.1: BEAR'S HUMP HIKING TRAIL SEISMIC STATION BUILDING PROPOSED REMEDIATION	287382	5438123	725688	5438641	-113.910529	49.059251
SITE 8.3: INDIGENOUS HISTORY VIEWPOINT PROPOSED REMEDIATION EXTENTS	286744	5442926	724672	5443378	-113.921788	49.102175
SITE 9.1: MCNEALY'S DAY USE AREA PROPOSED REMEDIATION EXTENTS	283299	5440428	721435	5440615	-113.96758	49.078529
SITE 9.2: LITTLE PRAIRIE DAY USE AREA PROPOSED REMEDIATION EXTENTS	278379	5436407	716849	5436218	-114.032653	49.040656

APPENDIX B

Contractor Evaluation Form

APPENDIX B - QUALIFICATIONS FORM

Using the provided forms, provide a response to each of the requirements. Responses must be written into the space provided on the project experience form (no modifications allowed). When completing the project experience forms, the page width and length must not exceed 8.5" X 11". References must be the client (i.e. Entity that contracted for the work) and have no affiliation with the Bidder.

Bidders must include the following with their submission:

- Resumes for proposed personnel in each category: Project Manager (1 individual), Superintendent/Field Coordinator (1 individual), Machine Operator (2 individuals).
- Resumes for proposed Geotechnical Monitors who will be responsible for reviewing the on-site implementation of the Contractor's Excavation and Restoration Design Plan (2 individuals)
- Completion of the relevant project experience forms (see attachments) for proposed personnel in each category.

Please note: If replacement or additional personnel are proposed after contract award, they must meet the defined experience level for the category. A resume and completed relevant project experience form of the proposed personnel will be reviewed by the Departmental Representative and is subject to their approval. Resumes must clearly demonstrate the number of years experience and the relevancy of the experience.

A minimum of two staff must be on-site at all times during construction/remediation. These staff include the superintendent/field coordinator and equipment operator.

All qualifications requirements and information requirements are mandatory.

The evidence provided by the Bidder may be verified by Canada. Failure by the Bidder to provide the required evidence or in the event that the evidence cannot be verified shall result in the Bidder being disqualified and no further consideration being given to the Bidder. Any blank responses on the project experience forms will result in the bid being disqualified with no further consideration being given to the bidder.

Canada reserves the right to verify information for completeness and accuracy and to confirm reference satisfaction with services provided. In the event the information cannot be verified, or the service is found to be unsatisfactory, the bid will be considered non-responsive and no further consideration will be given to the Bidder.

Define experience levels for each of the personnel categories identified:

Project Manager:

Minimum 10 years experience in the environmental/remediation industry including 10 years experience in overall management (i.e. responsibility for project budget, allocation of technical personnel, adherence to project schedule) of ex-situ remediation projects similar to federal facilities and properties. Must have managed one (1) contaminated sites remediation project with a cost of \$1,000,000 or greater in the last five (5) years. Cost means the purpose of the project and the majority of the cost must be directly attributable to contaminated sites remediation.

Project Manager Experience Table

Name of Individual:	
Total Number of Years Experience as Project Mgr in the environmental/remediation industry (must meet a minimum of 10 years experience)	
Contaminated sites remediation project over \$1,000,000	Project Dollar Value: Project Name & Description: Project Completion Date: Reference Name: Reference Phone Number:

Superintendent/Field Coordinator: Minimum 10 years experience in the environmental/remediation industry including 10 years of demonstrated experience in on-site supervision of contracted personnel, inspection and approval of remediation projects similar to federal facilities and properties and inspection and approval of construction projects adhering to engineering drawings and designs.

Superintendent/Field Coordinator Experience Table

Name of Individual:	
Total Number of Years Experience in the environmental/remediation industry (minimum 10 years)	
Number of Years Experience in the superintendent/field coordinator role (minimum 10 years)	
Please provide project name and project reference (must include name and phone # for each reference). Note: Different projects can be used for the evaluation criteria listed below.	
Working around Species-at-Risk or sensitive species.	Project Name: Reference Name: Reference Title: Reference Phone #: Brief project description including names of species at risk (specific name & common name) or sensitive species worked with:
Working in sensitive habitats including aquatic environments, provincial/federal parks, conservation areas, or National Wildlife Areas.	Project Name: Reference Name: Reference Title: Reference Phone #: Brief project description including types of sensitive or protected habitats worked with:
Construction project where majority of project involves excavation and movement of soil in accordance with engineering drawings and designs with a project value of over \$500,000	Project Name: Reference Name: Reference Title: Reference Phone #: Brief project description:

Machine Operator #1 and #2: Minimum 10 years experience operating heavy equipment.

Machine Operator #1 Experience Table

Name of Individual:	
Number of Years Experience in the machine/equipment operator role (minimum 10 years)	
Please provide project name and project reference (must include name and phone # for each reference). Note: Different projects can be used for the evaluation criteria listed below.	
Working around Species-at-Risk or sensitive species	Project Name: Reference Name: Reference Title: Reference Phone #: Brief project description including names of species at risk (specific name & common name) or sensitive species worked with:
Working in sensitive habitats including aquatic environments, provincial/federal parks, conservation areas, or National Wildlife Areas	Project(s) Name: Reference Title: Reference Name: Reference Phone #: Brief project description including types of sensitive or protected habitats worked with.
Construction project where majority of project involves excavation and movement of soil in accordance with engineering drawings and designs with a project value of over \$500,000	Project(s) Name: Reference Title: Reference Name: Reference Phone #: Brief project description:

Machine Operator #2 Experience Table

Name of Individual:	
Number of Years Experience in the machine/equipment operator role (minimum 10 years)	
Please provide project name and project reference (must include name and phone # for each reference). Note: Different projects can be used for the evaluation criteria listed below.	
Working around Species-at-Risk or sensitive species	<p>Project Name:</p> <p>Reference Name:</p> <p>Reference Title:</p> <p>Reference Phone #:</p> <p>Brief project description including names of species at risk (specific name & common name) or sensitive species worked with:</p>
Working in sensitive habitats including aquatic environments, provincial/federal parks, conservation areas, or National Wildlife Areas	<p>Project(s) Name:</p> <p>Reference Title:</p> <p>Reference Name:</p> <p>Reference Phone #:</p> <p>Brief project description including types of sensitive or protected habitats worked with.</p>
Construction project where majority of project involves excavation and movement of soil in accordance with engineering drawings and designs with a project value of over \$500,000	<p>Project(s) Name:</p> <p>Reference Title:</p> <p>Reference Name:</p> <p>Reference Phone #:</p> <p>Brief project description:</p>

APPENDIX C

SLR RARMP Report



global environmental solutions

**Sites Affected by the Kenow Wildfire
Waterton Lakes National Park, Alberta**

**Remedial Action and Risk Management Plan
Non-Priority Sites**

Public Services and Procurement Canada

**February 2020
SLR Project No.: 203.02356.00001**

**REMEDIAL ACTION AND RISK MANAGEMENT PLAN
NON-PRIORITY SITES**

**SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA**

SLR Project No.: 203.02356.00001

Prepared by
SLR Consulting (Canada) Ltd.
1185, 10201 Southport Road, SW
Calgary, AB T2W 4X9

For

Public Services and Procurement Canada
Suite 310, 269 Main Street
Winnipeg, MB R3C 1B3

February 13, 2020

Association of Professional Engineers and Geoscientists of Alberta
Permit to Practice P05449

Prepared by:

Reviewed by:

Kate Lindfield, M.Sc., P.Geol.
Senior Geologist



2020-02-13

Mel Hamilton, P.Eng.
Senior Engineer

CONFIDENTIAL

Distribution: 1 PDF electronic copy – Public Services and Procurement Canada
1 copy – SLR Consulting (Canada) Ltd.

EXECUTIVE SUMMARY

SLR Consulting (Canada) Ltd. (SLR) was retained by Public Services and Procurement Canada (PSPC), on behalf of Parks Canada Agency (PCA) to complete a Remedial Action and Risk Management Plan (RARMP) for 36 sites in Waterton Lakes National Park (WLNP), Alberta that were affected by the 2017 Kenow Wildfire.

This report provides site-specific abatement, remediation and risk management plans for the 14 low-priority sites within WLNP (i.e., non-priority sites: 1.20, 2.1, 2.2, 2.3, 3.1, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 8.3, 9.1 and 9.2). Remediation/risk management and abatement plans for the 22 high-priority sites were previously provided in the SLR report titled *“Remediation Action and Risk Management Plan, Crandell Campground, Lost Horse and Coppermine Day Use Areas: 22 Sites Affected by the Kenow Wildfire”*, dated August 8, 2019.

The site-specific abatement and remediation plans will be used to support the development of tender specifications to allow for the future award of the remediation construction contract. The tender specifications will require the contractor to provide documents including, but not limited to, applicable permits, disposal facility details, health and safety plans and environmental protection plans.

The project objectives of the RARMP were to:

- Quantify volumes of various media requiring removal and off-site disposal that were identified in the SLR Debris and Soil Assessment Report (September 2019) (i.e., hazardous and non-hazardous debris, concrete and impacted soil); and
- Provide options for the removal of hazardous and non-hazardous debris and the remediation/risk management of contaminants of concern (COCs) in shallow soil.

A summary of identified hazardous building materials/debris and COCs in soil that exceeded the applicable guidelines are summarised in the table below.

The Debris and Soil Assessment concluded that remediation and/or risk management and/or debris removal measures are required at all of the investigated sites. Some sites only require removal of debris; however, where COCs in the soil present a potential risk to human health or environmental receptors (via direct soil contact or soil/food ingestion) a remediation and/or risk management approach is required.

The appropriate remediation criteria are the Canadian Council of Ministers of the Environment (CCME) *Canadian Environmental Quality Guidelines (EQG)* (1999, updated 2014), and the CCME *Canada-Wide Standards (CWS) for Petroleum Hydrocarbons in Soil* (2001, revised 2008) Tier I Levels for Soils. The applicable land use at the site was Parkland and Agricultural to be protective of human health in a recreational scenario, and also ecological health, as all sites are available to wildlife for grazing and migration. Coarse-grained soil texture was applicable at all of the sites included in this RARMP with the exception of sites 4.1 to 4.3 and 6.1, which were all fine-grained. Reference concentrations of polycyclic aromatic hydrocarbons (PAH) and metals from samples obtained from burnt forested areas throughout the study area will also be used as remediation criteria for any low-level naphthalene and barium concentrations that exceed the applicable CCME guidelines.

The following remedial objectives were considered to be applicable to all sites:

- Remediation and abatement to be completed during summer 2020.
- Remedial measures should reduce or eliminate risks to human and/or ecological receptors posed by debris and COCs in soil associated with the Kenow wildfire.
- Post-remedial conditions should meet federal guidelines for applicable COCs and/or background/reference conditions in preparation for redevelopment and re-opening of park facilities.

In order to meet the remedial objectives, and based on the limited timeframe for remediation, removal and disposal of impacted soil and building debris is the most appropriate remedial option for these sites; with risk assessment and risk management measures recommended where excavation/removal is not feasible. Where hazardous building materials are present in buildings, abatement of these materials was considered the recommended approach (including buildings that are to remain on-site).

The recommended site-specific remediation and abatement approaches and the proposed quantities of impacted soil, hazardous materials, non-hazardous debris and concrete to be removed and disposed of off-site are summarised in the table below; however, the overall remedial and abatement strategies can be summarised as follows:

- **Sites where impacted soil and/or burnt building debris are present:** excavate non-hazardous and hazardous debris (if present), remove concrete building foundations, excavate impacted soil to the extents shown on the drawings, complete confirmatory soil sampling, backfill (if required) and/or rough-grade and recontour excavations when soil analysis indicates that the excavation extents meet the specified remediation criteria, and dispose of the segregated waste streams off-site. It is expected that all non-recyclable hazardous and non-hazardous materials and soil can be disposed of at the Pincher Creek landfill due to proximity to the site, although approval to dispose of this material has not been confirmed. The remedial contractor bidders may choose to provide alternate disposal or recycling locations.
- **Unburnt structures that will be retained – specifically site 1.20 (Crandell Campground Water Tower) and site 9.2 (Little Prairie Day Use Area picnic shelter):** complete abatement of hazardous building materials in/on the structure to be retained, dispose of the hazardous waste stream off-site. Where required (at site 9.2), complete removal of impacted soil and hazardous and non-hazardous debris as per the first bullet.
- **Structures that require demolition – specifically site 6.1 (Bear’s Hump Hiking Trail):** high risk abatement procedures are required during dismantling of the seismic station building as the remaining concrete block walls and building slab contain asbestos-containing materials. Dispose of the hazardous waste stream off-site. Complete removal of impacted soil and remaining non-hazardous debris as per the first bullet.

A Class C cost estimate for implementing the abatement and remediation plans has been included under separate cover.

Site No.	Site Name	Hazardous Materials Identified	COCs Identified in Soil Samples	Volumes (m ³) for Disposal				Proposed Remediation Approach
				Hazardous Surface Debris	Concrete	Non-Hazardous Surface Debris	Impacted Soil	
1.20	Crandell Campground Water Tower	Lead-Based Paint	Soil sampling not included in scope	<0.1 (surface area of 2 m ²)	0	0	0	-PCA to manage site in the future. No further work required; however, it is recommended that dispersible lead-based paint be removed, and the affected area is repainted.
2.1	Crandell Backcountry Campground Kitchen Shelter	Silica	Lead	0	3.0	3.0	0.3	-Removal and disposal of concrete footings and burnt non-hazardous building debris. -Excavation and disposal of lead-impacted soil. -Removal of debris and soil off-site by helicopter. -Grade and smooth the excavation and seed disturbed areas. -Excavation backfilling not required.
2.2	Crandell Backcountry Campground Campsites	Not Sampled ¹	Barium	0	0	2.0	20	-Excavation and disposal of impacted soil. -Removal and disposal of wooden tent pad borders. -Removal of debris and soil off-site by helicopter. -Grade and smooth gravel tent pads and soil excavation area to contour with surrounding ground. -Seed disturbed areas.
2.3	Crandell Backcountry Campground Outhouse	Not Sampled ¹	None	0	0	<0.1	0	-PCA to manage site in the future. No further work required; however, it is recommended that minor non-hazardous debris is removed.
3.1	Melted roadside edge markers – Red Rock Parkway	Not Sampled ¹	Not Sampled	0	0	2.0	0	-PCA to remove markers. No further work required.

Site No.	Site Name	Hazardous Materials Identified	COCs Identified in Soil Samples	Volumes (m ³) for Disposal				Proposed Remediation Approach
				Hazardous Surface Debris	Concrete	Non-Hazardous Surface Debris	Impacted Soil	
4.1	Goat Lake Backcountry Campground 4 Campsites	Not Sampled ¹	None	0	0	2.0	0	-Removal and disposal of wooden tent pad borders. Removal off-site by helicopter. -Grade and smooth gravel tent pads to contour with surrounding ground. -Seed disturbed areas.
4.2	Goat Lake Backcountry Campground Outhouse	Not Sampled ¹	None	0	0	0.5	0	-Hand-pick minor non-hazardous debris (metal and glass) and broken food hang pole and removal off-site by helicopter.
4.3	Goat Lake Backcountry Campground Picnic Tables	Not Sampled ¹	None	0	0	2.0	0	-Removal and disposal of wooden picnic tables. Removal off-site by helicopter. -Grade and smooth gravel tent pads to contour with surrounding ground. -Seed disturbed areas.

Site No.	Site Name	Hazardous Materials Identified	COCs Identified in Soil Samples	Volumes (m ³) for Disposal				Proposed Remediation Approach
				Hazardous Surface Debris	Concrete	Non-Hazardous Surface Debris	Impacted Soil	
5.1	Waterton Golf Course Reservoir	Silica	Indeno(1,2,3-c,d)pyrene, lead	0	17	1.0	10	<ul style="list-style-type: none"> -Removal and disposal of non-hazardous debris (burnt wooden beams within reservoir and minor debris around perimeter of reservoir). -Excavation and removal of concrete reservoir base and walls. -Excavation and disposal of impacted soil. -Backfill with gravel fill sourced from outside WLNP. -Place clean topsoil and seed disturbed areas.
5.2	Waterton Golf Course Lightning Shelter Shed	Silica	Arsenic, chromium, copper, lead, zinc	0	2.0	0	4.0	<ul style="list-style-type: none"> -Excavation and removal of concrete shed base. -Excavation and disposal of impacted soil. -Backfill excavation to existing grades with fill sourced from outside WLNP. -Place clean topsoil and seed disturbed areas.

Site No.	Site Name	Hazardous Materials Identified	COCs Identified in Soil Samples	Volumes (m³) for Disposal				Proposed Remediation Approach
				Hazardous Surface Debris	Concrete	Non-Hazardous Surface Debris	Impacted Soil	
6.1	Seismic Station Building – Bear's Hump Hiking Trail	ACM² Lead-based Paint Silica	Benzene, toluene, ethylbenzene, PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, phenanthrene, and pyrene), cadmium	6.0 (ACM covers a surface area of 66 m²) (Lead-Based Paint covers a surface area of 64 m² but as it is bonded to the substrate it is not considered a hazardous material)	1.0	2.0	6.5	<ul style="list-style-type: none"> -Conduct high-risk abatement procedures to remove the asbestos-containing vermiculite concrete block wall fill insulation and debris, the asbestos-containing penetration caulking from the building penetrations, and asbestos-containing concrete slab. -Remove any dispersible lead-based paint not bonded to the concrete blocks and conduct Toxicity Characteristic Leaching Procedure (TCLP) analysis of paint/building material waste stream to assess disposal options. -Removal of remaining non-hazardous building material and other site equipment (satellite dish, antenna bases, etc.). -Excavation and disposal of impacted soil. -Removal of all soil, hazardous and non-hazardous debris off-site by helicopter or tracked wheelbarrow. -Rough-grade excavation. -No backfilling required. -No restoration required.

Site No.	Site Name	Hazardous Materials Identified	COCs Identified in Soil Samples	Volumes (m³) for Disposal				Proposed Remediation Approach
				Hazardous Surface Debris	Concrete	Non-Hazardous Surface Debris	Impacted Soil	
8.3	Indigenous History Viewpoint	Silica	Arsenic, copper	0	0.2	2.0	4.5	<ul style="list-style-type: none"> -Removal and disposal of non-hazardous debris (remnants of bench and gazebo). -Excavation and disposal of ash and impacted soil. -Rough-grade excavation. -No backfilling required. -No restoration required.
9.1	McNealy's Day Use Area	Lead-based Paint Silica	PAH (naphthalene and phenanthrene), chromium, tin	<0.1 (lead-based paint covers a surface area of 1 m²)	7	17	4.0	<ul style="list-style-type: none"> -Remove and segregate wooden debris with dispersible lead-based paint from the remains of the Picnic Shelter. -Excavation of ash and the non-hazardous surface debris associated with the burnt picnic shelter and outhouse structures. -Excavation and removal of the concrete building slabs and footings associated with the picnic shelter and outhouse structures. -Excavation and disposal of impacted soil in the vicinity of the burnt outhouse structure. -Backfill outhouse vault with gravel sourced from outside WLNP. -Grade the outhouse backfill and the picnic shelter excavation. Seed disturbed areas. -Retain the concrete pad under the garbage dumpster.

Site No.	Site Name	Hazardous Materials Identified	COCs Identified in Soil Samples	Volumes (m³) for Disposal				Proposed Remediation Approach
				Hazardous Surface Debris	Concrete	Non-Hazardous Surface Debris	Impacted Soil	
9.2	Little Prairie Day Use Area	Lead-based Paint Silica	Arsenic, chromium, nickel	<0.1 (lead-based paint covers a surface area of 55 m² [54m² in good condition and 1 m² in poor condition])	2.0	2.0	7.5	<ul style="list-style-type: none"> -PCA will manage lead-based paint on intact picnic shelter structure. -Excavation of ash and the non-hazardous surface debris associated with the burnt outhouse structure. -Removal and disposal of the remains of the picnic table (contains lead-based paint). -Removal and disposal of the partially burnt entrance sign (non-hazardous). -Excavation and removal of the concrete building slabs and footings associated with the outhouse structure. -Excavation and disposal of impacted soil in the vicinity of the burnt outhouse structure and the burnt picnic table. -Backfill outhouse vault with gravel sourced from outside WLNP. Backfill to grade and seed disturbed areas.

Notes:

¹ Hazardous Materials were not sampled as only limited quantities of non-hazardous debris (including un-painted metal, unpainted wood, HDPE plastic) remained on-site.

² ACM – Asbestos-Containing Material

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APPENDICES

Appendix A	Abatement Procedures for Lead, Asbestos and Silica
Appendix B	Air Monitoring Methodology

LIST OF ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-containing material
AL	Agricultural Land Use
BIA	Basic Impact Assessment
BFD	Blind Field Duplicate
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CALA	Canadian Association for Laboratory Accreditation
CCME	Canadian Council of Ministers of the Environment
COC	Contaminant of Concern
COHSR	Canada Occupational Health and Safety Regulations
CLC	Canada Labour Code
cm	Centimetre
CVC	Combustible vapour concentration
CWS	Canada Wide Standards
EHSP	EHS Partnerships
EPEA	Alberta Environmental Protection and Enhancement Act
EQG	Canadian Environmental Quality Guidelines
GPS	Global Positioning System
HASP	Health and Safety Plan
ha	Hectare
JSA	Job Safety Analysis
km	Kilometre
m	Metres
m bgs	Metres Below Ground Surface
mg/kg	Milligram per Kilogram
mL	Millilitre
mm	Millimetre
NJC OHS	National Joint Council Occupational Health and Safety
OH&S	Occupational Health and Safety
PAH	Polycyclic Aromatic Hydrocarbons
PCA	Parks Canada Authority
PCB	Polychlorinated Biphenols
PCOC	Potential Contaminant of Concern

PHC	Petroleum Hydrocarbons
PHC F1	Canada-Wide Standards for petroleum hydrocarbons fraction F1 (nC6-nC10)
PHC F2	Canada-Wide Standards for petroleum hydrocarbons fraction F2 (>nC10-nC16)
PHC F3	Canada-Wide Standards for petroleum hydrocarbons fraction F3 (>nC16-nC34)
PHC F4	Canada-Wide Standards for petroleum hydrocarbons fraction F4 (>nC34)
PL	Parkland Land Use
ppm	Parts per Million
ppmv	Parts per Million by Volume
PSPC	Public Services and Procurement Canada
PVC	Polyvinyl Chloride
PWP	Preliminary Work Plan
QA/QC	Quality Assurance/Quality Control
RARMP	Remedial Action and Risk Management Plan
RDL	Reportable Detection Limits
RPD	Relative Percent Difference
SLR	SLR Consulting (Canada) Ltd.
SQG	Soil Quality Guidelines
TCLP	Toxicity Characteristic Leaching Procedure
TOR	Terms of Reference
VOC	Volatile Organic Compounds
WLNP	Waterton Lakes National Park
µg/L	Microgram per Litre

1.0 INTRODUCTION

SLR Consulting (Canada) Ltd. (SLR) was retained by Public Services and Procurement Canada (PSPC), on behalf of Parks Canada Agency (PCA) to complete a Remedial Action and Risk Management Plan (RARMP) for 36 sites in Waterton Lakes National Park (WLNP), Alberta, that were affected by the 2017 Kenow Wildfire.

This report provides remediation, risk management and hazardous materials abatement options for 14 low-priority sites (i.e., non-priority sites). Remediation/risk management and abatement plans for the remaining 22 high-priority sites are provided under separate cover.

As outlined in the Terms of Reference (TOR) dated October 2018, many of the sites include structures and assets that were partially or completely destroyed by the fire. Additional sites were added to the scope in January, May and August 2019. The sites were located mainly in backcountry areas of WLNP that were not accessible to the public after the fire. The site locations pertinent to this report are shown on Drawing 1 and are summarized in Table 1-1 below.

**Table 1-1
Site Locations**

SITE NO.	SITE NAME
Crandell Campground	
1.20	Crandell Campground Water Tower
Crandell Backcountry Campground	
2.1	Kitchen Shelter
2.2	4 Campsites
2.3	Outhouse
Goat Lake Backcountry Campground	
4.1	4 Campsites
4.2	Outhouse
4.3	Picnic Tables
Waterton Golf Course	
5.1	Golf Course Reservoir
5.2	Lightning Shelter Shed
6.1	Seismic Station Building and associated infrastructure – Bear's Hump Hiking Trail
Red Rock Parkway	
3.1	Melted roadside edge markers – Red Rock Parkway
8.3	Indigenous History Viewpoint
Akamina Parkway	
9.1	McNealy's Day Use Area
9.2	Little Prairie Day Use Area

1.1 Objectives

The RARMP is designed to support the development of tender specifications for remediation of select sites within WLNP. The RARMP will outline the volumes of hazardous and non-hazardous debris present at sites 1.20, 2.1, 2.2, 2.3, 3.1, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 8.3, 9.1, and 9.2, and soil impacted by contaminants of concern (COCs). It will also provide plans for remediation and/or

risk management and abatement. The data within the RARMP was collected during the soil and debris assessment conducted in December 2018 and May 2019 and the subsequent assessment and delineation work conducted in August 2019. The work was completed as per SLR's work plan submitted to PSPC in November 2018.

1.2 Scope of Work

As outlined in the TOR, the scope of work for the RARMP includes the following tasks:

- Presenting a summary of all data from the Debris and Soil Assessment, including COCs, affected media and quantity/volumes of materials to be removed (including non-hazardous materials, hazardous materials, concrete and impacted soil).
- Completing a remedial options evaluation to evaluate suitable remediation and/or risk management techniques and providing discussion on how the preferred strategy was chosen for each site.
- Providing a detailed plan for each site outlining the selected remediation and/or risk management technique and requirements for hazardous materials abatement.
- Presenting an overall remediation, risk management and/or abatement implementation plan, including control measures that will be put in place to minimize further risk.
- Developing a plan and methodology describing how remediation will be verified.

Note that an indicative Class C cost estimate to complete the recommended remedial activities and/or abatement of hazardous building materials/debris has been provided under separate cover.

Tasks to be completed in subsequent phases of the project include:

- Preparation of Tender Package (Specifications, Drawings, and Class 'A' Cost Estimate for low priority sites).

2.0 BACKGROUND INFORMATION

Waterton Lakes National Park encompasses an area of 50,500 hectares (ha), of which 20,329 ha were affected by the Kenow Wildfire that spread through the park in September and October 2017. The Kenow Wildfire partially or completely destroyed numerous assets/structures within front country and backcountry areas of WLNP that were used for the support of park operations and as recreational facilities, including day-use washrooms, shelters, cooking structures, outhouses, interpretive signs and campgrounds. In total, thirty-nine sites in backcountry areas of WLNP were selected for soil and/or debris assessment, with thirty-six being carried forward for remediation and/or risk management. Fourteen sites are included in this report. These sites have not been accessible to the general public since the fire.

2.1 Summary of the Debris and Soil Assessment

An assessment of sites that contained assets or structures that were affected by the 2017 Kenow Wildfire was conducted in November and December 2018 and May 2019. Results of the debris and soil assessment were reported by SLR in September 2019.

Obtaining samples of debris resulting from burnt structures and samples of potentially hazardous building materials from surviving or partially burnt structures was conducted by EHS Partnerships (EHSP) of Calgary, Alberta. Soil sampling was completed by SLR.

Additional soil sampling was also conducted in May 2019, including additional background sampling and delineation sampling to refine the horizontal extent of COCs at the following sites pertinent to this report:

- Site 2.1 – Crandell Backcountry Campground Kitchen Shelter.
- Site 2.2 – Crandell Backcountry Campground Campsites.
- Site 6.1 – Seismic Station Building – Bear’s Hump Hiking Trail.
- Site 8.3 – Indigenous History Viewpoint.

In addition, ten infrastructure facilities located in the Crandell campground were added to the scope by PCA in January 2019. These buildings were all unaffected by the fire and were assessed for the presence of hazardous building materials only. The results of site 1.20 (water tower) are pertinent to this report. The assessment of building materials was conducted in May 2019 by EHSP.

The Goat Lake sites were not accessible during the December 2018 or the May 2019 sampling programs due to avalanche hazard. Soil assessments were conducted at these sites in August 2019. One additional site, comprising two picnic tables on gravel pads (site 4.3) was encountered at the Goat Lake campground during the August 2019 field program. The site was added to the project scope and was assessed for the presence of soil impacts and hazardous debris.

Soil sampling to horizontally delineate previously identified impacts at Crandell Backcountry Campground Campsites (site 2.2) and the Bear’s Hump Seismic Station (site 6.1) was also conducted during the August 2019 field program.

2.1.1 Hazardous Material Assessment

The assessment of hazardous materials associated with debris from burned buildings and structures and several intact structures was conducted between November 29 and December 5, 2018; May 13 to 15, 2019 and August 6, 2019. The assessment was completed by EHSP on behalf of SLR. Samples were obtained from building materials and debris suspected as being hazardous and were submitted for the analysis of asbestos content, concentrations of lead or polychlorinated biphenyls (PCB) in paint and presence of silica in concrete.

Table 2-1 below summarises the hazardous materials encountered at the sites. Estimated quantities of hazardous and non-hazardous building materials/debris and concrete are summarised in the site-specific remediation plans outlined in Section 5.0.

2.1.2 Soil Assessment

A total of 224 soil samples were collected over 20 sites in November/December 2018. An additional 22 soil samples were collected in May 2019 and 34 samples were collected in August 2019. Samples were collected by hand-digging to a depth of approximately 0.25 metres (m) below ground surface (bgs). Soil samples were submitted for analysis of select contaminants of potential concern including benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum

hydrocarbon (PHC) fractions F1 to F4, polycyclic aromatic hydrocarbons (PAH), volatile organic compounds (VOC), PCB, metals, and nutrients.

In addition, a total of 26 soil samples were collected to complete a preliminary assessment of background conditions. Background sample locations are shown on Drawing 2. Background samples were collected at 'burnt natural areas', which were considered to be reference locations, and 'unburnt natural areas' which were considered to be natural areas, to allow for the representative comparison of site and delineation samples. Samples were collected in the vicinity of the subject sites, at locations where soil and vegetation conditions were similar, at the same depth of 0.25 m bgs and using consistent sampling methodology. Locations were selected in the field based on assessment of site conditions. In this report, 'reference' samples pertain to background sample locations where burning had taken place and background samples from 'natural areas' pertain to sample locations within unburnt areas.

Soil sample results were compared to the applicable criteria at each site for the shallow soil, comprising the Canadian Council of Ministers of the Environment (CCME) *Canadian Environmental Quality Guidelines (EQG)* (1999, updated 2014) and the CCME *Canada-Wide Standards (CWS) for Petroleum Hydrocarbons in Soil* (2001, revised 2008) Tier 1 Levels for Soil. The applicable land use at the site comprising Parkland and Agricultural and coarse-grained soil texture was applicable at the majority of the sites included in this RARMP, with the exception of the three sites at Goat Lake (4.1 to 4.3) and site 6.1 (Bear's Hump), which were fine-grained.

COCs identified in soil at the non-priority sites include PHCs (specifically benzene, toluene and ethylbenzene), PAH (specifically naphthalene, benzo[a]anthracene, benzo[a]pyrene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, phenanthrene and pyrene), and metals (specifically arsenic, barium, cadmium, chromium, copper, lead, nickel, tin and zinc).

Concentrations of one or more COCs were encountered at all sites sampled, with the exception of the Crandell Backcountry Campground Outhouse (site 2.3) and the Goat Lake campsites (site 4.1).

Naphthalene and barium concentrations within a number of samples collected from 23 reference locations in burnt forested areas of WLNP exceeded the applicable CCME SQGs. These exceedances were considered indicative of conditions related to natural areas burnt by the wildfire. Concentrations of naphthalene and barium within samples collected from sites 2.1, 2.2, 4.2, 4.3, 5.1, 5.2, 6.1, 8.3, 9.1 and 9.2 were compared to the maximum burnt area reference concentrations (0.086 milligram per kilogram [mg/kg] for naphthalene and 720 mg/kg for barium). Naphthalene and barium were excluded as COCs at sites where concentrations were below the maximum reference values. This comparison removed the Goat Lake Outhouse and Picnic Tables (sites 4.2 and 4.3) from the proposed soil remediation program.

Where encountered, COCs generally presented a potential risk to ecological receptors, mainly to freshwater aquatic life, contact with impacted soil and ingestion of soil and food. To a lesser extent, COCs also presented a potential risk to human health, specifically related to drinking water, vapour inhalation and soil ingestion pathways.

Where impacted soil was encountered, broad horizontal delineation of COCs was achieved at all sites except for site 2.2 (Crandell Backcountry Campsite campsites).

Vertical delineation of all COCs was not achieved due to the sampling methodology and ground disturbance restrictions; however, as impacts are likely to be associated with surface debris and ash deposits, for the purpose of this RARMP delineation at a depth of 0.3 m bgs was assumed.

Table 2-1 below summarises the COCs identified in the soil at each site and the exposure pathways potentially present. Results from the Debris and Soil Assessment report are also presented in Tables 2 to 13. Waste classification results to assess hazardous or non-hazardous soil conditions are presented in Table 14. The Debris and Soil Assessment report recommended remediation, management and/or restoration measures at the investigated sites. Some sites only require removal of debris; however, where COCs in the soil present a risk to human health or environmental receptors, removal of impacted soil has been recommended.

Table 2-1
Summary of Results – Hazardous Materials and Soil

Site No.	Site Name	Hazardous Materials Detected	COCs Detected in Soil Samples	Impacted Sample ID	Human Health/Ecological Health Pathways Exceeded
1.2	Crandell Campground Water Tower	Lead-based Paint	Not Sampled ³	1.20-Pb1	N/A
2.1	Crandell Backcountry Campground Kitchen Shelter	Silica	Lead	2.1-S3 2.1-4	Soil and Food Ingestion (ecological health)
2.2	Crandell Backcountry Campground Campsites	Not Sampled ¹	Barium	2.2-2, 2.2-14, 2.2-15, 2.2-16, 2.2-17, 2.2-18, 2.2-19, 2.2-20, 2.2-21	Ecological Health (no specific pathway defined)
2.3	Crandell Backcountry Campground Outhouse	Not Sampled ¹	None	-	No exceedances
3.1	Melted roadside edge markers – Red Rock Parkway	Not Sampled ¹	Not Sampled ³	NA	N/A
4.1	Goat Lake Backcountry Campground 4 campsites	Not Sampled ¹	None	-	No exceedances
4.2	Goat Lake Backcountry Campground Outhouse	Not Sampled ¹	None	-	No exceedances above reference or natural area background concentrations
4.3	Goat Lake Backcountry Campground Picnic Tables	Not Sampled ¹	None	-	No exceedances above reference or natural area background concentrations

Site No.	Site Name	Hazardous Materials Detected	COCs Detected in Soil Samples	Impacted Sample ID	Human Health/Ecological Health Pathways Exceeded
5.1	Waterton Golf Course Reservoir	Silica	Indeno(1,2,3-c, d)pyrene, lead	5.1-S3 5.1-1, 5.4-4	Soil ingestion, (human health) Aquatic Life, Direct Soil Contact, Soil and Food Ingestion (ecological health)
5.2	Waterton Golf Course Lightning Shelter Shed	Silica	Arsenic, chromium, copper, lead, zinc	5.2-S3 5.2-1, 5.2-2, 5.2-4	Soil ingestion, (human health) Direct Soil Contact, Soil and Food Ingestion, Nutrient Cycling (ecological health)
6.1	Seismic Station Building – Bear's Hump Hiking Trail	ACM ² Lead-based Paint Silica	Benzene, toluene, ethylbenzene, PAHs (benzo[a]anthracene, benzo[a]pyrene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, phenanthrene, and pyrene), cadmium	6.1-A4 to A7, A9, A10, A13 6.1-Pb1, Pb2 6.1-S1 6.1-1, 6.1-5, 6.1-6	Drinking Water, soil ingestion, (human health) Aquatic Life, Soil and Food Ingestion, overall ecological health (no specific pathways) (ecological health)
8.3	Indigenous History Viewpoint	Silica	Arsenic, copper	10.1-S1 8.3-1, 8.3-3	Soil ingestion, (human health) Aquatic Life, and Direct Soil Contact (ecological health)
9.1	McNealy's Day Use Area	Lead-based Paint Silica	Naphthalene, phenanthrene, chromium, tin	9.1-S1 9.1-1	Aquatic Life, overall ecological health (no specific pathways) (ecological health)
9.2	Little Prairie Day Use Area	Lead-based Paint Silica	Arsenic, chromium, nickel	9.2-Pb5, 9.2-Pb7 9.2-S1 9.2-1, 9.2-6	Soil ingestion, (human health) Direct Soil Contact and Nutrient cycling (ecological health).

Notes:

¹ Hazardous Materials were not sampled as only limited quantities of non-hazardous debris (including un-painted metal, unpainted wood, HDPE plastic) remained on-site. No concrete, painted materials or suspected ACM were present.

² ACM – Asbestos-Containing Material

³ Soil sampling was not part of the project scope.

3.0 REGULATORY FRAMEWORK

3.1 Soil

The applicable criteria for remediation of shallow soil assessed at all sites are the CCME *EQG* (1999, updated 2017). The selected soil quality guidelines (SQGs) are based on land use at the sites that was applicable at the time of the fire, on the assumption that the land use will be the same as ‘pre-fire’ conditions following remediation. CCME does not provide specific guidelines for ‘natural areas’ or ‘wildland’ land use, as per the agricultural and wildlands memo for national parks (CCME, 2006). Parkland, as defined by CCME relates to areas where the primary activity is residential or recreational and is inclusive of campground areas; therefore, the Residential/Parkland criteria were applied to all of the sites. For the purpose of this assessment, this definition has also been extended to include all buildings within the campsites and day-use areas. Even though these areas will only be used for recreational land use for four to five months of the year, use of the Residential/Parkland guidelines are still applicable as the most conservative guidelines protective of human health. In order to be protective of animal receptors that are considered likely to graze/browse on vegetation at the sites, the Agricultural (AI) guidelines have also been deemed applicable to all sites. For PAHs and benzene the 1×10^{-6} incremental risk value was used.

Applicable criteria for PHC fractions F1 through F4 (F1 to F4) in soil at each site are the CCME *Canada-Wide Standards (CWS) for Petroleum Hydrocarbons in Soil* (2001, revised 2008) Tier 1 Levels for Soil – Parkland (PI) and AI Land Use guidelines.

The CCME SQG and CWS for PHC are dependent on soil texture. The CCME Guideline defines fine-grained soils as those that contain greater than 50% by mass particles less than 75 micrometres (μm) mean diameter. Coarse-grained soils are those that contain greater than 50% by mass particles greater than 75 μm mean diameter. Grain size analyses conducted on samples from the various sites in 2018 and 2019 indicated that surface soil is consistently coarse-grained for the sites included in this RARMP, with the exception of the Goat Lake sites (4.1 to 4.3) and the Bear’s Hump seismic station (site 6.1), which were fine-grained.

3.2 Discussion of Background Samples in Relation to Remedial Objectives

For a number of COCs the most stringent CCME SQG is for the freshwater aquatic life exposure pathway. The CCME SQGs do not specify a distance where the pathway can be excluded; however, the Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites (2015) specify that the freshwater aquatic life pathway is applicable within 500 m from the site, and the Alberta Tier 1 Guidelines specify a distance of 300 m. As all sites are located near to permanent or ephemeral water bodies with distances ranging between 14 m and 300 m, the freshwater aquatic life pathway can conservatively be considered applicable at all sites.

At a number of sites (Crandell Backcountry Campground Campsites, Waterton Golf Course Reservoir, Waterton Golf Course Lightning Shelter Shed, Bear’s Hump Seismic Station, Indigenous History Viewpoint, McNealy’s Day Use Area, and the Little Prairie Day Use Area) concentrations of PAH constituents (notably naphthalene) exceeded the CCME SQG protective of aquatic life. Given that background samples collected from reference areas indicated that concentrations of naphthalene exceed the CCME SQGs protective of aquatic life in naturally burnt areas of the site, it is likely that during the remediation program excavation of confirmatory samples may exceed the aquatic life criteria. It would be impractical to extend remedial excavations to remove all soil that exceeds the CCME SQGs for aquatic life, hence the remedial

objective for naphthalene at these sites will be 0.086 mg/kg – the maximum concentration encountered in a burnt reference area.

Concentrations of barium also exceeded the CCME SQGs in samples collected from burnt reference areas and may be related to the wildfire. At sites where barium exceeds the CCME SQG, the remedial objective will be 720 mg/kg – the maximum concentration encountered in a burnt reference area.

At a number of sites, specifically 2.2 (Crandell Backcountry Campground Campsites), 5.1 (Waterton Golf Course reservoir), 5.2 (Waterton Golf Course lightning shelter shed), 6.1 (Bear's Hump seismic station), 8.3 (Indigenous History Viewpoint), and 9.2 (Little Prairie Day Use Area) concentrations of naphthalene and/or barium that exceeded the applicable CCME SQGs were below the maximum reference values of 0.086 mg/kg and 720 mg/kg, respectively and were not considered to be COCs requiring remediation.

3.3 Hazardous Materials

The following regulations are applicable to abatement, removal and disposal of hazardous materials.

Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II and The Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances. As the sites are owned and operated by PCA (a federal department), the CLC and COHSR apply.

According to subsection 122 (1) of Part II of the CLC, hazardous substance is defined as: "a controlled product and a chemical, biological or physical agent that, by reason of a property that the agent possesses, is hazardous to the safety or health of a person exposed to it". If there is a likelihood that the health or safety of an employee in a workplace is or may be endangered by exposure to a hazardous substance, the employer shall, without delay:

- Appoint a qualified person to carry out an investigation in that regard; and
- For the purposes of providing for the participation of the workplace committee or the health and safety representative in the investigation, notify either of the proposed investigation and of the name of the qualified person appointed to carry out that investigation.

3.3.1 Provincial Regulations

Occupational Health and Safety in the Workplace is regulated in Alberta by Alberta Occupational Health and Safety (Alberta OH&S) and the Alberta OH&S Code, 2009. Part 2 Hazard Assessment, Elimination, and Control of the Alberta OH&S Code, 2009 details the requirements of employers to assess their workplaces for hazards and develop appropriate controls.

3.3.2 Asbestos-Containing Materials

3.3.2.1 Federal Regulations and Guidelines

The COHSR, Part X, Hazardous Substances covers specific requirements related to the management and control of asbestos-containing materials (ACM). There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC. The asbestos management requirements in federally owned or leased buildings and facilities is

also provided by the federal government in the National Joint Council Occupational Health and Safety Directive (NJC OHS), Part XI – Hazardous Substances, 11.6 Asbestos Management. Currently the NJC OHS Directive directs federal departments to follow the PSPC (formerly Public Works and Government Services Canada) Policy DP 057 dated December 1997 for asbestos management. The NJC OHS Directive will soon be updated and DP 057 will be replaced with the new PSPC Asbestos Management Standard that was released in June 2017.

The PSPC Asbestos Management Standard, (June 2017) was released prior to recent changes made in the CLC Part II regarding asbestos management. The PSPC Standard is currently being revised and updated to include these recent amendments to the CLC. The following documents will be referenced in this report:

- Canada Labour Code, Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, 2017-06-20 (or most current version);
- Public Services and Procurement Canada Asbestos Management Standard, (June 2017) (or most current version);
- National Joint Council Occupational Health and Safety Directive (NJC OHS), Part XI – Hazardous Substances, 11.6 Asbestos Management, (January 2001) (or most current version); and
- Transport Canada, Transport of Dangerous Goods Regulations.

3.3.2.2 *Provincial Regulations*

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the Alberta OH&S Act, Regulations and Code (2009). The legislation is referenced below:

- Alberta OH&S Act, Regulations and Code, (2009); and
- Alberta Asbestos Abatement Manual, (2012).

Federal Regulations define an ACM as a material that contains 1% or greater asbestos. For contractors on-site in Alberta, the Provincial Regulations are followed, as they are more stringent than the Federal Regulations. In Alberta any amount of asbestos in building material means the materials are ACM, however employers are required to develop a Code of Practice for managing any ACM that contain 0.1% asbestos or greater.

Part 4 Chemical Hazards, Biological Hazards, Harmful Substances, of the Alberta OH&S Code (2009) defines the general requirements for controlling worker exposure to chemical hazards in the workplace.

Sections 31 through 38 of Part 4 outline the requirements related to asbestos in facilities. Sections 31 to 35 outline the specific limitations on the use of asbestos in buildings and are summarized below:

- Asbestos products that have the potential for releasing fibres may not be installed (31);
- All materials containing crocidolite are banned from use (32(1));

- Spray-applied asbestos products are banned from use (32(2));
- Asbestos products, in general, must not be in a form or location where they could release airborne fibres and allow them to enter a ventilation system (33);
- Buildings to be demolished are to have all materials with the potential of releasing asbestos fibres removed (34); and
- Buildings being altered or renovated are to have all materials with the potential of releasing asbestos fibres in the alteration or renovation areas removed (35).

The Alberta Asbestos Abatement Manual (2012) is a guide published by Alberta OH&S that is used for determining compliance with the Alberta OH&S Act, Regulations and Code (2009). The manual covers basic information on asbestos health hazards, requirements for worker protection, safe work practices, minimum sampling requirements and the basic principles to follow for the safe abatement of ACM.

3.3.3 Lead-Based Paint

Presently there are no regulations in Alberta specifically addressing lead levels in paint. There is still an onus on an employer to ensure the health and safety of workers engaged in the work and on the work site of that employer. In these circumstances, it is applicable to use the regulations set by the U.S. Department of Housing and Urban Development (HUD). HUD classifies lead-based paint as any paint application containing at least 1.0 milligram of lead per square centimetre of surface area (mg/cm²), or 5,000 mg/kg lead by weight, tested by chemical analysis. Canadian federal regulation SOR/2016-193 Surface Coating Materials Regulations define a lead content greater than 90 mg/kg in a surface coating as a lead-based paint. However, this is a value to keep the lead concentration in surface coatings as low as possible and should not be confused with health-based standards which correlates to acceptable blood lead levels. As part of this report, EHSP will refer to the Canadian federal classification of lead-based paint.

The Alberta Environmental Protection and Enhancement Act (Alberta EPEA) includes regulations set out to protect the environment from hazardous materials. The Alberta User Guide for Waste Managers is a comprehensive document used to identify what is considered hazardous materials and how these materials are to be disposed.

The present requirement under the Alberta EPEA is to prevent the release of lead into the environment. Disposal of leachable lead-based products is outlined in the Alberta User Guide for Waste Managers issued by Alberta Environmental Protection, Environmental Services. Alberta Environmental Protection classifies leachable lead-based products as any dispersible application containing at least 5.0 milligrams of lead per litre (mg/L), tested by Toxicity Characteristic Leaching Procedure (TCLP) analysis. A dispersible paint is defined by the waste managers guide as a friable solid that can be ground to pass through a 9.5mm mesh opening.

3.3.4 Polychlorinated Biphenyls (PCB)

Canadian federal regulation SOR/2008/-273 PCB Regulations and the Alberta EPEA “Waste Control Regulations”, 192/1996, outline the requirements for handling, storage and removal of materials containing PCB.

The Alberta User Guide for Waste Managers guide defines materials containing more than 50 mg/kg PCB as hazardous waste. The CCME EQG (1999, updated 2017) defines the SQGs for PCBs in soils for parkland land use as 1.3 mg/kg. As part of this report, EHSP will refer to the CCME guideline of 1.3 mg/kg as the action limit above which remediation would be required.

3.3.5 Silica

Part 4 Chemical Hazards, Biological Hazards, Harmful Substances, of the Alberta OH&S Code (2009) defines the general requirements for controlling worker exposure to chemical hazards in the workplace including silica dust. Silica dust may be generated and become airborne during construction activities including blasting, grinding, crushing and sandblasting silica-containing materials. There are no specific disposal requirements for materials containing silica.

4.0 REMEDIAL APPROACH

4.1 Remediation Objectives

Based on discussions with PSPC and PCA, it is SLR's understanding that the following objectives are to be considered with respect to remediation and/or risk management at the sites:

- Remediation is scheduled for completion in summer 2020.
- Remediation should reduce or eliminate risks to human and/or ecological receptors posed by debris and impacted soil as a result of the Kenow Wildfire.
- Post-remedial conditions should meet applicable federal guidelines and/or reference conditions in preparation for redevelopment and re-opening of park facilities. The most stringent of the two applicable CCME land use guidelines (Agricultural and Residential/Parkland) will be used as the remedial objectives when conducting confirmatory sampling following remedial activities.
- Remediation is the preferable option, with PCA specifying soil excavation as their preferred option, but risk management plans should be developed where remediation is not feasible.

4.2 Remediation Options Evaluation

To select the recommended remedial approach that will successfully meet the specific remedial objectives for the project, it is standard practice to evaluate several remedial approaches.

The key elements that are generally considered when selecting options for remediation include, but are not limited to, contaminant type and concentration, media contaminated, location and depth of contamination, economies of scale, timeframes, assurance of success, impact on site operations, impact on sensitive wildlife habitat and ecosystems, disruptions to park visitors and staff, and stakeholder acceptance.

In the case of remediation of the impacted soil at the WLNP project sites, the most important evaluation criterion is timeframe, as remediation has to be completed during summer 2020 to allow for site redevelopment and/or restoration.

Contaminant type, specifically the presence of metals and PAHs and the shallow depth also limits the options available.

Limited timeframe excluded ex-situ options such as landfarming/biopiling, and contaminant properties limited in-situ options such as soil turning plus amendment with chemical oxidation, or excavation and on-site thermal desorption. These options are not effective at removing metal impacts.

The only remaining options include capping impacts with a layer of clean soil or soil stabilization/encapsulation. Capping impacts is not considered practical at the site as soil would have to be excavated to ensure that the cap would align with the existing site grade. This method would not eliminate the direct soil contact pathway for ecological receptors and excavation would essentially remove the shallow impact. Soil stabilization/encapsulation is not suitable for such shallow impacts, as the method will change the properties of surface soil which may not make it suitable for redevelopment or re-establishment of vegetation.

Given the limitations and the requirements of PCA, the most appropriate remediation option is excavation of impacted soil and subsequent off-site disposal. Excavation and disposal of impacted soil would be completed concurrently with the removal of surface debris and ash and waste that has resulted from building abatement activities.

Risk management and risk assessment will be considered where excavation is not possible or cost effective, for example, adjacent to building foundations, where soil has to be removed off-site by helicopter, or where residual soil impact is spatially extensive and potentially natural in origin.

4.3 Risk Management Options

Contaminant risk management is often used as an alternative to physical remediation or remedial technologies. In-situ management is typically used when contaminant concentrations are relatively low, when contaminant migration is not readily occurring and/or when pathways to human and ecological receptors can be managed (e.g., source removal combined with engineered or administrative controls). Risk management is also considered when physical remediation is not practical (e.g., when it is technically challenging, exceedingly costly or when the physical disturbance would do more damage than good).

Although a risk management approach may not result in complete reduction of liability, risk assessment results can be used to develop and refine remedial strategies, including the selection of, and order in which to address, areas requiring additional remedial actions.

It is anticipated that soil impacts at the majority of the sites can be addressed fully via soil excavation and disposal; however, risk management or risk assessment may be required at sites where excavation may disturb facilities that may be retained or for managing residual impact following soil excavation and disposal (particularly where PAH concentrations at excavation limits may exceed the CCME SQGs and reference concentrations).

It should be noted that sampling at the sites included in the work scope encountered concentrations of naphthalene that were similar to reference concentrations collected from burnt undeveloped forested areas. Although excavation and soil removal will address risks to human and ecological receptors from impacted soil in the immediate vicinity of the sites, further risk management and risk assessment work would be required to assess whether the wider PAH impacts related to the forest fire present a risk to ecological receptors in the park.

5.0 SITE-SPECIFIC ABATEMENT, REMEDIATION/RISK MANAGEMENT PLANS

Sections 5.1 to 5.14 describe the proposed abatement, remediation or risk management approach for each site. Estimated volumes of impacted soil, hazardous materials, non-hazardous materials and concrete at each site have also been documented in the sections below.

Volumes of hazardous and non-hazardous debris and impacted soil are based on sampling and site observations made in December 2018, May 2019 and August 2019.

Broad horizontal delineation of soil impacts has been achieved at all sites with the exception of site 2.2; however, as full horizontal delineation has not been achieved in all directions at some of the sites, the proposed excavation extents have been placed at 0.5 m beyond the extent of visible debris. The estimated extents of remedial excavations are shown on Drawings 3 to 16.

Vertical delineation of impacted soil was not achieved at all sites. Where excavation and disposal of impacted soil is the recommended remedial approach, an excavation depth of 0.3 m bgs has been proposed.

The final soil and debris volumes outlined in the tables below are estimates based on the available results. Volumes are subject to change and will be based on the results of confirmatory sampling following remediation.

In addition to the site-specific abatement and/or remediation plans, overall procedures to implement the WLNP remediation and abatement program are presented in Section 6.0. Indicative costs to implement remediation or risk management at each site have been provided under separate cover.

5.1 Site 1.20 – Crandell Campground Water Tower

5.1.1 Site Observations

As noted during the soil and debris assessment in May 2019, the water tower is a metal structure located west of the Crandell Campground, beyond the youth camp and west of the access road. The tower is surrounded by a chain link fence. At the time of the site visit, the water tower was painted with grey paint that was in fair condition. Approximately 2.0 m² of paint was beginning to delaminate as a result of the impacts from the fire.

5.1.2 Hazardous Materials – Results

One sample collected from grey paint on the water tower exterior was confirmed to be lead-based paint.

5.1.3 Shallow Soil – Results

Soil sampling at site 1.20 was not included in the project scope.

5.1.4 Proposed Abatement Plan

Based on the above information, the abatement plan for site 1.20 is presented in Table 5-1.

Table 5-1
Abatement Plan: Site 1.20 – Crandell Campground Water Tower

Future Land Use	The Campground Redevelopment Plan provided by PCA indicates that the water tower will be retained. Land use will not change.	
Selected Abatement Option	<ul style="list-style-type: none"> Abatement of lead-based paint in poor condition. The remainder of the lead-based paint that is well bonded to the structure does not require abatement. 	
Objectives	<ul style="list-style-type: none"> Remove all dispersible lead-based paint. 	
Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> Assess disposal options based on leachable lead criteria. 	
Details of Work Steps	<p>PCA will manage the work program, however the recommended work steps are as follows:</p> <ul style="list-style-type: none"> Abatement of dispersible grey paint on the exterior of the metal water tower as shown on Drawing 3. Visually ensure no paint has flaked onto the ground during abatement. Paint that flakes onto the ground should be cleaned up (can be done using a vacuum) and segregated. TCLP testing of the paint waste stream to assess if it is hazardous. Disposal of the potentially hazardous paint off-site. Repaint the structure. 	
Volumes of Impacted Materials (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Hazardous Debris	<0.1	Lead-based paint covering an area of 2.0 m ² on exterior of water tower.
Disposal Location		Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.
Additional Post Abatement Activities Required		None

5.2 Site 2.1 – Crandell Backcountry Campground Kitchen Shelter

5.2.1 Site Observations

As noted during the soil and debris assessment in November 2018 the kitchen shelter building had been completely destroyed by the fire. The footprint of the building contained an ash-covered compacted gravel floor with the remains of eight concrete post bases/footings. A pile of burnt building debris, comprising wooden beams and a metal soffit was present within the footprint of the former building. Burnt asphalt shingles were present along the western edge of the footprint. A fire pit and a metal picnic table (both unaffected by the fire) were located west of the former shelter.

5.2.2 Hazardous Materials – Results

Lead concentrations in the two paint samples were below 90 mg/kg and are not considered to be lead-based.

Insufficient paint material was available for PCB analysis; however, paints present on-site were visually similar to those identified and sampled at other sites in WLNP. All paint samples analysed

for PCB at other sites were confirmed to be below the CCME guideline of 1.3 mg/kg for parkland/residential sites, which was used as a reference value at the site.

One sample of concrete collected from the building slab contained a concentration of silica in excess of 40%.

5.2.3 Shallow Soil – Results

The concentrations of lead in sample 2.1-4, located directly west of the debris pile exceeded the CCME AI SQG and reference concentrations.

For metals that exceed the applicable SQGs and the background concentrations, a summary of operable exposure pathways is shown in Table 5-2 below.

Table 5-2
Applicable Exposure Pathways: Site 2.1 - Crandell Backcountry Campground Kitchen Shelter

COC	Risks to Receptors							
	Human Health Pathways			Ecological Pathways				Other
	Drinking Water	Vapour Inhalation	Soil Ingestion	Aquatic Life	Direct Soil Contact	Soil & Food Ingestion	Nutrient Cycling	Management Limits
Metals	-	-	X	-	X	✓	X	X

✓ Soil concentrations exceed the CCME SQG for the applicable pathway.

X Soil concentrations are below the CCME SQG for the applicable pathway.

5.2.4 Proposed Remediation Plan

Based on the above information, the remediation plan for the site is shown in Table 5-3.

Table 5-3
Remediation Plan: Site 2.1 - Crandell Backcountry Campground Kitchen Shelter

Future Land Use	According to PCA, the kitchen shelter will not be replaced. The area will be restored to a natural area.
Selected Remedial Option	<ul style="list-style-type: none"> Removal and disposal of the concrete footings. Removal and disposal of surface ash and non-hazardous debris associated with the burnt structure. Excavation and disposal of impacted soil.
Rationale for Remedial Options	<ul style="list-style-type: none"> The lead-impacted soil requires removal off-site. Burnt debris from the structure will also require removal by helicopter.
Objectives	<ul style="list-style-type: none"> Remove all burnt surface debris and concrete. Remove soil containing concentrations of COCs that present a risk to ecological receptors through the soil and food ingestion pathways.
Remediation Criteria for Soils	<ul style="list-style-type: none"> The most stringent of the CCME SQGs for AI and PI Land Use
Abatement Criteria for Hazardous Building Materials/Debris	No abatement required – no hazardous building materials or debris present.

Details of Work Steps	<ul style="list-style-type: none"> • Excavation of ash and the non-hazardous surface debris associated with the burnt structure. Debris removal to be based on the extents shown on Drawing 4. • Excavation of the concrete footings. • Cut, cap or remove any encountered utilities (none expected). • Removal and disposal of non-hazardous debris off-site by helicopter. • Excavation and disposal of impacted soil to 0.3 m bgs to the limits shown on Drawing 4. Removal of soil off-site by helicopter. • Confirmatory sampling of excavation extents. • Submit five confirmatory samples for COCs (metals). • Rough-grade and recontour the excavation to match surrounding grades. • Rake area smooth and re-seed disturbed areas with PCA approved seed mix.
Volumes of Materials for Disposal (m³)	COCs/Hazardous/Non-Hazardous Materials Present
Soil	0.3 Lead
Concrete Foundation Material	3.0 Concrete slab
Non-Hazardous Debris	3.0 Wooden beams, a metal soffit, and burnt asphalt shingles
Hazardous Debris	- None present
Disposal Location	Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.
Additional Post Remediation Risk Management Activities Required	If confirmatory samples fail, the preferred approach would be to extend the limits of the excavation to removal all lead-impacted soil. If this is not possible, a risk management plan could be developed to manage residual impacted soil, which could include a HHERA or fencing.

5.3 Site 2.2 – Crandell Backcountry Campground Campsites

5.3.1 Site Observations

As noted during the soil and debris assessment in November 2018 and May and August 2019, four tent pads were present, comprising compacted fine gravel held in place by treated wooden beams. The beams were fire damaged and had been dislodged at tent pad #2. No ash was noted on the ground, and vegetation had started to recover, partially obscuring the ground surface. Other than the wooden beams, no debris was present.

During the November site visit, a second outhouse was located between tent pads #3 and #4. The structure had been completely destroyed by fire, and remaining debris comprised burnt wooden beams and metal door hinges. No ash was noted on the ground in the vicinity of the former structure.

5.3.2 Hazardous Materials – Results

No hazardous building materials or debris were present.

5.3.3 Shallow Soil – Results

Concentrations of barium exceeding the CCME SQG were encountered in soil samples submitted for analysis from adjacent to tent pad #1 and within tent pad #3. Concentrations within tent pad #3 were below reference values collected across the study area; therefore, the barium exceedances within tent pad #3 were not considered to be COCs. Barium concentrations in the sample collected adjacent to tent pad #1 and in subsequent delineation samples exceeded the maximum reference concentration, therefore where concentrations exceed the reference values, barium is considered to be a COC.

The closest surface water body is Crandell Lake approximately 26 m to the southeast, hence the aquatic life pathway is applicable. Concentrations of naphthalene encountered at site 2.2 are considered consistent with reference values representative of burnt natural areas across the study area. Naphthalene concentrations associated with the burnt building materials at site 2.2 have been excluded as a COC; however, further work should be undertaken to assess whether the wider PAH impacts related to the forest fire presents a risk to aquatic life.

For metals that exceed the applicable SQGs and the reference concentrations, a summary of operable exposure pathways is shown in Table 5-4 below.

Table 5-4
Applicable Exposure Pathways: Site 2.2 - Crandell Backcountry Campground Campsites

COC	Risks to Receptors							
	Human Health Pathways			Ecological Pathways				Other
	Drinking Water	Vapour Inhalation	Direct Contact	Aquatic Life	Direct Soil Contact	Soil & Food Ingestion	Nutrient Cycling	Management Limits
Metals	-	-	X	✓ ¹				X

¹ No pathway specified. The COC is considered a risk to overall environmental health.

✓ Soil concentrations exceed the CCME SQG for the applicable pathway.

X Soil concentrations are below the CCME SQG for the applicable pathway.

5.3.4 Proposed Remediation Plan

Based on the above information, the remediation plan for the site is shown in Table 5-5.

Table 5-5
Remediation Plan: Site 2.2 - Crandell Backcountry Campground Campsites

Future Land Use	Future land use is not expected to change. Tent pads will remain in the current locations.
Selected Remedial Option	<ul style="list-style-type: none"> Removal and disposal of the burnt tent pad borders and minor outhouse debris. Excavation and disposal of impacted soil.
Rationale for Remedial Option	<ul style="list-style-type: none"> The barium impacted soil around easternmost tent pad #1 requires removal off-site. Burnt tent pad borders will also require removal by helicopter.
Objectives	<ul style="list-style-type: none"> Remove burnt wooden tent pad borders and outhouse metal hinges as shown on Drawing 5.

	<ul style="list-style-type: none"> Remove soil containing concentrations of COCs that present a risk to ecological health. 	
Remediation Criteria for Soils	<ul style="list-style-type: none"> The most stringent of the CCME SQGs for AI and PI Land Use Maximum reference value for barium (720 mg/kg). 	
Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> No abatement required – no hazardous building materials or debris present. 	
Details of Work Steps	<ul style="list-style-type: none"> Excavation and disposal of impacted soil to 0.3 m bgs to the limits shown on Drawing 5. Removal of soil off-site using a helicopter. Confirmatory sampling of excavation extents. Submit ten confirmatory samples for COCs (metals). Rough-grade and recontour the excavation to match surrounding grades. Remove burnt wooden tent pad borders Hand-pick minor metal debris associated with the outhouse. Removal and disposal of non-hazardous debris off-site using a helicopter. Grade tent pads to match surrounding ground contours. Rake excavation and graded tent pad areas smooth, and re-seed disturbed areas with PCA approved seed mix. 	
Volumes of Impacted Materials (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Soil	20	Barium.
Concrete Foundation Material	-	No concrete is present.
Non-Hazardous Debris	2.0	Wooden tent pad borders, metal tie down bolts.
Hazardous Debris	-	None present
Disposal Location		Pincher Creek Landfill or other licensed recycling/disposal facility selected by the contractor.
Additional Post Remediation Risk Management Activities Required		If confirmatory samples fail, the preferred approach would be to extend the limits of the excavation to removal all barium impact. If this is not possible, a risk management plan could be developed to manage residual impacted soil.

5.4 Site 2.3 – Crandell Backcountry Campground Outhouse

5.4.1 Site Observations

As noted during the soil and debris assessment in November 2018, the structure had been completely destroyed by fire, and remaining debris comprised metal tie down bolts.

5.4.2 Hazardous Materials – Results

No hazardous debris or building materials were present.

5.4.3 Shallow Soil – Results

No soil exceedances were encountered.

5.4.4 Proposed Remediation Plan

Based on the above information, the remediation plan for the site is shown in Table 5-6.

Table 5-6
Remediation Plan: Site 2.3 - Crandell Backcountry Campground Outhouse

Future Land Use	Land use is not expected to change. PCA have indicated that no further work is required in this area.	
Selected Remedial Option	<ul style="list-style-type: none"> Removal and disposal of non-hazardous debris associated with the burnt structure. 	
Objectives	<ul style="list-style-type: none"> Remove all burnt surface debris. 	
Remediation Criteria for Soils	<ul style="list-style-type: none"> Not applicable – no impacted soils present. 	
Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> No abatement required - no hazardous debris or building materials present. 	
Details of Work Steps	<p>PCA will manage the work program; however, the recommended work steps are as follows:</p> <ul style="list-style-type: none"> Collect minor metal debris by hand, as shown on Drawing 6. Removal and disposal of non-hazardous debris off-site. 	
Volumes of Materials for Disposal (m³)	COCs/Hazardous/Non-Hazardous Materials Present	
Soil	-	None present
Concrete Foundation Material	-	None present
Non-Hazardous Debris	<0.1	Metal tie down bolts
Hazardous Debris	-	None present
Disposal Location	Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.	
Additional Post Remediation Risk Management Activities Required	None	

5.5 Site 3.1 – Melted Roadside Edge Markers – Red Rock Parkway

5.5.1 Site Observations

As noted during the soil and debris assessment in December 2018, between the winter gate to the east, and the Red Rock Canyon trailhead at the western extent, 26 plastic roadside markers were located along the Red Rock Parkway. The markers were generally intact, but the plastic had been deformed.

5.5.2 Hazardous Materials – Results

No hazardous debris or building materials were present. No painted materials were present.

5.5.3 Shallow Soil – Results

No soil samples were obtained.

5.5.4 Proposed Remediation Plan

Based on the above information, the remediation plan for the site is shown in Table 5-7.

Table 5-7
Remediation Plan: Site 3.1 – Melted Roadside Edge Markers – Red Rock Parkway

Future Land Use	Land use is not expected to change. The area occupied by the markers will continue to be used as a road shoulder.	
Selected Remedial Option	<ul style="list-style-type: none"> Removal and disposal of non-hazardous roadside markers. 	
Objectives	<ul style="list-style-type: none"> Remove all burnt markers. 	
Remediation Criteria for Soils	<ul style="list-style-type: none"> Not applicable – no impacted soils present. 	
Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> No abatement required - no hazardous debris or building materials present. 	
Details of Work Steps	<p>PCA will manage the work program; however, the recommended work steps are as follows:</p> <ul style="list-style-type: none"> Use hand tools or other equipment to pull all 26 HDPE markers out of the ground. Marker locations are shown on Drawings 7A to 7F. Removal and disposal of non-hazardous debris off-site. 	
Volumes of Materials for Disposal (m³)	COCs/Hazardous/Non-Hazardous Materials Present	
Soil	-	None present
Concrete Foundation Material	-	None present
Non-Hazardous Debris	2.0	26 HDPE markers.
Hazardous Debris	-	None present
Disposal Location	Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.	
Additional Post Remediation Risk Management Activities Required	None	

5.6 Site 4.1 – Goat Lake Backcountry Campground Campsites

5.6.1 Site Observations

As noted during the soil and debris assessment in August 2019, there were a total of four campsites, and each campsite consisted of a 3 m by 3 m square tent pad comprised of compacted gravel contained within four treated logs. The gravel at each pad was approximately 0.3 m in depth and a dusting of grey and black ash was observed on the surface of the gravel. Black geo-textile fabric was observed underlying the gravel and above the soil at three of the four tent pads. Evidence of burning (i.e., black-singed wood) was observed on both structures. A minor amount of burnt surface debris (i.e., <0.1 m³) including wood, glass, scrap metal and plastic was observed scattered across the campsites.

5.6.2 Hazardous Materials – Results

No hazardous debris or building materials were present. No painted materials were present.

5.6.3 Shallow Soil – Results

No soil exceedances were encountered.

5.6.4 Proposed Remediation Plan

Based on the above information, the remediation plan for the site is shown in Table 5-8.

Table 5-8
Remediation Plan: Site 4.1 – Goat Lake Backcountry Campground Campsites

Future Land Use	Land use is not expected to change. The tent pads will remain in the same locations.	
Selected Remedial Option	<ul style="list-style-type: none"> Removal and disposal of the burnt tent pad borders and minor debris. 	
Objectives	<ul style="list-style-type: none"> Remove all burnt surface debris. 	
Remediation Criteria for Soils	<ul style="list-style-type: none"> Not applicable – no impacted soils present. 	
Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> No abatement required - no hazardous debris or building materials present. 	
Details of Work Steps	<ul style="list-style-type: none"> Collect minor metal, plastic and glass debris by hand, as shown on Drawing 8. Remove burnt tent pad borders. Removal and disposal of non-hazardous debris off-site using a helicopter. Grade tent pads to match surrounding ground contours. Rake graded tent pad areas smooth, and re-seed disturbed areas with PCA approved seed mix. 	
Volumes of Materials for Disposal (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Soil	-	None present
Concrete Foundation Material	-	None present
Non-Hazardous Debris	2.0	Burnt wooden beams. Minor plastic, glass and metal fragments (<0.1m ³).
Hazardous Debris	-	None present
Disposal Location	Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.	
Additional Post Remediation Risk Management Activities Required	None	

5.7 Site 4.2 – Goat Lake Backcountry Campground Outhouse

5.7.1 Site Observations

As noted during the soil and debris assessment in August 2019, the outhouse consisted of a 1.8 m by 1.8 m square hole delineated by large rocks along its perimeter and covered with wood at surface. A minor amount of burnt surface debris (i.e., <1 m³) including wood, glass, scrap metal and steel nails was observed at the site. No ash was noted on the soil surrounding the area of debris. The remains of a food hang pole comprising two metal cylinders was also noted in the trees adjacent to the outhouse.

5.7.2 Hazardous Materials – Results

No hazardous debris or building materials were present. No painted materials were present.

5.7.3 Shallow Soil – Results

The closest surface water body is Goat Lake approximately 55 m to the south, hence the aquatic life pathway is applicable. Concentrations of naphthalene encountered at site 4.2 are considered consistent with reference values representative of burnt natural areas across the study area. Naphthalene concentrations associated with the burnt building materials at site 4.2 have been excluded as a COC; however, further work should be undertaken to assess whether the wider PAH impacts related to the forest fire presents a risk to aquatic life.

5.7.4 Proposed Remediation Plan

Based on the above information, the remediation plan for the site is shown in Table 5-9.

Table 5-9
Remediation Plan: Site 4.2 – Goat Lake Backcountry Campground Outhouse

Future Land Use	The outhouse will not be replaced at the existing location. The area will be returned to a natural area.	
Selected Remedial Option	<ul style="list-style-type: none"> Removal and disposal of the minor debris. 	
Objectives	<ul style="list-style-type: none"> Remove all burnt surface debris. 	
Remediation Criteria for Soil	<ul style="list-style-type: none"> Not applicable – no impacted soil present. 	
Remediation/Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> No abatement required - no hazardous debris or building materials present. 	
Details of Work Steps	<ul style="list-style-type: none"> Collect minor metal, plastic and glass debris by hand at locations shown on Drawing 9. Removal and disposal of non-hazardous debris off-site. 	
Volumes of Materials for Disposal (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Soil	-	None present
Concrete Foundation Material	-	None present
Non-Hazardous Debris	0.5 m	Burnt wood, glass and metal.
Hazardous Debris	-	None present
Disposal Location	Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.	
Additional Post Remediation Risk Management Activities Required	None	

5.8 Site 4.3 – Goat Lake Backcountry Campground Picnic Tables

5.8.1 Site Observations

As noted during the soil and debris assessment in August 2019, a total of two picnic tables were present. Each picnic table consisted of five sawed-off tree logs (one large table log and four smaller seat logs). The logs were situated on a 2.8 m by 2.8 m square pad comprised of

compacted gravel contained within four treated wooden borders. Evidence of minor fire damage was observed on both structures. No ash was noted on the soil surrounding the area of debris.

5.8.2 Hazardous Materials – Results

No hazardous debris or building materials were present. No painted materials were present.

5.8.3 Shallow Soil – Results

The closest surface water body is Goat Lake approximately 55 m to the south, hence the aquatic life pathway is applicable. Concentrations of naphthalene encountered at site 4.3 are considered consistent with reference values representative of burnt natural areas across the study area. Naphthalene concentrations associated with the burnt building materials at site 4.3 have been excluded as a COC; however, further work should be undertaken to assess whether the wider PAH impact related to the forest fire presents a risk to aquatic life.

5.8.4 Proposed Remediation Plan

Based on the above information, the remediation plan for the site is shown in Table 5-10.

Table 5-10
Remediation Plan: Site 4.3 – Goat Lake Backcountry Campground Picnic Tables

Future Land Use	Land use is not expected to change. The gravel pads will be retained.	
Selected Remedial Option	<ul style="list-style-type: none"> Removal and disposal of the picnic tables and wooden gravel pad borders. 	
Objectives	<ul style="list-style-type: none"> Remove all burnt surface debris. 	
Remediation Criteria for Soils	<ul style="list-style-type: none"> Not applicable – no impacted soils present. 	
Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> No abatement required - no hazardous debris or building materials present. 	
Details of Work Steps	<ul style="list-style-type: none"> Remove picnic tables and wooden gravel pad borders as shown on Drawing 10. Removal and disposal of non-hazardous debris off-site using a helicopter. Grade picnic table pads to match surrounding ground contours. Rake graded picnic table pad areas smooth, and re-seed disturbed areas with PCA approved seed mix. 	
Volumes of Materials for Disposal (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Soil	-	None present
Concrete Foundation Material	-	None present
Non-Hazardous Debris	2.0 m	Burnt wood.
Hazardous Debris	-	None present
Disposal Location		Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.
Additional Post Remediation Risk Management Activities Required		None

5.9 Site 5.1 – Waterton Golf Course Reservoir

5.9.1 Site Observations

As noted during the soil and debris assessment in December 2018, the site had been fenced subsequent to the fire. The concrete reservoir remained intact and was empty; however, the concrete was lined with a burnt moisture barrier. Burnt wooden beams and a metal ladder were present within the reservoir and burnt wire mesh and plastic material was located on the ground at the northern end of the reservoir. Although obscured by snow cover, ash was present on the ground within 100 to 300 mm of the reservoir edge.

5.9.2 Hazardous Materials – Results

No painted materials were present, and a sample of the moisture barrier did not contain ACM.

One sample of concrete collected from the reservoir contained a concentration of silica in excess of 40%.

5.9.3 Shallow Soil – Results

A concentration of PAH constituent indeno(1,2,3-c, d)pyrene exceeded the CCME AI interim SQG guideline protective of overall environmental health in sample 5.1-4, located at the west end of the reservoir.

A lead concentration exceeding the CCME SQG was encountered in soil sample 1.5-1, located below the debris pile. A concentration of barium exceeding the CCME SQG was also encountered in this sample; however, the concentration was below the maximum reference value encountered in burnt natural areas across WLNP and therefore was not considered a COC.

The nearest surface water body is a potential wetland located approximately 175 m to the northeast, hence the aquatic life pathway is considered applicable. Concentrations of naphthalene encountered at site 5.1 are considered consistent with reference values representative of burnt natural areas across the study area. Naphthalene concentrations associated with the burnt building materials at site 5.1 have been excluded as a COC; however, further work should be undertaken to assess whether the wider PAH impacts related to the forest fire presents a risk to aquatic life.

For impacted soils, a summary of applicable exposure pathways is shown in Table 5-11 below.

Table 5-11
Applicable Exposure Pathways: Site 5.1 – Waterton Golf Course Reservoir

COC	Potential Risks to Receptors							
	Human Health Pathways			Ecological Pathways				Other
	Drinking Water	Vapour Inhalation	Soil Ingestion	Aquatic Life	Direct Soil Contact	Soil & Food Ingestion	Nutrient Cycling	Management Limits
PAH	X	-	X	√ ¹				-
Metals	-	-	✓	-	✓	✓	X	X

¹ No pathway specified. The COC is considered a risk to overall environmental health.

✓ Soil concentrations exceed the CCME SQG for the applicable pathway.

X Soil concentrations are below the CCME SQG for the applicable pathway.

5.9.4 Proposed Remediation Plan

Based on the above information, the remediation plan for the site is shown in Table 5-12.

Table 5-12
Remediation Plan: Site 5.1 – Waterton Golf Course Reservoir

Future Land Use	The reservoir will be removed and restored; however, the adjacent golf course will remain.	
Selected Remedial Option	<ul style="list-style-type: none"> Removal and disposal of the concrete reservoir. Removal and disposal of surface ash and non-hazardous debris associated with the burnt structure. Excavation and disposal of impacted soil. 	
Rationale for Remedial Options	<ul style="list-style-type: none"> Excavation is the most cost-efficient way of removing impacted soil while equipment is on-site to remove the burnt building material. 	
Objectives	<ul style="list-style-type: none"> Remove all burnt surface debris and concrete. Remove soil containing concentrations of COCs that present a risk to human health and ecological receptors through the soil ingestion, aquatic life, and direct soil contact pathways. 	
Remediation Criteria for Soils	<ul style="list-style-type: none"> The most stringent of the CCME SQGs for AI and PI Land Use. 	
Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> No abatement required - no hazardous debris or building materials present. 	
Details of Work Steps	<ul style="list-style-type: none"> Excavation of ash and the non-hazardous surface debris associated with the burnt structure. Debris removal to be based on the extents shown on Drawing 11. Excavation of the concrete reservoir walls and base. Cut, cap or remove any encountered utilities (none expected). Removal and disposal of non-hazardous debris off-site. Excavation and disposal of impacted soil to 0.3 m bgs to the limits shown on Drawing 11. Confirmatory sampling of the excavation extents. Submit eight confirmatory samples for COCs (PAH and metals). Backfill the excavation with granular fill. Grade to ground surface. Place imported topsoil and re-seed disturbed areas with a seed mix approved by PCA. 	
Volumes of Materials for Disposal (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Soil	10	Lead, PAH
Concrete Foundation Material	17	Concrete slab
Non-Hazardous Debris	1.0	Burnt wooden beams, a metal ladder, burnt wire mesh and plastic material
Hazardous Debris	-	None present
Estimated Backfill Volume (m³)		180
Disposal Location		Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.
Additional Post Remediation Risk Management Activities Required		None. Horizontal delineation achieved.

5.10 Site 5.2 – Waterton Golf Course Lightning Shelter Shed

5.10.1 Site Observations

As noted during the soil and debris assessment in December 2018, the shelter structure had been destroyed by fire, and the only part of the structure remaining was the concrete floor slab. Ash deposits with a thickness of approximately 300 mm were present within 0.5 m of the edge of the building slab. No additional debris associated with the structure was present.

5.10.2 Hazardous Materials – Results

There were no painted materials present.

One sample of concrete collected from the building slab contained a concentration of silica in excess of 40%.

5.10.3 Shallow Soil – Results

Various metal concentrations exceeded the CCME AI and PI SQG in samples 5.2-1, 5.2-2, 5.2-4 and 5.2-5 (BFD of 5.2-4). Arsenic, chromium, copper, lead and zinc concentrations are considered to be COCs.

The nearest surface water body is Blakiston Creek located approximately 170 m east of the site, hence the aquatic life pathway is considered applicable. Concentrations of naphthalene encountered at site 5.2 are considered consistent with reference values representative of burnt natural areas. Naphthalene concentrations associated with the burnt building materials at site 5.2 have been excluded as a COC; however, further work should be undertaken to assess whether the wider PAH impacts related to the forest fire present a risk to aquatic life.

For impacted soils, a summary of applicable exposure pathways is shown in Table 5-13 below.

Table 5-13
Applicable Exposure Pathways: Site 5.2 - Waterton Golf Course Lightning Shelter Shed

COC	Potential Risks to Receptors							
	Human Health Pathways			Ecological Pathways				Other
	Drinking Water	Vapour Inhalation	Soil Ingestion	Aquatic Life	Direct Soil Contact	Soil & Food Ingestion	Nutrient Cycling	Management Limits
Metals	-	-	✓	-	✓	✓	✓	X

✓ Soil concentrations exceed the CCME SQG for the applicable pathway.

X Soil concentrations are below the CCME SQG for the applicable pathway.

5.10.4 Proposed Remediation Plan

Based on the above information, the remediation plan for the site is shown in Table 5-14.

Table 5-14
Remediation Plan: Site 5.2 - Waterton Golf Course Lightning Shelter Shed

Future Land Use	The lightning shelter will not be replaced; however, the surrounding golf course will remain.	
Selected Remedial Option	<ul style="list-style-type: none"> Removal and disposal of the concrete foundation slab. Removal and disposal of surface ash associated with the burnt structure. Excavation and disposal of impacted soil. 	
Rationale for Remedial Options	<ul style="list-style-type: none"> Excavation is the most cost-efficient way of removing impacted soil while equipment is on-site to remove the burnt building material. 	
Objectives	<ul style="list-style-type: none"> Remove all surface ash and concrete. Remove soil containing concentrations of COCs that present a risk to human health and ecological receptors through the soil and food ingestion, direct soil contact and nutrient cycling pathways. 	
Remediation Criteria for Soils	<ul style="list-style-type: none"> The most stringent of the CCME SQGs for AI and PI Land Use 	
Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> No abatement required - no hazardous debris or building materials present. 	
Details of Work Steps	<ul style="list-style-type: none"> Excavation of the concrete foundation slab and disposal off-site. Excavation and disposal of surface ash and impacted soil to 0.3 m bgs to the limits shown on Drawing 12. Confirmatory sampling of the excavation extents. Submit five confirmatory samples for COCs (metals). Backfill the excavation with granular fill (if excavation depth requires). Grade to ground surface. Place imported topsoil, and re-seed disturbed areas with a seed mix approved by PCA. 	
Volumes of Materials for Disposal (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Soil	4.0	Arsenic, chromium, copper, lead, and zinc
Concrete Foundation Material	2.0	Concrete slab
Non-Hazardous Debris	-	No debris present.
Hazardous Debris	-	None present
Estimated Backfill Volume (m³)		4.0
Disposal Location		Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.
Additional Post Remediation Risk Management Activities Required		None. Horizontal delineation achieved.

5.11 Site 6.1 – Bear’s Hump Hiking Trail – Seismic Station Building

5.11.1 Site Observations

As noted during the soil and debris assessment in May and August 2019, the remains of the seismic station building comprised a concrete floor and concrete cinder block wall. Approximately 0.15 m accumulation of ash and burnt building debris including glass, metal, wood, steel and

electronics (hard drive, battery backup) covered the floor of the building. Additional ash and burnt building debris were observed on ground surface around the exterior walls of the building. One antenna and one satellite dish supported by a wood and concrete cinder block base was observed east and southeast of the building, respectively. Two concrete monuments were also present on a bedrock outcrop in the vicinity of the antenna. Evidence of heat damage was observed on the wooden framing of the satellite dish support base.

5.11.2 Hazardous Materials – Results

Four samples of vermiculite insulation within the concrete block wall contained detectable concentrations of actinolite asbestos, and two samples of the penetration caulking, and one sample of the concrete slab contained detectable concentrations of chrysotile asbestos.

The concentrations of lead from both paint samples collected from the building's green concrete block walls exceeded 90 ppm.

The concentration of PCB in the paint sample was below the laboratory detection limit.

One sample of concrete collected from the site contained concentrations of silica in excess of 40%.

5.11.3 Shallow Soil – Results

Samples 6.1-1 (and its BFD, 6.1-2), 6.1-5 and 6.1-6, located adjacent the north wall of the building under the ash and debris, west of the ash/debris footprint, and southeast of the ash/debris footprint, respectively contained concentrations of benzene that exceeded the CCME AI and PI SQGs. Concentrations of toluene and ethylbenzene that exceeded the CCME AI and PI SQGs were also encountered in sample 6.1-6. No visual or olfactory observations of hydrocarbon impact were noted in any of the samples. Samples collected in August 2019 horizontally delineated the PHC impact.

Sample 6.1-1 (and its BFD, 6.1-2), located adjacent the north wall of the building under the ash and debris, contained concentrations of several PAH constituents (benz[a]anthracene, benzo[a]pyrene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, phenanthrene and pyrene) that exceeded the interim or provisional CCME AI and PI SQGs. Naphthalene concentrations were less than the site wide reference concentrations.

Cadmium exceeded the CCME AI and PI SQG in sample 6.1-6 and is considered to be a COC. Additional samples collected in August 2019 horizontally delineated the cadmium impact.

Samples 6.1-3 and 6.1-6 contained concentrations of barium that exceeded the CCME PI SQGs. The barium concentrations were less than reference concentrations detected in samples collected from burnt areas throughout the study area and therefore, barium is not considered to be a COC.

The nearest surface water body is Waterton Lake, approximately 300 m to the south; hence the aquatic life pathway is considered applicable. Concentrations of naphthalene encountered at site 6.1 are considered consistent with reference values representative of burnt natural areas. Naphthalene concentrations associated with the burnt building materials at site 6.1 have been excluded as a COC; however, further work should be undertaken to assess whether the wider PAH impact related to the forest fire presents a risk to aquatic life.

For impacted soils, a summary of applicable exposure pathways is shown in Table 5-15 below.

Table 5-15
Applicable Exposure Pathways: Site 6.1 – Bear’s Hump Hiking Trail – Seismic Station Building

COC	Potential Risks to Receptors							
	Human Health Pathways			Ecological Pathways				Other
	Drinking Water	Vapour Inhalation	Soil Ingestion	Aquatic Life	Direct Soil Contact	Soil & Food Ingestion	Nutrient Cycling	Management Limits
PHC	✓	X	X	X	X	X	-	X
PAH	X	-	X	✓	X	✓	-	-
Metals	-	-	✓	✓ ¹				X

¹ No pathway specified. The COC is considered a risk to overall environmental health.

✓ Soil concentrations exceed the CCME SQG for the applicable pathway.

X Soil concentrations are below the CCME SQG for the applicable pathway.

5.11.4 Proposed Abatement and Remediation Plan

Based on the above information, the abatement and remediation plan for the site is shown in Table 5-16.

Table 5-16
Abatement and Remediation Plan: Site 6.1 – Bear’s Hump Hiking Trail – Seismic Station Building

Future Land Use	Restoration to a natural area.
Selected Remedial Option	<ul style="list-style-type: none"> Removal and disposal of the building foundations and all above ground infrastructure. Removal and disposal of hazardous and non-hazardous surface debris associated with the partially destroyed structure. Excavation and disposal of impacted soil.
Rationale for Remedial Options	<ul style="list-style-type: none"> Excavation is the most cost-efficient way of removing impacted soil while equipment is on-site to remove the burnt building material.
Objectives	<ul style="list-style-type: none"> Remove all man-made materials from the site including burnt surface debris and hazardous building materials. Remove soil containing concentrations of COCs that present a risk to human health and ecological aquatic life, soil and food ingestion, and general environmental health (no pathways specified).
Remediation Criteria for Soils	<ul style="list-style-type: none"> The most stringent of the CCME SQGs for AI and PI Land Use. CCME CWS for PHC.
Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> Conduct high-risk abatement procedures to remove the asbestos-containing vermiculite block fill insulation and debris, the asbestos-containing penetration caulking from the penetrations and the asbestos-containing concrete slab. Remove dispersible lead-based paint. Paint that is well bonded to the concrete blocks does not require abatement and can be disposed of attached to the blocks. Assess disposal options based on leachable lead results.

Details of Work Steps		<ul style="list-style-type: none"> • Abatement and removal of dispersible lead-based paint and ACM. • Removal of ash and the non-hazardous surface debris associated with the burnt structure within the limits shown on Drawing 13. • Segregation of debris waste streams, and TCLP testing of the paint waste stream (if required) to assess if it is hazardous. • Excavation and disposal of the asbestos-containing concrete foundation. • Cut, cap or remove any encountered utilities (none are expected). • Removal and disposal of the hazardous and non-hazardous debris waste streams off-site using a helicopter or tracked wheelbarrow. • Excavation and disposal of impacted soil to 0.3 m bgs to the limits shown on Drawing 13. • Confirmatory sampling of the excavation extents. • Submit approximately 12 confirmatory samples for COCs (PHC, PAH and metals). • Rough-grade and recontour the excavation.
Volumes of Materials for Disposal (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Soil	6.5	Benzene, toluene, ethylbenzene, various PAHs, cadmium.
Concrete Foundation Material	1.0	Concrete monuments, satellite dish, and antenna bases. The concrete slab and concrete block building walls contain asbestos and are considered hazardous debris. Hazardous concrete debris has been accounted for below.
Non-Hazardous Debris	2.0	Burnt building debris including glass, metal, wood, steel, and electronics (hard drive, battery backup). One antenna and one satellite dish.
Volumes of Materials for Disposal (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Hazardous Debris	6.0	Asbestos-containing penetration caulking, asbestos-containing vermiculite block fill insulation and debris, asbestos-containing concrete slab. ACM covers an area of 66 m ² in total. Lead-based paint (green paint on the concrete block walls which covers an area of approximately 64m ² in total). The lead-based paint is in fair to good condition and is well bonded to concrete waste, so if no ACM is present it can be disposed of as general non-hazardous construction waste.
Disposal Location		Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.
Additional Post Remediation Risk Management Activities Required		None. Horizontal delineation achieved.

5.12 Site 8.3 – Indigenous History Viewpoint - Red Rock Parkway

5.12.1 Site Observations

As noted during the soil and debris assessment in November 2018, the site comprised a gravel surfaced pathway that led from the parking area on the Red Rock Parkway to a gravel surfaced area at the top of the bluffs overlooking Blakiston Creek. Debris comprising a metal bench frame, a metal support for a sign, and burnt treated timber was present at the overlook area. Ash was

also present on the ground around the debris. The interpretive sign at the start of the pathway was undamaged by the fire.

5.12.2 Hazardous Materials – Results

No painted materials were present, and the debris did not contain ACM.

One sample of concrete debris contained a concentration of silica in excess of 40%.

5.12.3 Shallow Soil – Results

Sample 8.3-1 located in the centre of the gravel surfaced area contained concentrations of arsenic and copper that exceeded the CCME AI and PI SQGs. Arsenic also exceeded the CCME AI and PI SQGs in sample 8.3-3.

The nearest surface water body is Blakiston Creek located approximately 26 m south of the site, hence the aquatic life pathway is considered applicable. Concentrations of naphthalene encountered at site 8.3 are considered consistent with reference values representative of burnt natural areas. Naphthalene concentrations associated with the burnt building materials at site 8.3 have been excluded as a COC; however, further work should be undertaken to assess whether the wider PAH impact related to the forest fire presents a risk to aquatic life.

For impacted soils, a summary of applicable exposure pathways is shown in Table 5-17 below.

Table 5-17
Applicable Exposure Pathways: Site 8.3 - Indigenous History Viewpoint - Red Rock Parkway

COC	Potential Risks to Receptors							
	Human Health Pathways			Ecological Pathways				Other
	Drinking Water	Vapour Inhalation	Soil Ingestion	Aquatic Life	Direct Soil Contact	Soil & Food Ingestion	Nutrient Cycling	Management Limits
Metals	-	-	✓	-	✓	X	X	X

✓ Soil concentrations exceed the CCME SQG for the applicable pathway.

X Soil concentrations are below the CCME SQG for the applicable pathway.

5.12.4 Proposed Remediation Plan

Based on the above information, the remediation plan for the site is shown in Table 5-18.

Table 5-18
Remediation Plan: Site 8.3 - Indigenous History Viewpoint - Red Rock Parkway

Future Land Use	Land use is not expected to change. The site will remain a scenic viewpoint and structures will be replaced.
Selected Remedial Option	<ul style="list-style-type: none"> Removal and disposal of the concrete bench footings and all above ground infrastructure. Removal and disposal of surface ash and non-hazardous debris associated with the burnt structure. Excavation and disposal of impacted soil.

Rationale for Remedial Options	<ul style="list-style-type: none"> Excavation is the most cost-efficient way of removing impacted soil while equipment is on-site to remove the burnt building material. 	
Objectives	<ul style="list-style-type: none"> Remove all burnt surface debris and concrete. Remove soil containing concentrations of COCs that present a risk to human health and ecological receptors through the direct soil contact pathway. 	
Remediation Criteria for Soils	<ul style="list-style-type: none"> CCME SQGs for AI and PI Land Use. 	
Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> No abatement required - no hazardous debris or building materials present. 	
Details of Work Steps	<ul style="list-style-type: none"> Excavation of ash and the non-hazardous surface debris associated with the burnt structures. Debris removal to be based on the extents shown on Drawing 14. Excavation of the concrete bench footings. Removal and disposal of non-hazardous debris off-site. Excavation and disposal of impacted soil to 0.3 m bgs to the limits shown on Drawing 14. Confirmatory sampling of the excavation extents. Submit ten confirmatory samples for COCs (metals). Rough-grade and recontour the excavation. 	
Volumes of Materials for Disposal (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Soil	4.5	Arsenic, copper
Concrete Foundation Material	0.2	Concrete bench footings
Non-Hazardous Debris	2.0	Metal bench frame, a metal support for a sign, and burnt timber
Volumes of Materials for Disposal (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Hazardous Debris	-	None present
Disposal Location		Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.
Additional Post Remediation Risk Management Activities Required		None. Horizontal delineation achieved.

5.13 Site 9.1 – McNealy’s Day Use Area – Akamina Parkway

5.13.1 Site Observations

As noted during the soil and debris assessment in November 2018, structures at the site comprised the fire damaged remains of a picnic shelter and a washroom.

The picnic shelter had been completely destroyed by fire. A concrete floor slab was located in the central portion of the building, with the remaining footprint comprising compacted gravel. Four concrete column bases were also present. Identifiable building debris comprised a metal stove, the collapsed remains of a concrete block chimney, and the metal frames of two picnic tables. Two upright burnt timber columns that were likely treated were also present. A pile of additional burnt debris was present within the building footprint and comprised burnt wooden beams and metal.

The washroom had been completely destroyed by fire. A concrete floor slab remained, and identifiable burnt building debris comprised one metal door. A pile of additional burnt building debris comprising concrete, metal, wood, ceramic tiles, and dry wall was present within the footprint of the building and on the ground to the vicinity of the building footprint.

There was very little ash in the vicinity of the site.

5.13.2 Hazardous Materials – Results

One sample collected from the remaining brown paint on the picnic shelter beams was confirmed to comprise lead-based paint. All paint remaining on the picnic shelter debris should be treated as lead-based paint.

Insufficient paint material was available for PCB analysis; however, paints present on-site were visually similar to those identified and sampled at other sites in WLNP. All paint samples analysed for PCB at other sites were confirmed to be below the CCME guideline of 1.3 parts per million (ppm) for parkland/residential sites which was used as a reference value at the site.

One sample of concrete collected from the building slab contained a concentration of silica in excess of 40%.

5.13.3 Shallow Soil – Results

Sample 9.1-1 located below the debris pile adjacent to the former washroom contained concentrations of naphthalene and phenanthrene that exceeded the CCME AI and PI SQGs. The concentration of naphthalene was also higher than the reference concentrations, therefore naphthalene is considered a COC.

Chromium and tin exceeded the CCME AI and PI SQG in sample 9.1-1 and are considered to be COCs.

The nearest surface water body is Cameron Creek, located approximately 14 m southeast of the site; hence the aquatic life pathway is considered applicable. As outlined in Section 3.2, confirmatory samples collected following remediation will be compared to both the CCME SQGs protective of aquatic life and the remedial objective of 0.086 mg/kg, the maximum naphthalene concentration encountered in a burnt reference area.

For impacted soils, a summary of applicable exposure pathways is shown in Table 5-19 below.

Table 5-19
Applicable Exposure Pathways: Site 9.1 - McNealy's Day Use Area – Akamina Parkway

COC	Potential Risks to Receptors							
	Human Health Pathways			Ecological Pathways				Other
	Drinking Water	Vapour Inhalation	Soil Ingestion	Aquatic Life	Direct Soil Contact	Soil & Food Ingestion	Nutrient Cycling	Management Limits
PAH	X	-	X	✓	X	X	-	-
Metals	-	-	X	✓	X	✓	-	-

✓ Soil concentrations exceed the CCME SQG for the applicable pathway.

X Soil concentrations are below the CCME SQG for the applicable pathway.

5.13.4 Proposed Abatement and Remediation Plan

Based on the above information, the abatement and remediation plan for the site is shown in Table 5-20.

Table 5-20
Abatement and Remediation Plan: Site 9.1 - McNealy's Day Use Area – Akamina Parkway

Future Land Use	No change in land use. The site will remain a day use area.	
Selected Remedial Option	<ul style="list-style-type: none"> Removal and disposal of the building foundations and all above ground infrastructure. Removal and disposal of hazardous and non-hazardous surface debris associated with the burnt outhouse and picnic shelter structure. Excavation and disposal of impacted soil. 	
Rationale for Remedial Options	<ul style="list-style-type: none"> Excavation is the most cost-efficient way of removing impacted soil while equipment is on-site to remove the burnt building material. 	
Objectives	<ul style="list-style-type: none"> Remove all burnt surface debris, including hazardous building materials. Remove soil containing concentrations of COCs that present a risk to aquatic life and soil and food ingestion. 	
Remediation Criteria for Soils	<ul style="list-style-type: none"> The most stringent of the CCME SQGs for AI and PI Land Use. Maximum reference value for naphthalene (0.086 mg/kg). 	
Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> Remove dispersible paint from wooden beams. Assess disposal options based on leachable lead results. 	
Details of Work Steps	<ul style="list-style-type: none"> Excavation of ash and the non-hazardous surface debris associated with the burnt outhouse and picnic shelter structure within the limits shown on Drawing 15. Segregation of debris waste streams, and TCLP testing of the paint waste stream to assess if it is hazardous. Excavation and disposal of the concrete outhouse and picnic shelter foundation. Cut, cap or remove any encountered utilities (none expected). Removal and disposal of the potentially hazardous and non-hazardous debris waste streams off-site. Excavation and disposal of impacted soil to 0.3 m bgs to the limits shown on Drawing 15. Confirmatory sampling of the excavation extents. Submit approximately six confirmatory samples for COCs (PAH and metals). Backfill the outhouse vault with granular fill. Grade and recontour excavations/backfilled area and re-seed disturbed areas using a PCA-approved seed mix. 	
Volumes of Materials for Disposal (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Soil	4.0	Chromium, tin, naphthalene, phenanthrene.
Concrete Foundation Material	7.0	Concrete slab (assume 0.15 m thick).

Non-Hazardous Debris	17.0	Metal stove, concrete blocks, metal frames of two picnic tables, two upright burnt timber columns, burnt wooden beams, metal, one metal door, ceramic tiles and dry wall.
Hazardous Debris	<0.1	Lead-based paint (brown paint in poor condition on the picnic shelter beams which covers an area of approximately 1m ² in total). Lead-based paint that is well bonded to wooden waste can be disposed of as general construction waste.
Estimated Backfill Volume (m³)	5.0	
Disposal Location		Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.
Additional Post Remediation Risk Management Activities Required		None. Horizontal delineation achieved.

5.14 Site 9.2 – Little Prairie Day Use Area – Akamina Parkway

5.14.1 Site Observations

As noted during the soil and debris assessment in December 2018, structures at the site comprised a picnic shelter that was undamaged by the fire and the fire damaged remains of an outhouse. The outhouse had been completely destroyed by fire. A concrete floor slab remained, and identifiable burnt building debris comprised one metal door and a metal ventilation fan. A pile of additional burnt building debris comprising metal, PVC pipe, wood, ceramic tiles and dry wall was present on the concrete slab and on the ground in the vicinity of the former structure. A fire damaged picnic table was located outside of the picnic shelter. A second picnic table located adjacent to the parking area was unaffected by the fire. At the entrance to the site a partially burnt sign was present. There was very little ash in the vicinity of the site.

5.14.2 Hazardous Materials – Results

Two samples collected from green paint on the picnic shelter exterior and the black paint on the adjacent picnic table were confirmed to be lead-based paint.

The remaining paints throughout the site were well bonded to the substrate and could not be sampled for PCB; however, paints present on-site were visually similar to those identified and sampled at other sites in WLNP. All paint samples analysed for PCB at other sites were confirmed to be below the CCME guideline of 1.3 ppm for parkland/residential sites, which was used as a reference value at the site.

One sample of concrete collected from the building slab contained a concentration of silica in excess of 40%.

5.14.3 Shallow Soil – Results

Concentrations of chromium and nickel exceeded the interim CCME AI and PI SQG in sample 9.2-1, located adjacent to the unburnt picnic shelter. The arsenic concentration exceeded the CCME AI and PI SQG in sample 9.2-6 located adjacent to the burnt outhouse.

The nearest surface water body is Cameron Creek, located approximately 17 m east of the site, hence the aquatic life pathway is considered applicable. Concentrations of naphthalene

encountered at site 9.2 are considered consistent with reference values representative of burnt natural areas. Naphthalene concentrations associated with the burnt building materials at site 9.2 have been excluded as a COC; however, further work should be undertaken to assess whether the wider PAH impact related to the forest fire presents a risk to aquatic life.

For impacted soils, a summary of applicable exposure pathways is shown in Table 5-21 below.

Table 5-21
Applicable Exposure Pathways: Site 9.2 – Little Prairie Day Use Area – Akamina Parkway

COC	Potential Risks to Receptors							
	Human Health Pathways			Ecological Pathways				Other
	Drinking Water	Vapour Inhalation	Soil Ingestion	Aquatic Life	Direct Soil Contact	Soil & Food Ingestion	Nutrient Cycling	Management Limits
Metals	-	-	✓	-	✓	X	✓	X

✓ Soil concentrations exceed the CCME SQG for the applicable pathway.

X Soil concentrations are below the CCME SQG for the applicable pathway.

5.14.4 Proposed Abatement and Remediation Plan

Based on the above information, the abatement and remediation plan for the site is shown in Table 5-22.

Table 5-22
Abatement and Remediation Plan: Site 9.2 – Little Prairie Day Use Area – Akamina Parkway

Future Land Use	No change in land use. The site will remain a day use area.
Selected Remedial Option	<ul style="list-style-type: none"> • Conduct abatement of lead-based paint on the unburnt picnic shelter that is likely to be retained. • Removal and disposal of the destroyed outhouse building foundation and all above ground infrastructure. • Removal and disposal of hazardous and non-hazardous surface debris associated with the burnt outhouse structure and picnic table. • Excavation and disposal of impacted soil.
Rationale for Remedial Options	<ul style="list-style-type: none"> • Lead-based paint on parts of the intact picnic shelter is in poor condition and removal is recommended. The main exposure risk is related to inhalation/ingestion of dust generated from remedial work (including sanding and scraping); however, the likelihood of exposure of the public to the lead-based paint that is currently in-place on the structure is minimal as the flaking/delaminating paint is not be in a form that would be a significant exposure risk. In summary, although removal of the lead-based paint is recommended, the structure can be opened to the public and the repairs made at a later date.
Objectives	<ul style="list-style-type: none"> • Remove dispersible lead-based paint from the unburnt picnic shelter structure. • Remove all burnt surface debris related to the destroyed outhouse and picnic table, including hazardous debris. • Remove soil containing concentrations of COCs that present a risk to human health, ecological direct soil contact and nutrient cycling.

Remediation Criteria for Soils	<ul style="list-style-type: none"> The most stringent of the CCME SQGs for AI and PI Land Use 	
Abatement Criteria for Hazardous Building Materials/Debris	<ul style="list-style-type: none"> Remove dispersible paint on the intact picnic shelter. Remove picnic table burnt debris coated in lead-based paint. Assess disposal options based on leachable lead results. 	
Details of Work Steps	<ul style="list-style-type: none"> Conduct abatement of lead-based paint on the intact picnic shelter structure and conduct TCLP analysis of the paint waste stream to assess destination of waste. PCA will manage the lead-based paint portion of the work. Re-paint and retain the picnic shelter. Remove and segregate wooden debris with dispersible lead-based paint from the remains of the picnic table adjacent to the picnic shelter and conduct TCLP analysis of paint/building material waste stream to assess destination of waste. Excavation of ash and the non-hazardous surface debris associated with the burnt outhouse structures to extents shown on Drawing 16. Removal and disposal of the partially burnt entrance sign (non-hazardous). Excavation and removal of the concrete building slabs and footings associated with the outhouse structures. Excavation and disposal of impacted soil in the vicinity of the burnt outhouse structure and the burnt picnic table to extents shown on Drawing 16. Confirmatory sampling of the excavation extents. Submit approximately ten confirmatory samples for COCs (metals). Backfill the outhouse vault with granular fill. Grade and recontour excavation and backfilled area and re-seed disturbed areas with PCA approved seed mix 	
Volumes of Impacted Materials (m³)		COCs/Hazardous/Non-Hazardous Materials Present
Soil	7.5	Chromium, nickel, arsenic.
Concrete Foundation Material	2.0	Concrete slab (assume 0.15 m thick).
Non-Hazardous Debris	2.0	Debris related to the destroyed outhouse comprised a metal door and a metal ventilation fan. A pile of additional burnt building debris comprising metal, PVC pipe, wood, ceramic tiles and dry wall was present on the concrete slab and on the ground in the vicinity of the former structure. A fire damaged picnic table and burnt sign was also present.
Hazardous Debris	<0.1	Green lead-based paint covering an area of approximately 54 m ² on the intact picnic shelter and black paint on the adjacent picnic table. 1 m ² of lead-based paint on the picnic table is in poor condition. The remainder of the lead-based paint that is well bonded to wooded waste can be disposed of as general construction waste.
Disposal Location		Pincher Creek Landfill or another licensed recycling/disposal facility selected by the contractor.
Estimated Backfill Volume (m³)		5.0

Additional Post Remediation Risk Management Activities Required	None. Horizontal delineation achieved.
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6.0 ABATEMENT AND REMEDIATION IMPLEMENTATION PLAN

Conceptual implementation plans for the site-specific options described in Section 5.0 are outlined below.

6.1 Removal of Debris, Excavation of Soil and Off-Site Disposal

At the sites where excavation and off-site disposal of impacted soil and/or hazardous debris is proposed, the following tasks would be undertaken:

- Task 1: Tender Process – Includes preparation of the tender package, issuance of the tender on the Government of Canada's open procurement service, completion of an on-site bidder's meeting, preparation of responses to bidders' questions and issuance of amendments as required, evaluation of technical and financial bid components, and award of the remediation contract.
- Task 2: Pre-Remediation Permitting – This task includes consultation with PCA to ensure that the necessary permits have been obtained. Permits may include, but are not limited to the following:
 - Basic Impact Assessment (BIA): PCA have indicated that a BIA will be required for the project under the Parks Canada Environmental Impact Analysis (EIA) program. In general, an EIA is required for any project where there is potential for adverse environmental effects. A BIA is a less comprehensive impact assessment used when adverse effect will be confined to the project site or immediate surroundings, where adverse effects are well understood, or where mitigation measures and impact management techniques are familiar. The intent of the BIA is to evaluate potential adverse effects and develop mitigations. The BIA will be provided by PCA and will take into account regulations under the Canada National Parks Act, Canadian Environmental Assessment Act, Canada Fisheries Act, Canada Migratory Birds Convention Act and Canada Species at Risk Act.
 - Environmental Protection Plan (EPP): as mentioned above, the BIA identifies potential adverse environmental effects and likely mitigation measures. The intent of the EPP is to detail the environmental protection measures that will be required to ensure that the adverse effects identified in the BIA are mitigated. The EPP is generally prepared by the contractor.
 - Archeological Impact Assessments (AIA): If projects are located in areas of historical/cultural significance, archeological overview assessments, and if necessary, AIAs are to be completed prior to ground disturbance associated with remediation.
 - Cultural Resource Impact Analysis (CRIA): If projects are found to have the potential to cause adverse effects to cultural resources (including a resource listed in a Parks Canada cultural resource management document, or any structure, site or thing of historical, archaeological, paleontological or architectural significance), a CRIA will be used to assess impacts and determine appropriate mitigation measures.

- Task 3: Pre-Work Submittals – This task includes the preparation and review of all pre-work submittals to be obtained by the contractor, including permits, disposal facility details, site layout drawings, construction progress schedule and participation in a project kick-off meeting with PCA. To minimize risks to workers, visitors, members of the public and the environment during the remediation program, the contractor will also submit health and safety documents and EPP. These documents will include but are not limited to provision for spill response, dust control and monitoring, equipment decontamination (preventing the spread of invasive species and weeds and the dispersal of impacted soil and debris), applicable personal protective equipment, wildlife/vegetation protection plans, backfill/topsoil sources, site protection and access.
- Task 4: Site Preparation Activities – This task may include the completion of any ecological surveys required by the BIA or EPP (e.g., nesting surveys), mobilization of contractor site facilities (e.g., portable toilets, site office, etc.), installation of temporary erosion and sediment control measures, setting up helicopter staging areas, and mobilization/setup of temporary security fencing (if required).
- Task 5: Debris Removal – This task includes the segregation, removal and off-site disposal of hazardous and non-hazardous debris located within the perimeters shown on the attached drawings and documented in the site-specific remediation plans. Task 5 would also include the removal of concrete foundations. Debris would be removed from the ground surface and underlying soil would be removed as outlined in Task 6 below.
- Task 6: Excavation of Impacted Soils – This task includes the excavation and off-site disposal of impacted soil to a depth of 0.3 m bgs. Note that while the assumed impacted soil excavation boundaries have been approximated either by delineation sampling or demarcating the perimeter of the impacted debris/ash around each building during the initial site visit, the debris and ash may have spread in the months following the site visit via wind or surface water runoff as a result of precipitation. As a result, the soil excavation boundaries may not precisely reflect site conditions, since soil excavation is only required in areas with known soil impacts and directly underneath the impacted debris/ash. Based on the extent of impacted debris/ash on-site at the time of remediation, additional soil excavation may be required. Following excavation to the limits provided to the contractor in the tender specifications, samples would be collected from the limits of the excavation at a spacing of 5 m along the excavation walls, and on a 5 m by 5 m grid across the excavation floor. Samples will be analysed for COCs specific to each site to assess whether impacted soil has been excavated or remains in place. Additional soil excavation may be required if the confirmatory samples fail the remedial targets. Alternatively, a risk assessment may be considered to assess residual impact. As mentioned in Section 3.2, to assess if remediation has been achieved, confirmatory samples collected following remediation will be compared to both the CCME SQGs and the remedial objectives of 0.086 mg/kg and 720 mg/kg, the maximum naphthalene and barium concentrations encountered in a burnt reference area, respectively.
- Task 7: Transportation and Off-site Disposal – All excavated debris and soil would be transported off-site for disposal at the Pincher Creek Landfill or recycling facilities specified by the contractor. Note that it will be at the discretion of the contractor to decide where and how impacted debris and soils will be stored prior to hauling to the selected disposal facility. The excavated material can be immediately placed in trucks and transported directly to the landfill, or materials can be placed in storage bins or stockpiled on HDPE liner at a designated staging area until sufficient quantities for disposal have been collected. Should

material be stockpiled on a liner or placed in bins, tarps will be required over the materials to prevent the spread of impacted soil and debris during windy weather and/or preventing runoff.

- Task 8: Excavation Backfilling - This task will comprise import and placement of granular backfill at sites 5.1, 5.2 (if required), 9.1 and 9.2. To prepare the sites for future development, granular backfill will be imported, placed and compacted by the contractor once analytical results meet the applicable remedial targets. The contractor will specify the backfill source as part of their tender submittal and will ensure the material is free of COCs, weed seeds and invasive species. The backfill material will be sampled at source prior to import to site and will also be pre-approved by PCA.
- Task 8: Site Restoration – This task will comprise rough-grading and contouring of the excavations or backfilled areas to match the surrounding grade in preparation for revegetation or redevelopment (if required). At sites 5.1 and 5.2, PCA have specified that topsoil be placed over the backfill or excavated areas, and that disturbed areas be re-seeded. The topsoil source and seed mix would be pre-approved by PCA. Graded and contoured areas at sites 2.1, 2.2, 4.1, 4.3, 9.1 and 9.2 would also be raked smooth and seeded.

6.2 Abatement of Hazardous Materials and Demolition

At the sites where buildings containing hazardous materials are likely to be retained (sites 1.20 and 9.2), or where hazardous materials require segregation from debris prior to disposal (site 6.1 and 9.1), the following tasks would be conducted:

- Tasks 1 to 4: Tendering, permitting, and site preparation tasks, as outlined in Section 6.1 above.
- Task 5: Abatement of Hazardous Materials – Abatement of ACM and/or lead-based paint from structures and debris will follow the procedures documented in Appendix A. During any removal of concrete foundations or building slabs the safe work procedures to be followed are also presented in Appendix A. To ensure that debris removal activities are not impacting health and safety of site workers or the surrounding environment, it is recommended that air monitoring during abatement is conducted in accordance with the procedures outlined in Appendix B. All construction debris will be segregated and salvaged and recycled where possible. Remaining construction debris will be disposed as outlined in Section 6.1 above. At all sites the void left by removal of the concrete building slab will be rough-graded and contoured to match the surround ground surface.
- Task 6: Debris Removal – as outlined in Section 6.1 above.
- Task 7: Off-site Disposal of Hazardous Materials – as outlined in Section 6.1 above.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the Debris and Soil Assessment completed in December 2018 and May 2019, and subsequent delineation completed in August 2019, have indicated that abatement, remediation and/or debris removal is required at all of the non-priority sites (1.20, 2.1, 2.2, 2.3, 3.1, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 8.3, 9.1, and 9.2). Some sites only require removal of debris; however, where COCs in the soil present a potential risk to human health or environmental receptors (via direct soil contact or soil/food ingestion), removal of impacted soil is the preferred remedial option.

Where hazardous building materials are present in or on buildings that are going to be retained (sites 9.1 and 1.20), or where ACMs are present (site 6.1), abatement of these materials was considered the recommended approach.

The recommended approach for each site and the proposed quantities of impacted soil, hazardous and non-hazardous debris, and concrete to be removed and disposed of off-site are summarised in Table 7-1; however, the overall remedial and abatement strategies can be summarised as follows:

- **Sites where impacted soil and/or burnt building debris are present:** excavate non-hazardous and hazardous debris (if present), remove concrete building foundations, excavate impacted soil to the extents shown on the drawings, complete confirmatory soil sampling, backfill (if required) and/or rough-grade and recontour excavations when soil analysis indicates that the excavation extents meet the specified remediation criteria, and dispose of the segregated waste streams off-site. It is expected that all non-recyclable hazardous and non-hazardous materials and soil can be disposed of at the Pincher Creek landfill due to proximity to the site, although approval to dispose of this material has not been confirmed. The remedial contractor bidders may choose to provide alternate disposal or recycling locations.
- **Unburnt structures that will be retained – specifically site 1.20 (Crandell Campground Water Tower) and site 9.2 (Little Prairie Day Use Area picnic shelter):** complete abatement of hazardous building materials in/on the structure to be retained, dispose of the hazardous waste stream off-site. Where required (at site 9.2), complete removal of impacted soil and hazardous and non-hazardous debris as per the first bullet.
- **Structures that require demolition – specifically site 6.1 (Bear’s Hump Hiking Trail):** - high risk abatement procedures are required during dismantling of the seismic station building as the remaining concrete block walls and building slab contain asbestos-containing materials. Dispose of the hazardous waste stream off-site. Complete removal of impacted soil and remaining non-hazardous debris as per the first bullet.

It is expected that all waste materials can be disposed of at the Pincher Creek landfill; however, the successful contractor may choose to provide alternate disposal or recycling locations.

The site-specific abatement and remediation plans will be used to support the development of tender specifications to allow for the future award of the remediation construction contract. The tender specifications will require the contractor to provide documents including, but not limited to, applicable permits, disposal facility details, health and safety plans, and environmental protection plans.

A Class C cost estimate for implementing the abatement and remediation plans has been included under separate cover.

Table 7-1
Proposed Remediation Strategy and Volumes of Materials for Disposal

Site No.	Site Name	Hazardous Materials Identified	COCs Identified in Soil Samples	Volumes (m ³)				Proposed Remediation Approach
				Hazardous Surface Debris	Concrete	Non-Hazardous Surface Debris	Impacted Soil	
1.2	Crandell Campground Water Tower	Lead-Based Paint	Soil sampling not included in scope	<0.1 (surface area of 2 m ²)	0	0	0	-PCA to manage site in the future. No further work required; however, it is recommended that dispersible lead-based paint is removed, and the affected area is repainted.
2.1	Crandell Backcountry Campground Kitchen Shelter	Silica	Lead	0	3.0	3.0	0.3	-Removal and disposal of concrete footings and burnt non-hazardous building debris. -Excavation and disposal of lead-impacted soil. -Removal of debris and soil off-site by helicopter. -Grade and smooth the excavation and seed disturbed areas. -Excavation backfilling not required.
2.2	Crandell Backcountry Campground Campsites	Not Sampled ¹	Barium	0	0	2.0	20	-Excavation and disposal of impacted soil. -Removal and disposal of wooden tent pad borders. -Removal of debris and soil off-site by helicopter. -Grade and smooth gravel tent pads and soil excavation area to contour with surrounding ground. -Seed disturbed areas.
2.3	Crandell Backcountry Campground Outhouse	Not Sampled ¹	None	0	0	<0.1	0	-PCA to manage site in the future. No further work required; however, it is recommended that minor non-hazardous debris is removed.

Site No.	Site Name	Hazardous Materials Identified	COCs Identified in Soil Samples	Volumes (m ³)				Proposed Remediation Approach
				Hazardous Surface Debris	Concrete	Non-Hazardous Surface Debris	Impacted Soil	
3.1	Melted roadside edge markers – Red Rock Parkway	Not Sampled ¹	Not Sampled	0	0	2.0	0	-PCA to remove markers. No further work required.
4.1	Goat Lake Backcountry Campground 4 Campsites	Not Sampled ¹	None	0	0	2.0	0	-Removal and disposal of wooden tent pad borders. Removal off-site by helicopter. -Grade and smooth gravel tent pads to contour with surrounding ground. -Seed disturbed areas.
4.2	Goat Lake Backcountry Campground Outhouse	Not Sampled ¹	None	0	0	0.5	0	-Hand-pick minor non-hazardous debris (metal and glass) and broken food hang pole and removal off-site by helicopter.
4.3	Goat Lake Backcountry Campground Picnic Tables	Not Sampled ¹	None	0	0	2.0	0	-Removal and disposal of wooden picnic tables. Removal off-site by helicopter. -Grade and smooth gravel tent pads to contour with surrounding ground. -Seed disturbed areas.
5.1	Waterton Golf Course Reservoir	Silica	Indeno(1,2,3-c,d)pyrene, lead	0	17	1.0	10	-Removal and disposal of non-hazardous debris (burnt wooden beams within reservoir and minor debris around perimeter of reservoir). -Excavation and removal of concrete reservoir base and walls. -Excavation and disposal of impacted soil. -Backfill with gravel fill sourced from outside WLNP. -Place clean topsoil and seed disturbed areas.

Site No.	Site Name	Hazardous Materials Identified	COCs Identified in Soil Samples	Volumes (m³)				Proposed Remediation Approach
				Hazardous Surface Debris	Concrete	Non-Hazardous Surface Debris	Impacted Soil	
5.2	Waterton Golf Course Lightning Shelter Shed	Silica	Arsenic, chromium, copper, lead, zinc	0	2.0	0	4.0	<ul style="list-style-type: none"> -Excavation and removal of concrete shed base. -Excavation and disposal of impacted soil. -Backfill excavation to existing grades with fill sourced from outside WLNP. -Place clean topsoil and seed disturbed areas.
6.1	Seismic Station Building – Bear's Hump Hiking Trail	ACM Lead-based Paint Silica	Benzene, toluene, ethylbenzene, PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, phenanthrene, and pyrene), cadmium	6.0 (ACM covers a surface area of 66 m²) (Lead-Based Paint covers a surface area of 64 m² but is not considered a hazardous material)	1.0	2.0	6.5	<ul style="list-style-type: none"> -Conduct high-risk abatement procedures to remove the asbestos-containing vermiculite concrete block wall fill insulation and debris, the asbestos-containing penetration caulking from the building penetrations, and asbestos-containing concrete slab. -Remove any dispersible lead-based paint not bonded to the concrete blocks and conduct TCLP analysis of paint/building material waste stream to assess disposal options. -Removal of remaining non-hazardous building material and other site equipment (satellite dish, antenna bases etc). -Excavation and disposal of impacted soil. -Removal of all soil, hazardous and non-hazardous debris off-site by helicopter or tracked wheelbarrow. -Rough-grade excavation. -No backfilling required. -No restoration required.

Site No.	Site Name	Hazardous Materials Identified	COCs Identified in Soil Samples	Volumes (m ³)				Proposed Remediation Approach
				Hazardous Surface Debris	Concrete	Non-Hazardous Surface Debris	Impacted Soil	
8.3	Indigenous History Viewpoint	Silica	Arsenic, copper	0	0.2	2.0	4.5	<ul style="list-style-type: none"> -Removal and disposal of non-hazardous debris (remnants of bench and gazebo). -Excavation and disposal of ash and impacted soil. -Rough-grade excavation. -No backfilling required. -No restoration required.
9.1	McNealy's Day Use Area	Lead-based Paint Silica	PAH (naphthalene and phenanthrene), chromium, tin	<0.1 (lead-based paint covers a surface area of 1 m ²)	7	17	4.0	<ul style="list-style-type: none"> -Remove and segregate wooden debris with dispersible lead-based paint from the remains of the Picnic Shelter. -Excavation of ash and the non-hazardous surface debris associated with the burnt picnic shelter and outhouse structures. -Excavation and removal of the concrete building slabs and footings associated with the picnic shelter and outhouse structures. -Excavation and disposal of impacted soil in the vicinity of the burnt outhouse structure. -Backfill outhouse vault with gravel sourced from outside WLNP. -Grade the outhouse backfill and the picnic shelter excavation. Seed disturbed areas. -Retain the concrete pad under the garbage dumpster.

Site No.	Site Name	Hazardous Materials Identified	COCs Identified in Soil Samples	Volumes (m ³)				Proposed Remediation Approach
				Hazardous Surface Debris	Concrete	Non-Hazardous Surface Debris	Impacted Soil	
9.2	Little Prairie Day Use Area	Lead-based Paint Silica	Arsenic, chromium, nickel	<0.1 (lead-based paint covers a surface area of 55 m ² [54m ² in good condition and 1 m ² in poor condition])	2.0	2.0	7.5	<ul style="list-style-type: none"> -PCA will manage lead-based paint on intact picnic shelter structure. -Excavation of ash and the non-hazardous surface debris associated with the burnt outhouse structure. -Removal and disposal of the remains of the picnic table (contains lead-based paint). -Removal and disposal of the partially burnt entrance sign (non-hazardous). -Excavation and removal of the concrete building slabs and footings associated with the outhouse structure. -Excavation and disposal of impacted soil in the vicinity of the burnt outhouse structure and the burnt picnic table. --Backfill outhouse vault with gravel sourced from outside WLNP. Backfill to grade and seed disturbed areas.

Notes:

¹ Hazardous Materials were not sampled as only limited quantities of non-hazardous debris (including un-painted metal, unpainted wood, HDPE plastic) remained on-site.

8.0 STATEMENT OF LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SLR for Public Services and Procurement Canada.

This report has been prepared for specific application to this site and site conditions existing at the time work for the report was completed. Any conclusions or recommendations made in this report reflect SLR's professional opinion based on limited investigations including: visual observation of the site, surface and subsurface investigation at discrete locations and depths, and laboratory analysis of specific chemical parameters. The results cannot be extended to previous or future site conditions, portions of the site that were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters and materials that were not addressed. Substances other than those addressed by the investigation may exist within the site; and substances addressed by the investigation may exist in areas of the site not investigated in concentrations that differ from those reported. SLR does not warranty information from third party sources used in the development of investigations and subsequent reporting.

Nothing in this report is intended to constitute or provide a legal opinion. SLR expresses no warranty to the accuracy of laboratory methodologies and analytical results. SLR makes no representation as to the requirements of compliance with environmental laws, rules, regulations or policies established by federal, provincial or local government bodies. Revisions to the regulatory standards referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary.

Public Services and Procurement Canada may submit this report to the Alberta Environment and Parks and/or related Alberta environmental regulatory authorities or persons for review and comment purposes.

9.0 REFERENCES

- Alberta Tier 1 Soil and Groundwater Remediation Guidelines, Alberta Environment, February 2009.
- Canada Labour Code, Canada Occupational Health and Safety Regulations Part X, Hazardous Substances; SOR/86-304, 2017-06-20
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- Canadian Council of Ministers of the Environment, Canadian Environmental Quality Guidelines, Update 7.0, September 2007.
- Canadian Council of Ministers of the Environment, Canada Wide Standards (CWS) for Petroleum Hydrocarbons (PHCs) in Soil, January 2008.
- Dillon Consulting Limited. Debris and Soil Assessment Related to Kenow Wildfire – Draft Report, Waterton Lakes National Park, Alberta, March 2018.
- Dillon Consulting Limited. Remediation Action and Risk Management Plan Related to Kenow Wildfire – Final Report, Waterton Lakes National Park, Alberta, Canada, August 2018.
- National Joint Council Occupational Health and Safety Directive (NJC OHS), Part XI – Hazardous Substances, 11.6 Asbestos Management, January 1, 2001.
- Parks Canada, Drawings & Pictures – Waterton Lakes Ntl. Park Backcountry Sites.
- Public Works & Government Services Canada, Heritage Recording Report, Comfort Station #2, #6, #8, #9, December 2013.
- Public Services and Procurement Canada Asbestos Management Standard, June 2017.
- SLR Consulting (Canada) Ltd. Debris and Soil Assessment – 28 Sites Affected by the Kenow Wildfire, Waterton Lakes National Park, Alberta. September 2019.
- SLR Consulting (Canada) Ltd. Remedial Action and Risk Management Plan, Crandell Campground, Lost Horse and Coppermine Day Use Areas - 22 Sites Affected by the Kenow Wildfire, Waterton Lakes National Park, Alberta. August 2019.

TABLES

RARMP – Non-Priority Sites
Sites Affected by the Kenow Wildfire
Waterton Lakes National Park, Alberta
SLR Project No. 203.02356.00001

Table 1: Summary of Analytical Results – Background Samples

Table 1 – Summary of Analytical Results – Background Samples					Sample Location																																
					Sample ID				BG-1	BG-2	BG-3	BG-4	BG-5	BG-6	BG-7	BG-8	BG-9	BG-10	BG-11	BG-12	BG-13	BG-14	BG-15	BG-16	BG-17	BG-18	BG-19	BG-20	BG-21	BG-22	BG-23	BG-24	BG-25	BG-26	BG-27	BG-28	
					Sample Date				30-Nov-2018	30-Nov-2018	1-Dec-2018	1-Dec-2018	5-Dec-2018	5-Dec-2018	6-Aug-2019	6-Aug-2019	13-May-2019	13-May-2019	13-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	15-May-2019	15-May-2019	15-May-2019	15-May-2019	15-May-2019	15-May-2019
					CVC (ppm)				10	0	0	0	0	0	35	20	0	0	0	0	0	0	0	0	0	20	10	0	0	5	0	0	0	0	0	0	0
					CCME CWS PHC, AL/PL/RL (Coarse Soil)	CCME SoilQG Tier 1 AL (Coarse Soil)	CCME SoilQG Tier 1 RL/PL (Coarse Soil)																														
Particle Size																																					
% >75um	%	ng	ng	ng	45	75	-	60	-	-	18	51	-	-	62	74	-	-	-	-	-	-	-	-	-	-	-	56	13	-	-	-	-	11			
% Gravel (>2mm)	%	ng	ng	ng	-	-	-	-	-	-	38	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Sieve-Pan	%	ng	ng	ng	55	25	-	40	-	-	82	49	-	-	38	26	-	-	-	-	-	-	-	-	-	-	-	44	87	-	-	-	-	89			
Grain Size	N/A	ng	ng	ng	Fine	Coarse	-	Coarse	-	-	Fine	Coarse	-	-	Coarse	Coarse	-	-	-	-	-	-	-	-	-	-	-	Coarse	Fine	-	-	-	-	Fine			
Physical Parameters																																					
Percent Saturation	%	ng	ng	ng	56	92	73	98	50	53	64	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Moisture	%	ng	ng	ng	25	26	27	30	13	16	20	5.8	19	11	16	14	13	11	13	8.6	8.0	12	12	6.5	23	20	43	30	4.6	26	19	28					
Petroleum Hydrocarbons																																					
Benzene	mg/kg	ng	0.03 ⁴¹	0.03 ⁴¹	-	-	0.022	0.011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Toluene	mg/kg	ng	0.37 ⁴¹	0.37 ⁴¹	-	-	0.068	0.057	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Ethylbenzene	mg/kg	ng	0.082 ⁴³	0.082 ⁴³	-	-	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Xylenes	mg/kg	ng	11 ⁴³	11 ⁴³	-	-	<0.045	<0.045	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Styrene	mg/kg	ng	0.1	5	-	-	<0.02	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
MTBE	mg/kg	ng	ng	ng	-	-	<0.03	<0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
F1-BTEX (C6-C10)	mg/kg	30	ng	ng	-	-	<10	<10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
F2	mg/kg	150	ng	ng	-	-	<10	<10	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10				
F3 (C16-C34)	mg/kg	300	ng	ng	-	-	<50	60	-	-	-	-	<50	<50	100	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50				
F4 (C34-C50)	mg/kg	2800	ng	ng	-	-	<50	<50	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50				
PAHs																																					
Benzo(c)phenanthrene	mg/kg	ng	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.012	<0.0050	0.0095	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				
Benzo(e)pyrene	mg/kg	ng	ng	ng	<0.005	<0.005	<0.005	<0.005	0.018	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0084	<0.0050	<0.005	<0.005	0.0056	<0.005	<0.005				
Acenaphthene	mg/kg	ng	0.28 ⁴⁴	0.28 ⁴⁴	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.005	<0.005	<0.005	0.0072	<0.005			
Acenaphthylene	mg/kg	ng	320 ⁴⁴	320 ⁴⁴	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.005	<0.005	<0.005	<0.005				
Acridine	mg/kg	ng	ng	ng	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01				
Anthracene	mg/kg	ng	2.5 ⁴⁵	2.5 ⁴⁵	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.004	<0.004	<0.004	<0.004	<0.004				
Benz[a]anthracene	mg/kg	ng	0.1 ⁴⁶	1 ⁴⁶	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.015	<0.0050	<0.005	<0.005	<0.005	<0.005	0.018				
Benzo[a]pyrene	mg/kg	ng	0.6 ⁴⁷	0.6 ⁴⁷	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0078	<0.0050	<0.005	<0.005	<0.005	0.02				
Benzo(g,h,i)perylene	mg/kg	ng	ng	ng	<0.005	<0.005	<0.005	<0.005	0.011	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.005	0.0055	0.0089	<0.005	0.024			
Benzo(k)fluoranthene	mg/kg	ng	0.1 ⁴⁶	1 ⁴⁶	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.005	<0.005	<0.005	0.011				
Benzo(b+j)fluoranthenes	mg/kg	ng	ng	ng	<0.005	<0.005	<0.005	<0.005	0.0095	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0087	<0.0050	<0.005	<0.005	<0.005	0.049				
Chrysene	mg/kg	ng	6.2 ⁴⁸	6.2 ⁴⁸	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.020	<0.0050	<0.005	<0.005	<0.005	0.022				
Dibenz(a,h)anthracene	mg/kg	ng	0.1 ⁴⁶	1 ⁴⁶	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.005	<0.005	<0.005				
Fluoranthene	mg/kg	ng	15.4 ⁴⁹	15.4 ⁴⁹	<0.005	<0.005	0.0098	<0.005	<0.005	<0.005	<0.005	<0.005																									

Table 1: Summary of Analytical Results – Background Samples

Table 1 – Summary of Analytical Results – Background Samples				Sample Location		BG-1	BG-2	BG-3	BG-4	BG-5	BG-6	BG-7	BG-8	BG-9	BG-10	BG-11	BG-12	BG-13	BG-14	BG-15	BG-16	BG-17	BG-18	BG-19	BG-20	BG-21	BG-22	BG-23	BG-24	BG-25	BG-26	BG-27	BG-28		
				Sample ID		BG-1	BG-2	BG-3	BG-4	BG-5	BG-6	BG-7	BG-8	BG-9	BG-10	BG-11	BG-12	BG-13	BG-14	BG-15	BG-16	BG-17	BG-18	BG-19	BG-20	BG-21	BG-22	BG-23	BG-24	BG-25	BG-26	BG-27	BG-28		
				Sample Date		30-Nov-2018	30-Nov-2018	1-Dec-2018	1-Dec-2018	5-Dec-2018	5-Dec-2018	6-Aug-2019	6-Aug-2019	13-May-2019	13-May-2019	13-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	14-May-2019	15-May-2019	15-May-2019	15-May-2019	15-May-2019	15-May-2019	15-May-2019	15-May-2019
				CVC (ppm)		10	0	0	0	0	0	35	20	0	0	0	0	0	0	0	0	0	20	10	0	0	5	0	0	0	0	0	0	0	0
		CCME CWS PHC, AL/PL/RL (Coarse Soil)	CCME SoilQG Tier 1 AL (Coarse Soil)	CCME SoilQG Tier 1 RL/PL (Coarse Soil)																															
Metals																																			
Antimony	mg/kg	ng	20	20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Arsenic (inorganic)	mg/kg	ng	12	12	4.4	4.6	9.4	6.5	4.9	2.8	9.1	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Barium (non-barite)	mg/kg	ng	750	500	500	370	270	580	160	160	170	130	600	-	-	-	-	-	-	59	140	-	80	120	350	190	710	720	-	-	160	-			
Beryllium	mg/kg	ng	4	4	0.94	0.80	0.83	0.96	0.51	0.54	0.95	0.94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Boron (Calculated)	mg/kg	ng	ng	ng	0.076	0.12	<0.073	<0.098	0.066	0.13	0.068	<0.048	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Boron (hot water soluble)	mg/kg	ng	2	ng	0.44	0.78	0.38	0.50	0.58	0.65	0.31	<0.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Boron (Saturated Paste)	mg/L	ng	ng	ng	0.14	0.13	<0.10	<0.10	0.13	0.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Cadmium	mg/kg	ng	1.4	10	0.20	0.26	0.18	0.29	0.12	0.095	0.12	0.077	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Chromium (hexavalent)	mg/kg	ng	0.4	0.4	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Chromium (III+VI)	mg/kg	ng	64	64	19	16	15	18	32	10	20	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Cobalt	mg/kg	ng	40	50	8.1	6.1	8.2	9.8	6.2	5.5	15	9.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Copper	mg/kg	ng	63	63	8.5	18	29	18	12	8.8	21	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Lead	mg/kg	ng	70	140	17	15	20	23	9.8	4.9	14	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Mercury (total)	mg/kg	ng	6.6	6.6	<0.050	0.087	0.073	0.19	0.087	0.24	<0.050	<0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Molybdenum	mg/kg	ng	5	10	0.45	0.49	0.50	0.58	0.49	<0.40	1.1	0.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Nickel	mg/kg	ng	45	45	12	13	13	15	19	11	17	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Selenium	mg/kg	ng	1	1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Silver	mg/kg	ng	20	20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Thallium	mg/kg	ng	1	1	0.17	<0.10	0.13	0.14	<0.10	<0.10	0.11	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Tin	mg/kg	ng	5	50	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Uranium	mg/kg	ng	23	23	0.53	0.65	0.70	0.78	0.36	<0.20	0.82	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Vanadium	mg/kg	ng	130	130	31	12	17	14	14	8.1	28	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Zinc	mg/kg	ng	250	250	46	52	57	80	37	30	57	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

Env Stds Description

CCME CWS PHC, AL/PL/RL (Coarse Soil):CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil, Tier 1 Agricultural/Residential/Parkland (Coarse Soil)

CCME SoilQG Tier 1 AL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Agricultural (Coarse Soil)

CCME SoilQG Tier 1 RL/PL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Residential/Parkland (Coarse Soil)

Env Stds Comments

- #1:Surface
- #2:Subsurface
- #3:Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.
- #4:No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.
- #5:Ecological receptors only, based on non-carcinogenic effects of PAHs.
- #6:Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)
- #7:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 20 mg/kg. See PAH Fact Sheet for details.
- #8:Provisional value for the protection of soil and food ingestion (ecological receptors). No SQGe value listed. See PAH Fact Sheet for details.
- #9:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 50 mg/kg. See PAH Fact Sheet for details.
- #10:Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).
- #11:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 10 mg/kg. See PAH Fact Sheet for details.
- #12:SQGe based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000.

- Concentration exceeds CCME CWS PHC, AL/PL/RL (Coarse Soil)
- Concentration exceeds CCME SoilQG Tier 1 AL (Coarse Soil)
- Concentrations exceeds CCME SoilQG Tier 1 RL/PL (Coarse Soil)

Notes:

- % - percent
- mg/L - milligram per liter
- mg/kg - milligram per kilogram
- mm - millimeters
- um - micrometers
- ^ - sample not analyzed for parameter indicated
- > - denotes particle size greater than 75 micrometres
- < - denotes concentration less than laboratory reported detection limit
- * - indicates field duplicate soil sample
- ng - no guideline
- N/A - not applicable
- B(a)P TPE - Benzo[a]pyrene total potency equivalents
- CVC - Combustible Vapour Concentration
- IACR - Index of additive cancer risk
- MTBE - methyl tert-butyl ether
- PAHs - polycyclic aromatic hydrocarbons
- ppm - parts per million
- VOCs - volatile organic compounds
- Laboratory reports detail detection limits, testing protocols and QA/QC procedures.

Table 2 – Summary of Analytical Results – Site 2.1: Crandell Backcountry Campground Kitchen Shelter

Table 2 – Summary of Analytical Results – Site 2.1: Crandell Backcountry Campground Kitchen Shelter				Sample Location		2.1-1	2.1-2	2.1-3	2.1-4	2.1-6
				Sample ID		2.1-1	2.1-2	2.1-3	2.1-4	2.1-6
				Sample Date		30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	15-May-2019
				CVC (ppm)		5	5	10	10	5
CCME SoilQG Tier 1 AL (Coarse Soil)		CCME SoilQG Tier 1 RL/PL (Coarse Soil)								
Particle Size										
% >75um	%	ng	ng	-	86	-	-	-		
Sieve-Pan	%	ng	ng	-	14	-	-	-		
Grain Size	N/A	ng	ng	-	Coarse	-	-	-		
Physical Parameters										
Percent Saturation	%	ng	ng	25	25	67	44	-		
Moisture	%	ng	ng	5.9	11	19	13	12		
PAHs										
Benzo(c)phenanthrene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	-		
Benzo(e)pyrene	mg/kg	ng	ng	<0.005	0.014	<0.005	<0.005	-		
Acenaphthene	mg/kg	0.28 ^{#1}	0.28 ^{#1}	<0.005	<0.005	<0.005	<0.005	-		
Acenaphthylene	mg/kg	320 ^{#1}	320 ^{#1}	<0.005	<0.005	<0.005	<0.005	-		
Acridine	mg/kg	ng	ng	<0.01	<0.01	<0.01	<0.01	-		
Anthracene	mg/kg	2.5 ^{#2}	2.5 ^{#2}	<0.004	<0.004	<0.004	<0.004	-		
Benz[a]anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	0.0058	<0.005	<0.005	-		
Benzo[a]pyrene	mg/kg	0.6 ^{#4}	0.6 ^{#4}	<0.005	0.0096	<0.005	<0.005	-		
Benzo(g,h,i)perylene	mg/kg	ng	ng	<0.005	0.018	<0.005	<0.005	-		
Benzo(k)fluoranthene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	0.0066	<0.005	<0.005	-		
Benzo(b+j)fluoranthenes	mg/kg	ng	ng	<0.005	0.023	<0.005	<0.005	-		
Chrysene	mg/kg	6.2 ^{#5}	6.2 ^{#5}	<0.005	0.0073	<0.005	<0.005	-		
Dibenz(a,h)anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	<0.005	-		
Fluoranthene	mg/kg	15.4 ^{#6}	15.4 ^{#6}	<0.005	0.013	<0.005	<0.005	-		
Fluorene	mg/kg	0.25 ^{#1}	0.25 ^{#1}	<0.005	<0.005	<0.005	<0.005	-		
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	0.015	<0.005	<0.005	-		
1-methylnaphthalene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	-		
2-methylnaphthalene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	-		
Naphthalene	mg/kg	0.013 ^{#7}	0.013 ^{#7}	<0.005	0.0062	<0.005	<0.005	-		
Perylene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	-		
Phenanthrene	mg/kg	0.046 ^{#7}	0.046 ^{#7}	<0.005	0.011	<0.005	<0.005	-		
Pyrene	mg/kg	0.1 ^{#3}	7.7 ^{#8}	<0.005	0.0086	<0.005	<0.005	-		
Quinoline	mg/kg	0.1	ng	<0.01	<0.01	<0.01	<0.01	-		
B(a)P TPE (Lab)	mg/kg	5.3 ^{#9}	5.3 ^{#9}	<0.0071	0.017	<0.0071	<0.0071	-		
IACR (Coarse)	N/A	ng	ng	<0.1	<0.1	<0.1	<0.1	-		
IACR (Fine)	N/A	ng	ng	<0.1	<0.1	<0.1	<0.1	-		
Metals										
Antimony	mg/kg	20	20	0.53	0.51	<0.5	2.8	<0.50		
Arsenic (inorganic)	mg/kg	12	12	3.8	5.3	3.8	5.1	4.2		
Barium (non-barite)	mg/kg	750	500	92	160	120	140	130		
Beryllium	mg/kg	4	4	0.86	0.78	0.66	0.75	0.73		
Boron (Calculated)	mg/kg	ng	ng	0.042	<0.025	<0.067	<0.044	-		
Boron (hot water soluble)	mg/kg	2	ng	0.22	0.23	0.62	0.38	0.46		
Boron (Saturated Paste)	mg/L	ng	ng	0.17	<0.1	<0.1	<0.1	-		
Cadmium	mg/kg	1.4	10	0.084	0.097	0.094	0.11	0.070		
Chromium (hexavalent)	mg/kg	0.4	0.4	<0.08	<0.08	<0.08	<0.08	<0.08		
Chromium (III+VI)	mg/kg	64	64	31	17	14	48	14		
Cobalt	mg/kg	40	50	6.6	6.7	6.1	7.3	5.9		
Copper	mg/kg	63	63	8.5	18	17	27	8.9		
Lead	mg/kg	70	140	26	22	18	120	14		
Mercury (total)	mg/kg	6.6	6.6	0.068	0.072	0.13	0.18	<0.050		
Molybdenum	mg/kg	5	10	0.46	0.6	<0.4	0.47	<0.40		
Nickel	mg/kg	45	45	21	16	13	20	13		
Selenium	mg/kg	1	1	<0.5	<0.5	<0.5	<0.5	<0.50		
Silver	mg/kg	20	20	<0.2	<0.2	<0.2	<0.2	<0.20		
Thallium	mg/kg	1	1	<0.1	<0.1	<0.1	<0.1	<0.10		
Tin	mg/kg	5	50	<1	1.4	<1	1.7	<1.0		
Uranium	mg/kg	23	23	0.56	0.54	0.55	0.48	0.62		
Vanadium	mg/kg	130	130	11	10	9.1	9.3	9.3		
Zinc	mg/kg	250	250	75	100	54	61	38		

Env Stds Description

CCME SoilQG Tier 1 AL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Agricultural (Coarse Soil)
CCME SoilQG Tier 1 RL/PL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Residential/Parkland (Coarse Soil)

Env Stds Comments

- #1:Surface
#2:Subsurface
#3:Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.
#4:No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.
#5:Ecological receptors only, based on non-carcinogenic effects of PAHs.
#6:Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)
#7:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 20 mg/kg. See PAH Fact Sheet for details.
#8:Provisional value for the protection of soil and food ingestion (ecological receptors). No SQGe value listed. See PAH Fact Sheet for details.
#9:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 50 mg/kg. See PAH Fact Sheet for details.
#10:Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).
#11:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 10 mg/kg. See PAH Fact Sheet for details.
#12:SQG based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000.

- Concentration exceeds CCME SoilQG Tier 1 AL (Coarse Soil)
- Concentrations exceeds CCME SoilQG Tier 1 RL/PL (Coarse Soil)

Notes:

- % - percent
mg/kg - milligram per kilogram
mg/L - milligram per litre
'-' - sample not analyzed for parameter indicated
> - denotes particle size greater than 75 micrometres
• laboratory reports detail detection limits, testing protocols and QA/QC procedures.
ng - no guideline
CVC - Combustible Vapour Concentration
PAHs - polycyclic aromatic hydrocarbons
ppm - parts per million
VOCs - volatile organic compounds

Table 3: Summary of Analytical Results – Site 2.2: Crandell Backcountry Campground Campsites

Table 3 – Summary of Analytical Results – Site 2.2: Crandell Backcountry Campground Campsites and Outhouse		Sample Location		2.2-1	2.2-2	2.2-3	2.2-4	2.2-5	2.2-6	2.2-7	2.2-8		2.2-10	2.2-11	2.2-13	2.2-14	2.2-15	2.2-16	2.2-17	2.2-18	2.2-19	2.2-20	2.2-21			
		Sample ID		2.2-1	2.2-2	2.2-3	2.2-4	2.2-5	2.2-6	2.2-7	2.2-8	2.2-9*	2.2-10	2.2-11	2.2-13	2.2-14	2.2-15	2.2-16	2.2-17	2.2-18	2.2-19	2.2-20	2.2-21			
		Sample Date		30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	15-May-2019	15-May-2019	7-Aug-2019	7-Aug-2019	7-Aug-2019	7-Aug-2019	7-Aug-2019	7-Aug-2019	7-Aug-2019		
		CVC (ppm)		5	5	5	5	5	5	5	5	5	-	-	5	5	0	0	70	50	40	-	-	-		
		CMCE SoilQG Tier 1 AL (Coarse Soil)	CMCE SoilQG Tier 1 RL/PL (Coarse Soil)																							
Physical Parameters																										
Percent Saturation	%	ng	ng	53	70	120	60	130	92	120	96	100	110	-	-	-	-	-	-	-	-	-	-			
Moisture	%	ng	ng	22	30	36	24	44	39	47	39	41	35	28	26	23	-	-	-	-	-	-	-			
PAHs																										
Benz[ghi]phenanthrene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-			
Benz[ghi]pyrene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-			
Acenaphthene	mg/kg	0.28 ^{LI}	0.28 ^{LI}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-			
Acenaphthylene	mg/kg	330 ^{LI}	320 ^{LI}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-			
Acridine	mg/kg	ng	ng	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-	-			
Anthracene	mg/kg	2.5 ^{LI}	2.5 ^{LI}	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	-	-	-	-	-	-	-			
Benz[a]anthracene	mg/kg	0.1 ^{LI}	1 ^{LI}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-			
Benz[a]pyrene	mg/kg	0.6 ^{LI}	0.6 ^{LI}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-			
Benz[ghi,h]perylene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-			
Benz[k]fluoranthene	mg/kg	0.1 ^{LI}	1 ^{LI}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-			
Benzo[b]h]fluoranthenes	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-			
Chrysene	mg/kg	6.2 ^{LI}	6.2 ^{LI}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-			
Fluorene	mg/kg	0.1 ^{LI}	1 ^{LI}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-			
Dibenz[a,h]anthracene	mg/kg	15.4 ^{LI}	15.4 ^{LI}	<0.0050	<0.0050	0.0084	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0092	-	-	-	-	-	-			
Fluorene	mg/kg	0.25 ^{LI}	0.25 ^{LI}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0077	-	-	-	-	-	-			
Indene[1,2,3-c,d]pyrene	mg/kg	0.1 ^{LI}	1 ^{LI}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-			
1-methylxanthhalene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.017	-	-	-	-	-	-			
2-methylnaphthalene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.022	-	-	-	-	-	-			
Naphthalene	mg/kg	0.013 ^{LI}	0.013 ^{LI}	<0.0050	0.03	0.021	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0093	<0.0050	<0.0050	<0.0050	0.039	0.039	-	-	-	-	-	-			
Phenylene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-			
Phenanthrene	mg/kg	0.046 ^{LI}	0.046 ^{LI}	<0.0050	0.0093	0.027	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.033	-	-	-	-	-	-			
Pyrene	mg/kg	0.1 ^{LI}	7.7 ^{LI}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.009	-	-	-	-	-	-			
Quinoline	mg/kg	0.1	ng	<0.010	<0.010	<0.010	<0.010	0.041	<0.010	0.034	0.018	0.018	0.018	0.018	0.018	0.027	0.041	-	-	-	-	-	-			
B[a]p TPE (Lab)	mg/kg	5.3 ^{LI}	5.3 ^{LI}	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	-	-	-	-	-	-			
IACR (Coarse)	N/A	ng	ng	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	-	-	-	-	-			
IACR (Fine)	N/A	ng	ng	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	-	-	-	-	-			
Metals																										
Antimony	mg/kg	20	20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	-	-	-	-	-	-			
Arsenic (inorganic)	mg/kg	12	12	4.9	6.8	4.8	4.4	3.4	3.9	4.1	3.8	4	5.1	5	4.3	5.8	-	-	-	-	-	-	-			
Barium (non-barite)	mg/kg	750	500	500	1000	460	440	430	430	400	390	420	520	510	530	1400	1200	810	900	2400	700	1200	2500			
Beryllium	mg/kg	4	4	0.81	1.2	0.76	0.84	0.76	0.97	0.92	1.1	1.0	0.90	0.98	0.87	1.0	-	-	-	-	-	-	-			
Boron (Calculated)	mg/kg	2	ng	<0.053	<0.07	<0.12	<0.16	<0.13	<0.092	<0.12	<0.096	<0.10	<0.11	<0.088	-	-	-	-	-	-	-	-	-			
Boron (Hot Water Soluble)	mg/kg	2	ng	<0.30	0.26	0.78	0.35	1.0	0.57	1.1	0.31	0.69	0.45	0.42	0.78	0.46	-	-	-	-	-	-	-			
Boron (Saturated Paste)	mg/kg	ng	ng	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	-	-	-	-	-	-			
Cadmium	mg/kg	1.4	10	0.22	0.24	0.36	0.15	0.25	0.20	0.32	0.20	0.23	0.18	0.13	0.14	0.41	-	-	-	-	-	-	-			
Chromium (hexavalent)	mg/kg	0.4	0.4	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	-	-	-	-	-	-	-			
Chromium [III+VI]	mg/kg	64	64	15	21	15	15	9.3	11	11	13	13	16	17	19	23	-	-	-	-	-	-	-			
Cobalt	mg/kg	40	50	6.4	8.7	5.9	7.1	3.9	4.6	4.6	4.8	4.9	7	7.4	7.6	7.7	-	-	-	-	-	-	-			
Copper	mg/kg	63	63	12	14	17	16	20	16	21	11	12	16	14	9.8	12	-	-	-	-	-	-	-			
Lead	mg/kg	70	140	14	17	16	13	13	13	13	13	14	16	14	13	20	-	-	-	-	-	-	-			
Mercury (total)	mg/kg	6.6	6.6	<0.050	0.099	0.11	0.066	0.092	0.11	0.095	0.081	0.067	0.11	0.095	<0.050	<0.050	-	-	-	-	-	-	-			
Molybdenum	mg/kg	5	10	<0.40	0.43	0.56	0.46	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	-	-	-	-	-	-	-			
Nickel	mg/kg	45	45	13	14	12	13	9.5	13	11	12	13	14	15	15	14	-	-	-	-	-	-	-			
Potassium	mg/kg	ng	ng	-	-	-	-	-	-	300	140	200	-	-	-	-	-	-	-	-	-	-	-			
Selenium	mg/kg	1	1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	-	-	-	-	-	-			
Silver	mg/kg	20	20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	-	-	-	-	-	-	-			
Thallium	mg/kg	1	1	0.10	0.23	0.13	0.13	<0.10	0.13	0.11	0.13	0.13	0.13	0.16	0.16	0.22	-	-	-	-	-	-	-			
Tin	mg/kg	5	50	<1.0	<1.0	1.5	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	-	-	-	-	-			
Uranium	mg/kg	23	23	0.53	0.68	0.54	0.55	0.88	0.9	1.0	0.88	0.93	0.81	0.77	0.68	0.66	-	-	-	-	-	-	-			
Vanadium	mg/kg	130	130	18	36	21	28	18	22	26	26	25	26	28	27	35	-	-	-	-	-	-	-			
Zinc	mg/kg	250	250	47	58	77	44	42	42	65	66	70	63	63	56	59	-	-	-	-	-	-	-			
Inorganics																										
Nitrate (as nitrogen)	mg/kg	ng	ng	-	-	-	-	-	-	64	3	<2	-	-	-	-	-	-	-	-	-	-	-			
Nitrate (as NO3-)	mg/kg	ng	ng	-	-	-	-	-	-	57	<2	<2	-													

Standards / Guidelines Descriptions:

CCME SoilQG Tier 1 AL (Coarse Soil): CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Agricultural (Coarse Soil)

CCME SoilQG Tier 1 RL/PL (Coarse Soil): CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Residential/Parkland (Coarse Soil)

Environmental Standards Comments:

#1:Surface

#2:Subsurface

#3: Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.

#4: No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.

#5: Ecological receptors only, based on non-carcinogenic effects of PAHs.

#6: Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)

#7: Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 20 mg/kg. See PAH Fact Sheet for

#8: Provisional value for the protection of soil and food ingestion (ecological receptors). No SQGe value listed. See PAH Fact Sheet for details

#9: Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 50 mg/kg. See PAH Fact Sheet for details.

#10: Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).

#11:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 10 mg/kg. See PAH Fact Sheet for details.

#12: SQG based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000.

Concentration exceeds CCME SoilQG Tier 1 AL (Coarse Soil)

10

Notes:

% - percent

mg/kg - milligram per killi

mg/L - milligram per litre

¹ - sample not analyzed for parameter indicated

≤ - denotes concentration is less than laboratory

* indicates field duplicate soil sample.

as an guideline

N/A - not applicable

N/A - not applicable

CVC - Combustible Vapour Concentration

PAHs - polycyclic aromatic hydrocarbons

ppm - parts per million

Table 4 – Summary of Analytical Results – Site 2.3: Crandell Backcountry Campground Outhouse

Table 4 – Summary of Analytical Results – Site 2.3: Crandell Backcountry Campground Outhouse		Sample Location		2.3-1	2.3-2
		Sample ID		2.3-1	2.3-2
		Sample Date		30-Nov-2018	30-Nov-2018
		CVC (ppm)		10	10
		CCME SoilQG Tier 1 AL (Coarse Soil)	CCME SoilQG Tier 1 RL/PL (Coarse Soil)		
Physical Parameters					
Percent Saturation	%	ng	ng	23	85
Moisture	%	ng	ng	12	26
PAHs					
Benzo(c)phenanthrene	mg/kg	ng	ng	<0.005	<0.005
Benzo(e)pyrene	mg/kg	ng	ng	<0.005	<0.005
Acenaphthene	mg/kg	0.28 ^{#1}	0.28 ^{#1}	<0.005	<0.005
Acenaphthylene	mg/kg	320 ^{#1}	320 ^{#1}	<0.005	<0.005
Acridine	mg/kg	ng	ng	<0.01	<0.01
Anthracene	mg/kg	2.5 ^{#2}	2.5 ^{#2}	<0.004	<0.004
Benz[a]anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005
Benzo[a]pyrene	mg/kg	0.6 ^{#4}	0.6 ^{#4}	<0.005	<0.005
Benzo(g,h,i)perylene	mg/kg	ng	ng	<0.005	<0.005
Benzo(k)fluoranthene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005
Benzo(b+j)fluoranthenes	mg/kg	ng	ng	<0.005	<0.005
Chrysene	mg/kg	6.2 ^{#5}	6.2 ^{#5}	<0.005	<0.005
Dibenz(a,h)anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005
Fluoranthene	mg/kg	15.4 ^{#6}	15.4 ^{#6}	<0.005	0.0072
Fluorene	mg/kg	0.25 ^{#1}	0.25 ^{#1}	<0.005	<0.005
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005
1-methylnaphthalene	mg/kg	ng	ng	<0.005	<0.005
2-methylnaphthalene	mg/kg	ng	ng	<0.005	<0.005
Naphthalene	mg/kg	0.013 ^{#7}	0.013 ^{#7}	<0.005	<0.005
Perylene	mg/kg	ng	ng	<0.005	<0.005
Phenanthrene	mg/kg	0.046 ^{#7}	0.046 ^{#7}	<0.005	0.0097
Pyrene	mg/kg	0.1 ^{#3}	7.7 ^{#8}	<0.005	0.0068
Quinoline	mg/kg	0.1	ng	<0.01	<0.01
B(a)P TPE (Lab)	mg/kg	5.3 ^{#9}	5.3 ^{#9}	<0.0071	<0.0071
IACR (Coarse)	N/A	ng	ng	<0.1	<0.1
IACR (Fine)	N/A	ng	ng	<0.1	<0.1
Metals					
Antimony	mg/kg	20	20	0.55	<0.5
Arsenic (inorganic)	mg/kg	12	12	12	3.3
Barium (non-barite)	mg/kg	750	500	220	180
Beryllium	mg/kg	4	4	1.8	0.76
Boron (Calculated)	mg/kg	ng	ng	0.2	0.1
Boron (hot water soluble)	mg/kg	2	ng	0.87	0.74
Boron (Saturated Paste)	mg/L	ng	ng	0.84	0.12
Cadmium	mg/kg	1.4	10	0.2	0.21
Chromium (hexavalent)	mg/kg	0.4	0.4	<0.08	<0.08
Chromium (III+VI)	mg/kg	64	64	36	13
Cobalt	mg/kg	40	50	15	6.3
Copper	mg/kg	63	63	63	13
Lead	mg/kg	70	140	25	8.4
Mercury (total)	mg/kg	6.6	6.6	<0.05	0.056
Molybdenum	mg/kg	5	10	1.1	<0.4
Nickel	mg/kg	45	45	30	13
Potassium	mg/kg	ng	ng	89	200
Selenium	mg/kg	1	1	<0.5	<0.5
Silver	mg/kg	20	20	<0.2	<0.2
Thallium	mg/kg	1	1	0.15	<0.1
Tin	mg/kg	5	50	1.6	<1
Uranium	mg/kg	23	23	1.1	0.55
Vanadium	mg/kg	130	130	29	11
Zinc	mg/kg	250	250	93	59
Inorganics					
Nitrate (as nitrogen)	mg/kg	ng	ng	11	12
Nitrate (as NO3-)	mg/kg	ng	ng	6.5	15
Nitrite (as nitrogen)	mg/kg	ng	ng	<2	<2
nitrate and nitrite (as N)	mg/kg	ng	ng	11	12
Phosphorus	mg/kg	ng	ng	24	33

Env Stds Description

CCME SoilQG Tier 1 AL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Agricultural (Coarse Soil)

CCME SoilQG Tier 1 RL/PL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Residential/Parkland (Coarse Soil)

Env Stds Comments

#1:Surface

#2:Subsurface

#3:Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.

#4:No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.

#5:Ecological receptors only, based on non-carcinogenic effects of PAHs.

#6:Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)

#7:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 20 mg/kg. See PAH Fact Sheet for details.

#8:Provisional value for the protection of soil and food ingestion (ecological receptors). No SQGe value listed. See PAH Fact Sheet for details.

#9:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 50 mg/kg. See PAH Fact Sheet for details.

#10:Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).

#11:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 10 mg/kg. See PAH Fact Sheet for details.

#12:SQG based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000.

- Concentration exceeds CCME SoilQG Tier 1 AL (Coarse Soil)
- Concentrations exceeds CCME SoilQG Tier 1 RL/PL (Coarse Soil)

Notes:

% - percent

mg/kg - milligram per kilogram

mg/L - milligram per litre

'-' - sample not analyzed for parameter indicated

> - denotes particle size greater than 75 micrometres

• laboratory reports detail detection limits, testing protocols and QA/QC procedures.

ng - no guideline

CVC - Combustible Vapour Concentration

PAHs - polycyclic aromatic hydrocarbons

ppm - parts per million

VOCs - volatile organic compounds

Table 5: Summary of Analytical Results – Site 4.1: Goat Lake Backcountry Campground Campsites

Table 5 – Summary of Analytical Results – Site 4.1: Goat Lake Backcountry Campground Campsites		Sample Location		4.1-1		4.1-2	4.1-3	4.1-4	4.1-5	4.1-6	4.1-7	4.1-8	4.1-9	4.1-10	
		Sample ID		4.1-1	4.1-11*	4.1-2	4.1-3	4.1-4	4.1-5	4.1-6	4.1-7	4.1-8	4.1-9	4.1-10	
		Sample Date		6-Aug-2019	6-Aug-2019	6-Aug-2019	6-Aug-2019	6-Aug-2019	6-Aug-2019	6-Aug-2019	6-Aug-2019	6-Aug-2019	6-Aug-2019	6-Aug-2019	6-Aug-2019
		CVC (ppm)		45	45	45	40	30	35	45	35	30	30	15	
		CCME SoilQG Tier 1 AL (Fine Soil)	CCME SoilQG Tier 1 RL/PL (Fine Soil)												
Particle Size															
% >75um	%	ng	ng	37	-	-	-	62	40	-	-	20	-	-	
% Gravel (>2mm)	%	ng	ng	61	-	-	-	59	41	-	-	37	-	-	
Sieve-Pan	%	ng	ng	63	-	-	-	38	60	-	-	80	-	-	
Grain Size	N/A	ng	ng	Fine	-	-	-	Coarse	Fine	-	-	Fine	-	-	
Physical Parameters															
Percent Saturation	%	ng	ng	62	56	61	73	51	67	61	69	74	65	60	
Moisture	%	ng	ng	18	17	20	15	9.8	18	14	18	23	16	15	
PAHs															
Benzo(c)phenanthrene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Benzo(e)pyrene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Acenaphthene	mg/kg	0.28 ^{#4}	0.28 ^{#4}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Acenaphthylene	mg/kg	320 ^{#4}	320 ^{#4}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Acridine	mg/kg	ng	ng	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Anthracene	mg/kg	2.5 ^{#5}	2.5 ^{#5}	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	
Benz[a]anthracene	mg/kg	0.1 ^{#6}	1 ^{#6}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Benzo[a]pyrene	mg/kg	0.6 ^{#7}	0.6 ^{#7}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Benzo(g,h,i)perylene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Benzo(k)fluoranthene	mg/kg	0.1 ^{#6}	1 ^{#6}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Benzo(b+j)fluoranthenes	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Chrysene	mg/kg	6.2 ^{#8}	6.2 ^{#8}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Dibenz(a,h)anthracene	mg/kg	0.1 ^{#6}	1 ^{#6}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Fluoranthene	mg/kg	15.4 ^{#9}	15.4 ^{#9}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Fluorene	mg/kg	0.25 ^{#4}	0.25 ^{#4}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 ^{#6}	1 ^{#6}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
1-Methylnaphthalene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
2-Methylnaphthalene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Naphthalene	mg/kg	0.013 ^{#10}	0.013 ^{#10}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0098	<0.0050	<0.0050	<0.0050	
Perylene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Phenanthrene	mg/kg	0.046 ^{#10}	0.046 ^{#10}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Pyrene	mg/kg	0.1 ^{#6}	7.7 ^{#11}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	
Quinoline	mg/kg	0.1	ng	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
B(a)P TPE (Lab)	mg/kg	5.3 ^{#12}	5.3 ^{#12}	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	
IACR (Coarse)	N/A	ng	ng	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
IACR (Fine)	N/A	ng	ng	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Metals															
Antimony	mg/kg	20	20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Arsenic (inorganic)	mg/kg	12	12	7.3	7	7.4	6.8	7.6	8.6	10	9.5	8.3	7.5	8.9	
Barium (non-barite)	mg/kg	750	500	170	190	230	230	170	230	240	240	230	190	260	
Beryllium	mg/kg	4	4	1.0	1.1	1.1	0.93	0.95	1.0	0.92	0.97	0.98	0.97	1.1	
Boron (Calculated)	mg/kg	ng	ng	<0.062	<0.056	<0.061	<0.073	<0.051	<0.067	<0.061	0.089	0.094	<0.065	<0.060	
Boron (Hot Water Soluble)	mg/kg	2	ng	<0.30	<0.30	0.16	<0.30	<0.30	0.36	0.42	0.38	0.48	<0.30	0.40	
Boron (Saturated Paste)	mg/L	ng	ng	-	-	-	-	-	-	-	-	-	-	-	
Cadmium	mg/kg	1.4	10	0.068	0.085	0.066	0.10	0.099	0.12	0.10	0.12	0.11	0.084	0.10	
Chromium (hexavalent)	mg/kg	0.4	0.4	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	<0.080	
Chromium (III+VI)	mg/kg	64	64	21	20	20	19	19	20	21	21	21	21	21	
Cobalt	mg/kg	40	50	11	11	11	12	12	16	13	15	14	14	14	
Copper	mg/kg	63	63	20	19	22	20	19	16	21	19	18	20	22	
Lead	mg/kg	70	140	10	11	11	12	12	14	14	15	14	13	14	
Mercury (total)	mg/kg	6.6	6.6	<0.050	0.051	0.059	0.056	0.056	0.064	0.063	0.053	0.063	<0.050	0.055	
Molybdenum	mg/kg	5	10	0.72	0.70	0.75	0.61	0.58	0.89	0.68	0.91	0.94	0.85	0.75	
Nickel	mg/kg	45	45	16	16	16	16	17	16	16	14	15	16	18	
Selenium	mg/kg	1	1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
Silver	mg/kg	20	20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Thallium	mg/kg	1	1	<0.10	0.11	0.12	0.11	<0.10	0.12	0.10	0.13	0.12	0.13	0.12	
Tin	mg/kg	5	50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Uranium	mg/kg	23	23	0.77	0.81	0.91	0.79	0.73	0.89	0.71	0.90	0.96	0.91	0.87	
Vanadium	mg/kg	130	130	25	26	27	26	27	26	25	30	28	29	28	
Zinc	mg/kg	250	250	47	48	50	51	53	61	54	54	53	59	55	

Standards / Guidelines Descriptions:

CCME SoilQG Tier 1 AL (Fine Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Agricultural (Fine Soil)
CCME SoilQG Tier 1 RL/PL (Fine Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Residential/Parkland (Fine Soil)

Environmental Standards Comments:

- #1:Surface
#2:Subsurface
#3:Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.
#4:No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.
#5:Ecological receptors only, based on non-carcinogenic effects of PAHs.
#6:Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)
#7:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 20 mg/kg. See PAH Fact Sheet for details.
#8:Provisional value for the protection of soil and food ingestion (ecological receptors). No SQGe value listed. See PAH Fact Sheet for details.
#9:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 50 mg/kg. See PAH Fact Sheet for details.
#10:Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).
#11:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 10 mg/kg. See PAH Fact Sheet for details.
#12:SQG based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000.

- Concentration exceeds CCME SoilQG Tier 1 AL (Fine Soil)
 Concentrations exceeds CCME SoilQG Tier 1 RL/PL (Fine Soil)

Notes:

% - percent
mg/kg - milligram per kilogram
mg/L - milligram per liter
mm - millimeters
'-' - sample not analyzed for parameter indicated
> - denotes particle size greater than 75 micrometres
< - denotes concentration less than laboratory reported detection limit
* - indicates field duplicate soil sample
ng - no guideline
N/A - not applicable
B(a)P TPE - Benzo[a]pyrene total potency equivalents
CVC - Combustible Vapour Concentration
IACR - Index of additive cancer risk
PAHs - polycyclic aromatic hydrocarbons
ppm - parts per million
Laboratory reports detail detection limits, testing protocols and QA/QC procedures.

Table 6: Summary of Analytical Results – Site 4.2: Goat Lake Backcountry Campground Outhouse

Table 6 – Summary of Analytical Results – Site 4.2: Goat Lake Backcountry Campground Outhouse		Sample Location		4.2-1	4.2-2	4.2-3
		Sample ID		4.2-1	4.2-2	4.2-3
		Sample Date		6-Aug-2019	6-Aug-2019	6-Aug-2019
		CVC (ppm)		15	40	45
		CCME SoilQG Tier 1 AL (Fine Soil)	CCME SoilQG Tier 1 RL/PL (Fine Soil)			
Particle Size						
% >75um	%	ng	ng	-	26	-
% Gravel (>2mm)	%	ng	ng	-	30	-
Sieve-Pan	%	ng	ng	-	74	-
Grain Size	N/A	ng	ng	-	Fine	-
Physical Parameters						
Percent Saturation	%	ng	ng	46	53	74
Moisture	%	ng	ng	14	18	15
PAHs						
Benzo(c)phenanthrene	mg/kg	ng	ng	<0.0050	<0.0050	<0.005
Benzo(e)pyrene	mg/kg	ng	ng	<0.0050	<0.0050	<0.005
Acenapthene	mg/kg	0.28 ^{#4}	0.28 ^{#4}	<0.0050	<0.0050	<0.01
Acenaphthylene	mg/kg	320 ^{#4}	320 ^{#4}	<0.0050	<0.0050	<0.0050
Acridine	mg/kg	ng	ng	<0.010	<0.010	<0.010
Anthracene	mg/kg	2.5 ^{#5}	2.5 ^{#5}	<0.0040	<0.0040	<0.0040
Benzo[a]anthracene	mg/kg	0.1 ^{#6}	1 ^{#6}	<0.0050	<0.0050	<0.0050
Benzo[a]pyrene	mg/kg	0.6 ^{#7}	0.6 ^{#7}	<0.0050	0.0089	<0.0050
Benzo(g,h,i)perylene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050
Benzo(k)fluoranthene	mg/kg	0.1 ^{#6}	1 ^{#6}	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthenes	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050
Chrysene	mg/kg	6.2 ^{#8}	6.2 ^{#8}	<0.0050	<0.0050	<0.0050
Dibenz(a,h)anthracene	mg/kg	0.1 ^{#6}	1 ^{#6}	<0.0050	<0.0050	<0.0050
Fluoranthene	mg/kg	15.4 ^{#9}	15.4 ^{#9}	<0.0050	<0.0050	<0.0050
Fluorene	mg/kg	0.25 ^{#4}	0.25 ^{#4}	<0.0050	<0.0050	<0.0050
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 ^{#6}	1 ^{#6}	<0.0050	<0.0050	<0.0050
1-Methylnaphthalene	mg/kg	ng	ng	<0.0050	<0.0050	0.0067
2-Methylnaphthalene	mg/kg	ng	ng	<0.0050	<0.0050	0.0077
Naphthalene	mg/kg	0.013 ^{#10}	0.013 ^{#10}	<0.0050	<0.0050	0.015
Perylene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050
Phenanthrene	mg/kg	0.046 ^{#10}	0.046 ^{#10}	<0.0050	<0.0050	0.0063
Pyrene	mg/kg	0.1 ^{#6}	7.7 ^{#11}	<0.0050	<0.0050	<0.0050
Quinoline	mg/kg	0.1	ng	<0.010	<0.010	<0.010
B(a)P TPE (Lab)	mg/kg	5.3 ^{#12}	5.3 ^{#12}	<0.0071	0.012	<0.0071
IACR (Coarse)	N/A	ng	ng	<0.10	<0.10	<0.10
IACR (Fine)	N/A	ng	ng	<0.10	<0.10	<0.10
Metals						
Antimony	mg/kg	20	20	<0.50	<0.50	<0.50
Arsenic (inorganic)	mg/kg	12	12	7.9	7.7	9.2
Barium (non-barite)	mg/kg	750	500	170	110	150
Beryllium	mg/kg	4	4	1.0	0.89	0.96
Boron (Calculated)	mg/kg	ng	ng	0.072	<0.053	0.085
Boron (Hot Water Soluble)	mg/kg	2	ng	0.34	<0.30	<0.30
Boron (Saturated Paste)	mg/L	ng	ng	-	-	-
Cadmium	mg/kg	1.4	10	0.095	0.080	0.14
Chromium (hexavalent)	mg/kg	0.4	0.4	<0.080	<0.080	<0.080
Chromium (III+VI)	mg/kg	64	64	20	19	21
Cobalt	mg/kg	40	50	12	10	15
Copper	mg/kg	63	63	29	16	20
Lead	mg/kg	70	140	11	12	15
Mercury (total)	mg/kg	6.6	6.6	<0.050	<0.050	<0.050
Molybdenum	mg/kg	5	10	0.66	0.77	0.87
Nickel	mg/kg	45	45	18	17	17
Selenium	mg/kg	1	1	<0.50	<0.50	<0.50
Silver	mg/kg	20	20	<0.20	<0.20	<0.20
Thallium	mg/kg	1	1	<0.10	<0.10	0.12
Tin	mg/kg	5	50	1.5	<1.0	<1.0
Uranium	mg/kg	23	23	0.78	0.56	0.80
Vanadium	mg/kg	130	130	25	23	28
Zinc	mg/kg	250	250	66	45	87
Inorganics						
Nitrate (as nitrogen)	mg/kg	ng	ng	10	-	-
Nitrate (as NO3-)	mg/kg	ng	ng	14	-	-
Nitrite (as nitrogen)	mg/kg	ng	ng	<2.0	-	-
Nitrate and Nitrite (as N)	mg/kg	ng	ng	10	-	-
Phosphorus	mg/kg	ng	ng	170	-	-
Potassium	mg/kg	ng	ng	35	-	-

Standards / Guidelines Descriptions:
CCME SoilQG Tier 1 AL (Fine Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Agricultural (Fine Soil)
CCME SoilQG Tier 1 RL/PL (Fine Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Residential/Parkland (Fine Soil)

Environmental Standards Comments:
#1:Surface
#2:Subsurface
#3:Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.
#4:No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.
#5:Ecological receptors only, based on non-carcinogenic effects of PAHs.
#6:Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)
#7:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 20 mg/kg. See PAH Fact Sheet for details.
#8:Provisional value for the protection of soil and food ingestion (ecological receptors). No SQGe value listed. See PAH Fact Sheet for details.
#9:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 50 mg/kg. See PAH Fact Sheet for details.
#10:Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).
#11:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 10 mg/kg. See PAH Fact Sheet for details.
#12:SQG based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000.

Concentration exceeds CCME SoilQG Tier 1 AL (Fine Soil)
 Concentrations exceeds CCME SoilQG Tier 1 RL/PL (Fine Soil)

Notes:
% - percent
mg/kg - milligram per kilogram
mg/L - milligram per liter
mm - millimeters
'-' - sample not analyzed for parameter indicated
> - denotes particle size greater than 75 micrometres
< - denotes concentration less than laboatory reported detection limit
* - indicates field duplicate soil sample
ng - no guideline
N/A - not applicable
B(a)P TPE - Benzo[a]pyrene total potency equivalents
CVC - Combustible Vapour Concentration
IACR - Index of additive cancer risk
PAHs - polycyclic aromatic hydrocarbons
ppm - parts per million
Laboratory reports detail detection limits, testing protocols and QA/QC procedures.

Table 7: Summary of Analytical Results – Site 4.3: Goat Lake Backcountry Campground Picnic Tables

Table 7 – Summary of Analytical Results – Site 4.3: Goat Lake Backcountry Campground Picnic Tables		Sample Location		4.3-1	4.3-2	4.3-3	4.3-4
		Sample ID		4.3-1	4.3-2	4.3-3	4.3-4
		Sample Date		6-Aug-2019	6-Aug-2019	6-Aug-2019	6-Aug-2019
		CVC (ppm)		60	40	45	20
		CCME SoilQG Tier 1 AL (Fine Soil)	CCME SoilQG Tier 1 RL/PL (Fine Soil)				
Physical Parameters							
% >75um	%	ng	ng	-	22	26	-
% Gravel (>2mm)	%	ng	ng	-	39	25	-
Sieve-Pan	%	ng	ng	-	78	74	-
Grain Size	N/A	ng	ng	-	Fine	Fine	-
Physical Parameters							
Percent Saturation	%	ng	ng	66	68	60	49
Moisture	%	ng	ng	18	16	22	16
PAHs							
Benzo(c)phenanthrene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(e)pyrene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050
Acenapthene	mg/kg	0.28 ^{#4}	0.28 ^{#4}	<0.0050	<0.0050	<0.0050	<0.0050
Acenaphthylene	mg/kg	320 ^{#4}	320 ^{#4}	<0.0050	<0.0050	<0.0050	<0.0050
Acridine	mg/kg	ng	ng	<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg	2.5 ^{#5}	2.5 ^{#5}	<0.0040	<0.0040	<0.0040	<0.0040
Benz[a]anthracene	mg/kg	0.1 ^{#6}	1 ^{#6}	<0.0050	<0.0050	<0.0050	<0.0050
Benzo[a]pyrene	mg/kg	0.6 ^{#7}	0.6 ^{#7}	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(g,h,i)perylene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(k)fluoranthene	mg/kg	0.1 ^{#6}	1 ^{#6}	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthenes	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050
Chrysene	mg/kg	6.2 ^{#8}	6.2 ^{#8}	<0.0050	<0.0050	<0.0050	<0.0050
Dibenz(a,h)anthracene	mg/kg	0.1 ^{#6}	1 ^{#6}	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	mg/kg	15.4 ^{#9}	15.4 ^{#9}	<0.0050	<0.0050	<0.0050	<0.0050
Fluorene	mg/kg	0.25 ^{#4}	0.25 ^{#4}	<0.0050	<0.0050	<0.0050	<0.0050
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 ^{#6}	1 ^{#6}	<0.0050	<0.0050	<0.0050	<0.0050
1-Methylnaphthalene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050
2-Methylnaphthalene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050
Naphthalene	mg/kg	0.013 ^{#10}	0.013 ^{#10}	<0.0050	<0.0050	0.017	<0.0050
Perylene	mg/kg	ng	ng	<0.0050	<0.0050	<0.0050	<0.0050
Phenanthrene	mg/kg	0.046 ^{#10}	0.046 ^{#10}	<0.0050	<0.0050	0.013	<0.0050
Pyrene	mg/kg	0.1 ^{#6}	7.7 ^{#11}	<0.0050	<0.0050	<0.0050	<0.0050
Quinoline	mg/kg	0.1	ng	<0.010	<0.010	<0.010	<0.010
B(a)P TPE (Lab)	mg/kg	5.3 ^{#12}	5.3 ^{#12}	<0.0071	<0.0071	<0.0071	<0.0071
IACR (Coarse)	N/A	ng	ng	<0.10	<0.10	<0.10	<0.10
IACR (Fine)	N/A	ng	ng	<0.10	<0.10	<0.10	<0.10
Metals							
Antimony	mg/kg	20	20	<0.50	<0.50	<0.50	<0.50
Arsenic (inorganic)	mg/kg	12	12	9.4	7.7	10	7.1
Barium (non-barite)	mg/kg	750	500	190	180	230	150
Beryllium	mg/kg	4	4	0.87	0.89	0.73	0.92
Boron (Calculated)	mg/kg	ng	ng	<0.066	<0.068	<0.060	<0.049
Boron (Hot Water Soluble)	mg/kg	2	ng	0.18	0.14	0.24	0.12
Boron (Saturated Paste)	mg/L	ng	ng	-	-	-	-
Cadmium	mg/kg	1.4	10	0.13	0.12	0.15	0.078
Chromium (hexavalent)	mg/kg	0.4	0.4	<0.080	<0.080	<0.080	<0.080
Chromium (III+VI)	mg/kg	64	64	20	20	18	18
Cobalt	mg/kg	40	50	12	12	11	11
Copper	mg/kg	63	63	19	18	22	17
Lead	mg/kg	70	140	13	14	14	12
Mercury (total)	mg/kg	6.6	6.6	0.067	<0.050	0.050	<0.050
Molybdenum	mg/kg	5	10	0.86	0.80	0.77	0.71
Nickel	mg/kg	45	45	15	16	14	15
Selenium	mg/kg	1	1	<0.50	<0.50	<0.50	<0.50
Silver	mg/kg	20	20	<0.20	<0.20	<0.20	<0.20
Thallium	mg/kg	1	1	0.11	0.13	<0.10	<0.10
Tin	mg/kg	5	50	<1.0	<1.0	<1.0	<1.0
Uranium	mg/kg	23	23	0.88	0.90	0.69	0.87
Vanadium	mg/kg	130	130	23	24	18	18
Zinc	mg/kg	250	250	62	64	64	42

Standards / Guidelines Descriptions:

CCME SoilQG Tier 1 AL (Fine Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Agricultural (Fine Soil)
CCME SoilQG Tier 1 RL/PL (Fine Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Residential/Parkland (Fine Soil)

Environmental Standards Comments:

- #1:Surface
#2:Subsurface
#3:Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.
#4:No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.
#5:Ecological receptors only, based on non-carcinogenic effects of PAHs.
#6:Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)
#7:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 20 mg/kg. See PAH Fact Sheet for details.
#8:Provisional value for the protection of soil and food ingestion (ecological receptors). No SQGe value listed. See PAH Fact Sheet for details.
#9:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 50 mg/kg. See PAH Fact Sheet for details.
#10:Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).
#11:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 10 mg/kg. See PAH Fact Sheet for details.
#12:SQG based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000.

- Concentration exceeds CCME SoilQG Tier 1 AL (Fine Soil)
- Concentrations exceeds CCME SoilQG Tier 1 RL/PL (Fine Soil)

Notes:

% - percent
mg/kg - milligram per kilogram
mg/L - milligram per liter
mm - millimeters
'-' - sample not analyzed for parameter indicated
> - denotes particle size greater than 75 micrometres
< - denotes concentration less than laboatory reported detection limit
* - indicates field duplicate soil sample
ng - no guideline
N/A - not applicable
B(a)P TPE - Benzo[a]pyrene total potency equivalents
CVC - Combustible Vapour Concentration
IACR - Index of additive cancer risk
PAHs - polycyclic aromatic hydrocarbons
ppm - parts per million
Laboratory reports detail detection limits, testing protocols and QA/QC procedures.

Table 8 - Summary of Analytical Results – Site 5.1: Waterton Golf Course Reservoir

Table 8 – Summary of Analytical Results – Site 5.1: Waterton Golf Course Reservoir		Sample Location		5.1-1	5.1-2	5.1-3	5.1-4
		Sample ID		5.1-1	5.1-2	5.1-3	5.1-4
		Sample Date		5-Dec-2018	5-Dec-2018	5-Dec-2018	5-Dec-2018
		CVC (ppm)		0	0	0	0
		CCME SoilQG Tier 1 AL (Coarse Soil)	CCME SoilQG Tier 1 RL/PL (Coarse Soil)				
Particle Size							
% >75um	%	ng	ng	-	77	-	-
Sieve-Pan	%	ng	ng	-	23	-	-
Grain Size	N/A	ng	ng	-	Coarse	-	-
Physical Parameters							
Percent Saturation	%	ng	ng	39	38	60	44
Moisture	%	ng	ng	26	11	13	20
PAHs							
Benzo(c)phenanthrene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.05
Benzo(e)pyrene	mg/kg	ng	ng	0.031	0.0085	<0.005	0.83
Acenapthene	mg/kg	0.28 ^{#1}	0.28 ^{#1}	<0.005	<0.005	<0.005	<0.05
Acenaphthylene	mg/kg	320 ^{#1}	320 ^{#1}	<0.005	<0.005	<0.005	<0.05
Acridine	mg/kg	ng	ng	<0.01	<0.01	<0.01	<0.1
Anthracene	mg/kg	2.5 ^{#2}	2.5 ^{#2}	<0.004	<0.004	<0.004	<0.04
Benzo[a]anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	<0.05
Benzo[a]pyrene	mg/kg	0.6 ^{#4}	0.6 ^{#4}	<0.005	<0.005	<0.005	0.17
Benzo(g,h,i)perylene	mg/kg	ng	ng	0.026	0.0089	<0.005	0.52
Benzo(k)fluoranthene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	<0.05
Benzo(b+j)fluoranthenes	mg/kg	ng	ng	0.009	<0.005	<0.005	0.23
Chrysene	mg/kg	6.2 ^{#5}	6.2 ^{#5}	<0.005	<0.005	<0.005	0.092
Dibenz(a,h)anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	0.091
Fluoranthene	mg/kg	15.4 ^{#6}	15.4 ^{#6}	<0.005	<0.005	<0.005	<0.05
Fluorene	mg/kg	0.25 ^{#1}	0.25 ^{#1}	<0.005	<0.005	<0.005	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 ^{#3}	1 ^{#3}	0.009	<0.005	<0.005	0.11
1-methylnaphthalene	mg/kg	ng	ng	0.0098	<0.005	<0.005	<0.05
2-methylnaphthalene	mg/kg	ng	ng	0.012	<0.005	0.0086	<0.05
Naphthalene	mg/kg	0.013 ^{#7}	0.013 ^{#7}	0.032	<0.005	0.0069	<0.05
Perylene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.05
Phenanthrene	mg/kg	0.046 ^{#7}	0.046 ^{#7}	0.011	<0.005	0.0076	<0.05
Pyrene	mg/kg	0.1 ^{#3}	7.7 ^{#8}	<0.005	<0.005	<0.005	0.1
Quinoline	mg/kg	0.1	ng	0.022	<0.01	<0.01	<0.1
B(a)P TPE (Lab)	mg/kg	5.3 ^{#9}	5.3 ^{#9}	0.008	<0.0071	<0.0071	0.3
IACR (Coarse)	N/A	ng	ng	<0.1	<0.1	<0.1	0.27
IACR (Fine)	N/A	ng	ng	<0.1	<0.1	<0.1	0.52
Metals							
Antimony	mg/kg	20	20	1.6	<0.5	<0.5	<0.5
Arsenic (inorganic)	mg/kg	12	12	8.3	3.1	2.6	2.2
Barium (non-barite)	mg/kg	750	500	600	170	130	180
Beryllium	mg/kg	4	4	0.49	0.57	0.58	0.54
Boron (Calculated)	mg/kg	ng	ng	0.081	<0.038	<0.06	<0.044
Boron (hot water soluble)	mg/kg	2	ng	0.35	0.17	0.21	0.27
Boron (Saturated Paste)	mg/L	ng	ng	0.21	<0.1	<0.1	<0.1
Cadmium	mg/kg	1.4	10	0.11	<0.05	<0.05	0.085
Chromium (hexavalent)	mg/kg	0.4	0.4	0.12	<0.08	<0.08	<0.08
Chromium (III+VI)	mg/kg	64	64	36	11	8.7	9.1
Cobalt	mg/kg	40	50	6.9	5	4.8	4.5
Copper	mg/kg	63	63	34	16	14	12
Lead	mg/kg	70	140	610	30	10	40
Mercury (total)	mg/kg	6.6	6.6	0.26	0.19	0.21	0.21
Molybdenum	mg/kg	5	10	<0.4	<0.4	<0.4	<0.4
Nickel	mg/kg	45	45	13	9.2	8.7	8.8
Selenium	mg/kg	1	1	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	20	20	<0.2	<0.2	<0.2	<0.2
Thallium	mg/kg	1	1	<0.1	<0.1	<0.1	<0.1
Tin	mg/kg	5	50	<1	<1	<1	<1
Uranium	mg/kg	23	23	<0.2	<0.2	<0.2	<0.2
Vanadium	mg/kg	130	130	18	5.8	5.8	6.6
Zinc	mg/kg	250	250	110	30	24	33

Env Stds Description

CCME SoilQG Tier 1 AL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Agricultural (Coarse Soil)

CCME SoilQG Tier 1 RL/PL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Residential/Parkland (Coarse Soil)

Env Stds Comments

#1:Surface

#2:Subsurface

#3:Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.

#4:No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.

#5:Ecological receptors only, based on non-carcinogenic effects of PAHs.

#6:Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)

#7:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 20 mg/kg. See PAH Fact Sheet for details.

#8:Provisional value for the protection of soil and food ingestion (ecological receptors). No SQGe value listed. See PAH Fact Sheet for details.

#9:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 50 mg/kg. See PAH Fact Sheet for details.

#10:Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).

#11:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 10 mg/kg. See PAH Fact Sheet for details.

#12:SQG based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000.

- Concentration exceeds CCME SoilQG Tier 1 AL (Coarse Soil)
- Concentrations exceeds CCME SoilQG Tier 1 RL/PL (Coarse Soil)

Notes:

% - percent

mg/kg - milligram per kilogram

mg/L - milligram per litre

'-' - sample not analyzed for parameter indicated

> - denotes particle size greater than 75 micrometres

• laboratory reports detail detection limits, testing protocols and QA/QC procedures.

ng - no guideline

CVC - Combustible Vapour Concentration

PAHs - polycyclic aromatic hydrocarbons

ppm - parts per million

Table 9 - Summary of Analytical Results – Site 5.2: Waterton Golf Course Lighting Shelter Shed

Table 9 – Summary of Analytical Results – Site 5.2: Waterton Golf Course Lightning Shelter Shed		Sample Location		5.2-1		5.2-2	5.2-4	5.2-7
		Sample ID		5.2-1	5.2-5*	5.2-2	5.2-4	5.2-7
		Sample Date		5-Dec-2018	5-Dec-2018	5-Dec-2018	5-Dec-2018	5-Dec-2018
		CVC (ppm)		0	-	5	0	5
		CCME SoilQG Tier 1 AL (Coarse Soil)	CCME SoilQG Tier 1 RL/PL (Coarse Soil)					
Particle Size								
% >75um	%	ng	ng	-	-	68	-	-
Sieve-Pan	%	ng	ng	-	-	32	-	-
Grain Size	N/A	ng	ng	-	-	Coarse	-	-
Physical Parameters								
Percent Saturation	%	ng	ng	34	49	45	50	57
Moisture	%	ng	ng	13	11	19	19	21
PAHs								
Benzo(c)phenanthrene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(e)pyrene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
Acenapthene	mg/kg	0.28 ^{#1}	0.28 ^{#1}	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthylene	mg/kg	320 ^{#1}	320 ^{#1}	<0.005	<0.005	<0.005	<0.005	<0.005
Acridine	mg/kg	ng	ng	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	mg/kg	2.5 ^{#2}	2.5 ^{#2}	<0.004	<0.004	<0.004	<0.004	<0.004
Benzo[a]anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo[a]pyrene	mg/kg	0.6 ^{#4}	0.6 ^{#4}	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(k)fluoranthene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(b+j)fluoranthenes	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
Chrysene	mg/kg	6.2 ^{#5}	6.2 ^{#5}	<0.005	<0.005	<0.005	<0.005	<0.005
Dibenz(a,h)anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoranthene	mg/kg	15.4 ^{#6}	15.4 ^{#6}	<0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	mg/kg	0.25 ^{#1}	0.25 ^{#1}	<0.005	<0.005	<0.005	<0.005	<0.005
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	<0.005	<0.005
1-methylnaphthalene	mg/kg	ng	ng	<0.005	0.0059	<0.005	<0.005	<0.005
2-methylnaphthalene	mg/kg	ng	ng	<0.005	0.0065	<0.005	<0.005	<0.005
Naphthalene	mg/kg	0.013 ^{#7}	0.013 ^{#7}	0.017	0.017	<0.005	<0.005	<0.005
Perylene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
Phenanthrene	mg/kg	0.046 ^{#7}	0.046 ^{#7}	0.009	0.01	0.0069	<0.005	0.0076
Pyrene	mg/kg	0.1 ^{#3}	7.7 ^{#8}	0.0061	0.006	<0.005	<0.005	<0.005
Quinoline	mg/kg	0.1	ng	0.015	0.017	0.011	<0.01	<0.01
B(a)P TPE (Lab)	mg/kg	5.3 ^{#9}	5.3 ^{#9}	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071
IACR (Coarse)	N/A	ng	ng	<0.1	<0.1	<0.1	<0.1	<0.1
IACR (Fine)	N/A	ng	ng	<0.1	<0.1	<0.1	<0.1	<0.1
Metals								
Antimony	mg/kg	20	20	2.5	4.9	0.97	3.2	1.3
Arsenic (inorganic)	mg/kg	12	12	27	110	3.5	4.8	5.8
Barium (non-barite)	mg/kg	750	500	76	160	170	140	200
Beryllium	mg/kg	4	4	0.55	0.54	0.58	0.78	0.64
Boron (Calculated)	mg/kg	ng	ng	<0.034	<0.049	0.12	<0.05	0.07
Boron (hot water soluble)	mg/kg	2	ng	0.3	0.48	0.4	0.53	0.74
Boron (Saturated Paste)	mg/L	ng	ng	<0.1	<0.1	0.27	<0.1	0.12
Cadmium	mg/kg	1.4	10	0.086	0.18	0.13	0.1	0.22
Chromium (hexavalent)	mg/kg	0.4	0.4	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium (III+VI)	mg/kg	64	64	48	120	70	43	22
Cobalt	mg/kg	40	50	8.3	12	6.6	7.4	7.3
Copper	mg/kg	63	63	29	97	9.8	9.7	17
Lead	mg/kg	70	140	170	490	310	150	57
Mercury (total)	mg/kg	6.6	6.6	0.18	0.11	0.2	0.11	0.089
Molybdenum	mg/kg	5	10	<0.4	0.41	<0.4	<0.4	<0.4
Nickel	mg/kg	45	45	13	13	10	13	12
Selenium	mg/kg	1	1	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	20	20	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	mg/kg	1	1	<0.1	<0.1	<0.1	0.1	<0.1
Tin	mg/kg	5	50	3.1	3.4	<1	<1	<1
Uranium	mg/kg	23	23	0.42	0.41	0.21	0.52	0.46
Vanadium	mg/kg	130	130	14	15	12	20	18
Zinc	mg/kg	250	250	140	530	65	57	69

Env Stds Description

CCME SoilQG Tier 1 AL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Agricultural (Coarse Soil)
CCME SoilQG Tier 1 RL/PL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Residential/Parkland (Coarse Soil)

Env Stds Comments

- #1:Surface
#2:Subsurface
#3:Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.
#4:No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.
#5:Ecological receptors only, based on non-carcinogenic effects of PAHs.
#6:Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)
#7:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 20 mg/kg. See PAH Fact Sheet for details.
#8:Provisional value for the protection of soil and food ingestion (ecological receptors). No SQGe value listed. See PAH Fact Sheet for details.
#9:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 50 mg/kg. See PAH Fact Sheet for details.
#10:Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).
#11:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 10 mg/kg. See PAH Fact Sheet for details.
#12:SQG based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000.

- Concentration exceeds CCME SoilQG Tier 1 AL (Coarse Soil)
 Concentrations exceeds CCME SoilQG Tier 1 RL/PL (Coarse Soil)

Notes:
% - percent
mg/kg - milligram per killigram
mg/L - milligram per litre
'-' - sample not analyzed for parameter indicated
> - denotes particle size greater than 75 micrometres
• laboratory reports detail detection limits, testing protocols and QA/QC procedures.
* - indicates field duplicate soil sample
ng - no guideline
CVC - Combustible Vapour Concentration
PAHs - polycyclic aromatic hydrocarbons
ppm - parts per million

Table 10 - Summary of Analytical Results – Site 6.1: Bear's Hump Hiking Trail Seismic Station Building

Table 10 – Summary of Analytical Results – Site 6.1: Bear's Hump Hiking Trail Seismic Station Building	Sample Location				6.1-1		6.1-3	6.1-5	6.1-6	6.1-7	6.1-8	6.1-9	6.1-10	6.1-11	6.1-12	6.1-13
	Sample ID				6.1-1	6.1-2*	6.1-3	6.1-5	6.1-6	6.1-7	6.1-8	6.1-9	6.1-10	6.1-11	6.1-12	6.1-13
	Sample Date				13-May-2019	13-May-2019	13-May-2019	13-May-2019	13-May-2019	7-Aug-2019	7-Aug-2019	7-Aug-2019	7-Aug-2019	7-Aug-2019	7-Aug-2019	7-Aug-2019
	CVC (ppm)				0	0	0	0	0	20	35	25	25	30	30	60
	CCME CWS PHC, AL/PL/RL (Fine Soil)	CCME SoilQG Tier 1 AL (Fine Soil)	CCME SoilQG Tier 1 RL/PL (Fine Soil)													
Particle Size																
% >75um	%	ng	ng	ng	-	-	39	-	-	-	-	-	-	-	-	-
Sieve-Pan	%	ng	ng	ng	-	-	61	-	-	-	-	-	-	-	-	-
Grain Size	N/A	ng	ng	ng	-	-	Fine	-	-	-	-	-	-	-	-	-
Physical Parameters																
Percent Saturation	%	ng	ng	ng	-	-	-	-	-	-	-	-	-	-	-	-
Moisture	%	ng	ng	ng	14	14	23	15	28	-	-	-	-	71	61	54
Petroleum Hydrocarbons																
Benzene	mg/kg	ng	0.0068 ^{#3}	0.0068 ^{#3}	0.012	0.013	<0.0050	0.012	0.026	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Toluene	mg/kg	ng	0.08 ^{#4}	0.08 ^{#3}	<0.050	<0.050	<0.050	<0.050	0.17	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ethylbenzene	mg/kg	ng	0.018 ^{#3}	0.018 ^{#3}	<0.010	<0.010	<0.010	<0.010	0.025	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Xylenes	mg/kg	ng	2.4 ^{#3}	2.4 ^{#3}	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045
Styrene	mg/kg	ng	0.1	5	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-
MTBE	mg/kg	ng	ng	ng	<0.030	<0.030	<0.030	<0.030	<0.030	-	-	-	-	-	-	-
F1-BTEX (C6-C10)	mg/kg	170	ng	ng	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
F2	mg/kg	150	ng	ng	<10	<10	<10	<10	15	<10	<10	12	<10	12	<10	<10
F3 (C16-C34)	mg/kg	1300	ng	ng	160	170	56	<50	120	54	<50	100	56	130	83	<50
F4 (C34-C50)	mg/kg	5600	ng	ng	450	640	<50	<50	50	<50	<50	<50	<50	54	<50	<50
PAHs																
Benzo(c)phenanthrene	mg/kg	ng	ng	ng	0.16	0.15	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(e)pyrene	mg/kg	ng	ng	ng	0.82	0.91	<0.0050	<0.0050	0.025	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acenaphthene	mg/kg	ng	0.28 ^{#4}	0.28 ^{#4}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acenaphthylene	mg/kg	ng	320 ^{#4}	320 ^{#4}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acridine	mg/kg	ng	ng	ng	0.014	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg	ng	2.5 ^{#5}	2.5 ^{#5}	0.016	0.016	<0.0040	<0.0040	0.0066	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Benz(a)anthracene	mg/kg	ng	0.1 ^{#6}	1 ^{#6}	0.67	0.65	<0.0050	<0.0050	0.013	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(a)pyrene	mg/kg	ng	0.6 ^{#7}	0.6 ^{#7}	0.68	0.77	<0.0050	<0.0050	0.011	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(g,h,i)perylene	mg/kg	ng	ng	ng	0.52	0.70	<0.0050	<0.0050	0.013	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(k)fluoranthene	mg/kg	ng	0.1 ^{#6}	1 ^{#6}	0.22	0.26	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthenes	mg/kg	ng	ng	ng	0.88	0.92	<0.0050	0.0089	0.027	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chrysene	mg/kg	ng	6.2 ^{#8}	6.2 ^{#8}	1.1	1.1	0.0073	<0.0050	0.027	0.0060	<0.0050	0.0087	<0.0050	<0.0050	<0.0050	<0.0050
Dibenz(a,h)anthracene	mg/kg	ng	0.1 ^{#6}	1 ^{#6}	0.19	0.22	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	mg/kg	ng	15.4 ^{#9}	15.4 ^{#9}	0.21	0.20	<0.0050	<0.0050	0.017	<0.0050	<0.0050	0.0064	<0.0050	<0.0050	<0.0050	<0.0050
Fluorene	mg/kg	ng	0.25 ^{#4}	0.25 ^{#4}	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050	<0.0050
Indeno(1,2,3-c,d)pyrene	mg/kg	ng	0.1 ^{#6}	1 ^{#6}	0.39	0.49	<0.0050	<0.0050	0.011	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050	<0.0050
1-methylnaphthalene	mg/kg	ng	ng	ng	0.0077	0.0072	<0.0050	<0.0050	0.0087	<0.0050	<0.0050	0.013	<0.0050	<0.0050	<0.0050	<0.0050
2-methylnaphthalene	mg/kg	ng	ng	ng	0.011	0.011	0.0086	0.0093	0.011	<0.0050	<0.0050	0.017	<0.0050	<0.0050	<0.0050	<0.0050
Naphthalene	mg/kg	ng	0.013 ^{#10}	0.013 ^{#10}	0.015	0.011	0.015	0.011	0.027	<0.0050	<0.0050	0.041	<0.0050	<0.0050	<0.0050	0.0057
Perylene	mg/kg	ng	ng	ng	0.12	0.12	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050	<0.0050
Phenanthrene	mg/kg	ng	0.046 ^{#10}	0.046 ^{#10}	0.095	0.092	0.0073	0.0075	0.021	<0.0050	<0.0050	0.021	<0.0050	<0.0050	<0.0050	<0.0050
Pyrene	mg/kg	ng	0.1 ^{#6}	7.7 ^{#11}	0.41	0.42	0.0071	0.0061	0.025	<0.0050	<0.0050	0.010	<0.0050	<0.0050	<0.0050	<0.0050
Quinoline	mg/kg	ng	0.1	ng	0.012	<0.010	0.017	0.016	0.03	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
B(a)P TPE (Lab)	mg/kg	ng	5.3 ^{#12}	5.3 ^{#12}	1.1	1.2	<0.0071	<0.0071	0.019	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071
IACR (Coarse)	N/A	ng	ng	ng	0.49	0.53	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
IACR (Fine)	N/A	ng	ng	ng	0.93	1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
VOCs																
Bromodichloromethane	mg/kg	ng	ng	ng	<0.030	<0.030	<0.030	<0.030	<0.030	-	-	-	-	-	-	-
Bromoform	mg/kg	ng	ng	ng	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-	-	-	-	-
Bromomethane	mg/kg	ng	ng	ng	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-
Tetrachloromethane (Carbon tetrachloride)	mg/kg	ng	0.1	5	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	ng	0.1	1	<0.0025	<0.0025	<0.0025	<0.0025	<0.0050	-	-	-	-	-	-	-
Dibromochloromethane	mg/kg	ng	ng	ng	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-
Chloroethane	mg/kg	ng	ng	ng	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-
Trichloromethane (Chloroform)	mg/kg	ng	0.1	5	<0.010	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-	-
Chloromethane	mg/kg	ng	ng	ng	<0.030	<0.030	<0.030	<0.030	<0.030	-	-	-	-	-	-	-
cis-1,2-dichloroethylene	mg/kg	ng	ng	ng	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-
cis-1,3-dichloropropene	mg/kg	ng	ng	ng	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-
1,2-dibromoethane	mg/kg	ng	ng	ng	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	-	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	ng	0.1	1	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-
1,3-dichlorobenzene	mg/kg	ng	0.1	1	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	ng	0.1	1	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	-	-	-	-
1,1-dichloroethane</																

Table 11 – Summary of Analytical Results – Site 8.3: Indigenous History Viewpoint

Table 11 – Summary of Analytical Results – Site 8.3: Indigenous History Viewpoint		Sample Location		8.3-1	8.3-2	8.3-3	8.3-4	8.3-6
		Sample ID		8.3-1	8.3-2	8.3-3	8.3-4	8.3-6
		Sample Date		29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	13-May-2019
		CVC (ppm)		0	15	0	0	0
		CCME SoilQG Tier 1 AL (Coarse Soil)	CCME SoilQG Tier 1 RL/PL (Coarse Soil)					
Particle Size								
% >75um	%	ng	ng	-	64	-	-	-
Sieve-Pan	%	ng	ng	-	36	-	-	-
Grain Size	N/A	ng	ng	-	Coarse	-	-	-
Physical Parameters								
Percent Saturation	%	ng	ng	24	68	88	61	-
Moisture	%	ng	ng	7.6	20	29	20	23
PAHs								
Benzo(c)phenanthrene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(e)pyrene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
Acenapthene	mg/kg	0.28 ^{#1}	0.28 ^{#1}	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthylene	mg/kg	320 ^{#1}	320 ^{#1}	<0.005	<0.005	<0.005	<0.005	<0.005
Acridine	mg/kg	ng	ng	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	mg/kg	2.5 ^{#2}	2.5 ^{#2}	<0.004	<0.004	<0.004	<0.004	<0.004
Benz[a]anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo[a]pyrene	mg/kg	0.6 ^{#4}	0.6 ^{#4}	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(k)fluoranthene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(b+j)fluoranthenes	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
Chrysene	mg/kg	6.2 ^{#5}	6.2 ^{#5}	<0.005	<0.005	<0.005	<0.005	<0.005
Dibenz(a,h)anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoranthene	mg/kg	15.4 ^{#6}	15.4 ^{#6}	<0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	mg/kg	0.25 ^{#1}	0.25 ^{#1}	<0.005	<0.005	<0.005	<0.005	<0.005
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	<0.005	<0.005
1-methylnaphthalene	mg/kg	ng	ng	<0.005	<0.005	0.0091	<0.005	0.0073
2-methylnaphthalene	mg/kg	ng	ng	<0.005	<0.005	0.011	<0.005	0.009
Naphthalene	mg/kg	0.013 ^{#10}	0.013 ^{#10}	<0.005	<0.005	0.021	<0.005	0.023
Perylene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
Phenanthrene	mg/kg	0.046 ^{#7}	0.046 ^{#7}	<0.005	<0.005	0.018	<0.005	0.017
Pyrene	mg/kg	0.1 ^{#3}	7.7 ^{#8}	<0.005	<0.005	<0.005	<0.005	<0.005
Quinoline	mg/kg	0.1	ng	<0.01	0.026	0.016	<0.01	0.043
B(a)P TPE (Lab)	mg/kg	5.3 ^{#9}	5.3 ^{#9}	<0.0071	<0.0071	<0.0071	<0.0071	<0.0071
IACR (Coarse)	N/A	ng	ng	<0.1	<0.1	<0.1	<0.1	<0.1
IACR (Fine)	N/A	ng	ng	<0.1	<0.1	<0.1	<0.1	<0.1
Metals								
Antimony	mg/kg	20	20	0.58	<0.5	<0.5	<0.5	<1.0
Arsenic (inorganic)	mg/kg	12	12	110	5.5	22	7.9	5.3
Barium (non-barite)	mg/kg	750	500	200	430	460	310	470
Beryllium	mg/kg	4	4	0.68	0.82	0.78	0.87	0.80
Boron (Calculated)	mg/kg	ng	ng	0.2	0.076	0.11	<0.061	-
Boron (hot water soluble)	mg/kg	2	ng	0.66	0.93	1.7	0.51	0.66
Boron (Saturated Paste)	mg/L	ng	ng	0.83	0.11	0.12	<0.1	-
Cadmium	mg/kg	1.4	10	0.12	0.17	0.2	0.12	0.17
Chromium (hexavalent)	mg/kg	0.4	0.4	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium (III+VI)	mg/kg	64	64	50	14	20	15	13
Cobalt	mg/kg	40	50	6.5	7.1	6.1	6.1	6.2
Copper	mg/kg	63	63	190	19	58	17	13
Lead	mg/kg	70	140	10	7	11	7.7	7.9
Mercury (total)	mg/kg	6.6	6.6	0.079	0.059	0.08	0.076	<0.10
Molybdenum	mg/kg	5	10	<0.4	<0.4	0.57	<0.4	<0.80
Nickel	mg/kg	45	45	12	12	11	12	11
Selenium	mg/kg	1	1	<0.5	<0.5	<0.5	<0.5	<1.0
Silver	mg/kg	20	20	<0.2	<0.2	<0.2	<0.2	<0.40
Thallium	mg/kg	1	1	<0.1	<0.1	<0.1	<0.1	<0.20
Tin	mg/kg	5	50	<1	<1	<1	<1	<2.0
Uranium	mg/kg	23	23	0.44	0.44	0.45	0.47	0.56
Vanadium	mg/kg	130	130	16	12	13	13	13
Zinc	mg/kg	250	250	50	53	67	47	53

Env Stds Description

CCME SoilQG Tier 1 AL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Agricultural (Coarse Soil)
CCME SoilQG Tier 1 RL/PL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Residential/Parkland (Coarse Soil)

Env Stds Comments

- #1:Surface
#2:Subsurface
#3:Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.
#4:No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.
#5:Ecological receptors only, based on non-carcinogenic effects of PAHs.
#6:Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)
#7:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 20 mg/kg. See PAH Fact Sheet for details.
#8:Provisional value for the protection of soil and food ingestion (ecological receptors). No SQGe value listed. See PAH Fact Sheet for details.
#9:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 50 mg/kg. See PAH Fact Sheet for details.
#10:Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).
#11:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 10 mg/kg. See PAH Fact Sheet for details.
#12:SQG based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000.

- Concentration exceeds CCME SoilQG Tier 1 AL (Coarse Soil)
- Concentrations exceeds CCME SoilQG Tier 1 RL/PL (Coarse Soil)

Notes:

- % - percent
mg/kg - milligram per killigram
mg/L - milligram per litre
'-' - sample not analyzed for parameter indicated
> - denotes particle size greater than 75 micrometres
• laboratory reports detail detection limits, testing protocols and QA/QC procedures.
ng - no guideline
CVC - Combustible Vapour Concentration
PAHs - polycyclic aromatic hydrocarbons
ppm - parts per million

Table 12 – Summary of Analytical Results – Site 9.1: McNealy’s Day Use Area

Table 12 – Summary of Analytical Results – Site 9.1: McNealy’s Day Use Area		Sample Location		9.1-1		9.1-3	9.1-5	9.1-6	9.1-7	9.1-8	9.1-9
		Sample ID		9.1-1	9.1-2*	9.1-3	9.1-5	9.1-6	9.1-7	9.1-8	9.1-9
		Sample Date		30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018	30-Nov-2018
		CVC (ppm)		10	-	0	0	0	0	0	-
		CCME SoilQG Tier 1 AL (Coarse Soil)	CCME SoilQG Tier 1 RL/PL (Coarse Soil)								
Particle Size											
% >75um	%	ng	ng	-	-	-	-	74	-	-	81
Sieve-Pan	%	ng	ng	-	-	-	-	27	-	-	19
Grain Size	N/A	ng	ng	-	-	-	-	Coarse	-	-	Coarse
Physical Parameters											
Percent Saturation	%	ng	ng	28	31	28	24	61	66	76	-
Moisture	%	ng	ng	8.9	8.1	9.7	6.4	27	22	27	16
PAHs											
Benzo(c)phenanthrene	mg/kg	ng	ng	0.012	0.0064	<0.005	<0.005	0.011	<0.005	<0.005	-
Benzo(e)pyrene	mg/kg	ng	ng	0.013	0.0078	<0.005	<0.005	0.039	0.014	0.011	-
Acenaphthene	mg/kg	0.28 ^{#1}	0.28 ^{#1}	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
Acenaphthylene	mg/kg	320 ^{#1}	320 ^{#1}	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
Acridine	mg/kg	ng	ng	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Anthracene	mg/kg	2.5 ^{#2}	2.5 ^{#2}	0.0081	0.0062	<0.004	<0.004	0.0078	0.0055	0.0079	-
Benzo[a]anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	0.028	0.012	<0.005	<0.005	0.039	0.017	<0.005	-
Benzo[a]pyrene	mg/kg	0.6 ^{#4}	0.6 ^{#4}	0.018	0.009	<0.005	<0.005	0.045	0.014	0.0068	-
Benzo(g,h,i)perylene	mg/kg	ng	ng	0.012	0.0074	<0.005	<0.005	0.035	0.011	0.0086	-
Benzo(k)fluoranthene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	<0.005	<0.005	<0.005	0.019	0.0086	<0.005	-
Benzo(b+j)fluoranthenes	mg/kg	ng	ng	0.02	0.01	<0.005	<0.005	0.073	0.027	0.015	-
Chrysene	mg/kg	6.2 ^{#5}	6.2 ^{#5}	0.034	0.02	<0.005	<0.005	0.033	0.019	0.007	-
Dibenz(a,h)anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	0.0074	<0.005	<0.005	<0.005	0.0069	<0.005	<0.005	-
Fluoranthene	mg/kg	15.4 ^{#6}	15.4 ^{#6}	0.014	0.0078	<0.005	<0.005	0.064	0.025	0.011	-
Fluorene	mg/kg	0.25 ^{#1}	0.25 ^{#1}	0.0087	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	-
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 ^{#3}	1 ^{#3}	0.0056	<0.005	<0.005	<0.005	0.034	0.011	0.0074	-
1-methylnaphthalene	mg/kg	ng	ng	0.014	0.035	<0.005	<0.005	<0.005	<0.005	<0.005	-
2-methylnaphthalene	mg/kg	ng	ng	0.017	0.039	<0.005	<0.005	<0.005	<0.005	<0.005	-
Naphthalene	mg/kg	0.013 ^{#7}	0.013 ^{#7}	0.038	0.13	<0.005	<0.005	0.0077	<0.005	<0.005	-
Perylene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
Phenanthrene	mg/kg	0.046 ^{#7}	0.046 ^{#7}	0.052	0.042	<0.005	<0.005	0.039	0.0071	<0.005	-
Pyrene	mg/kg	0.1 ^{#3}	7.7 ^{#8}	0.018	0.0095	<0.005	<0.005	0.06	0.021	0.0097	-
Quinoline	mg/kg	0.1	ng	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
B(a)P TPE (Lab)	mg/kg	5.3 ^{#9}	5.3 ^{#9}	0.031	0.015	<0.0071	<0.0071	0.069	0.023	0.012	-
IACR (Coarse)	N/A	ng	ng	<0.1	<0.1	<0.1	<0.1	0.15	<0.1	<0.1	-
IACR (Fine)	N/A	ng	ng	<0.1	<0.1	<0.1	<0.1	0.28	0.11	<0.1	-
Metals											
Antimony	mg/kg	20	20	<0.5	<0.5	<0.5	0.63	1	<0.5	0.68	-
Arsenic (inorganic)	mg/kg	12	12	11	10	6.8	7.5	8.4	7	8.9	-
Barium (non-barite)	mg/kg	750	500	210	150	170	120	130	140	180	-
Beryllium	mg/kg	4	4	0.71	0.67	0.41	0.79	0.7	0.73	0.84	-
Boron (Calculated)	mg/kg	ng	ng	0.047	0.051	<0.028	0.073	0.083	<0.066	0.11	-
Boron (hot water soluble)	mg/kg	2	ng	0.27	0.32	0.16	0.47	0.57	0.38	0.76	-
Boron (Saturated Paste)	mg/L	ng	ng	0.17	0.17	<0.1	0.31	0.14	<0.1	0.14	-
Cadmium	mg/kg	1.4	10	0.14	0.14	0.25	0.11	0.2	0.17	0.15	-
Chromium (hexavalent)	mg/kg	0.4	0.4	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-
Chromium (III+VI)	mg/kg	64	64	65	40	11	15	26	17	17	-
Cobalt	mg/kg	40	50	7.7	6.1	4.8	7.4	7.8	7.4	8.4	-
Copper	mg/kg	63	63	36	26	14	12	24	15	27	-
Lead	mg/kg	70	140	13	12	7.8	15	41	29	23	-
Mercury (total)	mg/kg	6.6	6.6	<0.05	<0.05	0.077	<0.05	0.14	0.086	0.13	-
Molybdenum	mg/kg	5	10	1.4	1.1	<0.4	0.52	1	0.46	0.54	-
Nickel	mg/kg	45	45	34	23	10	14	16	13	14	-
Potassium	mg/kg	ng	ng	86	97	-	-	-	-	-	-
Selenium	mg/kg	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
Silver	mg/kg	20	20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-
Thallium	mg/kg	1	1	0.11	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	-
Tin	mg/kg	5	50	2.5	6.5	<1	<1	1.3	1.7	<1	-
Uranium	mg/kg	23	23	0.45	0.45	0.46	0.47	0.6	0.64	0.84	-
Vanadium	mg/kg	130	130	17	16	15	16	16	17	17	-
Zinc	mg/kg	250	250	100	100	43	79	220	65	64	-
Inorganics											
Nitrate (as nitrogen)	mg/kg	ng	ng	<2	<2	-	-	-	-	-	-
Nitrate (as NO3-)	mg/kg	ng	ng	<2	<2	-	-	-	-	-	-
Nitrite (as nitrogen)	mg/kg	ng	ng	<2	<2	-	-	-	-	-	-
nitrate and nitrite (as N)	mg/kg	ng	ng	<2	<2	-	-	-	-	-	-
Phosphorus	mg/kg	ng	ng	4.6	3.1	-	-	-	-	-	-

Env Stds Description

CCME SoilQG Tier 1 AL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Agricultural (Coarse Soil)
CCME SoilQG Tier 1 RL/PL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Residential/Parkland (Coarse Soil)

Env Stds Comments

- #1:Surface
#2:Subsurface
#3:Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.
#4:No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.
#5:Ecological receptors only, based on non-carcinogenic effects of PAHs.
#6:Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)
#7:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 20 mg/kg. See PAH Fact Sheet for details.
#8:Provisional value for the protection of soil and food ingestion (ecological receptors). No SQGe value listed. See PAH Fact Sheet for details.
#9:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 50 mg/kg. See PAH Fact Sheet for details.
#10:Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).
#11:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 10 mg/kg. See PAH Fact Sheet for details.
#12:SQG based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000.

- Concentration exceeds CCME SoilQG Tier 1 AL (Coarse Soil)
- Concentrations exceeds CCME SoilQG Tier 1 RL/PL (Coarse Soil)

Notes:

- % - percent
mg/kg - milligram per killigram
mg/L - milligram per litre
'-' - sample not analyzed for parameter indicated
> - denotes particle size greater than 75 micrometres
• laboratory reports detail detection limits, testing protocols and QA/QC procedures.
* - indicates field duplicate soil sample
ng - no guideline
CVC - Combustible Vapour Concentration
PAHs - polycyclic aromatic hydrocarbons
ppm - parts per million

Table 13 – Summary of Analytical Results – Site 9.2: Little Prairie Day Use Area

Table 13 – Summary of Analytical Results – Site 9.2: Little Prairie Day Use Area		Sample Location		9.2-1	9.2-3	9.2-4	9.2-5	9.2-6
		Sample ID		9.2-1	9.2-3	9.2-4	9.2-5	9.2-6
		Sample Date		4-Dec-2018	4-Dec-2018	4-Dec-2018	4-Dec-2018	4-Dec-2018
		CVC (ppm)		0	10	10	10	5
		CCME SoilQG Tier 1 AL (Coarse Soil)	CCME SoilQG Tier 1 RL/PL (Coarse Soil)					
Particle Size								
% >75um	%	ng	ng	-	77	-	-	-
Sieve-Pan	%	ng	ng	-	23	-	-	-
Grain Size	N/A	ng	ng	-	Coarse	-	-	-
Physical Parameters								
Percent Saturation	%	ng	ng	59	100	54	53	47
Moisture	%	ng	ng	39	29	18	27	21
PAHs								
Benzo(c)phenanthrene	mg/kg	ng	ng	0.092	<0.005	<0.005	<0.005	<0.005
Benzo(e)pyrene	mg/kg	ng	ng	<0.005	0.023	<0.005	<0.005	<0.005
Acenaphthene	mg/kg	0.28 ^{#1}	0.28 ^{#1}	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthylene	mg/kg	320 ^{#1}	320 ^{#1}	<0.005	<0.005	<0.005	<0.005	<0.005
Acridine	mg/kg	ng	ng	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	mg/kg	2.5 ^{#2}	2.5 ^{#2}	<0.004	0.008	<0.004	<0.004	<0.004
Benzo[a]anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	0.026	<0.005	<0.005	<0.005
Benzo[a]pyrene	mg/kg	0.6 ^{#4}	0.6 ^{#4}	<0.005	0.029	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene	mg/kg	ng	ng	<0.005	0.026	<0.005	<0.005	<0.005
Benzo(k)fluoranthene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	0.016	<0.005	<0.005	<0.005
Benzo(b+j)fluoranthenes	mg/kg	ng	ng	<0.005	0.054	<0.005	<0.005	<0.005
Chrysene	mg/kg	6.2 ^{#5}	6.2 ^{#5}	<0.005	0.026	<0.005	<0.005	<0.005
Dibenz(a,h)anthracene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	0.0076	<0.005	<0.005	<0.005
Fluoranthene	mg/kg	15.4 ^{#6}	15.4 ^{#6}	0.0091	0.042	<0.005	<0.005	<0.005
Fluorene	mg/kg	0.25 ^{#1}	0.25 ^{#1}	<0.005	<0.005	<0.005	<0.005	<0.005
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 ^{#3}	1 ^{#3}	<0.005	0.029	<0.005	<0.005	<0.005
1-methylnaphthalene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
2-methylnaphthalene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
Naphthalene	mg/kg	0.013 ^{#7}	0.013 ^{#7}	0.014	<0.005	<0.005	0.0085	<0.005
Perylene	mg/kg	ng	ng	<0.005	<0.005	<0.005	<0.005	<0.005
Phenanthrene	mg/kg	0.046 ^{#7}	0.046 ^{#7}	0.022	0.032	<0.005	0.013	0.0078
Pyrene	mg/kg	0.1 ^{#3}	7.7 ^{#8}	<0.005	0.04	<0.005	<0.005	<0.005
Quinoline	mg/kg	0.1	ng	0.051	0.028	<0.01	0.023	<0.01
B(a)P TPE (Lab)	mg/kg	5.3 ^{#9}	5.3 ^{#9}	<0.0071	0.05	<0.0071	<0.0071	<0.0071
IACR (Coarse)	N/A	ng	ng	<0.1	0.11	<0.1	<0.1	<0.1
IACR (Fine)	N/A	ng	ng	<0.1	0.22	<0.1	<0.1	<0.1
Metals								
Antimony	mg/kg	20	20	<0.5	1.8	<0.5	<0.5	<0.5
Arsenic (inorganic)	mg/kg	12	12	5.7	10	4.8	6.1	19
Barium (non-barite)	mg/kg	750	500	270	160	200	160	180
Beryllium	mg/kg	4	4	0.49	0.57	0.62	0.53	0.45
Boron (Calculated)	mg/kg	ng	ng	<0.059	<0.1	<0.054	<0.053	<0.047
Boron (hot water soluble)	mg/kg	2	ng	0.48	1.2	0.26	0.42	0.28
Boron (Saturated Paste)	mg/L	ng	ng	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	mg/kg	1.4	10	0.25	0.3	0.1	0.62	0.25
Chromium (hexavalent)	mg/kg	0.4	0.4	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium (III+VI)	mg/kg	64	64	110	23	36	14	27
Cobalt	mg/kg	40	50	5.9	7.1	7.3	4.9	5.9
Copper	mg/kg	63	63	14	16	14	23	25
Lead	mg/kg	70	140	8.2	65	12	13	7.9
Mercury (total)	mg/kg	6.6	6.6	0.13	0.16	0.11	0.056	<0.05
Molybdenum	mg/kg	5	10	2	0.96	0.72	0.54	0.53
Nickel	mg/kg	45	45	53	12	21	10	12
Potassium	mg/kg	ng	ng	-	-	-	120	130
Selenium	mg/kg	1	1	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	20	20	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	mg/kg	1	1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	mg/kg	5	50	<1	<1	<1	<1	<1
Uranium	mg/kg	23	23	0.64	0.5	1.1	0.55	0.55
Vanadium	mg/kg	130	130	15	14	17	17	17
Zinc	mg/kg	250	250	48	240	48	68	80
Inorganics								
Nitrate (as nitrogen)	mg/kg	ng	ng	-	-	-	<2	<2
Nitrate (as NO3-)	mg/kg	ng	ng	-	-	-	<2	<2
Nitrite (as nitrogen)	mg/kg	ng	ng	-	-	-	<2	<2
nitrate and nitrite (as N)	mg/kg	ng	ng	-	-	-	<2	<2
Phosphorus	mg/kg	ng	ng	-	-	-	33	32

Env Stds Description

CCME SoilQG Tier 1 AL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Agricultural (Coarse Soil)

CCME SoilQG Tier 1 RL/PL (Coarse Soil):CCME Soil Quality Guidelines for the Protection of Environment and Human Health, Residential/Parkland (Coarse Soil)

Env Stds Comments

#1:Surface

#2:Subsurface

#3:Value for coarse soil and ILCR 1 in 100,000. Lower value for fine soil.

#4:No SQGe listed. Provisional value based on the protection of freshwater aquatic life. If impact to surface water is not a concern, see PAH Fact Sheet.

#5:Ecological receptors only, based on non-carcinogenic effects of PAHs.

#6:Ecological receptors only, based on non-carcinogenic effects of PAHs. Value based on Interim Soil Quality Criteria (CCME 1991)

#7:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 20 mg/kg. See PAH Fact Sheet for details.

#8:Provisional value for the protection of soil and food ingestion (ecological receptors). No SQGe value listed. See PAH Fact Sheet for details.

#9:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 50 mg/kg. See PAH Fact Sheet for details.

#10:Ecological receptors only (freshwater aquatic life), based on non-carcinogenic effects of PAHs. If impact to surface water is not a concern, revert to 1997 provisional SQGe (see Table 2 in PAH Fact Sheet).

#11:Provisional value for the protection of soil and food ingestion (ecological receptors). SQGe is 10 mg/kg. See PAH Fact Sheet for details.

#12:SQG based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000.

	Concentration exceeds CCME SoilQG Tier 1 AL (Coarse Soil)
	Concentrations exceeds CCME SoilQG Tier 1 RL/PL (Coarse Soil)

Notes:

% - percent

mg/kg - milligram per kilogram

mg/L - milligram per litre

'-' - sample not analyzed for parameter indicated

> - denotes particle size greater than 75 micrometres

• laboratory reports detail detection limits, testing protocols and QA/QC procedures.

ng - no guideline

CVC - Combustible Vapour Concentration

PAHs - polycyclic aromatic hydrocarbons

ppm - parts per million

Table 14 – Summary of Analytical Results – Waste Classification Samples: All Sites

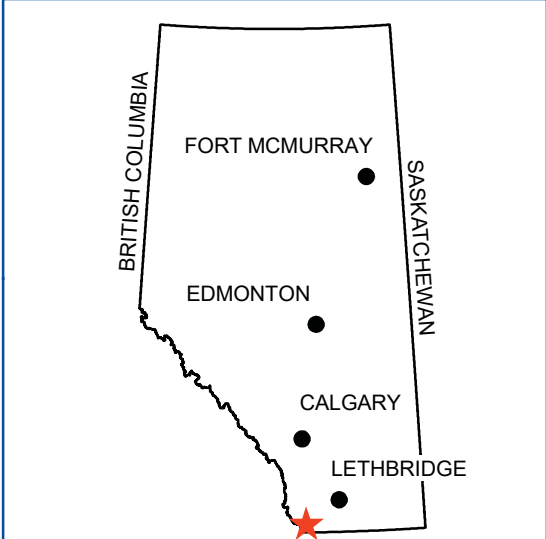
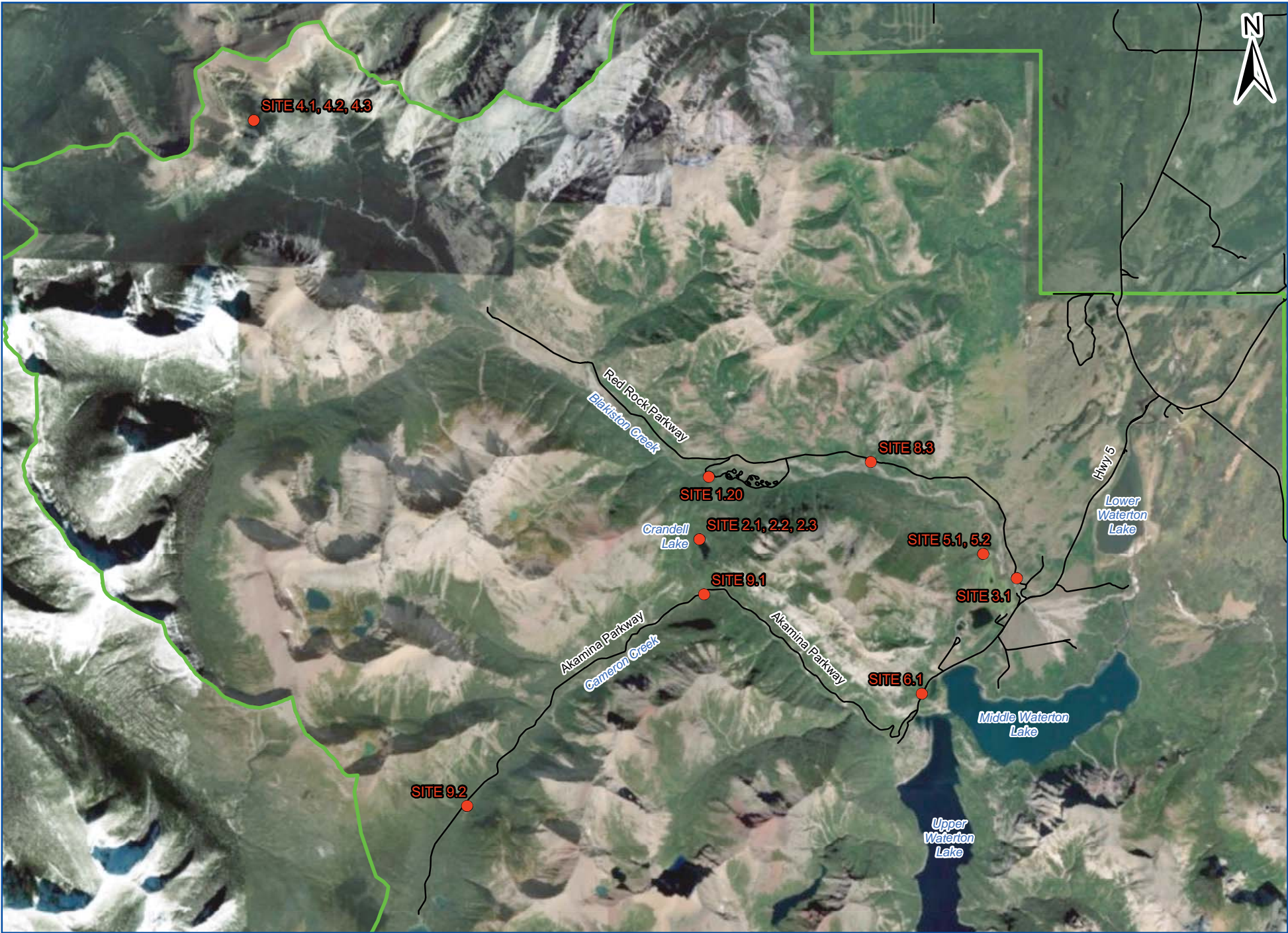
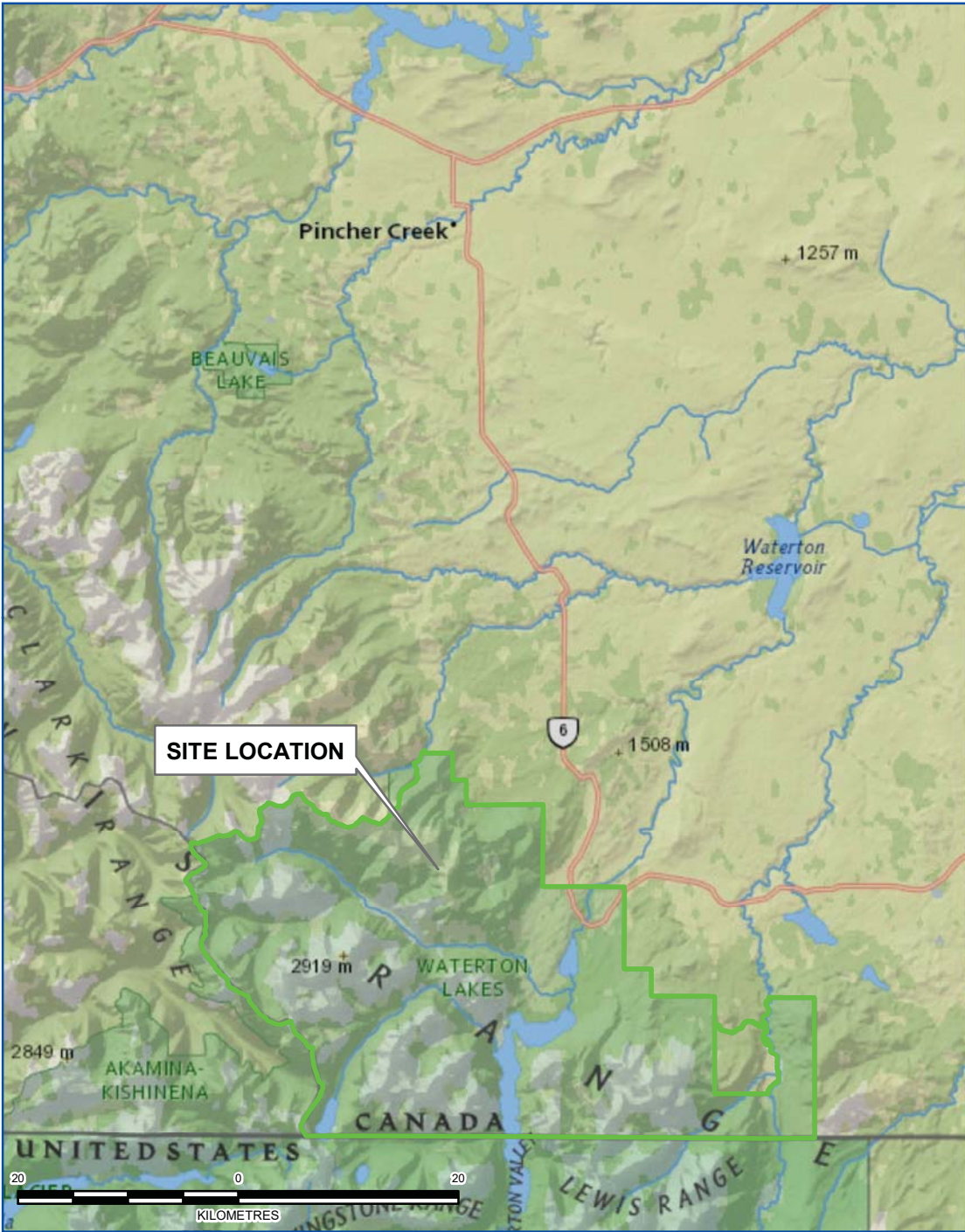
Table 14 – Summary of Analytical Results – Waste Classification	Sample Location	LF 1.1-6	LF 1.2-6	LF 1.3-6	LF 1.4-6	LF 1.5-5	LF 1.6-5	LF 1.7-5	LF 1.8-5	LF 1.9-5	LF 1.21-3	LF 2.1-5	LF 2.2-12	LF 2.3-4	LF 5.1-5	LF 5.2-6	LF 6.1-7	LF 8.1-9	LF 8.2-9	LF 8.3-5	LF 9.2-8	LF1.10-31	LF1.10-60	LF1.10-91	
	Sample ID	LF 1.1-6	LF 1.2-6	LF 1.3-6	LF 1.4-6	LF 1.5-5	LF 1.6-5	LF 1.7-5	LF 1.8-5	LF 1.9-5	LF 1.21-3	LF 2.1-5	LF 2.2-12	LF 2.3-4	LF 5.1-5	LF 5.2-6	LF 6.1-7	LF 8.1-9	LF 8.2-9	LF 8.3-5	LF 9.2-8	LF1.10-31	LF1.10-60	LF1.10-91	
	Sample Date	1-Dec-2018	1-Dec-2018	1-Dec-2018	1-Dec-2018	2-Dec-2018	2-Dec-2018	2-Dec-2018	2-Dec-2018	2-Dec-2018	1-Dec-2018	14-May-2019	1-Dec-2018	30-Nov-2018	30-Nov-2018	5-Dec-2018	5-Dec-2018	13-May-2019	1-Dec-2018	29-Nov-2018	29-Nov-2018	4-Dec-2018	3-Dec-2018	3-Dec-2018	4-Dec-2018
Physical Parameters																									
pH (after HCL)	Unitless	1.66	1.69	1.73	1.68	1.64	1.77	1.71	1.61	1.66	1.72	1.62	1.57	1.6	1.78	1.61	1.67	1.67	1.76	1.71	1.73	1.66	1.82	1.67	
pH (Final)	Unitless	5.51	5.21	6.08	6.08	5.69	6.25	6.05	5.62	6.03	5.64	5.13	5.02	5.02	5.31	5.47	6.08	5.82	6.16	5.65	6.1	5.58	5.77	5.7	
pH (Initial)	Unitless	8.67	8.83	9.46	9.27	8.75	9.34	9.1	9.06	8.74	7.62	9.12	6.91	7.05	8.94	8.55	9.03	8.9	9.33	8.36	8.97	8.16	8.83	8.66	
pH (Lab)	Unitless	7.46	7.48	7.96	7.88	7.67	8.35	7.5	8	7.56	6.81	7.87	6.51	6.19	7.38	7.51	7.21	7.34	7.59	6.98	7.07	7.21	7.77	7.35	
Flash Point	°C	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	>61	
Free Liquid	N/A	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	
Leachable Petroleum Hydrocarbons																									
Benzene	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Toluene	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Ethylbenzene	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Xylenes	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Leachable Metals																									
Antimony	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Arsenic (inorganic)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Barium (non-barite)	mg/L	2.8	1.4	1.1	1	1	1.3	1.3	<1	1.7	<1	1.2	1.8	<1	1.8	1	2.1	1.4	1.7	3.5	1.7	1.7	1.5	1.8	
Beryllium	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Boron (hot water soluble)	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Cadmium	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Chromium (III+VI)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Cobalt	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Copper	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Iron	mg/L	2.5	1.3	4.3	4.3	2.4	4.6	3.8	2.4	3.4	<1	<1	1.6	<1	1.8	2	5.3	3.3	4.3	2.6	<1	<1	<1	2.6	
Lead	mg/L	<0.5	<0.5	<0.5	0.69	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Mercury (total)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Nickel	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Selenium	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Silver	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Thallium	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Uranium	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Vanadium	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Zinc	mg/L	<1	1.2	1.2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.5	<1	<1	<1	<1	<1	<1	<1	<1	
Zirconium	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	

Notes:
°C - degrees Celsius
mg/L - milligram per litre
'-' - sample not analyzed for parameter indicated
• laboratory reports detail detection limits, testing protocols and QA/QC procedures.

DRAWINGS

RARMP – Non-Priority Sites
Sites Affected by the Kenow Wildfire
Waterton Lakes National Park, Alberta
SLR Project No. 203.02356.00001

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Topo Map: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

LEGEND

- SITE LOCATION
- WATERTON LAKES NATIONAL PARK BOUNDARY

2 2
SCALE: 1:100,000 METRES
WHEN PLOTTED CORRECTLY AT 11 x 17
WGS 1984 Web Mercator Auxiliary Sphere
THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL
LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA

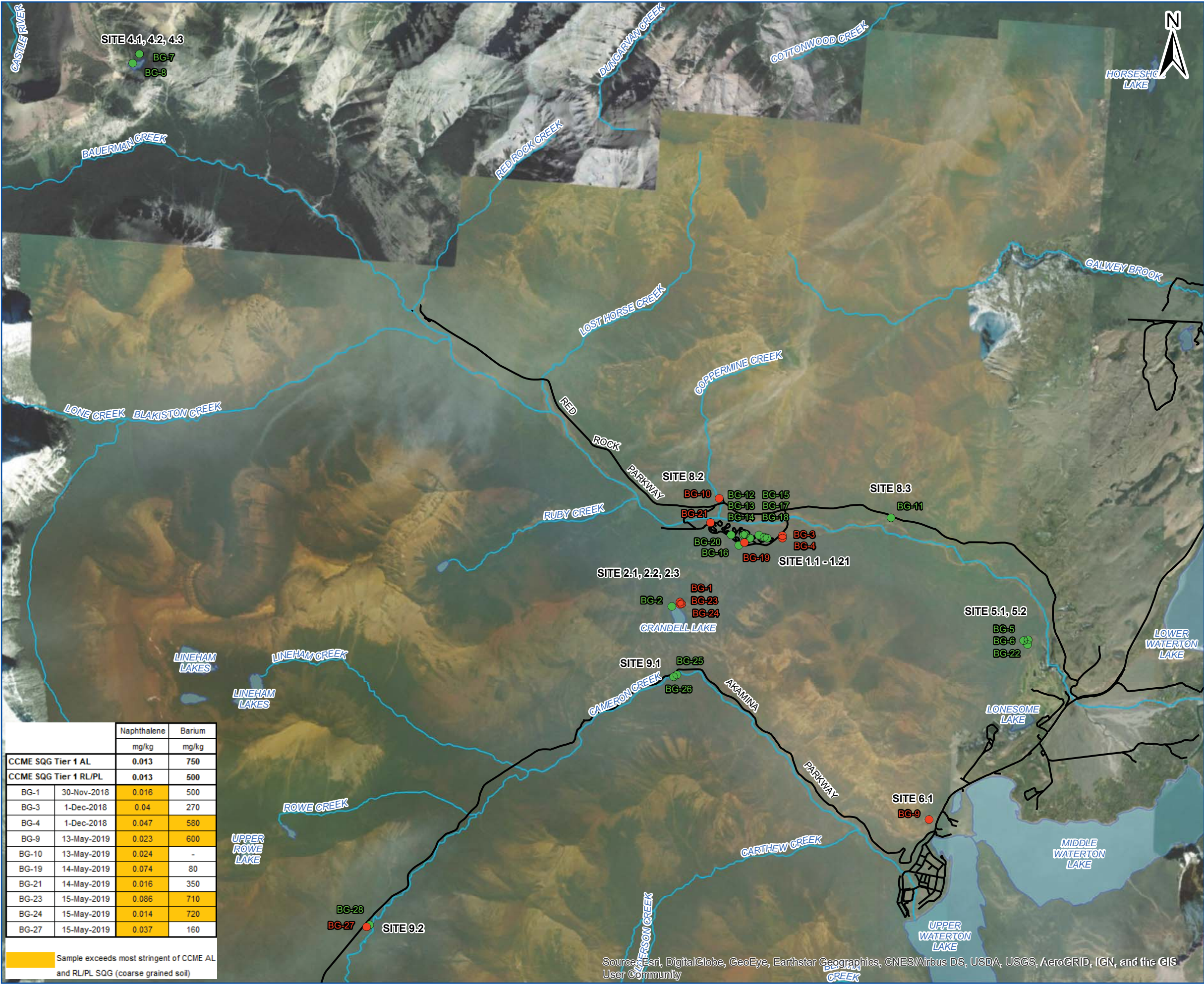
REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES

SITE LOCATION PLAN

September 30, 2019	Rev 0.0	Drawing No.
Project No.	203.02356.00000	1



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		Naphthalene	Barium
		mg/kg	mg/kg
CCME SQG Tier 1 AL		0.013	750
CCME SQG Tier 1 RL/PL		0.013	500
BG-1	30-Nov-2018	0.016	500
BG-3	1-Dec-2018	0.04	270
BG-4	1-Dec-2018	0.047	580
BG-9	13-May-2019	0.023	600
BG-10	13-May-2019	0.024	-
BG-19	14-May-2019	0.074	80
BG-21	14-May-2019	0.016	350
BG-23	15-May-2019	0.086	710
BG-24	15-May-2019	0.014	720
BG-27	15-May-2019	0.037	160

Sample exceeds most stringent of CCME AL and RL/PL SQG (coarse grained soil)

LEGEND

- CONCENTRATION OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES
- CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES
- ROAD
- WATERCOURSE
- WATERBODY

1,000 0 1,000
SCALE: 1:60,000 METRES
WHEN PLOTTED CORRECTLY AT 11 x 17
NAD 1983 UTM Zone 12N

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PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA

REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES

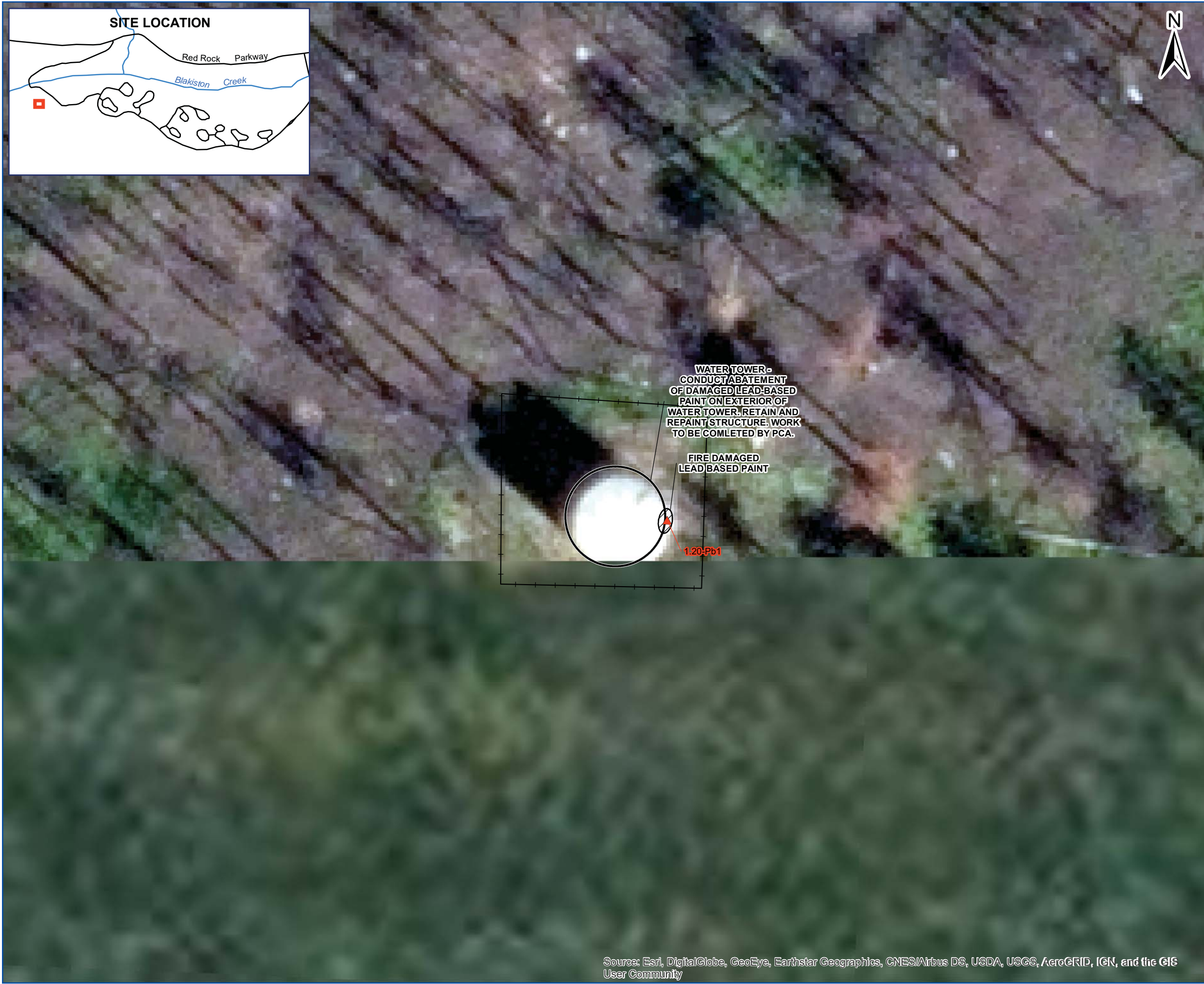
BACKGROUND SAMPLE LOCATIONS

Date: September 27, 2019	Rev 0.0	Drawing No.
Project No. 203.02356.00000		2



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

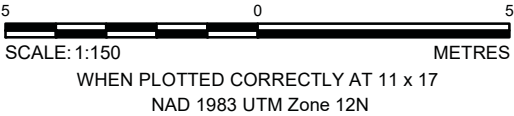
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LEGEND

BUILDING MATERIAL SAMPLE LOCATION

- ▲ DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES
- +— FENCE
- SURVEYED FEATURE
- ▨ EXTENT OF DEBRIS



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**PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA**

**REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES**

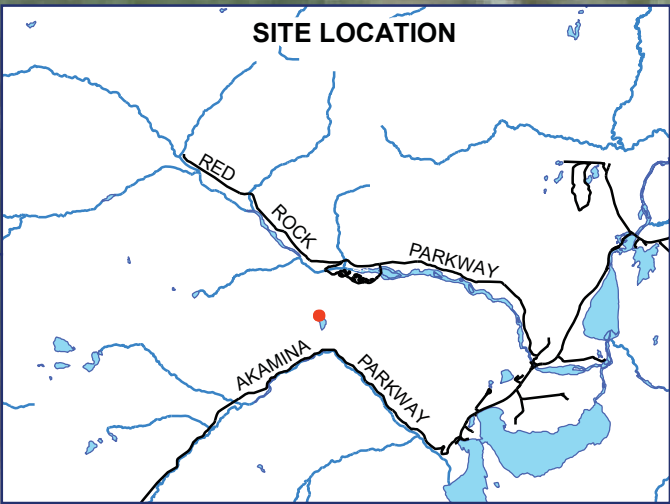
**SITE 1.20: CRANDELL CAMPGROUND WATER
TOWER PROPOSED REMEDIATION**

Date: October 23, 2019	Rev 0.0	Drawing No. 3
Project No. 209.40629.00001		



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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LEGEND

BUILDING MATERIAL SAMPLE LOCATION

▲ DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES

SOIL SAMPLE LOCATION

● CONCENTRATION OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES

● CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

SITE FEATURE

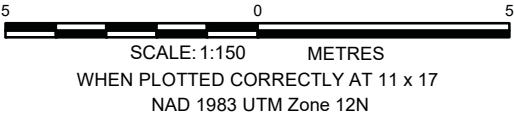
✱ FIREPIT

■ PICNIC TABLE

▭ SURVEYED FEATURE

▨ EXTENT OF DEBRIS

▭ EXTENT OF IMPACTED SOIL



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**PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA**

**REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES**

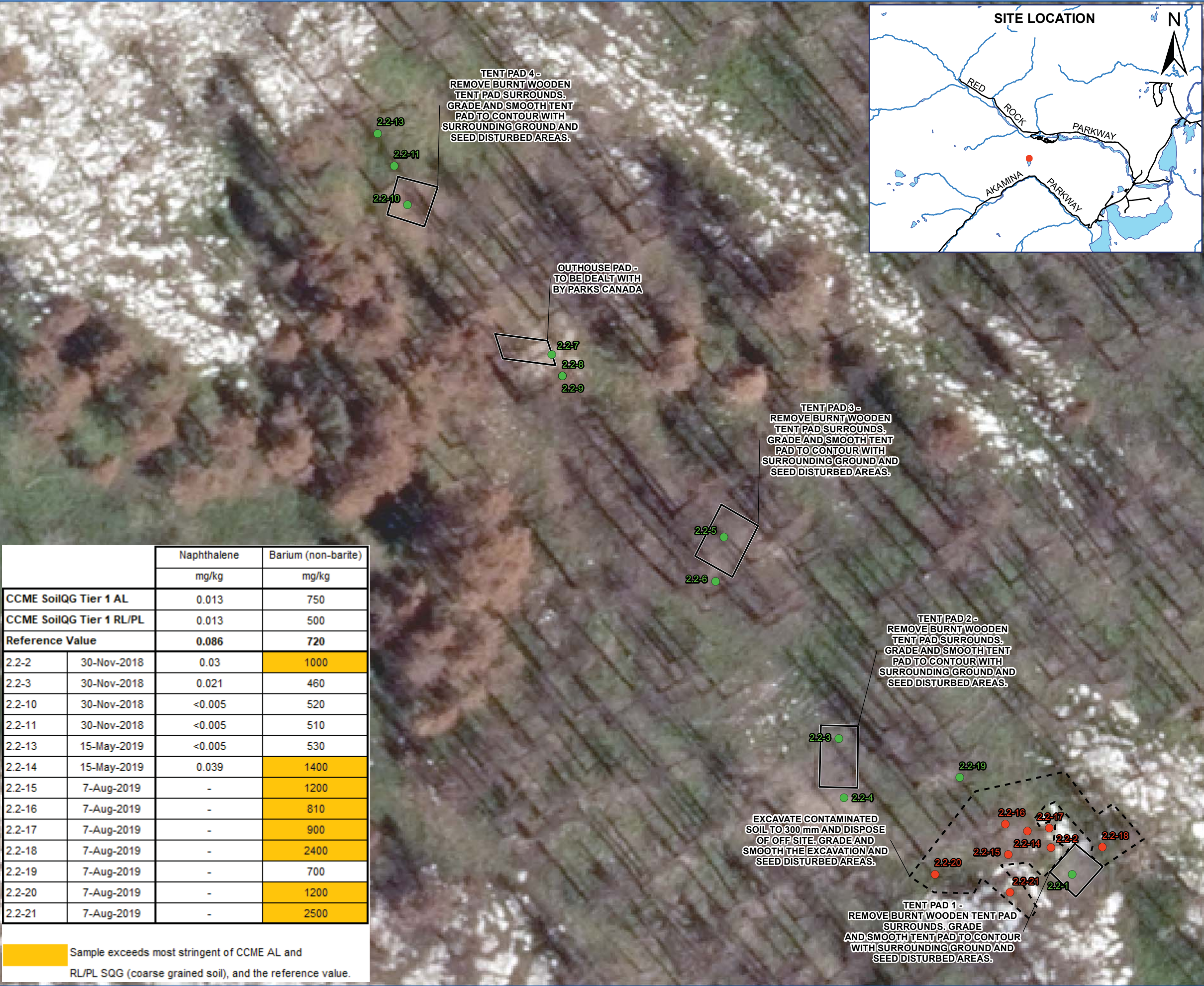
**SITE 2.1: CRANDELL BACKCOUNTRY CAMPGROUND
KITCHEN SHELTER PROPOSED REMEDIATION EXTENTS**

Date: December 12, 2019	Rev 0.0	Drawing No.
Project No. 203.02356.00000		4

		Lead
		mg/kg
CCME SoilQG Tier 1 AL		70
CCME SoilQG Tier 1 RL/PL		140
2.1-4	30-Nov-2018	120
Sample exceeds most stringent of CCME AL and RL/PL SQG (coarse grained soil).		



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**PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA**

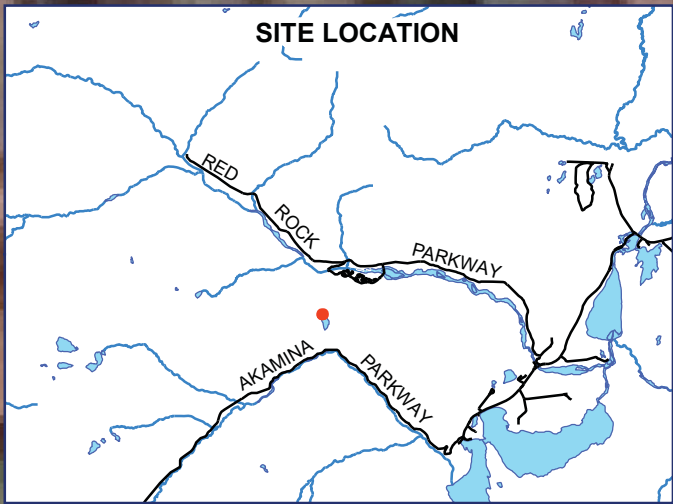
**REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES**

**SITE 2.2: CRANDELL BACKCOUNTRY CAMPGROUND
CAMPSITES DEBRIS REMOVAL**

Date: February 7, 2020	Rev 0.0	Drawing No.
Project No. 203.02356.00000		5



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LEGEND

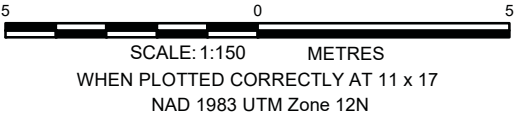
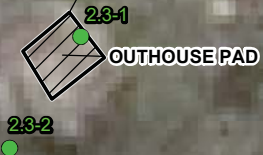
SOIL SAMPLE LOCATION

● CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

▭ SURVEYED FEATURE

▨ EXTENT OF DEBRIS

DEBRIS -
HANDPICK AND
DISPOSE OF MINOR
METAL DEBRIS.
PCA WILL COMPLETE
THE WORK.



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**PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA**

**REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES**

**SITE 2.3: CRANDELL BACKCOUNTRY CAMPGROUND
OUTHOUSE PROPOSED REMEDIATION EXTENTS**

Date: October 23, 2019	Rev 0.0	Drawing No.
Project No. 203.02356.00000		6



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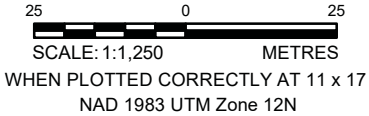


LEGEND

● MELTED ROADSIDE MARKER

REMOVE AND DISPOSE OF ALL NON-HAZARDOUS HDPE ROADSIDE MARKERS.

PCA WILL COMPLETE THE WORK



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PUBLIC SERVICES AND PROCUREMENT CANADA
28 SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA

REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES

SITE 3.1: MELTED ROADSIDE MARKERS -
RED ROCK PARKWAY DEBRIS DISPOSAL


Date: October 24, 2019	Rev 0.0	Drawing No.
Project No. 209.40629.00001		7A



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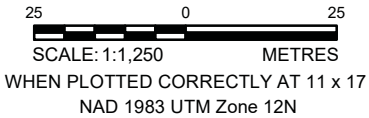


LEGEND

 MELTED ROADSIDE MARKER

REMOVE AND DISPOSE OF ALL NON-HAZARDOUS HDPE ROADSIDE MARKERS.

PCA WILL COMPLETE THE WORK



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**PUBLIC SERVICES AND PROCUREMENT CANADA
28 SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA**

**REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES**

**SITE 3.1: MELTED ROADSIDE MARKERS -
RED ROCK PARKWAY DEBRIS DISPOSAL**

Date: October 24, 2019	Rev 0.0	Drawing No.
Project No. 209.40629.00001	7B	



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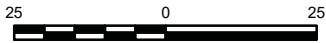


LEGEND

● MELTED ROADSIDE MARKER

REMOVE AND DISPOSE OF ALL NON-HAZARDOUS HDPE ROADSIDE MARKERS.

PCA WILL COMPLETE THE WORK



SCALE: 1:1,250 METRES
WHEN PLOTTED CORRECTLY AT 11 x 17
NAD 1983 UTM Zone 12N

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**PUBLIC SERVICES AND PROCUREMENT CANADA
28 SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA**

**REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES**

**SITE 3.1: MELTED ROADSIDE MARKERS -
RED ROCK PARKWAY DEBRIS DISPOSAL**

Date: October 24, 2019	Rev 0.0	Drawing No.
Project No. 209.40629.00001		7C



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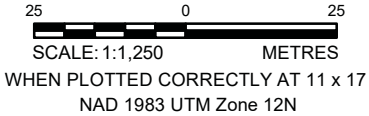


LEGEND

● MELTED ROADSIDE MARKER

REMOVE AND DISPOSE OF ALL NON-HAZARDOUS HDPE ROADSIDE MARKERS.

PCA WILL COMPLETE THE WORK



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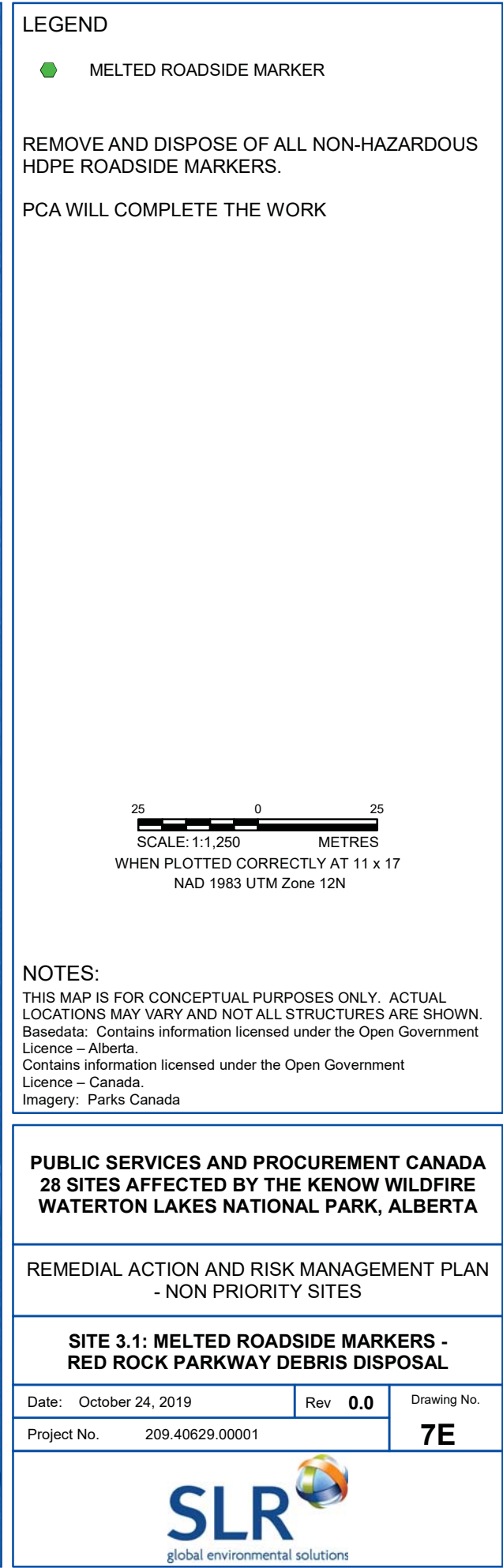
PUBLIC SERVICES AND PROCUREMENT CANADA
28 SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA

REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES

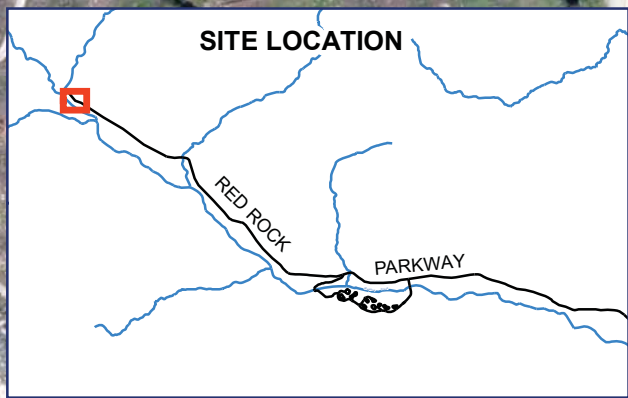
SITE 3.1: MELTED ROADSIDE MARKERS -
RED ROCK PARKWAY DEBRIS DISPOSAL

Date: October 24, 2019	Rev 0.0	Drawing No.
Project No. 209.40629.00001		7D





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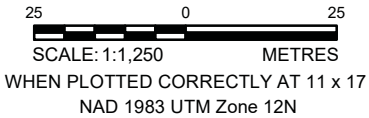


LEGEND

● MELTED ROADSIDE MARKER

REMOVE AND DISPOSE OF ALL NON-HAZARDOUS HDPE ROADSIDE MARKERS.

PCA WILL COMPLETE THE WORK



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PUBLIC SERVICES AND PROCUREMENT CANADA
28 SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA

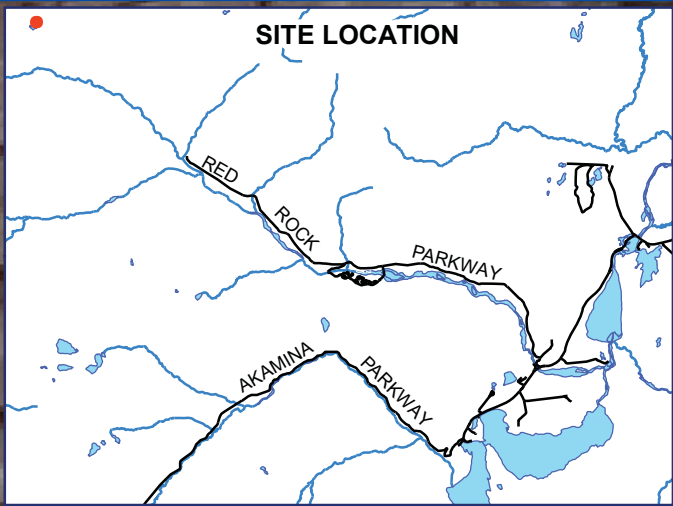
REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES

SITE 3.1: MELTED ROADSIDE MARKERS -
RED ROCK PARKWAY DEBRIS DISPOSAL

Date: October 24, 2019	Rev 0.0	Drawing No.
Project No. 209.40629.00001		7F



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LEGEND

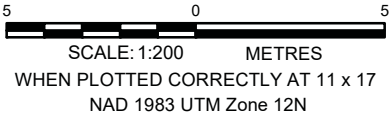
SOIL SAMPLE LOCATION

● CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

SITE FEATURE

▼ SIGN

▭ SURVEYED FEATURE



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**PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA**

**REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES**

**SITE 4.1: GOAT LAKE BACKCOUNTRY CAMPGROUND
CAMPSITES DEBRIS REMOVAL**

Date: October 23, 2019	Rev 0.0	Drawing No. 8
Project No. 203.02356.00000		



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LEGEND

SOIL SAMPLE LOCATION

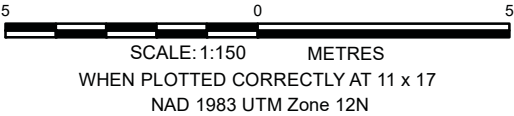
● CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

SITE FEATURE

◆ FOOD POLES

✱ METAL DEBRIS

▭ SURVEYED FEATURE



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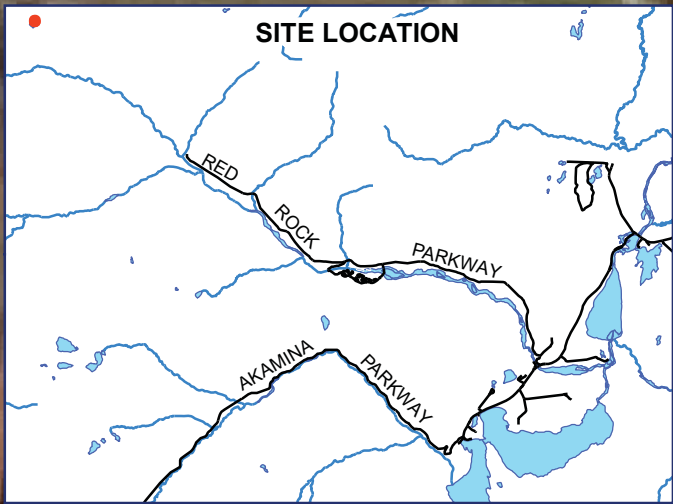
**PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA**

**REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES**

**SITE 4.2: GOAT LAKE BACKCOUNTRY CAMPGROUND
OUTHOUSE DEBRIS REMOVAL**

Date: February 7, 2020	Rev 0.0	Drawing No. 9
Project No. 203.02356.00000		

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LEGEND

SOIL SAMPLE LOCATION

● CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

SITE FEATURE

▼ SIGN

▭ SURVEYED FEATURE

REMOVE AND DISPOSE OF SIGNS

PICNIC TABLE PAD - REMOVE AND DISPOSE OF PICNIC TABLE LOGS. GRADE AND SMOOTH GRAVEL PAD TO CONTOUR WITH SURROUNDING GROUND AND SEED DISTURBED AREAS.

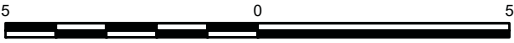
4.3-1

4.3-2

PICNIC TABLE PAD - REMOVE AND DISPOSE OF PICNIC TABLE LOGS. GRADE AND SMOOTH GRAVEL PAD TO CONTOUR WITH SURROUNDING GROUND AND SEED DISTURBED AREAS.

4.3-3

4.3-4



SCALE: 1:150 METRES
WHEN PLOTTED CORRECTLY AT 11 x 17
NAD 1983 UTM Zone 12N

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PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA

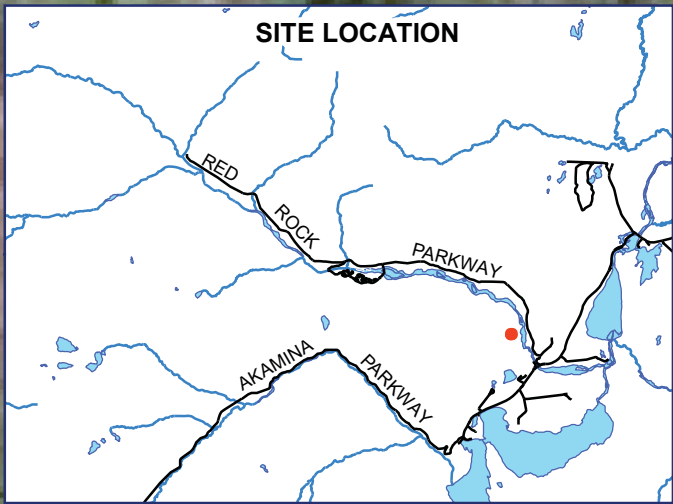
REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES

SITE 4.3: GOAT LAKE BACKCOUNTRY CAMPGROUND
PICNIC TABLES

Date: October 23, 2019	Rev 0.0	Drawing No.
Project No. 203.02356.00000		10



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LEGEND

BUILDING MATERIAL SAMPLE LOCATION

▲ DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES

SOIL SAMPLE LOCATION

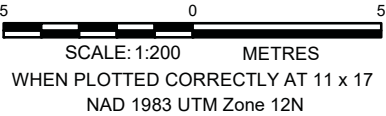
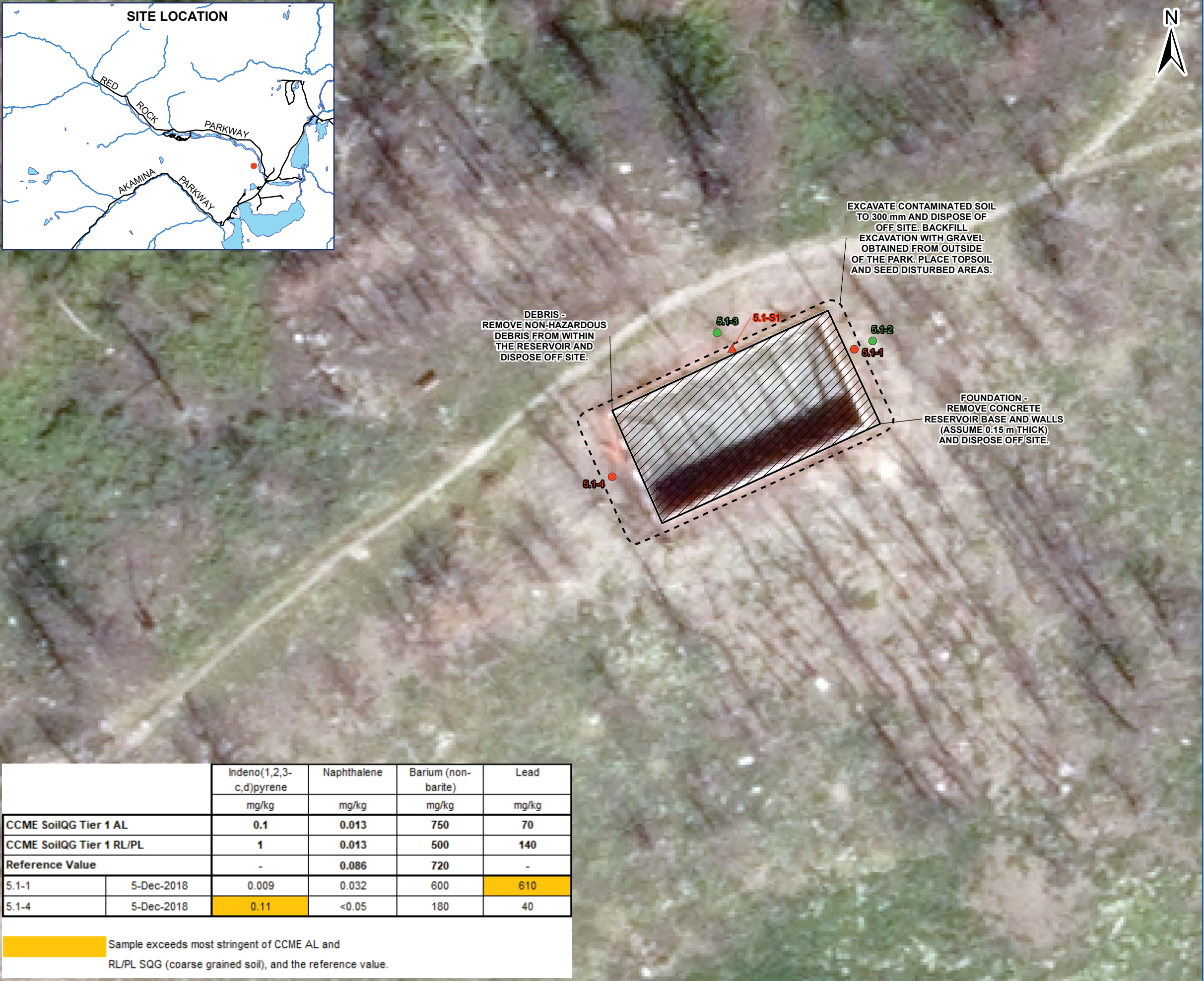
● CONCENTRATION OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES

● CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

▭ SURVEYED FEATURE

▨ EXTENT OF DEBRIS

▭ EXTENT OF IMPACTED SOIL



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**PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA**

**REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES**

**SITE 5.1: WATERTON GOLF COURSE RESERVOIR
PROPOSED REMEDIATION EXTENTS**

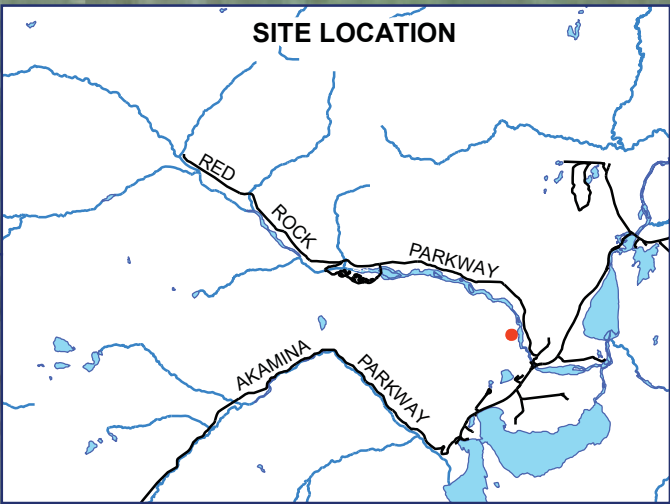
Date: December 12, 2019	Rev 0.0	Drawing No.
Project No. 203.02356.00000		11



		Indeno(1,2,3-c,d)pyrene	Naphthalene	Barium (non-barite)	Lead
		mg/kg	mg/kg	mg/kg	mg/kg
CCME SoilQG Tier 1 AL		0.1	0.013	750	70
CCME SoilQG Tier 1 RL/PL		1	0.013	500	140
Reference Value		-	0.086	720	-
5.1-1	5-Dec-2018	0.009	0.032	600	610
5.1-4	5-Dec-2018	0.11	<0.05	180	40

Sample exceeds most stringent of CCME AL and RL/PL SQG (coarse grained soil), and the reference value.

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LEGEND

BUILDING MATERIAL SAMPLE LOCATION

▲ DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES

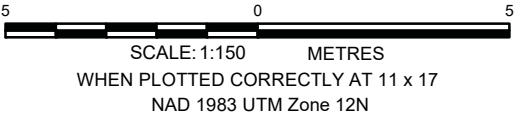
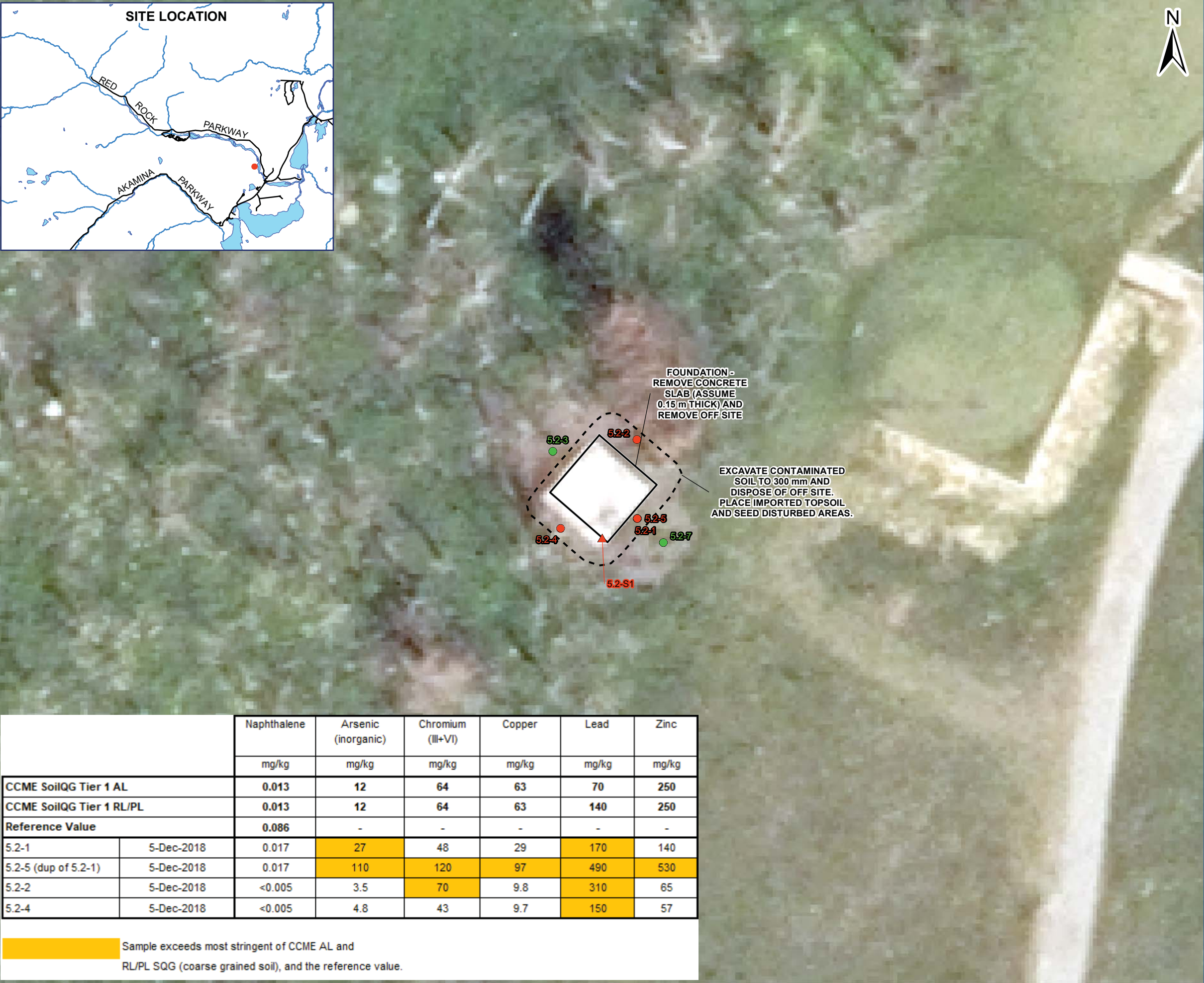
SOIL SAMPLE LOCATION

● CONCENTRATION OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES

● CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

▭ SURVEYED FEATURE

▭ EXTENT OF IMPACTED SOIL



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		Naphthalene	Arsenic (inorganic)	Chromium (III+VI)	Copper	Lead	Zinc
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
CCME SoilQG Tier 1 AL		0.013	12	64	63	70	250
CCME SoilQG Tier 1 RL/PL		0.013	12	64	63	140	250
Reference Value		0.086	-	-	-	-	-
5.2-1	5-Dec-2018	0.017	27	48	29	170	140
5.2-5 (dup of 5.2-1)	5-Dec-2018	0.017	110	120	97	490	530
5.2-2	5-Dec-2018	<0.005	3.5	70	9.8	310	65
5.2-4	5-Dec-2018	<0.005	4.8	43	9.7	150	57

Sample exceeds most stringent of CCME AL and RL/PL SQG (coarse grained soil), and the reference value.

PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA

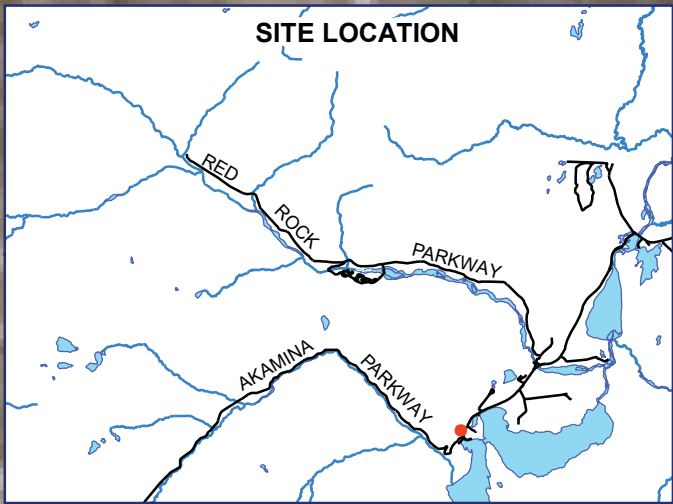
REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES

SITE 5.2: WATERTON GOLF COURSE LIGHTNING SHELTER
SHED PROPOSED REMEDIATION EXTENTS

Date: December 12, 2019	Rev 0.0	Drawing No.
Project No. 203.02356.00000		12



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LEGEND

BUILDING MATERIAL SAMPLE LOCATION

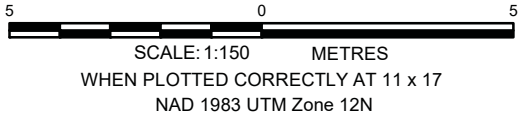
▲ DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES

SOIL SAMPLE LOCATION

● CONCENTRATION OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES
● CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

SITE FEATURE

◆ CONCRETE MONUMENT
✱ METAL DEBRIS
□ SURVEYED FEATURE
▨ EXTENT OF DEBRIS
▭ EXTENT OF IMPACTED SOIL



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**PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA**

**REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES**

**SITE 6.1: BEAR'S HUMP HIKING TRAIL SEISMIC STATION
BUILDING PROPOSED REMEDIATION**

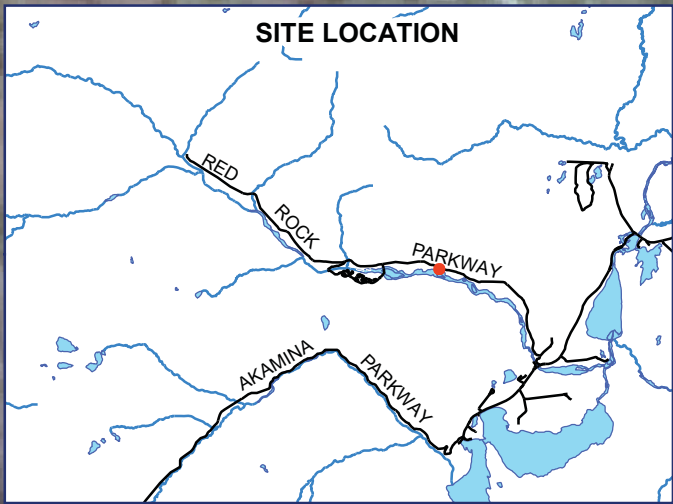
Date: October 24, 2019 Rev **0.0** Drawing No. **13**
Project No. 203.02356.00000



		Benzene	Toluene	Ethylbenzene	Benz[a]anthracene	Benzo[a]pyrene	Benzo(k)fluoranthene	Dibenz(a,h)anthracene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Barium (non-barite)	Cadmium
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
CCME CWS PHC, AL/PL/RL		ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng
CCME SoilQG Tier 1 AL		0.0068	0.08	0.018	0.1	0.6	0.1	0.1	0.1	0.013	0.046	0.1	750	1.4
CCME SoilQG Tier 1 RL/PL		0.0068	0.08	0.018	1	0.6	1	1	1	0.013	0.046	7.7	500	10
Reference Value		-	-	-	-	-	-	-	-	0.086	-	-	720	-
6.1-1	13-May-2019	0.012	<0.050	<0.010	0.67	0.68	0.22	0.19	0.39	0.015	0.095	0.41	270	0.48
6.1-2 (dup of 6.1-1)	13-May-2019	0.013	<0.050	<0.010	0.65	0.77	0.26	0.22	0.49	0.011	0.092	0.42	310	0.58
6.1-3	13-May-2019	<0.0050	<0.050	<0.010	<0.0050	<0.005	<0.005	<0.0050	<0.0050	0.015	0.0073	0.0071	540	0.27
6.1-5	13-May-2019	0.012	<0.050	<0.010	<0.0050	<0.005	<0.005	<0.0050	<0.0050	0.011	0.0075	0.0061	480	0.19
6.1-6	13-May-2019	0.026	0.17	0.025	0.013	0.011	<0.005	<0.0050	0.011	0.027	0.021	0.025	640	1.5
6.1-9	7-Aug-2019	<0.0050	<0.050	<0.010	<0.0050	<0.005	<0.005	<0.0050	<0.0050	0.041	0.021	0.01	-	-
6.1-12	7-Aug-2019	<0.0050	<0.050	<0.010	<0.0050	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	510	0.26

Sample exceeds most stringent of CCME AL and RL/PL SQG (coarse grained soil), and the reference value.

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LEGEND

BUILDING MATERIAL SAMPLE LOCATION

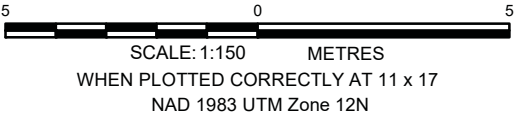
- ▲ DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES

SOIL SAMPLE LOCATION

- CONCENTRATION OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES
- CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

SITE FEATURE

- ✱ METAL DEBRIS
- ▨ EXTENT OF DEBRIS
- ▭ EXTENT OF IMPACTED SOIL



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PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA

REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES

SITE 8.3: INDIGENOUS HISTORY VIEWPOINT PROPOSED
REMEDiation EXTENTS

Date: December 12, 2019	Rev 0.0	Drawing No.
Project No. 203.02356.00000		14



		Naphthalene	Arsenic (inorganic)	Copper
		mg/kg	mg/kg	mg/kg
CCME SoilQG Tier 1 AL		0.013	12	63
CCME SoilQG Tier 1 RL/PL		0.013	12	63
Reference Value		0.086	-	-
8.3-1	29-Nov-2018	<0.005	110	190
8.3-3	29-Nov-2018	0.021	22	58
8.3-6	13-May-2019	0.023	5.3	13

Sample exceeds most stringent of CCME AL and RL/PL SQG (coarse grained soil), and the reference value.

DEBRIS - REMOVE SURFACE ASH AND NON-HAZARDOUS DEBRIS AND DISPOSE OF OFF SITE

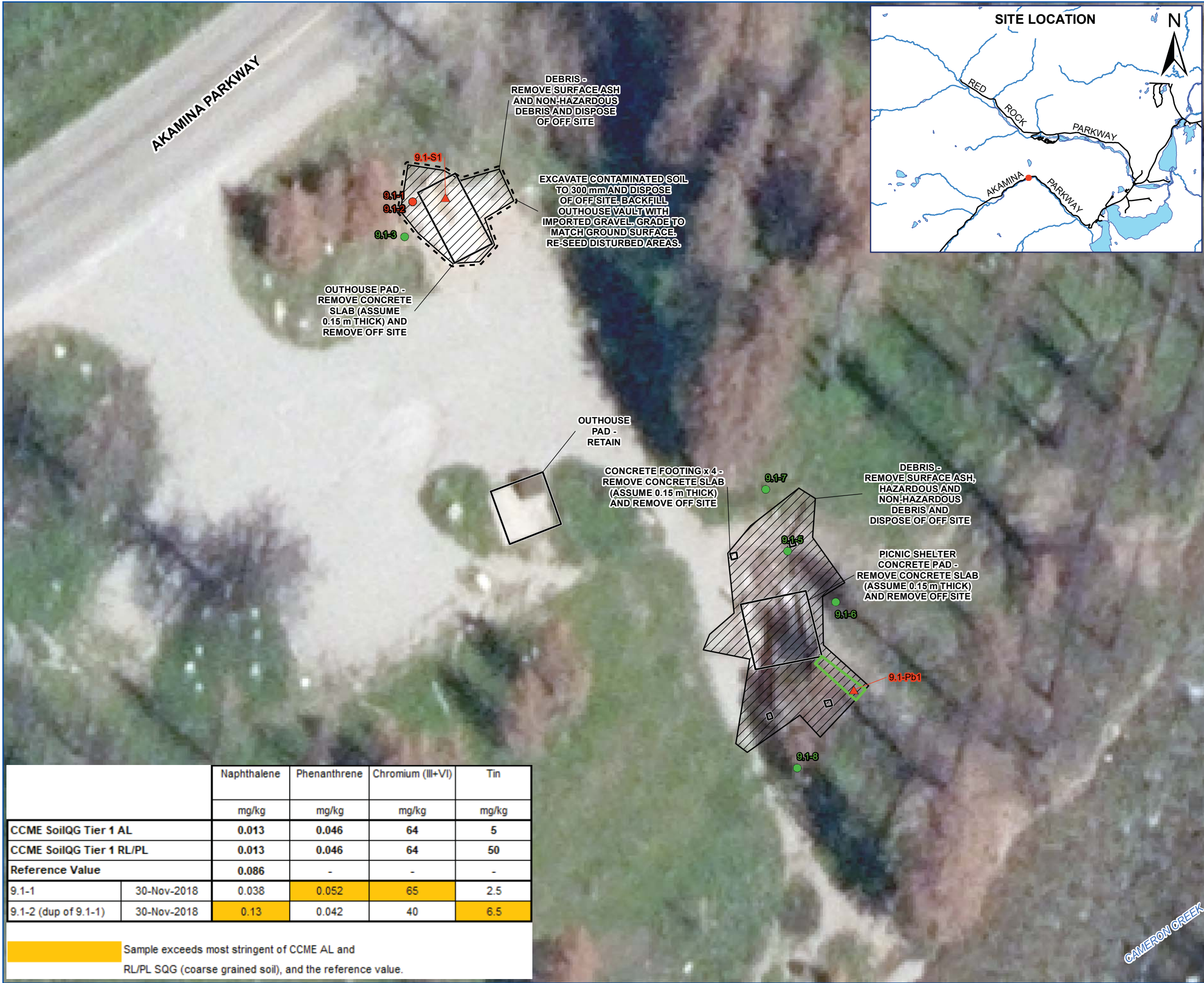
EXCAVATE CONTAMINATED SOIL TO 300 mm AND DISPOSE OF OFF SITE. GRADE EXCAVATION.

EXCAVATE CONTAMINATED SOIL TO 300 mm AND DISPOSE OF OFF SITE. GRADE EXCAVATION.

DEBRIS - REMOVE SURFACE ASH AND NON-HAZARDOUS DEBRIS AND DISPOSE OF OFF SITE

CONCRETE - REMOVE THE TWO BENCH FOOTINGS (ASSUME 0.2m x 0.2m x 0.2m THICK) AND REMOVE OFF-SITE

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LEGEND

BUILDING MATERIAL SAMPLE LOCATION

- ▲ DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES

SOIL SAMPLE LOCATION

- CONCENTRATION OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES
- CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

- LOCATION OF LEAD-BASED PAINT

- SURVEYED FEATURE

- ▨ EXTENT OF DEBRIS

- ▭ EXTENT OF IMPACTED SOIL

5 0 5
SCALE: 1:200 METRES
WHEN PLOTTED CORRECTLY AT 11 x 17
NAD 1983 UTM Zone 12N

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PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA

REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES

SITE 9.1: MCNEALY'S DAY USE AREA PROPOSED
REMEDIATION EXTENTS

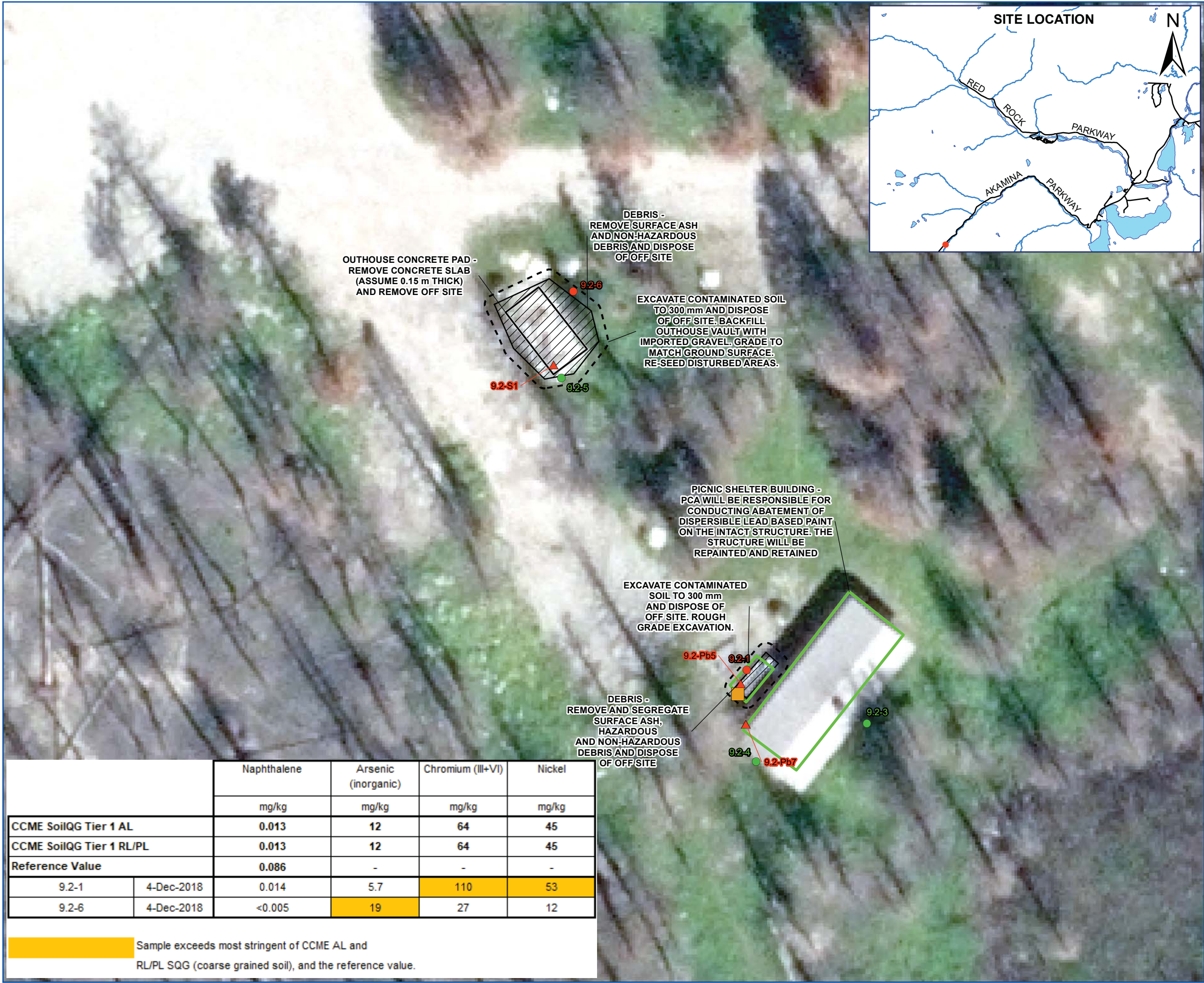
Date: December 12, 2019	Rev 0.0	Drawing No.
Project No. 203.02356.00000		15



		Naphthalene	Phenanthrene	Chromium (III+VI)	Tin
		mg/kg	mg/kg	mg/kg	mg/kg
CCME SoilQG Tier 1 AL		0.013	0.046	64	5
CCME SoilQG Tier 1 RL/PL		0.013	0.046	64	50
Reference Value		0.086	-	-	-
9.1-1	30-Nov-2018	0.038	0.052	65	2.5
9.1-2 (dup of 9.1-1)	30-Nov-2018	0.13	0.042	40	6.5

Sample exceeds most stringent of CCME AL and RL/PL SQG (coarse grained soil), and the reference value.

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		Naphthalene	Arsenic (inorganic)	Chromium (III+VI)	Nickel
		mg/kg	mg/kg	mg/kg	mg/kg
CCME SoilQG Tier 1 AL		0.013	12	64	45
CCME SoilQG Tier 1 RL/PL		0.013	12	64	45
Reference Value		0.086	-	-	-
9.2-1	4-Dec-2018	0.014	5.7	110	53
9.2-6	4-Dec-2018	<0.005	19	27	12

Sample exceeds most stringent of CCME AL and RL/PL SQG (coarse grained soil), and the reference value.

LEGEND

BUILDING MATERIAL SAMPLE LOCATION

DEBRIS SAMPLE EXCEEDS REFERENCED GUIDELINES

SOIL SAMPLE LOCATION

CONCENTRATION OF ONE OR MORE PARAMETERS EXCEEDS THE REFERENCED CCME SQGS OR CWS GUIDELINES

CONCENTRATIONS OF ALL PARAMETERS ARE BELOW THE REFERENCED CCME SQGS OR CWS GUIDELINES

SITE FEATURE

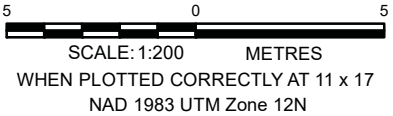
PICNIC TABLE

LOCATION OF LEAD-BASED PAINT

SURVEYED FEATURE

EXTENT OF DEBRIS

EXTENT OF IMPACTED SOIL



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PUBLIC SERVICES AND PROCUREMENT CANADA
SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA

REMEDIAL ACTION AND RISK MANAGEMENT PLAN
- NON PRIORITY SITES

SITE 9.2: LITTLE PRAIRIE DAY USE AREA PROPOSED
REMEDIATION EXTENTS

Date: February 7, 2020	Rev 0.0	Drawing No.
Project No. 203.02356.00000		16



APPENDIX A

Abatement Procedures for Lead, Asbestos and Silica

RARMP – Non-Priority Sites
Sites Affected by the Kenow Wildfire
Waterton Lakes National Park, Alberta
SLR Project No. 203.02356.00001



General Procedure for High-Risk Asbestos Abatement

GENERAL

This general abatement procedure is to be used by trained workers to remove asbestos-containing materials (ACM). This procedure will assist in reducing the amount of airborne asbestos generated and protect the worker and the public during the abatement of ACM.

REQUIRED TOOLS AND EQUIPMENT

Personal Protective Equipment required

Powered air purifying respirator (PAPR) with P100 HEPA filters
CSA rubber boots
Disposable coveralls

Supplies required

Disposable bags	Airless or pump sprayer
Vacuum with HEPA filters	6 mil polyethylene sheeting
Decontamination unit with shower	Negative air unit(s) – proficiency tested
Slow drying sealer	Tape and spray adhesive
First Aid Kit	mops, rags, brushes, etc.
Fire Extinguisher	

Occupational Health and Safety for the Asbestos Worker 2 day training course is required for any workers completing High-Risk Asbestos Abatement Activities.

Asbestos abatement activities should be completed in general accordance with the Alberta Human Services, Occupational Health and Safety (Alberta OH&S) Act, Regulations and Code, the Asbestos Abatement Manual August 2019, the Canada Labour Code (CLC) Part II and The Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances.

Part 18 of the Alberta OH&S Code, 2009 defines the requirements for PPE in the work place. Section 244 through 255 outline the requirements and limitations related to Respiratory Protective Equipment (RPE). Key elements included:

- The employer must prepare a code of practice governing the selection, maintenance and use of RPE (245)
- Employees must be fit tested in accordance with CSA Standard Z94.4-02, *Selection Use and Care of Respirators*

PROCEDURE

Building an Enclosure

1. Fully Enclose the work area using rip-proof polyethylene sheeting. Additional wood or metal structure may be necessary to protect the enclosure from the elements.

2. Construct an attached three stage Decontamination Unit to access the enclosure using 6mil polyethylene sheeting. The Decontamination Unit must include a shower and provide clean water and soap to complete the decontamination process.
3. Ensure proper signage is present at the entrance to the work area restricting access to properly trained workers with the proper PPE.
4. Establish negative pressure in the asbestos work area. Negative pressure units shall have total rated capacity with filters in place sufficient to provide minimum one (1) air change every 15 minutes. Volume of air shall be sufficient to ensure airflow is maintained from clean areas into asbestos work area. Vent air from work area to outside of building via flexible ducting from negative air units. Leak test all negative air units to be used on the project, in operating position at the beginning of the project, using an approved in-place filter test method. Operate negative pressure units continuously from the start of the project until completion of final air monitoring.
5. Provide temporary lighting in the asbestos work area to levels that will permit work to be done safely.
6. Provide temporary power via an appropriately placed generator equipped with ground fault circuit interrupters.

Entering the Controlled Work Area:

For entering the site use the following safe work procedure:

1. Only workers who have completed the Asbestos Worker training and are trained in the use and limitation of respiratory protective equipment and other personal protective equipment (PPE) may access the site during abatement activities.
2. A Decontamination Unit must be constructed and attached to the work area. The Decontamination Unit should have the following:
 - a. **Dirty Room:** Build a room between the shower room and the asbestos work area. Install waste receptor, and storage facilities for workers' boots and any protective clothing to be re-worn in asbestos work area. Equipment and access room shall be large enough to accommodate specified facilities, and other equipment needed, and allowing sufficient space for at least one worker to decontaminate comfortably. Minimum size 3 square metres (30 sq. ft.).
 - b. **Shower Room:** Build a room between the clean room and the dirty room. Provide constant separate supplies of hot and cold water. Provide valves controllable at shower(s) to regulate water temperature. Provide rigid piping with watertight connections and connect to water sources and drains. Provide soap, shampoo, clean towels and appropriate containers for disposal of used respirator filters. Filter waste water and direct it to a sanitary sewer drains.
 - c. **Clean Room:** Build a room between the shower room and the clean area outside of the decontamination enclosure. Provide hangers for workers' street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment, if required. Minimum size 3 square metres (30 sq. ft.). Provide a wash station with buckets filled with clean wash water and a supply of clean wash cloths. The water should be changed as needed throughout the work shift.
 - d. Provide a set of overlapping self-closing flaps between each room, and at both dirty and clean

entrances to enclosure systems.

3. The worker proceeds to the clean room of the Decontamination Unit and removes street clothes and personal belongings and stores them in the designated space.
4. The worker dons proper PPE which should consist of a powered air purifying respirator (PAPR) equipped with P100 HEPA filters, CSA approved steel toe rubber boots and disposable coveralls with hoods.
5. Each worker will proceed individually through the shower room and dirty room to the work area ensuring that each set of self-closing flaps are properly sealed before opening the next ones. If additional PPE has been stored in the dirty room, don the PPE prior to entering into the work area.

Removing Friable Asbestos-Containing Materials:

Note: A combination of cleaning techniques may be used including; HEPA vacuuming, washing, or wet wiping with disposable rags. The goal of the abatement is to remove all asbestos materials and debris from the work area prior to demolition. This will prevent asbestos fibres from leaving the work area while protecting the health and safety of the workers performing the work.

For removing friable asbestos-containing materials and settled dust from the work area, use the following safe work procedure:

1. Wet the ACM with water before removing.
2. While removing ACM, avoid procedures that create dust. Do not dry sweep or blow ACM with compressed air.
3. Bag the ACM in 6 mil disposable bags with the following label "CONTAINS ASBESTOS, CANCER HAZARD, AVOID BREATHING DUST". as it is removed. Ensure to double bag waste.
4. After removal, clean the work area with damp rags or HEPA vacuum. Dispose of all waste and vacuum bags as asbestos waste once completed.
5. On a daily basis, upon completion of the work activities:
 - a) clean tools and equipment; and
 - b) clean all surfaces in the work area to ensure all visible debris has been removed.
6. When the work area has been final cleaned, the consultant will complete a final visual inspection. Proper cleaning will ensure that all bulk asbestos materials have been removed from the substrate and no dust or debris remains in the enclosure. Based on the results of the inspection the work area may require re-cleaning.
7. Once the asbestos work area has passed a final inspection apply a coat of slow drying sealer to all surfaces in the asbestos work area and allow to dry for a minimum of 8 hours.
8. Upon approval of final air clearance sampling the enclosure may be dismantled

9. Following low-risk abatement procedures, remove polyethylene sheeting exposed during contaminated work including upper surfaces plus any underlying sheeting contaminated by water leaks, rips, tears, or exposed by failure of upper layer. wear half-face HEPA filtered respirators and disposable coveralls during removal of sheeting. Carefully roll sheeting away from walls to center of asbestos work area. As sheeting is rolled away from walls and corners, HEPA vacuum any visible debris.
10. Place polyethylene sheeting, seals, tape, cleaning material, clothing, and other contaminated waste in asbestos waste receptors for disposal. Remove any debris fallen behind sheeting with HEPA vacuum.

Exiting the Controlled Work Area:

For exiting the work area use the following safe work procedure:

1. Prior to leaving the work area remove bulk debris from coveralls, RPE, etc.
2. Proceed to the Decontamination Unit and remove disposable coveralls and rubber boots in the dirty room. All waste including disposable coveralls should be double bagged and disposed. Rubber boots should be appropriately cleaned to prevent the potential spread of ACM dust.
3. While still wearing a respirator proceed naked to the showers and clean the respirator to ensure that visible contamination is removed. Remove the respirator and place it in the clean room.
4. Continue to thoroughly wash hair and body with shampoo and soap prior to exiting the shower.
5. Clean and store respirators and respirator accessories.
6. Proceed to the clean change room, dry off and dress in street clothes.
7. Clean the inside of the respirator and store it in a fashion to allow it to be put on prior to entering asbestos work area at the start of the next shift without contaminating the clean area.



General Abatement Procedure for Delaminating Lead-Based Paint

GENERAL

This general abatement procedure is to be used by trained workers to remove delaminating paint from outdoor structure and debris. This procedure will assist in reducing the amount of airborne lead dust generated and protect the worker and the public during the abatement of lead based paint.

REQUIRED TOOLS AND EQUIPMENT

Personal Protective Equipment required

respirator with P100 HEPA filters
eye protection

CSA rubber boots (or disposable booties)
disposable coveralls

Supplies required

disposable bags
vacuum with HEPA filters
First Aid Kit
Fire Extinguisher

wash buckets with soap
6 mil polyethylene drop sheet
disposable rags
wire brush or steel wool

Lead Awareness training must be completed prior to completing lead abatement.

Lead abatement activities should be completed in general accordance with the Alberta Occupational Health and Safety (Alberta OH&S) Act, Regulations and Code, the Canada Labour Code (CLC) Part II and The Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances.

Part 18 of the Alberta OH&S Code, 2009 defines the requirements for PPE in the work place. Section 244 through 255 outline the requirements and limitations related to Respiratory Protective Equipment (RPE). Key elements included:

- The employer must prepare a code of practice governing the selection, maintenance and use of RPE (245)
- Employees must be fit tested in accordance with CSA Standard Z94.4-02, *Selection Use and Care of Respirators*

PROCEDURE

Entering the Controlled Work Area:

For entering the work area use the following safe work procedure:

1. Position barriers and/or warning signs at site access points. Only workers trained in the use and limitation of respiratory protective equipment and other personal protective equipment (PPE) should be accessing the site during abatement activities.
2. A decontamination area should be set up immediately at each entrance to the site. The decontamination area should have the following:

- a. polyethylene drop sheet;
 - b. wash bucket with clean water and soap;
 - c. clean rags;
 - d. storage area for staff clothing, equipment, supplies, etc.;
 - e. first aid kit;
 - f. waste receptacle; and
 - g. other PPE as required or identified from the job hazard assessment.
3. The worker proceeds to the decontamination area and removes excess street clothes and personal belongings and stores them in the designated space.
4. The worker dons proper PPE which, at a minimum, should consist of a half-face respirator equipped with P100 HEPA filters, rubber/nitrile gloves, CSA approved steel toe rubber boots (or disposable booties) and disposable coveralls with hoodies.

Removing Delaminating Lead-Based Paint, and Tool and Equipment Decontamination:

Note: A combination of cleaning techniques may be used including; HEPA vacuuming, mild scraping, or wet wiping with disposable rags. The goal of the abatement is to remove all delaminating paint materials and prevent lead dust from leaving the work area while protecting the health and safety of the workers performing the work.

For removing / cleaning up delaminating lead-based paint, tools use the following safe work procedure:

1. A designated “work area” should be established for equipment and tool decontamination. The work area is set up to help prevent cross contamination and prevent contaminated tools from leaving the work area. Prior to the start of work the work area should be properly cleaned as outlined in this procedure. A new drop sheet should be placed on the ground in the work area on a daily basis.
2. Loose delaminating paint should first be collected or vacuumed using a HEPA vacuum.
3. Once loose paint has been cleaned up the remaining paint should be wire brushed to removing and remaining loose paint.
4. Once all delaminating paint has been removed from the surfaces the area should be HEPA vacuumed to ensure all dust and debris has been removed from the work area.
5. The waste materials should be segregated as hazardous waste and tools and equipment should be safely stored. Place lead-containing waste in a sealable container and label the container to identify its contents, hazards, and the necessary precautions for handling the waste materials. To prevent any interference with the work activity, do not allow containers of hazardous waste to accumulate in the work area.
6. When an area has been final cleaned, the consultant will complete a final visual inspection. Based on the results of the visual inspection the area may require re-cleaning.
7. On a daily basis, upon completion of the work activities:

- a) fold up the drop sheet in the work area to contain any debris and place into 6mil polyethylene bag;
- b) clean tools and equipment; and
- c) clean all surfaces in the work area to ensure all visible debris has been removed.

Exiting the Controlled Work Area:

For exiting the building use the following safe work procedure:

1. Prior to leaving the work area remove bulk debris from coveralls, RPE, etc.
2. Proceed to the worker decontamination area and remove disposable coveralls and rubber boots. All waste including disposable coveralls should be bagged and disposed. Rubber boots should be appropriately cleaned to prevent the potential spread of lead dust.
3. Workers must use the provided soap and water to wash exposed body surfaces such as their hands and face along with their respirator upon leaving the work area.



General Procedures for Working With Silica

GENERAL

This safe work procedure is to be used by trained workers to safely dispose of concrete slabs and foundations. This procedure will assist in reducing the amount of airborne silica dust generated and protect the worker and the public during the removal of concrete materials.

REQUIRED TOOLS AND EQUIPMENT

Personal Protective Equipment (PPE) required

respirator with P100 HEPA filters
eye protection

CSA rubber boots (or disposable booties)
disposable coveralls

Supplies required

Water truck or other means of misting the air
First Aid Kit
Fire Extinguisher

wash buckets with soap
disposable rags

Silica Awareness training must be completed prior to completing concrete demolition.

Concrete demolition activities should be completed in general accordance with the Alberta Occupational Health and Safety (Alberta OH&S) Act, Regulations and Code, the Canada Labour Code (CLC) Part II and The Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances.

Part 18 of the Alberta OH&S Code, 2009 defines the requirements for PPE in the work place. Section 244 through 255 outline the requirements and limitations related to Respiratory Protective Equipment (RPE). Key elements included:

- The employer must prepare a code of practice governing the selection, maintenance and use of RPE (245)
- Employees must be fit tested in accordance with CSA Standard Z94.4-02, *Selection Use and Care of Respirators*

PROCEDURE

Entering the Controlled Work Area:

For entering the work area use the following safe work procedure:

1. Position barriers and/or warning signs at site access points. Only workers trained in the use and limitation of respiratory protective equipment and other personal protective equipment (PPE) should be accessing the site during concrete demolition activities.
2. A decontamination area should be set up immediately at each entrance to the site. The decontamination area should have the following:

- a. polyethylene drop sheet;
 - b. wash bucket with clean water and soap;
 - c. clean rags;
 - d. storage area for staff clothing, equipment, supplies, etc.;
 - e. first aid kit;
 - f. waste receptacle; and
 - g. other PPE as required or identified from the job hazard assessment.
3. The worker proceeds to the decontamination area and removes excess street clothes and personal belongings and stores them in the designated space.
4. The worker dons proper PPE which, at a minimum, should consist of a half-face respirator equipped with P100 HEPA filters, CSA approved steel toe rubber boots (or disposable booties) and disposable coveralls with hoodies.

Concrete Demolition and dust mitigation:

Note: The goal of this procedure is to minimize dust generation while protecting the health and safety of the workers performing the work.

To remove and dispose of concrete slabs and foundations use the following safe work procedure:

1. A designated “work area” should be established where only trained workers wearing adequate PPE may enter.
2. A water truck or other water misting source should be present on site for the duration of the work.
3. During mechanical demolition of concrete materials the area should be misted regularly to prevent dust from becoming airborne.
4. Once the bulk of the slab or foundation has been removed and loose dust should be collected to prevent it from becoming airborne.
5. Silica containing concrete is not considered a hazardous waste and does not require special packaging for transport to the landfill.

Exiting the Controlled Work Area:

For exiting the building use the following safe work procedure:

1. Prior to leaving the work area remove bulk debris from coveralls, RPE, etc.
2. Proceed to the decontamination area and remove disposable coveralls and rubber boots. All waste including disposable coveralls should be bagged and disposed of as regular waste.
3. Workers must use the provided soap and water to wash exposed body surfaces such as their hands and face along with their respirator upon leaving the work area.

APPENDIX B

Air Monitoring Procedures

RARMP – Non-Priority Sites
Sites Affected by the Kenow Wildfire
Waterton Lakes National Park, Alberta
SLR Project No. 203.02356.00001

ASBESTOS AIR MONITORING METHODOLOGY

Asbestos air sample collection and analysis will be conducted following the National Institute for Occupational Safety and Health (NIOSH) method 74000A in general accordance with the Alberta Asbestos Abatement Manual. Air samples will be collected with calibrated plug-in and battery-operated pumps fitted with Tygon tubing and mixed cellulose ester (MCE) filters housed in a conductive cowl. The asbestos air samples will be analyzed by phase contract microscopy in accordance with the National Institute of Occupational Safety and Health (NIOSH) method 7400A. Asbestos air sample analysis will be conducted by trained and proficient EHS^P technicians that participate in the Canadian Association for Laboratory Accreditation (CALA) proficiency testing program.

Field blanks will be collected during the course of abatement. Field blanks are used to assess sample handling in the field. These samples are handled exactly the same way as samples that are placed in areas or worn by workers but are not exposed to the work environment. Field blanks are collected to verify that the handling procedures of samples in the field do not influence sample results by contaminating the sampler and are specified in the method.

LEAD AIR MONITORING METHODOLOGY

The lead dust air sample collection will be completed in accordance with the NIOSH method 7300. The samples will be collected using battery-powered industrial hygiene sampling pumps. Each pump will be calibrated to draw a known flow-rate of air through method-appropriate sampling media. Sampling will be conducted for an approximate 8-hour time period. After sample collection is complete the samples will be sent to Paracel Laboratories, an American Industrial Hygiene Association (AIHA) accredited laboratory, for analysis. The samples will be analyzed within the regular turnaround period for the laboratory (approx. 5 business days from receipt at laboratory).

Field blanks will be collected and issued to the laboratory analyzing samples. Field blanks are used to assess sample handling in the field. These samples are handled exactly the same way as samples that are placed in areas or worn by workers but are not exposed to the work environment. Field blanks are collected to verify that the handling procedures of samples in the field do not influence sample results by contaminating the sampler and are specified in the method.

SILICA AIR MONITORING METHODOLOGY

The air sampling for respirable particulate and respirable crystalline silica (as quartz) will be completed following the NIOSH methods 0600/7500. The samples will be collected using battery-powered industrial hygiene sampling pumps. Each pump will be calibrated to draw a known amount of air through method-appropriate sampling media and cyclone attachment. After sample collection is complete, the samples will be sent to Galson Laboratories an American Industrial Hygiene Association (AIHA) accredited laboratory, for analysis. The samples will be analyzed within the regular turnaround period for the laboratory (approx. 5 business days from receipt at laboratory).

Field blanks will be collected and issued to the laboratory analyzing samples. Field blanks are used to assess sample handling in the field. These samples are handled exactly the same way as samples that are placed in areas or worn by workers but are not exposed to the work

environment. Field blanks are collected to verify that the handling procedures of samples in the field do not influence sample results by contaminating the sampler and are specified in the method.



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APPENDIX D

EHSP Debris Assessment Report



HAZARDOUS MATERIALS ASSESSMENT

39 SITES AFFECTED BY THE KENOW WILDFIRE
WATERTON LAKES NATIONAL PARK, ALBERTA

EHS^P Project Number: 456BB-18-009

Prepared by:

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Prepared for:

Public Services and Procurement Canada and Parks Canada Agency

July 2019

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CONFIDENTIAL

Distribution:

2 Hard Copies to – PSPC/PCA

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1.0 INTRODUCTION

1.1 Purpose

EHS Partnerships Ltd. (EHS^P) was retained by SLR Consulting (Canada) Ltd. to complete a hazardous materials assessment of 39 Sites in Waterton Lakes National Park, Alberta. The work was completed for Public Services and Procurement Canada (PSPC) on behalf of Parks Canada Agency (PCA).

Fieldwork for the assessments was conducted on November 29 – December 5, 2018 and May 13 - 14, 2019 by Jon Ernst, Project Manager for EHS Partnerships Ltd.

1.2 Scope of Work

The Scope of Work for the project was to conduct a hazardous materials assessment on 39 sites which were impacted by the Kenow Wild Fire in September 2017. Inaccessible areas, such as fixed ceiling spaces and behind fixed walls, were not investigated at the time of the assessment. Specifically, each site was assessed for the presence of the following materials:

- Asbestos containing materials (ACM);
- Lead based paints;
- Polychlorinated Biphenyls (PCB) in paint and light ballasts; and
- Silica in concrete.

2.0 BACKGROUND INFORMATION

EHS^P conducted the assessment for SLR on behalf of PCA. The surveys consisted of investigations of 39 sites located in Waterton Lakes National Park, Alberta two (2) site was deferred to Summer 2019 as noted in Table 2.1.

Table 2.1: Site Locations

Site Number	Site Name	Notes
1.1	Generator House – Crandell Campground	
1.2	Wood Storage Shed– Crandell Campground	
1.3	Washroom 1 – Crandell Campground	
1.4	Washroom 2 – Crandell Campground	
1.5	Kitchen Shelter 1 – Crandell Campground	
1.6	Kitchen Shelter 2 – Crandell Campground	
1.7	Kitchen Shelter 3 – Crandell Campground	
1.8	Kitchen Shelter 4 – Crandell Campground	
1.9	Interpretive Theatre – Crandell Campground	
1.10	129 Campsites – Crandell Campground	
1.11	Entrance Kiosk – Crandell Campground	Added for May 2019 Field Work
1.12	Solar Building #1 – Crandell Campground	
1.13	Solar Building #2 – Crandell Campground	
1.14	Solar Building #3 – Crandell Campground	
1.15	Solar Building #4 – Crandell Campground	
1.16	Solar Building #5 – Crandell Campground	
1.17	Sani-Dump Station – Crandell Campground	
1.18	Washroom 3 – Crandell Campground	
1.19	Washroom 4 – Crandell Campground	
1.20	Water Tower – Crandell Campground	
1.21	Host Campground – Crandell Campground	Site identified during May 2019 Field Work
2.1	Kitchen Shelter – Crandell Back Country Campground	
2.2	Four Campsites & Outhouse – Crandell Back Country Campground	Outhouse identified on site
2.3	Outhouse – Crandell Back Country Campground	
3.1	Melted Road Side Markers – Red Rock Parkway	
4.1	4 Campsites - Goat Lake Backcountry Campground	Removed from December 2018 & May 2019 Field Work
4.2	Outhouse - Goat Lake Backcountry Campground	
5.1	Golf Course Reservoir – Waterton Golf Course	
5.2	Lightning Shelter – Waterton Golf Course	
6.1	Seismic Station Building and associated infrastructure – Bear’s Hump Hiking Trail	May 2019 Field Work
7.1	Campground Washroom #2 – Waterton Town Campground	
7.2	Campground Washroom #6 – Waterton Town Campground	
7.3	Campground Washroom #8 – Waterton Town Campground	
7.4	Campground Washroom #9 – Waterton Town Campground	
8.1	Lost Horse Day Use Area – Red Rock Parkway	
8.2	Copper Mine Day Use Area – Red Rock Parkway	
8.3	Indigenous History Viewpoint – Red Rock Parkway	Added to December 2018 Fieldwork
9.1	McNealy’s Day Use Area – Akamina Parkway	
9.2	Little Prairie Day Use Area – Akamina Parkway	

3.0 REGULATIONS, STANDARDS, AND GUIDELINES

For the purposes of this report, the most stringent of the following federal and provincial requirements will be followed where applicable.

3.1.1 Federal Regulations and Guidelines

The sites are owned by PCA. Occupational Health and Safety (OHS) for federal employees is regulated by the Canada Labour Code (CLC) Part II and The Canada Occupational Health and Safety Regulations (COHSR), Part X, Hazardous Substances.

According to subsection 122.(1) of Part II of the CLC, hazardous substance is defined as: “a controlled product and a chemical, biological or physical agent that, by reason of a property that the agent possesses, is hazardous to the safety or health of a person exposed to it”. If there is a likelihood that the health or safety of an employee in a work place is or may be endangered by exposure to a hazardous substance, the employer shall, without delay:

- appoint a qualified person to carry out an investigation in that regard; and
- for the purposes of providing for the participation of the work place committee or the health and safety representative in the investigation, notify either of the proposed investigation and of the name of the qualified person appointed to carry out that investigation.

3.1.2 Provincial Regulations

Occupational Health and Safety in the Workplace is regulated in Alberta by Alberta Occupational Health and Safety (Alberta OH&S) and the Alberta OH&S Code, 2009. Part 2 Hazard Assessment, Elimination, and Control of the Alberta OH&S Code, 2009 details the requirements of employers to assess their work places for hazards and develop appropriate controls.

3.2 ASBESTOS-CONTAINING MATERIALS

3.2.1 Federal Regulations and Guidelines

The COHSR, Part X, Hazardous Substances covers specific requirements related to the management and control of asbestos-containing materials (ACM). There are also specific requirements for hazard prevention detailed in the Hazard Prevention Program (HPP) in the CLC. The asbestos management requirements in federally owned or leased buildings and facilities is also provided by the federal government in the National Joint Council Occupational Health and Safety Directive (NJC OHS), Part XI – Hazardous Substances, 11.6 Asbestos Management. Currently the NJC OHS Directive directs federal departments to follow the PSPC (formerly Public Works and Government Services Canada) Policy DP 057 dated 1997-12-03 for asbestos management. The NJC OHS Directive will soon be updated and DP 057 will be replaced with the new PSPC Asbestos Management Standard that was released in June 2017.

The June 2017 PSPC Asbestos Management Standard was released prior to recent changes made in the CLC Part II regarding asbestos management. The PSPC Standard is currently being revised and updated to include these recent amendments to the CLC. The following documents will be referenced in this report:

- Canada Labour Code, *Canada Occupational Health and Safety Regulations Part X, Hazardous Substances*; SOR/86-304, 2017-06-20 (or most current version);

- Public Services and Procurement Canada Asbestos Management Standard, June 2017 (or most current version);
- National Joint Council Occupational Health and Safety Directive (NJC OHS), Part XI – Hazardous Substances, 11.6 Asbestos Management, January 1, 2001 (or most current version); and
- Transport Canada, Transport of Dangerous Goods Regulations.

3.2.2 Provincial Regulations

The management and requirements for the potential disturbance of asbestos in buildings is also regulated at the provincial level under the Alberta OH&S Act, Regulations and Code, 2009. The legislation is referenced below:

- Alberta OH&S Act, Regulations and Code, 2009; and
- Alberta Asbestos Abatement Manual, 2012.

Federal Regulations define an ACM as a material that contains 1% or greater asbestos. For contractors onsite in Alberta, the Provincial Regulations are followed, as they are more stringent than the Federal Regulations. Alberta does not define ACM. Any amount of asbestos in building material means the materials are ACM, however employers are required to develop a Code of Practice for managing any ACM that contain 0.1% asbestos or greater.

Part 4 Chemical Hazards, Biological Hazards, Harmful Substances, of the Alberta (OH&S) Code, 2009 defines the general requirements for controlling worker exposure to chemical hazards in the work place. Sections 31 through 38 of Part 4 outline the requirements related to asbestos in facilities. Sections 31 to 35 outline the specific limitations on the use of asbestos in buildings and are summarized below:

- asbestos products that have the potential for releasing fibres may not be installed (31);
- all materials containing crocidolite are banned from use (32(1));
- spray-applied asbestos products are banned from use (32(2));
- asbestos products, in general, must not be in a form or location where they could release airborne fibres and allow them to enter a ventilation system (33);
- buildings to be demolished are to have all materials with the potential of releasing asbestos fibres removed (34); and
- buildings being altered or renovated are to have all materials with the potential of releasing asbestos fibres in the alteration or renovation areas removed (35).

The Alberta Asbestos Abatement Manual, 2012 is a guide published by Alberta OH&S that is used for determining compliance with the Alberta OH&S Act, Regulations and Code, 2009. The manual covers basic information on asbestos health hazards, requirements for worker protection, safe work practices, minimum sampling requirements, and the basic principles to follow for the safe abatement of ACM.

3.3 LEAD-BASED PAINT

Presently there are no regulations in Alberta specifically addressing lead levels in paint. There is still an onus on an employer to ensure the health and safety of workers engaged in the work and on the work site of that employer. In these circumstances, it is applicable to use the regulations set by the U.S. Department of Housing and Urban Development (HUD). HUD classifies lead-based paint as any paint application containing at least 1.0 milligram of lead per square centimeter of surface area (mg/cm²), or 5,000 milligram per kilogram (mg/kg) lead by weight, tested by chemical analysis. Canadian Federal regulation SOR/2016-193 Surface Coating Materials Regulations define a lead content greater than 90 mg/kg in a surface coating

as a lead-based paint. However, this is a value to keep the lead concentration in surface coatings as low as possible and should not be confused with health-based standards which correlates to acceptable blood lead levels. As part of this report, EHS^P will refer to the Canadian Federal Law classification of lead-based paint.

The Alberta Environmental Protection and Enhancement Act (Alberta EPEA) are regulations set out to protect the environment from hazardous materials. The Alberta User Guide for Waste Managers is a comprehensive document used to identify what is considered hazardous materials and how these materials are to be disposed.

The present requirement under the Alberta EPEA is to prevent the release of lead into the environment. Disposal of leachable lead-based products is outlined in the Alberta User Guide for Waste Managers issued by Alberta Environmental Protection, Environmental Services. Alberta Environmental Protection classifies leachable lead-based products as any dispersible application containing at least 5.0 milligrams of lead per litre (mg/L), tested by TCLP analysis. A dispersible paint is defined by the waste managers guide as a friable solid that can be ground to pass through a 9.5mm mesh opening.

3.4 Polychlorinated Biphenyls (PCB)

Canadian federal regulation SOR/2008/-273 PCB Regulations, and the Alberta EPEA “Waste Control Regulations”, 192/1996, outline the requirements for handling, storage, and removal of materials containing PCB.

The Alberta User Guide for Waste Managers guide defines materials containing more than 50mg/kg PCB as hazardous waste. The Canadian Council of Ministers of the Environment (CCME) *Canadian Environmental Quality Guidelines (EQG)* (1999, updated 2017) defines action levels for contamination of various compounds in soils. The action level for PCB for lands designated as Parkland is 1.3 milligrams per kilogram (mg/kg). As part of this report, EHS^P will refer to the CCME guideline of 1.3 mg/kg as the action limit above which remediation would be required.

3.5 SILICA

Part 4 Chemical Hazards, Biological Hazards, Harmful Substances, of the Alberta (OH&S) Code, 2009 defines the general requirements for controlling worker exposure to chemical hazards in the work place including silica dust. Silica dust may be generated and become airborne during construction activities including blasting, grinding, crushing, and sandblasting silica-containing materials. There are no specific disposal requirements for materials containing silica.

4.0 SURVEY METHODOLOGY

4.1 ASBESTOS-CONTAINING MATERIALS

Each site on was inspected in order to identify the locations of potential ACM. Representative samples of materials suspected of containing asbestos, that are considered friable or in poor condition, were sampled and submitted to Maxxam Analytics (Maxxam) or Paracel Laboratories Ltd. (Paracel) for analysis to determine asbestos type and percentage content using Polarized Light Microscopy and dispersion staining techniques in accordance with the United States Environmental Protection Agency (USEPA) methodologies. The systems reviewed included, but were not limited to:

- Structural - systems including fireproofing on beams, open and solid webbed joist systems, Q-deck;

- Mechanical - systems insulation including hot water and steam system, condensate system, chilled water system, glycol system, domestic hot and cold water, emergency generator exhaust, boiler units, heat exchangers, reboiler units, asbestos cement piping, wall joint compound, asbestos sheet products; and
- Architectural - systems including texture coats, sheet flooring, vinyl floor tile, acoustical spray-applied materials, condensation control applications, ceiling tile, wall board, drywall joint compound, asbestos sheet products.

Bulk sampling protocols followed the PSPC Standard, which indicates requirements for the number of samples to collect for each homogeneous material. Table 1.2 of the AAAM provides recommendations for sampling of homogeneous materials. For homogeneous materials, the minimum number of bulk samples collected should be completed as noted in Table 4.1 below as per the AAAM and PSPC. If analysis establishes that a bulk material sample does contain asbestos, then the entire area of homogeneous material from which the bulk material sample was taken is considered to be asbestos-containing.

Table 4.1: Bulk Material Samples

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Samples Collected
Any homogeneous material, including but not limited to fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes and visually similar floor tiles.	Less than 90 m ² (<1000 ft ²)	3
	90 m ² or more but less than 450 m ² (1000-5000 ft ²)	5
	450 m ² or more (>5000 ft ²)	7

The work was conducted in accordance with standards outlined by the National Institute for Occupational Safety and Health (NIOSH).

4.1.1 Buildings Constructed After 1995

Buildings constructed after 1995, following strict federal limitations on the use of asbestos in buildings, are not suspected to contain asbestos building materials. EHS^P followed PSPC's *Guidance on Sampling in Buildings Constructed After 1995* stating:

- For all buildings constructed after 1995 PSPC recommends the buildings be visually inspected for potential ACM (which exceeds the 1995 criteria) by a competent person. Sampling should be performed only when a competent person has determined there is a likelihood of a friable material being ACM, and/or if the potential non-friable ACM is in poor condition and may potentially release fibers.

4.2 LEAD-BASED PAINT

Testing for lead-based paint was conducted by collecting bulk samples of the suspect material and submitting to Maxxam or Paracel. Interior and exterior painted surfaces were tested for the presence of lead paint. Results are reported as milligrams per kilogram (mg/kg) Paints found to contain lead above 90mg/kg were classified by condition using the matrix as outlined in Table 4.2.

Table 4.2: Lead Paint Condition Matrix

Condition	Description
Good	Well adhered to material surface, material in good condition
Adhered	Well adhered to materials surface, material in poor condition
Fair	Some paint peeling from material surface
Poor	More than 20% of the paint peeling from the material surface

For the purpose of the assessment materials in Fair to poor condition were considered to be dispersible as defined by the Alberta Waste Managers Guide.

4.3 POLYCHLORINATED BIPHENYLS

The sites were visually assessed for the presence of PCB in fluorescent light ballasts and paints. Suspected PCB-containing light ballasts were inspected and compared to the criteria found in the Environment Canada Report Identification of Lamp Ballasts Containing PCB, EPS 2/CC/2 (revised) August 1991.

Paint samples were collected and submitted to Maxxam or Paracel for analysis to determine the concentration of PCB in the sample. Results are reported as milligram per kilogram (mg/kg).

4.4 SILICA

Bulk samples of materials suspected to contain silica were collected and submitted to Maxxam or Paracel. Results are reported as % Silicon Dioxide (%SiO₂). Laboratory results received from Paracel were reported as %Silica. Results were converted to %SiO₂ by dividing by the mass ratio of Si to SiO₂

4.5 SAMPLE COLLECTION

All Samples were collected using chisels, razor scrapers, or a hammer drill. Tools were wiped down between samples using single use baby wipes. Samples were collected and sealed in Whirl-Pak bags for submission.

4.6 QUALITY ASSURANCE/ QUALITY CONTROL

Quality Assurance and Quality Control (QA/QC) Plans ensure that data used to evaluate analytical results are accurate and reliable. In this way, data interpretation and analysis will produce results that are scientifically accurate and defensible. All samples were submitted to Maxxam and Paracel, which are National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratories. The Laboratories follow the ISO/IEC 17025 - Testing and Calibration Laboratories standard. Following the standard the laboratories conduct a QA/QC Review of their analytical method for each batch of samples. The Batch review evaluates reproducibility of results, recovery of known spikes and laboratory blank analysis. Any discrepancies are then reported to the clients in a timely manner.

5.0 RESULTS

5.1 ASBESTOS-CONTAINING MATERIALS

Bulk samples of materials suspected to contain asbestos were collected at each site. A total of 268 samples were collected. All samples were sent via Chain of Custody to Maxxam and Paracel for analysis.

The laboratory reporting limit of quantization by PLM EPA/600/R-93/116 (Calibrated Visual Estimation) is <1%, although asbestos may be quantitatively identified at concentrations less than 1%. “None Detected” indicates that no asbestos fibres were observed.

Eighteen (18) samples were identified to contain asbestos. The results are summarized in Tables 5.1 Laboratory certificates of analysis are presented in Appendix A. Site plans indicating sample locations are included on Drawings 1 through 38. A photolog of the samples collected and their location is presented in Appendix B.

Table 5.1: Asbestos Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	Asbestos Type and %
1.1-A1.1	Siding Dark Grey	Site 1.1 Debris Pile	None Detected
1.1-A1.2	Siding Brown Grey	Site 1.1 Debris Pile	None Detected
1.1-A2.1	Siding Dark Grey	Site 1.1 Debris Pile	None Detected
1.1-A2.2	Siding Brown Grey	Site 1.1 Debris Pile	None Detected
1.1-A3.1	Siding Dark Grey	Site 1.1 Debris Pile	None Detected
1.1-A3.2	Siding Brown Grey	Site 1.1 Debris Pile	None Detected
1.1-A4	Door Caulking	Site 1.1 Debris Pile	None Detected
1.1-A5	Door Caulking	Site 1.1 Debris Pile	None Detected
1.1-A6	Door Caulking	Site 1.1 Debris Pile	None Detected
1.1-A7	Concrete Slab	Site 1.1 Debris Pile	None Detected
1.1-A8	Concrete Slab	Site 1.1 Debris Pile	None Detected
1.1-A9	Concrete Slab	Site 1.1 Debris Pile	None Detected
Samples collected at Site 1.4 were recorded as 1.3			
1.3-A1	Wall Plaster	Site 1.4 Debris Pile	None Detected
1.3-A2	Wall Plaster	Site 1.4 Debris Pile	None Detected
1.3-A3	Wall Plaster	Site 1.4 Debris Pile	None Detected
1.3-A4	Concrete Slab	Site 1.4 Debris Pile	None Detected
1.3-A5	Concrete Slab	Site 1.4 Debris Pile	None Detected
1.3-A6	Concrete Slab	Site 1.4 Debris Pile	None Detected
1.3-A7	Pipe Packing Compound	Site 1.4 Debris Pile	None Detected
1.3-A8	Pipe Packing Compound	Site 1.4 Debris Pile	None Detected
1.3-A9	Pipe Packing Compound	Site 1.4 Debris Pile	None Detected
1.3-A10	Asphalt Shingles	Site 1.4 Debris Pile	None Detected
1.3-A11	Asphalt Shingles	Site 1.4 Debris Pile	None Detected
1.3-A12	Asphalt Shingles	Site 1.4 Debris Pile	None Detected
1.3-A13	Solar Building #2 Roof Seal	Site 1.13 Solar Building Roof	None Detected
1.3-A14	Solar Building #2 Roof Seal	Site 1.13 Solar Building Roof	None Detected
1.3-A15	Solar Building #2 Roof Seal	Site 1.13 Solar Building Roof	None Detected

Table 5.1: Asbestos Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	Asbestos Type and %
Samples collected at Site 1.3 were recorded as 1.4			
1.4-A1	Concrete Slab	Site 1.3 Debris Pile	None Detected
1.4-A2	Concrete Slab	Site 1.3 Debris Pile	None Detected
1.4-A3	Concrete Slab	Site 1.3 Debris Pile	None Detected
1.4-A4	Wall Plaster	Site 1.3 Debris Pile	None Detected
1.4-A5	Wall Plaster	Site 1.3 Debris Pile	None Detected
1.4-A6	Wall Plaster	Site 1.3 Debris Pile	None Detected
1.4-A7	Asphalt Shingles	Site 1.3 Debris Pile	None Detected
1.4-A8	Asphalt Shingles	Site 1.3 Debris Pile	None Detected
1.4-A9	Asphalt Shingles	Site 1.3 Debris Pile	None Detected
1.4-A10	Pipe Packing Compound	Site 1.3 Debris Pile	None Detected
1.4-A11	Pipe Packing Compound	Site 1.3 Debris Pile	None Detected
1.4-A12	Pipe Packing Compound	Site 1.3 Debris Pile	None Detected
1.4-A13	Solar Building #1 Roof Seal	Site 1.12 Solar Building Roof	None Detected
1.4-A14	Solar Building #1 Roof Seal	Site 1.12 Solar Building Roof	None Detected
1.4-A15	Solar Building #1 Roof Seal	Site 1.12 Solar Building Roof	None Detected
1.5-A1	Chimney Mortar	Site 1.5 Debris Pile	None Detected
1.5-A2	Chimney Mortar	Site 1.5 Debris Pile	None Detected
1.5-A3	Chimney Mortar	Site 1.5 Debris Pile	None Detected
1.5-A4	Concrete Slab	Site 1.5 Debris Pile	None Detected
1.5-A5	Concrete Slab	Site 1.5 Debris Pile	None Detected
1.5-A6	Concrete Slab	Site 1.5 Debris Pile	None Detected
1.5-A7	Asphalt Shingles	Site 1.5 Debris Pile	None Detected
1.5-A8	Asphalt Shingles	Site 1.5 Debris Pile	None Detected
1.5-A9	Asphalt Shingles	Site 1.5 Debris Pile	None Detected
1.6-A1	Chimney Mortar	Site 1.6 Debris Pile	None Detected
1.6-A2	Chimney Mortar	Site 1.6 Debris Pile	None Detected
1.6-A3	Chimney Mortar	Site 1.6 Debris Pile	None Detected
1.6-A4	Concrete Slab	Site 1.6 Debris Pile	None Detected
1.6-A5	Concrete Slab	Site 1.6 Debris Pile	None Detected
1.6-A6	Concrete Slab	Site 1.6 Debris Pile	None Detected
1.6-A7	Asphalt Shingles	Site 1.6 Debris Pile	None Detected
1.6-A8	Asphalt Shingles	Site 1.6 Debris Pile	None Detected
1.6-A9	Asphalt Shingles	Site 1.6 Debris Pile	None Detected
1.7-A1	Chimney Mortar	Site 1.7 Debris Pile	None Detected
1.7-A2	Chimney Mortar	Site 1.7 Debris Pile	None Detected
1.7-A3	Chimney Mortar	Site 1.7 Debris Pile	None Detected
1.7-A4	Concrete Slab	Site 1.7 Debris Pile	None Detected
1.7-A5	Concrete Slab	Site 1.7 Debris Pile	None Detected
1.7-A6	Concrete Slab	Site 1.7 Debris Pile	None Detected
1.7-A7	Asphalt Shingles	Site 1.7 Debris Pile	None Detected
1.7-A8	Asphalt Shingles	Site 1.7 Debris Pile	None Detected
1.7-A9	Asphalt Shingles	Site 1.7 Debris Pile	None Detected
1.8-A1	Chimney Mortar	Site 1.8 Debris Pile	None Detected
1.8-A2	Chimney Mortar	Site 1.8 Debris Pile	None Detected

Table 5.1: Asbestos Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	Asbestos Type and %
1.8-A3	Chimney Mortar	Site 1.8 Debris Pile	None Detected
1.8-A4	Concrete Slab	Site 1.8 Debris Pile	None Detected
1.8-A5	Concrete Slab	Site 1.8 Debris Pile	None Detected
1.8-A6	Concrete Slab	Site 1.8 Debris Pile	None Detected
1.8-A7	Asphalt Shingles	Site 1.8 Debris Pile	None Detected
1.8-A8	Asphalt Shingles	Site 1.8 Debris Pile	None Detected
1.8-A9	Asphalt Shingles	Site 1.8 Debris Pile	None Detected
1.9-A1	Concrete Walls	Site 1.9 Debris Pile	None Detected
1.9-A2	Concrete Walls	Site 1.9 Debris Pile	None Detected
1.9-A3	Concrete Walls	Site 1.9 Debris Pile	None Detected
1.9-A4	Parging - Exterior	Site 1.9 Debris Pile	None Detected
1.9-A5	Parging - Exterior	Site 1.9 Debris Pile	None Detected
1.9-A6	Parging - Exterior	Site 1.9 Debris Pile	None Detected
1.9-A7	Mortar - Top of Wall	Site 1.9 Debris Pile	None Detected
1.9-A8	Mortar - Top of Wall	Site 1.9 Debris Pile	None Detected
1.9-A9	Mortar - Top of Wall	Site 1.9 Debris Pile	None Detected
1.10-A1	Parging - Exterior	Site 1.10 Campground A8 Picnic Table	None Detected
1.10-A2	Parging - Exterior	Site 1.10 Campground B13 Picnic Table	None Detected
1.10-A3	Parging - Exterior	Site 1.10 Campground C7 Picnic Table	None Detected
1.11-A1	Parging - Exterior	Site 1.11 Foundation	None Detected
1.11-A2	Parging - Exterior	Site 1.11 Foundation	None Detected
1.11-A3	Parging - Exterior	Site 1.11 Foundation	None Detected
1.11-A4	Caulking (White)	Site 1.11 Windows	None Detected
1.11-A5	Caulking (White)	Site 1.11 Windows	None Detected
1.11-A6	Caulking (White)	Site 1.11 Windows	None Detected
1.11-A7	Glazing Putty	Site 1.11 Windows	None Detected
1.11-A8	Glazing Putty	Site 1.11 Windows	None Detected
1.11-A9	Glazing Putty	Site 1.11 Windows	None Detected
1.11-A10	Concrete Slab	Site 1.11 Floor	None Detected
1.11-A11	Concrete Slab	Site 1.11 Floor	None Detected
1.11-A12	Concrete Slab	Site 1.11 Floor	None Detected
1.11-A13	Vinyl Sheet Flooring (Green)	Site 1.11 Floor	None Detected
1.11-A14	Vinyl Sheet Flooring (Green)	Site 1.11 Floor	None Detected
1.11-A15	Vinyl Sheet Flooring (Green)	Site 1.11 Floor	None Detected
1.12-A1	Concrete Slab	Site 1.12 Floor	None Detected
1.12-A2	Concrete Slab	Site 1.12 Floor	None Detected
1.12-A3	Concrete Slab	Site 1.12 Floor	None Detected
1.13-A1	Concrete Slab	Site 1.13 Floor	None Detected

Table 5.1: Asbestos Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	Asbestos Type and %
1.13-A2	Concrete Slab	Site 1.13 Floor	None Detected
1.13-A3	Concrete Slab	Site 1.13 Floor	None Detected
1.14-A1	Roof Seal	Site 1.14 Ceiling	None Detected
1.14-A2	Roof Seal	Site 1.14 Ceiling	None Detected
1.14-A3	Roof Seal	Site 1.14 Ceiling	None Detected
1.14-A4	Concrete Slab	Site 1.14 Floor	None Detected
1.14-A5	Concrete Slab	Site 1.14 Floor	None Detected
1.14-A6	Concrete Slab	Site 1.14 Floor	None Detected
1.15-A1	Roof Seal	Site 1.15 Ceiling	None Detected
1.15-A2	Roof Seal	Site 1.15 Ceiling	None Detected
1.15-A3	Roof Seal	Site 1.15 Ceiling	None Detected
1.15-A4	Concrete Slab	Site 1.15 Floor	None Detected
1.15-A5	Concrete Slab	Site 1.15 Floor	None Detected
1.15-A6	Concrete Slab	Site 1.15 Floor	None Detected
1.15-A7	Penetration Parging	Site 1.15 Walls	None Detected
1.15-A8	Penetration Parging	Site 1.15 Walls	None Detected
1.15-A9	Penetration Parging	Site 1.15 Walls	None Detected
1.16-A1	Roof Seal	Site 1.16 Ceiling	None Detected
1.16-A2	Roof Seal	Site 1.16 Ceiling	None Detected
1.16-A3	Roof Seal	Site 1.16 Ceiling	None Detected
1.16-A4	Penetration Parging	Site 1.16 Walls	None Detected
1.16-A5	Penetration Parging	Site 1.16 Walls	None Detected
1.16-A6	Penetration Parging	Site 1.16 Walls	None Detected
1.16-A7	Concrete Slab	Site 1.16 Floor	None Detected
1.16-A8	Concrete Slab	Site 1.16 Floor	None Detected
1.16-A9	Concrete Slab	Site 1.16 Floor	None Detected
1.17-A1	Concrete Slab	Site 1.17 Floor	None Detected
1.17-A2	Concrete Slab	Site 1.17 Floor	None Detected
1.17-A3	Concrete Slab	Site 1.17 Floor	None Detected
1.18-A1	Asphalt Shingles	Site 1.18 Roof	None Detected
1.18-A2	Asphalt Shingles	Site 1.18 Roof	None Detected
1.18-A3	Asphalt Shingles	Site 1.18 Roof	None Detected
1.18-A4	Concrete Slab	Site 1.18 Floor	None Detected
1.18-A5	Concrete Slab	Site 1.18 Floor	None Detected
1.18-A6	Concrete Slab	Site 1.18 Floor	None Detected
1.18-A7	Tile Grout (Red)	Site 1.18 Walls	Chrysotile, <1%
1.18-A8	Tile Grout (Red)	Site 1.18 Walls	None Detected
1.18-A9	Tile Grout (Red)	Site 1.18 Walls	None Detected

Table 5.1: Asbestos Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	Asbestos Type and %
1.19-A1	Concrete Slab	Site 1.19 Floor	None Detected
1.19-A2	Concrete Slab	Site 1.19 Floor	None Detected
1.19-A3	Concrete Slab	Site 1.19 Floor	None Detected
1.19-A4	Asphalt Shingles	Site 1.19 Roof	None Detected
1.19-A5	Asphalt Shingles	Site 1.19 Roof	None Detected
1.19-A6	Asphalt Shingles	Site 1.19 Roof	None Detected
1.19-A7	Tile Grout (Red)	Site 1.19 Walls	None Detected
1.19-A8	Tile Grout (Red)	Site 1.19 Walls	None Detected
1.19-A9	Tile Grout (Red)	Site 1.19 Walls	None Detected
1.21-A1	Cementitious Tile	Site 1.21 Debris	None Detected
1.21-A2	Cementitious Tile	Site 1.21 Debris	None Detected
1.21-A3	Cementitious Tile	Site 1.21 Debris	None Detected
2.1-A1	Asphalt Shingles	Site 2.1 Debris Pile	None Detected
2.1-A2	Asphalt Shingles	Site 2.1 Debris Pile	None Detected
2.1-A3	Asphalt Shingles	Site 2.1 Debris Pile	None Detected
2.1-A4	Concrete Piles	Site 2.1 Debris Pile	None Detected
2.1-A5	Concrete Piles	Site 2.1 Debris Pile	None Detected
2.1-A6	Concrete Piles	Site 2.1 Debris Pile	None Detected
5.1-A1	Moisture Barrier	Site 5.1 Foundation	None Detected
5.1-A2	Moisture Barrier	Site 5.1 Foundation	None Detected
5.1-A3	Moisture Barrier	Site 5.1 Foundation	None Detected
5.1-A4	Foundation Concrete	Site 5.1 Foundation	None Detected
5.1-A5	Foundation Concrete	Site 5.1 Foundation	None Detected
5.1-A6	Foundation Concrete	Site 5.1 Foundation	None Detected
5.2-A1	Concrete Slab	Site 5.2 Foundation	None Detected
5.2-A2	Concrete Slab	Site 5.2 Foundation	None Detected
5.2-A3	Concrete Slab	Site 5.2 Foundation	None Detected
6.1-A1	Block Mortar	Site 6.1 Walls	None Detected
6.1-A2	Block Mortar	Site 6.1 Walls	None Detected
6.1-A3	Block Mortar	Site 6.1 Walls	None Detected
6.1-A4	Vermiculite	Site 6.1 Walls	Actinolite, 3%
6.1-A5	Vermiculite	Site 6.1 Walls	Actinolite, 3%
6.1-A6	Vermiculite	Site 6.1 Walls	Actinolite, 3%
6.1-A7	Vermiculite	Site 6.1 Walls	Actinolite, 3%
6.1-A8	Penetration Caulking	Site 6.1 Walls	None Detected
6.1-A9	Penetration Caulking	Site 6.1 Walls	Chrysotile, <1%
6.1-A10	Penetration Caulking	Site 6.1 Walls	Chrysotile, <1%
6.1-A11	Concrete Slab	Site 6.1 Floor	None Detected
6.1-A12	Concrete Slab	Site 6.1 Floor	None Detected
6.1-A13	Concrete Slab	Site 6.1 Floor	Chrysotile, <1%

Table 5.1: Asbestos Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	Asbestos Type and %
7.1-A1	Cement Board Walls	Site 7.1 Walls	Chrysotile, 12%
7.1-A2	Cement Board Ceiling	Site 7.1 Ceiling	Chrysotile, 15%
7.1-A3	Building Paper	Site 7.1 Exterior Walls	None Detected
7.1-A4	Building Paper	Site 7.1 Exterior Walls	None Detected
7.1-A5	Building Paper	Site 7.1 Exterior Walls	None Detected
7.1-A6	Glazing Putty	Site 7.1 Windows	None Detected
7.1-A7	Glazing Putty	Site 7.1 Windows	None Detected
7.1-A8	Glazing Putty	Site 7.1 Windows	None Detected
7.1-A9	Asphalt Shingles	Site 7.1 Roof	None Detected
7.1-A10	Asphalt Shingles	Site 7.1 Roof	None Detected
7.1-A11	Asphalt Shingles	Site 7.1 Roof	None Detected
7.1-A12	Riverstone Mortar	Site 7.1 Exterior Walls	None Detected
7.1-A13	Riverstone Mortar	Site 7.1 Exterior Walls	None Detected
7.1-A14	Riverstone Mortar	Site 7.1 Exterior Walls	None Detected
7.1-A15	Pipe Packing Compound	Site 7.1 Piping	None Detected
7.2-A1	Cement Board Walls	Site 7.2 Walls	Chrysotile, 15%
7.2-A2	Cement Board Ceiling	Site 7.2 Ceiling	Chrysotile, 15%
7.2-A3	Riverstone Mortar	Site 7.2 Exterior Walls	None Detected
7.2-A4	Riverstone Mortar	Site 7.2 Exterior Walls	None Detected
7.2-A5	Riverstone Mortar	Site 7.2 Exterior Walls	None Detected
7.2-A6	Asphalt Shingles	Site 7.2 Roof	None Detected
7.2-A7	Asphalt Shingles	Site 7.2 Roof	None Detected
7.2-A8	Asphalt Shingles	Site 7.2 Roof	None Detected
7.2-A9	Glazing Putty	Site 7.2 Windows	None Detected
7.2-A10	Glazing Putty	Site 7.2 Windows	None Detected
7.2-A11	Glazing Putty	Site 7.2 Windows	None Detected
7.3-A1	Cement Board Walls	Site 7.3 Walls	Chrysotile, 15%
7.3-A2	Cement Board Ceiling	Site 7.3 Ceiling	Chrysotile, 15%
7.3-A3	Cement Board Ceiling	Site 7.3 Ceiling	Chrysotile, 15%
7.3-A4	Cement Board Ceiling	Site 7.3 Ceiling	Chrysotile, 15%
7.3-A5	Glazing Putty	Site 7.3 Windows	None Detected
7.3-A6	Glazing Putty	Site 7.3 Windows	None Detected
7.3-A7	Glazing Putty	Site 7.3 Windows	None Detected
7.4-A1	Cement Board Walls	Site 7.4 Walls	Chrysotile, 15%
7.4-A2	Cement Board Ceiling	Site 7.4 Ceiling	Chrysotile, 15%
7.4-A3	Glazing Putty	Site 7.4 Windows	None Detected
7.4-A4	Glazing Putty	Site 7.4 Windows	None Detected
7.4-A5	Glazing Putty	Site 7.4 Windows	None Detected
7.4-A6	Asphalt Shingles	Site 7.4 Roof	None Detected
7.4-A7	Asphalt Shingles	Site 7.4 Roof	None Detected
7.4-A8	Asphalt Shingles	Site 7.4 Roof	None Detected
8.1-A1	Roofing Felt	Site 8.1 Kitchen Shelter Roof	None Detected
8.1-A2	Roofing Felt	Site 8.1 Kitchen Shelter Roof	None Detected
8.1-A3	Chimney Mortar	Site 8.1 Kitchen Shelter Chimney	None Detected
8.1-A4	Concrete Picnic Table	Site 8.1 Adjacent Kitchen Shelter	None Detected

Table 5.1: Asbestos Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	Asbestos Type and %
8.1-A5	Roofing Felt	Site 8.1 Outhouse Roof	None Detected
8.1-A6	Concrete Bin Slab	Site 8.1 Garbage Bin Slab	None Detected
8.2-A1	Siding	Site 8.2 Outhouse Debris Pile	None Detected
8.2-A2.1	Siding Grey	Site 8.2 Outhouse Debris Pile	None Detected
8.2-A2.2	Siding White	Site 8.2 Outhouse Debris Pile	None Detected
8.2-A3	Concrete Slab	Site 8.2 Kitchen Shelter Debris Pile	None Detected
8.2-A4	Chimney Mortar	Site 8.2 Kitchen Shelter Debris Pile	None Detected
9.1-A1.1	Chimney Mortar Grey	Site 9.1 Kitchen Shelter Debris Pile	None Detected
9.1-A1.2	Chimney Mortar Black Coating	Site 9.1 Kitchen Shelter Debris Pile	None Detected
9.1-A2	Chimney Mortar	Site 9.1 Kitchen Shelter Debris Pile	None Detected
9.1-A3.1	Chimney Mortar Grey	Site 9.1 Kitchen Shelter Debris Pile	None Detected
9.1-A3.2	Chimney Mortar Black Coating	Site 9.1 Kitchen Shelter Debris Pile	None Detected
9.1-A4	Concrete Slab	Site 9.1 Kitchen Shelter Debris Pile	None Detected
9.1-A5	Concrete Slab	Site 9.1 Kitchen Shelter Debris Pile	None Detected
9.1-A6	Concrete Slab	Site 9.1 Kitchen Shelter Debris Pile	None Detected
9.1-A7	Cement Board Siding	Site 9.1 Outhouse Debris Pile	None Detected
9.1-A8	Cement Board Siding	Site 9.1 Outhouse Debris Pile	None Detected
9.1-A9.1	Cement Board Siding Dark Grey	Site 9.1 Outhouse Debris Pile	None Detected
9.1-A9.2	Cement Board Siding Brown	Site 9.1 Outhouse Debris Pile	None Detected
9.1-A10	Caulking (White)	Site 9.1 Outhouse Debris Pile	None Detected
9.1-A11	Caulking (White)	Site 9.1 Outhouse Debris Pile	None Detected
9.1-A12	Caulking (White)	Site 9.1 Outhouse Debris Pile	None Detected
9.2-A1	Cement Board Siding	Site 9.2 Outhouse Debris Pile	None Detected
9.2-A2	Cement Board Siding	Site 9.2 Outhouse Debris Pile	None Detected
9.2-A3	Cement Board Siding	Site 9.2 Outhouse Debris Pile	None Detected
9.2-A4	Caulking (White)	Site 9.2 Outhouse Debris Pile	None Detected
9.2-A5	Caulking (White)	Site 9.2 Outhouse Debris Pile	None Detected
9.2-A6	Caulking (White)	Site 9.2 Outhouse Debris Pile	None Detected
9.2-A7	Asphalt Shingles	Site 9.2 Outhouse Debris Pile	None Detected
9.2-A8	Asphalt Shingles	Site 9.2 Outhouse Debris Pile	None Detected
9.2-A9	Asphalt Shingles	Site 9.2 Outhouse Debris Pile	None Detected
9.2-A10	Concrete Slab	Site 9.2 Outhouse Debris Pile	None Detected
9.2-A11	Concrete Slab	Site 9.2 Outhouse Debris Pile	None Detected
9.2-A12	Concrete Slab	Site 9.2 Outhouse Debris Pile	None Detected
9.2-A13	Chimney Mortar	Site 9.2 Kitchen Shelter Chimney	None Detected
10.1-A1	Bench Concrete Pile	Site 8.3 Debris Pile	None Detected

The following materials were common to the sites. These materials do not contain asbestos and were not sampled during the investigation:

- Metal doors and equipment; and
- Wood materials.

5.2 LEAD-BASED PAINT

Eighty-three (83) paint samples suspected to contain lead were collected from the typically finished interior and exterior surfaces. Fifty-one (51) samples were confirmed to contain amounts of lead equal or greater than 90 mg/kg. The results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A. Site plans indicating sample locations are included on Drawings 1 through 38. A photolog of the samples collected and their location is presented in Appendix B. The sample results are summarized in Table 5.2 below:

Table 5.2: Lead Paint Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	Concentration (mg/kg) ⁽¹⁾	Condition
1.1-Pb1	Pink / Beige Paint Siding	Site 1.1 Debris Pile	11	--
1.1-Pb2	Pink / Beige Paint Siding	Site 1.1 Debris Pile	300	Adhered
1.1-Pb3	Green Siding	Site 1.1 Debris Pile	14	--
1.4-Pb1	Beige Metal Door	Site 1.12 Door	<13	--
1.5-Pb1	Black Stove	Site 1.5 Debris Pile	<10	--
1.5-Pb2	Beige Metal Food Bin	Site 1.5 Debris Pile	61	--
1.6-Pb1	Black Stove	Site 1.6 Debris Pile	10	--
1.7-Pb1	Beige Metal Food Bin	Site 1.7 Debris Pile	76	--
1.8-Pb1	Black Stove	Site 1.8 Debris Pile	<10	--
1.8-Pb2	Beige Metal Food Bin	Site 1.8 Debris Pile	56	--
1.10-Pb1	Brown Metal Food Storage Bin	Site 1.10 Campground C7	<10	--
1.10-Pb2	Brown Metal Food Storage Bin	Site 1.10 Campground D11	<10	--
1.10-Pb3	Brown Metal Food Storage Bin	Site 1.10 Campground E01	<10	--
1.10-Pb4	Brown Metal Food Storage Bin	Site 1.10 Campground G6	510	Poor
1.10-Pb5	Brown Metal Food Storage Bin	Site 1.10 Campground I1	<10	--
1.11-Pb1	Beige Exterior Wood	Site 1.11 Window Frames and Trim	11,400	Poor
1.11-Pb2	Beige Exterior Wood	Site 1.11 Window Frames and Trim	4,710	Poor
1.11-Pb3	Green Exterior Wood	Site 1.11 Siding	<20	--
1.11-Pb4	Green Exterior Wood	Site 1.11 Siding	<20	--
1.11-Pb5	Beige Interior Wood	Site 1.11 Walls	<20	--
1.11-Pb6	White Interior Wood	Site 1.11 Trim	<20	--
1.18-Pb1	Green Wood Siding	Site 1.18 Exterior Walls	23,700	Poor
1.18-Pb2	Green Wood Siding	Site 1.18 Exterior Walls	28,400	Poor
1.18-Pb3	Beige Wood Trim	Site 1.18 Exterior Walls	620	Poor
1.18-Pb4	Beige Wood Trim	Site 1.18 Exterior Walls	3,980	Poor
1.19-Pb1	Green Wood Siding	Site 1.19 Exterior Walls	11,100	Poor
1.19-Pb2	Green Wood Siding	Site 1.19 Exterior Walls	9,140	Poor
1.19-Pb3	Beige Wood Trim	Site 1.19 Exterior Walls	9,360	Poor

Table 5.2: Lead Paint Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	Concentration (mg/kg)⁽¹⁾	Condition
1.19-Pb4	Beige Wood Trim	Site 1.19 Exterior Walls	8,280	Poor
1.20-Pb1	Grey Metal Structure	Site 1.20 Exterior	6,890	Fair
2.1-Pb1	Beige Metal Flashing	Site 2.1 Debris Pile	86	--
6.1-Pb1	Green Concrete Block Walls	Site 6.1 Walls	288	Fair
6.1-Pb2	Green Concrete Block Walls	Site 6.1 Walls	333	Fair
7.1-Pb1	Beige Wood Stalls	Site 7.1 Walls	2,900	Fair
7.1-Pb2	Beige Wood Stalls	Site 7.1 Walls	2,900	Fair
7.1-Pb3	Grey wood Ceiling	Site 7.1 Ceiling	140,000	Good
7.1-Pb4	Grey wood Ceiling	Site 7.1 Ceiling	120,000	Good
7.1-Pb5	Brown Metal Door	Site 7.1 Door	5,700	Good
7.1-Pb6	Brown Wood Siding	Site 7.1 Walls	36,000	Poor
7.1-Pb7	White Wood Exterior Trim	Site 7.1 Walls	73,000	Poor
7.1-Pb8	White Wood Exterior	Site 7.1 Windows	91,000	Poor
7.1-Pb9	Green Wood	Site 7.1 Door & Window Covers	35,000	Poor
7.2-Pb1	Beige Wood Stalls	Site 7.2 Walls	2,000	Good
7.2-Pb2	Grey wood Ceiling	Site 7.2 Ceiling	16,000	Good
7.2-Pb3	Grey wood Ceiling	Site 7.2 Ceiling	40,000	Good
7.2-Pb4	Brown Metal Door	Site 7.2 Door	3,700	Good
7.2-Pb5	Brown Exterior Siding	Site 7.2 Walls	4,800	Poor
7.2-Pb6	White Wood Exterior Trim	Site 7.2 Walls	110,000	Poor
7.2-Pb7	White Wood Trim	Site 7.2 Windows	130,000	Poor
7.3-Pb1	Beige Wood Stalls	Site 7.3 Walls	12,000	Good
7.3-Pb2	Beige Wood Stalls	Site 7.3 Walls	15,000	Good
7.3-Pb3	Brown Wood Door	Site 7.3 Door	23,000	Poor
7.3-Pb4	Brown Exterior Siding	Site 7.3 Walls	31,000	Poor
7.3-Pb5	White Exterior Trim	Site 7.3 Walls	21,000	Poor
7.3-Pb6	White Wood Trim	Site 7.3 Windows	88,000	Poor
7.4-Pb1	Beige Wood Stalls	Site 7.4 Walls	1,800	Good
7.4-Pb2	Beige Wood Stalls	Site 7.4 Walls	1,200	Good
7.4-Pb3	Brown Wood Door	Site 7.4 Door	26,000	Poor
7.4-Pb4	Brown Wood Exterior Siding	Site 7.4 Walls	32,000	Poor
7.4-Pb5	White Wood Exterior Trim	Site 7.4 Walls	110,000	Poor
7.4-Pb6	White Wood Exterior Trim	Site 7.4 Windows	110,000	Poor
8.1-Pb1	Beige Wood Trim	Site 8.1 Kitchen Shelter	800	Fair
8.1-Pb2	Green and Brown Wood Walls	Site 8.1 Kitchen Shelter	980	Poor

Table 5.2: Lead Paint Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	Concentration (mg/kg)⁽¹⁾	Condition
8.1-Pb3	Black Wood	Site 8.1 Picnic Table	<17	--
8.1-Pb4	Black Stove	Site 8.1 Stove	<210	Fair
8.1-Pb5	Green Siding	Site 8.1 Outhouse	<48	--
8.1-Pb6	Beige Metal Door	Site 8.1 Outhouse	<18	--
8.1-Pb7	White Wall	Site 8.1 Outhouse Interior	<45	--
8.2-Pb1	Green Siding	Site 8.2 Outhouse Debris Pile	<10	--
8.2-Pb2	Beige Siding	Site 8.2 Outhouse Debris Pile	<10	--
8.2-Pb3	Green and Brown Wood	Site 8.2 Kitchen Shelter Debris Pile	2100	Fair
8.2-Pb5	Black Wood	Site 8.2 Picnic Table	<23	--
8.2-Pb6	Green Wood	Site 8.2 Sign Post	4800	Poor
9.1-Pb1	Brown Wood Beams	Site 9.1 Kitchen Shelter Debris Pile	1900	Poor
9.1-Pb2	Green Cement Board	Site 9.1 Outhouse Debris Pile	<10	--
9.1-Pb3	Brown Plastic Vent Stack	Site 9.1 Outhouse Debris Pile	<80	--
9.2-Pb1	Green Cement Board	Site 9.2 Outhouse Debris Pile	<10	--
9.2-Pb2	Brown Plastic Vent Stack	Site 9.2 Outhouse Debris Pile	<10	--
9.2-Pb3	Beige Siding	Site 9.2 Outhouse Debris Pile	<10	--
9.2-Pb4	Brown Wood Beams	Site 9.2 Kitchen Shelter	<10	--
9.2-Pb5	Black Wood Table	Site 9.2 Picnic Table	1500	Poor
9.2-Pb6	Beige Wood Trim	Site 9.2 Kitchen Shelter	<28	--
9.2-Pb7	Green Wood Facia	Site 9.2 Kitchen Shelter	660	Fair

Note (1) mg/kg – milligrams per kilogram

5.3 POLYCHLORINATED BIPHENYLS

Fifteen (15) paint samples suspected to contain PCB were collected from the typically finished interior and exterior surfaces. None of the samples were found to contain amounts of PCB equal or greater than 1.3 mg/kg. The Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A. Site plans indicating sample locations are included on Drawings 1 through 38. A photolog of the samples collected and their location is presented in Appendix B The sample results are summarized in Table 5.3 below:

Table 5.3: PCB in Paint Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	Concentration (mg/kg) ⁽¹⁾
1.6-PCB1	Black Paint on Stove	Site 1.6 Debris Pile	<0.2
1.7-PCB1	Beige Paint on Food Bin	Site 1.7 Debris Pile	<0.2
1.8-PCB1	Beige Paint on Food Bin	Site 1.8 Debris Pile	<0.2
1.10-PCB1	Brown on Metal Food Storage Bin	Site 1.10 Campground I1	<0.2
1.11-PCB1	Beige Exterior Wood	Site 1.11 Window Frames and Trim	<0.02
1.12-PCB1	Beige Metal	Site 1.12 Door	<0.02
1.18-PCB1	Green Wood Siding	Site 1.18 Exterior Walls	<0.02
1.19-PCB1	Green Wood Siding	Site 1.19 Exterior Walls	<0.02
6.1-PCB1	Green Concrete Block	Site 6.1 Walls	<0.02
7.1-PCB1	White Wood Trim	Site 7.1 Windows	0.21
7.2-PCB1	Brown Wood Exterior Siding	Site 7.2 Walls	<0.2
7.3-PCB1	White Wood Exterior Trim	Site 7.3 Windows	<0.2
7.4-PCB1	Brown Wood Exterior Siding	Site 7.4 Walls	0.71
8.1-PCB1	Beige Wood Trim	Site 8.1 Kitchen Shelter Walls	0.43
8.2-PCB1	Green on Wood	Site 8.2 Sign Post	<0.2

Note (1) mg/kg – milligrams per kilogram

5.4 SILICA

Thirty-eight (38) representative samples of concrete suspected to contain silica were collected. All of the samples were found to contain a significant percentage of silica. The results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A. Site plans indicating sample locations are included on Drawings 1 through 38. A photolog of the samples collected and their location is presented in Appendix B. The sample results are summarized in Table 5.4 below:

Table 5.4: Silica as SiO₂ in Concrete Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	% SiO ₂ ⁽¹⁾
1.1-S1	Concrete Slab	Site 1.1 Generator House	52.07
1.3-S1	Concrete Slab	Site 1.4 Washroom 2	48.70
1.4-S1	Concrete Slab	Site 1.3 Washroom 1	50.14
1.5-S1	Concrete Slab	Site 1.5 Kitchen Shelter 1	47.35
1.6-S1	Concrete Slab	Site 1.6 Kitchen Shelter 2	48.22
1.7-S1	Concrete Slab	Site 1.7 Kitchen Shelter 3	47.98
1.8-S1	Concrete Slab	Site 1.8 Kitchen Shelter 4	54.00
1.9-S1	Concrete Slab	Site 1.9 Amphitheatre	49.72
1.10-S1	Concrete Slab Site A8	Site 1.10 Campground A8	45.85
1.10-S2	Concrete Slab Site B13	Site 1.10 Campground B13	49.94
1.10-S3	Concrete Slab Site C7	Site 1.10 Campground C7	49.52
1.10-S4	Concrete Slab Site D11	Site 1.10 Campground D11	52.26
1.10-S5	Concrete Slab Site E10	Site 1.10 Campground E10	55.93
1.10-S6	Concrete Slab Site F9	Site 1.10 Campground F9	55.06
1.10-S7	Concrete Slab Site G6	Site 1.10 Campground G6	55.60

Table 5.4: Silica as SiO₂ in Concrete Sample Results – Waterton Lakes National Park, Alberta

Sample #	Sample Description	Sample Location	% SiO ₂ ⁽¹⁾
1.10-S8	Concrete Slab Site H10	Site 1.10 Campground H10	55.66
1.10-S9	Concrete Slab Site I1	Site 1.10 Campground I1	58.21
1.10-S10	Concrete Slab Site J18	Site 1.10 Campground J18	57.78
1.10-S11	Concrete Slab Site K14	Site 1.10 Campground K14	57.01
1.10-S12	Concrete Slab Site L12	Site 1.10 Campground L12	59.44
1.11-S1	Concrete Slab	Site 1.11 Floor	48.4*
1.12-S1	Concrete Slab	Site 1.12 Floor	58.6*
1.13-S1	Concrete Slab	Site 1.13 Floor	56.7*
1.14-S1	Concrete Slab	Site 1.14 Floor	52.2*
1.15-S1	Concrete Slab	Site 1.15 Floor	55.4*
1.16-S1	Concrete Slab	Site 1.16 Floor	57.6*
1.17-S1	Concrete Slab	Site 1.17 Drain Slab	56.5*
1.18-S1	Concrete Slab	Site 1.18 Floor	52.0*
1.19-S1	Concrete Slab	Site 1.19 Floor	52.8*
2.1-S1	Concrete Piles	Site 2.1 Kitchen Shelter	51.49
5.1-S1	Foundation Concrete	Site 5.1 Reservoir Walls	46.08
5.2-S1	Concrete Slab	Site 5.2 Lightning Shelter	46.92
6.1-S1	Concrete Slab	Site 6.1 Seismic Station Floor	46.4*
8.1-S1	Concrete Slab Bin Slab	Site 8.1 Bin Slab	44.74
8.2-S1	Concrete Slab Kitchen Shelter	Site 8.2 Kitchen Shelter	51.01
9.1-S1	Concrete Slab Kitchen Shelter	Site 9.1 Kitchen Shelter	49.67
9.2-S1	Concrete Slab Outhouse	Site 9.2 Outhouse	72.86
10.1-S1	Bench Concrete Pile	Site 8.3 Bench Pile	76.21

Note (1) %SiO₂ – Percent Silicon Dioxide

*Sample results reported as %Si on laboratory results Converted to %SiO₂

6.0 OBSERVATIONS AND DISCUSSION

6.1 GENERAL DISCUSSION

The methodology for asbestos sampling calls for the collection of multiple samples of each homogeneous material. Asbestos content is known to vary significantly within a material therefore comparative field duplicates may not provide confirmation of field sampling methodology.

Paint samples were challenging to collect from many of the fire damaged sites. Where possible two paint samples were collected for each paint colour for lead analysis. Lead concentrations in paint can vary on orders of magnitude based on the presence or absence of underlying layers.

6.2 SITE 1.1 GENERATOR HOUSE – CRANDELL CAMPGROUND

6.2.1 Site Description

The Generator House was observed to have burnt debris throughout the site. Debris was contained primarily around the main concrete pad which remained intact. Remnants of a generator and battery bank were observed. A propane tank was present to the East of the pad. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 2.

6.2.2 Asbestos-containing Materials

A total of twelve (12) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. The Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal doors and equipment; and
- Melted glass and plastic materials.

6.2.3 Lead-Based Paints

Three (3) paint samples suspected to contain lead were collected from the site. The paint samples were submitted with the substrate attached as the cement board substrate was inseparable. One (1) of the samples was confirmed to contain amounts of lead equal or greater than 90 mg/kg. The Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

- Pink / Beige Paint on Exterior Siding (300mg/kg)

The lead containing paint was present on siding throughout the debris pile. The paint was well bound to the siding debris and not in a disburseable form. Additional sources of lead contamination on site includes lead salts from batteries that exploded or melted in the fire.

6.2.4 Polychlorinated Biphenyls

The paints on the site were well bound to the substrate and could not be sampled for PCB.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

6.2.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.3 SITE 1.2 WOOD STORAGE SHED – CRANDELL CAMPGROUND

6.3.1 Site Description

The wood storage shed was located directly north of the pathway. Some traces of the structure remain, no concrete pad was present. Propane cylinders, a heater and other metal objects were present. A photographic log is presented in Appendix B.

6.3.2 Asbestos-containing Materials

Materials suspected to contain asbestos were not identified on the site

6.3.3 Lead-Based Paints

No Paint was identified on the site.

6.3.4 Polychlorinated Biphenyls

No Paint was identified on the site.

6.3.5 Silica

No concrete materials were present on the site.

6.4 SITE 1.3 WASHROOM 1 – CRANDELL CAMPGROUND

6.4.1 Site Description

Crandell Washroom 1 was observed to have burnt debris throughout the site. The debris was contained primarily on and around the main concrete pad which remained intact. Metal Roof Posts remain standing on the slab. Evidence of metal stall dividers, lockers, and sinks, melted glass, porcelain, and plumbing was observed. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 5.

Samples collected from Washroom 1 were recorded as 1.4-XX.

6.4.2 Asbestos-Containing Materials

A total of twelve (12) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal doors and equipment;
- Porcelain and metal plumbing fixtures; and
- Melted glass and plastic materials.

6.4.3 Lead-Based Paints

Paint was not identified on any materials within the washroom debris.

6.4.4 Polychlorinated Biphenyls

Paint was not identified on any materials within the washroom debris

6.4.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.5 SITE 1.4 WASHROOM 2 – CRANDELL CAMPGROUND

6.5.1 Site Description

Crandell Washroom 2 was observed to have burnt debris throughout the site. The debris was contained primarily on and around the main concrete pad which remained intact. Metal Roof Posts remain standing on the slab. Evidence of metal stall dividers, lockers, and sinks, melted glass, porcelain, and plumbing was observed. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 4.

Samples collected from Washroom 2 were recorded as 1.3-XX.

6.5.2 Asbestos-containing Materials

A total of twelve (12) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. The Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal doors and equipment;
- Porcelain and metal plumbing fixtures; and
- Melted glass and plastic materials.

6.5.3 Lead-Based Paints

Paint was not identified on any materials within the washroom debris.

6.5.4 Polychlorinated Biphenyls

Paint was not identified on any materials within the washroom debris

6.5.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.6 SITE 1.5 KITCHEN SHELTER 1 – CRANDELL CAMPGROUND

6.6.1 Site Description

Crandell Kitchen Shelter 1 was observed to have burnt debris throughout the site. The debris was contained primarily on and around the concrete pad which remained intact. A metal stove, metal picnic table frames, and the remains of a cinderblock chimney were observed on the pad. A metal food bin was observed directly adjacent to the pad. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 6.

6.6.2 Asbestos-Containing Materials

A total of nine (9) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal stove, picnic table frames and food bin; and
- Wood beams.

6.6.3 Lead-Based Paints

Two (2) paint samples suspected to contain lead were collected from the site. The samples were confirmed to be below 90mg/kg and are not considered to be lead-based. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

6.6.4 Polychlorinated Biphenyls

Insufficient paint material was available for PCB analysis.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

6.6.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.7 SITE 1.6 KITCHEN SHELTER 2 – CRANDELL CAMPGROUND

6.7.1 Site Description

Crandell Kitchen Shelter 2 was observed to have burnt debris throughout the site. The debris was contained primarily on and around the concrete pad which remained intact. A metal stove, metal picnic table frames, and the remains of a cinderblock chimney were observed on the pad. A metal food bin was observed approximately 10m away from the pad. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 7.

6.7.2 Asbestos-Containing Materials

A total of nine (9) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal stove, picnic table frames and food bin; and
- Wood beams.

6.7.3 Lead-Based Paints

One (1) paint sample suspected to contain lead was collected from the site. The sample was confirmed to be below 90mg/kg and is not considered to be lead-based. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

6.7.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the detection limit for PCB.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.7.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.8 SITE 1.7 KITCHEN SHELTER 3 – CRANDELL CAMPGROUND

6.8.1 Site Description

Crandell Kitchen Shelter 3 was observed to have burnt debris throughout the site. The debris was contained primarily on and around the concrete pad which remained intact. A metal stove, metal picnic table frames, and a cinderblock chimney was observed on the pad. A metal food bin was observed adjacent to the pad. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 8.

6.8.2 Asbestos-Containing Materials

A total of nine (9) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal stove, picnic table frames and food bin; and
- Wood beams.

6.8.3 Lead-Based Paints

One (1) paint sample suspected to contain lead was collected from the site. The sample was confirmed to be below 90mg/kg and is not considered to be lead-based. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

6.8.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the detection limit for PCB.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.8.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.9 SITE 1.8 KITCHEN SHELTER 4 – CRANDELL CAMPGROUND

6.9.1 Site Description

Crandell Kitchen Shelter 4 was observed to have burnt debris throughout the site. The debris was contained primarily on and around the concrete pad which remained intact. A metal stove, metal picnic table frames,

and the remains of a cinderblock chimney were observed on the pad. A metal food bin was observed adjacent to the pad. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 9.

6.9.2 Asbestos-Containing Materials

A total of nine (9) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal stove, picnic table frames and food bin; and
- Wood beams.

6.9.3 Lead-Based Paints

Two (2) paint samples suspected to contain lead were collected from the site. The samples were confirmed to be below 90mg/kg and are not considered to be lead-based. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

6.9.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the detection limit for PCB.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.9.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.10 SITE 1.9 AMPHITHEATRE – CRANDELL CAMPGROUND

6.10.1 Site Description

The amphitheatre was observed to have burnt debris throughout the site. The debris was contained primarily on and around the concrete pad & foundation which remained intact. Remains of electrical conduit and electrical panels were identified along with metal bench frames. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 10.

6.10.2 Asbestos-Containing Materials

A total of nine (9) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal bench frames and electrical components; and
- Wood beams.

6.10.3 Lead-Based Paints

No Paint was identified on the site.

6.10.4 Polychlorinated Biphenyls

No Paint was identified on the site.

6.10.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.11 SITE 1.10 129 CAMPSITES – CRANDELL CAMPGROUND

6.11.1 Site Description

The Campground consists of 129 campsites around 12 loops (A to L). Each campsite included a gravel pad, a picnic table (Loop A - C concrete with wood top, Loop D – L metal with plastic composite top), a metal food storage locker on a concrete pad, and a fire ring. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawings 11A through 11L.

6.11.2 Asbestos-Containing Materials

A total of three (3) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal picnic table frames and food boxes; and
- Wood planks on picnic tables.

6.11.3 Lead-Based Paints

Five (5) paint samples suspected to contain lead were collected from the site. One (1) of the samples was confirmed to contain amounts of lead equal or greater than 90 mg/kg. The paint was observed to be in poor condition and in a dispersible form on approximately 83 of the 130 bins.

All paint present in the food storage bins in the campsites was visually similar and should be treated as lead-based paint. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

6.11.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the detection limit for PCB.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.11.5 Silica

Twelve (12) samples were collected from the concrete slabs and picnic tables. The samples were confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.12 SITE 1.11 ENTRANCE KIOSK – CRANDELL CAMPGROUND

6.12.1 Site Description

The Entrance Kiosk was locked and winterized at the time of assessment. Located at the east entrance to the Crandell Campground the wood structure sits on a concrete slab foundation and includes a washroom, and office space. The siding showed some signs of heat damage but was not charred. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 12.

6.12.2 Asbestos-Containing Materials

A total of fifteen (15) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Paracel for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Porcelain sinks and toilet; and
- Wood siding, walls and ceilings.

6.12.3 Lead-Based Paints

Six (6) paint samples suspected to contain lead were collected from the site. Two (2) of the samples were confirmed to be above 90mg/kg and are considered to be lead-based. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A. The beige paint present in poor condition on the exterior north east window frames should be treated as lead-based paint.

6.12.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.12.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.13 SITE 1.12 SOLAR BUILDING #1 – CRANDELL CAMPGROUND

6.13.1 Site Description

Solar Building #1 is located adjacent to the site of washroom #1 in the Crandell Campground. The building is a concrete prefabricated design with a solar array on the roof. The door showed signs of heat damage, but the building was otherwise intact. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 13.

6.13.2 Asbestos-Containing Materials

A total of six (6) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody for analysis. Three of the samples were collected in December as part of Site 1.3 and sent to Maxxam, the other three samples were collected in May and sent to Paracel. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Electrical equipment and batteries; and
- Solar arrays.

6.13.3 Lead-Based Paints

One (1) paint sample suspected to contain lead was collected from the solar building door in December as part of Site 1.4. The paint was confirmed to be below 90mg/kg and is not considered to be lead-based. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

6.13.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.13.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.14 SITE 1.13 SOLAR BUILDING #2 – CRANDELL CAMPGROUND

6.14.1 Site Description

Solar Building #2 is located adjacent to the site of washroom #2 in the Crandell Campground. The building is a concrete prefabricated design with a solar array on the roof. The door showed signs of heat damage, but the building was otherwise intact. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 14.

6.14.2 Asbestos-Containing Materials

A total of six (6) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody for analysis. Three of the samples were collected in December as part of Site 1.4 and sent to Maxxam, the other three samples were collected in May and sent to Paracel. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Electrical equipment and batteries; and
- Solar arrays.

6.14.3 Lead-Based Paints

The door to the solar building was observed to have paint on the interior of the door. The paint was not in a disbursable form and could not be separated from the substrate. The paint on the exterior of the door has been fully burnt off.

The paint and construction were observed to be visually similar to the paint on the door of Site 1.13 Crandell Campground Solar Building #1 (1.4-Pb1, <13mg/kg). The Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

6.14.4 Polychlorinated Biphenyls

The door to the solar building was observed to have paint on the interior of the door. The paint was not in a disburseable form and could not be separated from the substrate.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.14.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.15 SITE 1.14 SOLAR BUILDING #3 – CRANDELL CAMPGROUND

6.15.1 Site Description

Solar Building #3 is located adjacent to the site of washroom #3 in the Crandell Campground. The building is a concrete prefabricated design. The building was not affected by the fire. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 15.

6.15.2 Asbestos-Containing Materials

A total of six (6) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Electrical equipment and batteries; and
- Solar arrays.

6.15.3 Lead-Based Paints

The door to the solar building was observed to have beige paint on the door. The paint was not in a disburseable form and could not be separated from the substrate.

The paint and construction were observed to be visually similar to the paint on the door of Site 1.13 Crandell Campground Solar Building #2 (1.4-Pb1, <10mg/kg). The Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

6.15.4 Polychlorinated Biphenyls

The door to the solar building was painted beige. The paint was not in a disbursable form and could not be separated from the substrate.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.15.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.16 SITE 1.15 SOLAR BUILDING #4 – CRANDELL CAMPGROUND

6.16.1 Site Description

Solar Building #4 is located adjacent to the site of washroom #4 in the Crandell Campground. The building is a concrete prefabricated design. The building was not affected by the fire. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 16.

6.16.2 Asbestos-Containing Materials

A total of nine (9) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Electrical equipment and batteries; and
- Solar arrays.

6.16.3 Lead-Based Paints

The door to the solar building was observed to have beige paint on the door. The paint was not in a disbursable form and could not be separated from the substrate.

The paint and construction were observed to be visually similar to the paint on the door of Site 1.13 Crandell Campground Solar Building #2 (1.4-Pb1, <10mg/kg). The Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

6.16.4 Polychlorinated Biphenyls

The door to the solar building was painted beige. The paint was not in a disbursable form and could not be separated from the substrate.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.16.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.17 SITE 1.16 SOLAR BUILDING #5 – CRANDELL CAMPGROUND

6.17.1 Site Description

Solar Building #5 is located adjacent to the Sani-Dump Station on the in the Crandell Campground. The building is a concrete prefabricated design and the site includes a propane tank, generator, and solar array within a fenced area. The building and associated infrastructure was not affected by the fire. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 17.

6.17.2 Asbestos-Containing Materials

A total of nine (9) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Electrical equipment and batteries; and
- Solar arrays.

6.17.3 Lead-Based Paints

The door to the solar building was observed to have beige paint on the door. The paint was not in a disbursable form and could not be separated from the substrate.

The paint and construction were observed to be visually similar to the paint on the door of Site 1.13 Crandell Campground Solar Building #2 (1.4-Pb1, <10mg/kg). The Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

6.17.4 Polychlorinated Biphenyls

The door to the solar building was painted beige. The paint was not in a disbursable form and could not be separated from the substrate.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.17.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.18 SITE 1.17 SANI-DUMP STATION – CRANDELL CAMPGROUND

6.18.1 Site Description

The Sani Dump Station is Located adjacent to Solar Building #5 in Crandell Campground. The only above ground infrastructure is a concrete slab with a drain. The underground tanks were not accessible for testing at the time of assessment. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 18.

6.18.2 Asbestos-Containing Materials

A total of three (3) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Paracel for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Wood Sign Post.

6.18.3 Lead-Based Paints

No Paint was identified on the site.

6.18.4 Polychlorinated Biphenyls

No Paint was identified on the site.

6.18.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.19 SITE 1.18 WASHROOM 3 – CRANDELL CAMPGROUND

6.19.1 Site Description

The washroom was locked and winterized at the time of assessment. Located adjacent to loop F of the Crandell Campground the wood structure sits on a concrete slab foundation and includes a men's washroom, women's washroom, and janitorial room. Vinyl cased windows appear to have been recently installed. A solar array is present on the roof. The siding showed some signs of heat damage but was not charred. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 19.

6.19.2 Asbestos-Containing Materials

A total of nine (9) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Paracel for analysis. One (1) of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The grout present along the base of the washroom walls should be treated as asbestos containing.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal sinks and plumbing;
- Vinyl windows
- Plastic wall panels; and
- Wood siding and stall dividers.

6.19.3 Lead-Based Paints

Four (4) paint samples suspected to contain lead were collected from the site. The samples were confirmed to be above 90mg/kg and are considered to be lead-based. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A. All paint present in the washroom should be treated as lead-based paint.

The green paint on the sidings and the beige paint on the exterior trim was in poor condition at the time of assessment.

6.19.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.19.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.20 SITE 1.19 WASHROOM 4 – CRANDELL CAMPGROUND

6.20.1 Site Description

The washroom was locked and winterized at the time of assessment. Located adjacent to loop J of the Crandell Campground the wood structure sits on a concrete slab foundation and includes a men's washroom, women's washroom, and janitorial room. Vinyl cased windows appear to have been recently installed. A solar array is present on the roof. The siding showed some signs of heat damage but was not charred. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 20.

6.20.2 Asbestos-Containing Materials

A total of nine (9) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Paracel for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal sinks and plumbing;
- Vinyl windows;
- Plastic wall panels; and
- Wood siding and stall dividers.

6.20.3 Lead-Based Paints

Four (4) paint samples suspected to contain lead were collected from the site. The samples were confirmed to be above 90mg/kg and are considered to be lead-based. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A. All paint present in the washroom should be treated as lead-based paint.

The green paint on the sidings and the beige paint on the exterior trim was in poor condition at the time of assessment.

6.20.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background

level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.20.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.21 SITE 1.20 WATER TOWER – CRANDELL CAMPGROUND

6.21.1 Site Description

The water tower is a metal structure located west of the Crandell Campground beyond the youth camp and the west access road. The tower is surrounded by a chain link fence. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 21.

6.21.2 Asbestos-Containing Materials

Materials suspected to contain asbestos were not identified on the site

6.21.3 Lead-Based Paints

One (1) paint sample suspected to contain lead were collected from the site. The sample was confirmed to be above 90mg/kg and is considered to be lead-based. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A. All paint present in the washroom should be treated as lead-based paint.

The grey paint on the exterior of the water tower was in fair condition with approximately 4 square feet paint was beginning to delaminate as a result of the impacts from the fire.

6.21.4 Polychlorinated Biphenyls

An insufficient amount of delaminating paint was present to collect a sample for PCB analysis.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.21.5 Silica

Concrete materials were not present on the site.

6.22 SITE 1.21 HOST CAMPGROUND – CRANDELL CAMPGROUND

6.22.1 Site Description

The host campground was located on the east end of the Crandell Campground across from loop A. evidence of permanent structures was not observed. A fibreglass tank and a propane line were observed along the edges of the site. Remains of a melted glass tank were also observed. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 22.

6.22.2 Asbestos-Containing Materials

A total of three (3) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Paracel for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Glass tank remains;
- Metal gas tubing; and
- A fibreglass tank.

6.22.3 Lead-Based Paints

No Paint was identified on site.

6.22.4 Polychlorinated Biphenyls

No Paint was identified on site.

6.22.5 Silica

Permanent concrete materials were not present on the site.

6.23 SITE 2.1 KITCHEN SHELTER – CRANDELL BACKCOUNTRY CAMPGROUND

6.23.1 Site Description

The kitchen shelter footprint was defined by 8 concrete piles, with natural rock used as a pad. Evidence of metal soffit, burnt asphalt shingles, nails and some logs were present in and adjacent to the building footprint. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 23.

6.23.2 Asbestos-Containing Materials

A total of six (6) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

6.23.3 Lead-Based Paints

One (1) paint sample suspected to contain lead was collected from the site. The sample was confirmed to be below 90mg/kg and is not considered to be lead-based. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

6.23.4 Polychlorinated Biphenyls

Insufficient amounts of paint were present at the site and could not be sampled for PCB.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

6.23.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.24 SITE 2.2 CAMPSITES AND outhouse - CRANDELL BACKCOUNTRY CAMPGROUND

6.24.1 Site Description

The Campground consisted of four (4) log frame gravel pads and one outhouse pit. No evidence of the outhouse structure remained. Logs surrounding each gravel pad were partially burnt. A photographic log is presented in Appendix B. Site Plans are presented in Drawing 24.

6.24.2 Asbestos-containing Materials

Materials suspected to contain asbestos were not identified on the site

6.24.3 Lead-Based Paints

No Paint was identified on the site.

6.24.4 Polychlorinated Biphenyls

No Paint was identified on the site.

6.24.5 Silica

No concrete materials were present on the site.

6.25 SITE 2.3 OUTHOUSE - CRANDELL BACKCOUNTRY CAMPGROUND

6.25.1 Site Description

The outhouse pit consisted of a gravel pit and some metal hardware. Wood bracing could be seen below ground level. A new outhouse structure was present adjacent to the pit. A photographic log is presented in Appendix B. Site Plans are presented in Drawing 25.

6.25.2 Asbestos-containing Materials

Materials suspected to contain asbestos were not identified on the site.

6.25.3 Lead-Based Paints

No Paint was identified on the site.

6.25.4 Polychlorinated Biphenyls

No Paint was identified on the site.

6.25.5 Silica

No concrete materials were present on the site.

6.26 SITE 3.1 MELTED ROADSIDE MARKERS – RED ROCK PARKWAY

6.26.1 Site Description

Extruded plastic roadside markers with tape reflectors were identified along the Red Rock Parkway. Many of the markers that were previously present were completely melted or removed. 26 partially melted markers were identified along the parkway. Site Plans are presented in Drawings 26A – 26F.

6.26.2 Asbestos-containing Materials

The plastic road side markers are not suspected to contain asbestos.

6.26.3 Lead-Based Paints

No Paint was identified on the site.

6.26.4 Polychlorinated Biphenyls

No Paint was identified on the site.

6.26.5 Silica

No concrete materials were present on the site.

6.27 SITE 5.1 WATERTON GOLF COURSE RESERVOIR

6.27.1 Site Description

The remains of the reservoir building included a foundation with a metal ladder. Some burnt trees or beams were observed inside the foundation. The debris observed around the site appeared to be wood ash, no additional manufactured materials were identified. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 27.

6.27.2 Asbestos-containing Materials

A total of six (6) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

6.27.3 Lead-Based Paints

No Paint was identified on the site.

6.27.4 Polychlorinated Biphenyls

No Paint was identified on the site.

6.27.5 Silica

One (1) sample was collected from the concrete foundation. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.28 SITE 5.1 WATERTON GOLF COURSE LIGHTNING SHELTER SHED

6.28.1 Site Description

The remains of the lightning shelter included a concrete slab. Building material debris that may have remained after the fire appears to have been removed. No additional manufactured materials were identified. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 28.

6.28.2 Asbestos-containing Materials

A total of three (3) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

6.28.3 Lead-Based Paints

No Paint was identified on the site.

6.28.4 Polychlorinated Biphenyls

No Paint was identified on the site.

6.28.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.29 SITE 6.1 BEAR'S HUMP SEISMIC STATION

6.29.1 Site Description

The Bear's Hump Seismic station consists of a cinderblock building built on slab. A satellite dish mounted on a concrete base was also present on the site. The building was burnt, and no evidence of the roof remained. Metal fencing and other debris was stored behind the building. Computer components and evidence of a battery pack were present on the floor of the building. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 29.

6.29.2 Asbestos-Containing Materials

A total of thirteen (13) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Paracel for analysis. Seven (7) of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal fencing and debris.

Vermiculite

Four (4) samples of vermiculite were collected from the block walls of the building and found to contain asbestos. Vermiculite present as debris and within the block walls throughout the site should be treated as asbestos containing.

Penetration Caulking

Three (3) samples of penetration caulking were collected and two were found to contain asbestos the caulking around all electrical penetrations should be treated as asbestos containing.

Concrete Slab

Three (3) samples of concrete slab were collected and 1 was found to contain asbestos. The concrete slab of the building should be treated as asbestos containing.

6.29.3 Lead-Based Paints

Two (2) paint samples suspected to contain lead were collected from the site. The samples were confirmed to be above 90mg/kg and are considered to be lead-based. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A. All paint present on the walls of the building should be treated as lead-based paint.

The green paint was in fair to good condition and was well adhered to the cinderblock walls.

6.29.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.29.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.30 SITE 7.1 WATERTON TOWNSITE CAMPGROUND - CAMPGROUND WASHROOM #2

6.30.1 Site Description

The Washroom was abandoned and shuttered with plywood coverings at the time of inspection. Located in the North-East portion of the campground the wood structure sits on a concrete slab foundation and includes a men's and women's washroom. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 30.

6.30.2 Asbestos-Containing Materials

A total of fifteen (15) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. Two (2) of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

Two (2) samples of cement board were collected from the walls and ceilings of the washroom and found to contain asbestos. All cement board on the interior walls and ceilings should be treated as asbestos-containing.

Insulation on electrical wiring was of a style similar to products containing asbestos, if the wiring is to be impacted the insulation should be sampled to confirm if it is an ACM.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal sinks and plumbing; and
- Wood siding and stall dividers.

6.30.3 Lead-Based Paints

Eight (8) paint samples suspected to contain lead were collected from the site. The samples were confirmed to be above 90mg/kg and are considered to be lead-based. Exterior paint was in poor condition interior paint was in good to fair condition. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A. All paint present in the washroom should be treated as dispersible lead-based paint.

6.30.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.30.5 Silica

A silica sample was not collected from the concrete foundation. Concrete is known to contain silica. Impacting concrete materials throughout the site may generate silica dust.

6.31 SITE 7.2 WATERTON TOWNSITE CAMPGROUND - CAMPGROUND WASHROOM #6

6.31.1 Site Description

The Washroom was abandoned and shuttered with plywood coverings at the time of inspection. Located in the centre portion of the campground the wood structure sits on a concrete slab foundation and includes a men's and women's washroom. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 31.

6.31.2 Asbestos-Containing Materials

A total of eleven (11) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. Two (2) of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

Two (2) samples of cement board were collected from the walls and ceilings of the washroom and found to contain asbestos. All cement board on the interior walls and ceilings should be treated as asbestos-containing.

Insulation on electrical wiring was of a style similar to products containing asbestos, if the wiring is to be impacted the insulation should be sampled to confirm if it is an ACM.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal sinks and plumbing; and
- Wood siding and stall dividers.

6.31.3 Lead-Based Paints

Eight (8) paint samples suspected to contain lead were collected from the site. The samples were confirmed to be above 90mg/kg and are considered to be lead-based. Exterior paint was in poor condition interior paint was in good to fair condition. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A. All paint present in the washroom should be treated as dispersible lead-based paint.

6.31.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the detection limit for PCB.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.31.5 Silica

A silica sample was not collected from the concrete foundation. Concrete is known to contain silica. Impacting concrete materials throughout the site may generate silica dust.

6.32 SITE 7.3 WATERTON TOWNSITE CAMPGROUND - CAMPGROUND WASHROOM #8

6.32.1 Site Description

The Washroom was locked and winterized at the time of inspection. Located in the South-East part of the campground the wood structure sits on a concrete slab foundation and includes a men's and women's washroom. A small storage room located on the east side of the building was locked and inaccessible at the time of inspection. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 32.

6.32.2 Asbestos-Containing Materials

A total of seven (7) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. Four (4) of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

Four (4) samples of cement board were collected from the walls and ceilings of the washroom and found to contain asbestos. All cement board on the interior walls and ceilings should be treated as asbestos-containing.

Insulation on electrical wiring was of a style similar to products containing asbestos, if the wiring is to be impacted the insulation should be sampled to confirm if it is an ACM.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal sinks and plumbing; and
- Wood siding, shingles, and stall dividers.

6.32.3 Lead-Based Paints

Six (6) paint samples suspected to contain lead were collected from the site. The samples were confirmed to be above 90mg/kg and are considered to be lead-based. Exterior paint was in poor condition interior paint was in good to fair condition. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A. All paint present in the washroom should be treated as dispersible lead-based paint.

6.32.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.32.5 Silica

A silica sample was not collected from the concrete foundation. Concrete is known to contain silica. Impacting concrete materials throughout the site may generate silica dust.

6.33 SITE 7.4 WATERTON TOWNSITE CAMPGROUND - CAMPGROUND WASHROOM #9

6.33.1 Site Description

The Washroom was locked and winterized at the time of inspection. Located across Cameron creek and South of the main campground the wood structure sits on a concrete slab foundation and includes a men's and women's washroom. The attic hatch was sealed at the time of inspection. A photographic log including sample locations is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 33.

6.33.2 Asbestos-Containing Materials

A total of eight (8) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. Two (2) of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

Two (2) samples of cement board were collected from the walls and ceilings of the washroom and found to contain asbestos. All cement board on the interior walls and ceilings should be treated as asbestos-containing.

Insulation on electrical wiring was of a style similar to products containing asbestos, if the wiring is to be impacted the insulation should be sampled to confirm if it is an ACM.

The following materials were common to the site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal sinks and plumbing; and
- Wood siding and stall dividers.

6.33.3 Lead-Based Paints

Six (6) paint samples suspected to contain lead were collected from the site. The samples were confirmed to be above 90mg/kg and are considered to be lead-based. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A. All paint present in the washroom should be treated as lead-based paint.

6.33.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.33.5 Silica

A silica sample was not collected from the concrete foundation. Concrete is known to contain silica. Impacting concrete materials throughout the site may generate silica dust.

6.34 SITE 8.1 LOST HORSE CREEK DAY USE AREA - RED ROCK PARKWAY

6.34.1 Site Description

The structures at the Lost Horse Creek day use area were still standing and not observed to be impacted by the fire. The site consisted of a kitchen shelter with stove, outhouse, a small parking lot with parking blocks, a concrete pad for disposal bins and two picnic sites. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 34.

6.34.2 Asbestos-Containing Materials

A total of six (6) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

Composite siding was present on the outhouse, samples could not be collected without compromising the standing structure. Multiple samples of this material were collected from other sites in Waterton National Park and confirmed to be asbestos free.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal stove, picnic table frames and disposal bins; and
- Wood beams.

6.34.3 Lead-Based Paints

Seven (7) paint samples suspected to contain lead were collected from the site. Three (3) samples collected from the kitchen shelter were confirmed to be lead-based paint. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

Insufficient sample was collected from the black paint on the stove to reach a detection limit of 90mg/kg, an additional sample may be warranted. If a confirmatory sample is not collected the paint should be treated as lead-based paint.

All paint on the kitchen shelter walls (beige, green, and brown) were confirmed to be lead-based. All paint present on the kitchen shelter should be treated as lead-based paint.

6.34.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.34.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.35 SITE 8.2 COPPERMINE DAY USE AREA - RED ROCK PARKWAY

6.35.1 Site Description

The structures at the Coppermine day use area were reduced to debris by the fire. The site consisted of a kitchen shelter with stove, outhouse, a small parking lot with parking blocks, disposal bins and two picnic sites.

Debris on the outhouse slab consisted of siding and metal doors. The debris was mainly confined to the concrete slab.

Debris around the kitchen shelter consisted of some charred beams and a toppled chimney to the east of the slab and some charred beams to the west of the slab and two metal picnic table frames.

The picnic tables and disposal bins were not affected by the fire. A partially burnt sign post remained standing to the south east of the outhouse slab. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 35.

6.35.2 Asbestos-Containing Materials

A total of four (4) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal stove, doors, picnic table frames and disposal bins; and
- Wood beams.

6.35.3 Lead-Based Paints

Six (6) paint samples suspected to contain lead were collected from the site. Two (2) samples collected from the kitchen shelter and the site sign post were confirmed to be lead-based paint. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

The remaining paint on the kitchen shelter beams (green, and brown) as well as the green paint on the site sign post were confirmed to be lead-based. All paint present on the kitchen shelter should be treated as lead-based paint.

6.35.4 Polychlorinated Biphenyls

One (1) paint sample suspected to contain PCB was collected from the site. The sample was analysed and confirmed to be the detection limit.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. Results are summarized in Table 5.3. Laboratory certificates of analysis are presented in Appendix A.

6.35.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.36 SITE 8.3 INDIGENOUS HISTORY VIEWPOINT - RED ROCK PARKWAY

6.36.1 Site Description

The Indigenous History Viewpoint site was located approximately 15 meters south of the Red Rock Parkway. One metal bench frame in concrete piles and some hardware from a sign was all that remained at the site overlooking the valley. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 36.

6.36.2 Asbestos-containing Materials

A total of one (1) bulk sample of material suspected to contain asbestos was collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

6.36.3 Lead-Based Paints

No Paint was identified on the site.

6.36.4 Polychlorinated Biphenyls

No Paint was identified on the site.

6.36.5 Silica

One (1) sample was collected from the concrete piles. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.37 SITE 9.1 MCNEALY'S DAY USE AREA - AKAMINA PARKWAY

6.37.1 Site Description

The structures at the McNealy's day use area were reduced to debris by the fire. The site consisted of a kitchen shelter with stove, outhouse, and a slab to mount disposal bins.

Debris on the outhouse slab consisted of siding and a metal door. The debris was scattered on the concrete slab and to the north and east.

Debris around the kitchen shelter consisted of some charred beams and a toppled chimney to the north of the slab, some charred beams to the south of the slab, a metal stove, and two metal picnic table frames. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 37.

6.37.2 Asbestos-Containing Materials

A total of twelve (12) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal stove, door, and picnic table frames; and
- Wood beams.

6.37.3 Lead-Based Paints

Three (3) paint samples suspected to contain lead were collected from the site. One (1) sample collected from the kitchen shelter was confirmed to be lead-based paint. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

The remaining paint on the kitchen shelter beams (brown) was confirmed to be lead-based. All paint remaining on the kitchen shelter debris should be treated as lead-based paint.

6.37.4 Polychlorinated Biphenyls

Insufficient amounts of paint that could be freed from the substrate were present at the site to collect a sample for PCB analysis.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

6.37.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

6.38 SITE 9.2 LITTLE PRAIRIE DAY USE AREA - AKAMINA PARKWAY

6.38.1 Site Description

The structures at the Little Prairie day use area included an outhouse that was reduced to debris and a kitchen shelter that was left standing. A wood picnic table adjacent to the kitchen shelter was partially burned, another wood picnic table on the site was unaffected by fire. At the entrance to the site a partially burnt sign was present.

Debris on the outhouse slab consisted of siding and a metal door. The debris was scattered on the concrete slab and to the east and west.

The kitchen shelter consisted of a fully enclosed shelter with a sliding door. The interior was lined with plywood and held a stove and two picnic tables. The roof had cedar shingles and the exterior was sided with composite siding similar to the debris collected from the outhouse. A photographic log is presented in Appendix B. Site Plans indicating sample locations are presented in Drawing 38.

6.38.2 Asbestos-Containing Materials

A total of thirteen (13) bulk samples of materials suspected to contain asbestos were collected and sent via Chain of Custody to Maxxam for analysis. None of the samples were identified to contain asbestos. Results are summarized in Table 5.1. Laboratory certificates of analysis are presented in Appendix A.

The following materials were common to the Site. These materials do not contain asbestos and were not sampled during the investigation:

- Metal stove, door, and picnic table frames; and
- Wood beams.

6.38.3 Lead-Based Paints

Seven (7) paint samples suspected to contain lead were collected from the site. Two (2) samples collected from the kitchen shelter and the adjacent picnic table were confirmed to be lead-based paint. Results are summarized in Table 5.2. Laboratory certificates of analysis are presented in Appendix A.

The green paint on the kitchen shelter exterior and the paint on the picnic tables (black) were confirmed to be lead-based.

6.38.4 Polychlorinated Biphenyls

Insufficient amounts of paint that could be freed from the substrate were present at the site to collect a sample for PCB analysis.

Paints present on site were visually similar to those identified and sampled at other sites in Waterton National Park. All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites.

6.38.5 Silica

One (1) sample was collected from the concrete slab. The sample was confirmed to contain silica, measured as SiO₂, with a per-mass concentration in excess of 40% by weight. Impacting concrete materials throughout the site may generate silica dust. Results are summarized in Table 5.4. Laboratory certificates of analysis are presented in Appendix A.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the assessments, EHS^P makes the following conclusions and recommendations. A summary of the site-specific results and recommendations are presented in Table 7.1.

1. Only limited demolition was conducted during the assessment of standing structures. If any suspect hazardous materials are found during renovation or demolition activities, they should be positively identified and disposed of appropriately.

7.1 ASBESTOS-CONTAINING MATERIALS

Prior to demolition work, ACM must be removed. If additional materials not previously identified during the survey are identified during demolition activities, samples should be collected to identify for potential ACM. If the material is to be removed the following procedures should be implemented:

- Moderate-risk abatement procedures must be followed to remove the asbestos-containing tile grout present on the interior of Site 1.18 as per the Alberta Asbestos Abatement Manual, dated October 2012.
- Low risk abatement procedures must be followed to remove the asbestos-containing penetration caulking from the penetrations of Site 6.1 as per the Alberta Asbestos Abatement Manual, dated October 2012.
- Moderate risk abatement procedures must be followed to remove the asbestos-containing concrete slab at Site 6.1 as per the Alberta Asbestos Abatement Manual, dated October 2012.
- High-risk abatement procedures must be followed to remove the asbestos-containing vermiculite block fill insulation and debris present at Site 6.1 as per the Alberta Asbestos Abatement Manual, dated October 2012.
- Low-risk abatement procedures must be followed to remove the asbestos-containing cement board present on the interiors of Sites 7.1, 7.2, 7.3, and 7.4 as per the Alberta Asbestos Abatement Manual, dated October 2012.

Notification must be given to Alberta Occupational Health and Safety (OH&S) 72 hours prior to beginning the activities that may release asbestos fibers. Asbestos abatement must be completed by workers certified from Alberta OH&S. Throughout the abatement activities, appropriate air monitoring and inspections should be conducted by qualified personnel to demonstrate that work procedures are effective, asbestos is contained, and the waste is handled appropriately. It is recommended that a proper scope of work be developed that details the proper removal of identified ACM.

7.2 LEAD-BASED PAINT

Construction and demolition disturbance of lead-based paint may result in exposure to lead, either by inhaling lead dust, or ingesting lead powder. Contamination can include contact with skin and clothing during the disturbance activities. Workers must be aware of proper work procedures and health effects and have the appropriate personal protective equipment. Lead-based paint on metal substrate can be recycled in accordance with Alberta Environmental Protection and Enhancement Act and Regulations.

Toxicity Characteristic Leaching Procedure (TCLP) testing should be completed on waste streams with lead-based paint that meet the dispersibility criteria as outlined in the Alberta Waste Managers Guide. Dispersible paint may be collected in a segregated waste stream for testing, or the total waste stream may be tested to determine the disposal criteria.

7.3 POLYCHLORINATED BIPHENYLS

All paint samples analysed for PCB were confirmed to be below the CCME background level of 1.3mg/kg for parkland/residential sites. No evidence of ballasts or transformers was found on the sites. Paints present at the sites are not suspected to contribute to site contamination.

7.4 SILICA

Samples of concrete collected from 38 locations were confirmed to contain significant concentrations of silica, measured as SiO₂. The removal and demolition disturbance of concrete materials throughout the site may result the generation of respirable crystalline silica dust, which when made airborne can pose and inhalation hazard to workers. Workers must be trained and instructed by their employer in the appropriate work procedures for the safe handling and demolition of concrete structures, the health effects of the inhalation of silica dust, and the appropriate selection, use, and donning/doffing of personal protective equipment when disturbing materials containing silica. Silica is not a controlled product and may be disposed of with other non-hazardous wastes.

Table 7.1 Summary of Results and Recommendations

Site Number	Hazardous Materials Detected	Impacted Sample ID	Recommendations
1.1	Lead-based Paint Silica	1.1-Pb2 1.1-S1	TCLP analysis of waste stream to determine destination of waste Protect workers when generating dust.
1.2	None	--	--
1.3	Silica	1.3-S1	Protect workers when generating dust.
1.4	Silica	1.4-S1	Protect workers when generating dust.
1.5	Silica	1.5-S1	Protect workers when generating dust.
1.6	Silica	1.6-S1	Protect workers when generating dust.
1.7	Silica	1.7-S1	Protect workers when generating dust.
1.8	Silica	1.8-S1	Protect workers when generating dust.
1.9	Silica	1.9-S1	Protect workers when generating dust.
1.10	Lead-based Paint Silica	1.10-Pb4 1.10-S1 to S12	Dispersible paint to be removed from food bins TCLP analysis of waste stream to determine destination of waste Protect workers when generating dust.
1.11	Lead-based Paint Silica	1.11-Pb1, 1.11-Pb2 1.11-S1	Dispersible paint to be removed from Window Frames TCLP analysis of waste stream to determine destination of waste Protect workers when generating dust.
1.12	Silica	1.12-S1	Protect workers when generating dust.
1.13	Silica	1.13-S1	Protect workers when generating dust.
1.14	Silica	1.14-S1	Protect workers when generating dust.
1.15	Silica	1.15-S1	Protect workers when generating dust.
1.16	Silica	1.16-S1	Protect workers when generating dust.
1.17	Silica	1.17-S1	Protect workers when generating dust.
1.18	ACM Lead-based Paint Silica	1.18-A7 1.18-Pb1 to Pb4 1.18-S1	Moderate-risk abatement procedures must be followed to removed asbestos-containing tile grout. Dispersible paint to be removed from siding and trim TCLP analysis of waste stream to determine destination of waste. Protect workers when generating dust.

Continued Table 7.1 Summary of Results and Recommendations

Site Number	Hazardous Materials Detected	Impacted Sample ID	Recommendations
1.19	Lead-based Paint	1.19-Pb1 to Pb4	Dispersible paint to be removed from siding and trim TCLP analysis of waste stream to determine destination of waste.
	Silica	1.19-S1	Protect workers when generating dust.
1.20	Lead-based Paint	1.20-Pb1	Dispersible paint to be removed from side of water tower TCLP analysis of waste stream to determine destination of waste.
1.21	none	--	--
2.1	Silica	2.1-S1	Protect workers when generating dust.
2.2	none	--	--
2.3	none	--	--
3.1	none	--	--
5.1	Silica	5.1-S1	Protect workers when generating dust.
5.2	Silica	5.2-S1	Protect workers when generating dust.
6.1	ACM	6.1-A4 to A7, A9, A10, A13	Low-risk abatement procedures must be followed to remove the asbestos-containing caulking Moderate-risk abatement procedures must be followed to remove the asbestos-containing concrete High-risk abatement procedures must be followed to remove the asbestos-containing vermiculite
	Lead-based Paint	6.1-Pb1, Pb2	If paint is to be removed from the walls or begins to delaminate during demolition TCLP analysis of waste stream to determine destination of waste
	Silica	6.1-S1	Protect workers when generating dust.
7.1	ACM	7.1-A1, 7.1A2	Low-risk abatement procedures must be followed to remove the asbestos-containing cement board
	Lead based Paint	7.1-Pb1 to Pb8	Dispersible paint is to be removed - TCLP analysis of waste stream to determine destination of waste
7.2	ACM	7.1-A1, 7.1A2	Low-risk abatement procedures must be followed to remove the asbestos-containing cement board
	Lead based Paint	7.1-Pb1 to Pb8	Dispersible paint is to be removed - TCLP analysis of waste stream to determine destination of waste
7.3	ACM	7.1-A1 to A4	Low-risk abatement procedures must be followed to remove the asbestos-containing cement board
	Lead based Paint	7.1-Pb1 to Pb6	Dispersible paint is to be removed - TCLP analysis of waste stream to determine destination of waste

Continued Table 7.1 Summary of Results and Recommendations

Site Number	Hazardous Materials Detected	Impacted Sample ID	Recommendations
7.4	ACM	7.1-A1, 7.1A2	Low-risk abatement procedures must be followed to remove the asbestos-containing cement board
	Lead based Paint	7.1-Pb1 to Pb6	Dispersible paint is to be removed - TCLP analysis of waste stream to determine destination of waste
8.1	Lead-based Paint	8.1-Pb1, 8.1-Pb2	Dispersible paint is to be removed from the Kitchen Shelter TCLP analysis of waste stream to determine destination of waste
	Silica	8.1-S1	Protect Workers when generating dust
8.2	Lead-based Paint	8.2-Pb3, 8.2-Pb6	Dispersible paint is to be removed from the Kitchen Shelter and sign post TCLP analysis of waste stream to determine destination of waste
	Silica	8.2-S1	Protect Workers when generating dust
8.3	Silica	10.1-S1	Protect workers when generating dust.
9.1	Lead-based Paint	9.1-Pb1	Dispersible paint is to be removed from the Kitchen Shelter Beams TCLP analysis of waste stream to determine destination of waste
	Silica	9.1-S1	Protect workers when generating dust
9.2	Lead-based Paint	9.2-Pb5, 9.2-Pb7	If paint is to be removed from the Kitchen Shelter and/or picnic tables TCLP analysis of waste stream to determine destination of waste
	Silica	9.2-S1	Protect workers when generating dust

8.0 LIMITATIONS

The conclusions and recommendations contained in this assessment report are based upon professional opinions with regard to the subject matter. These opinions are in accordance with currently accepted environmental assessment standards and practices applicable to these locations and are subject to the following inherent limitations:

1. The data and findings presented in this report are valid as of the dates of the investigations. The passage of time, manifestation of latent conditions or occurrence of future events may warrant further exploration at the properties, analysis of the data, and re-evaluation of the findings, observations, and conclusions expressed in this report.
2. The data reported, and the findings, observations and conclusions expressed in this report are limited by the Scope of Work. The Scope of Work was defined by the request of the client, the time and budgetary constraints imposed by the client, and availability of access to the properties.
3. Because of the limitations stated above, the findings, observations and conclusions expressed by EHS^P in this report are not, and should not be, considered an opinion concerning compliance of any past or present owner or operator of the site with any federal, provincial or local laws or regulations.
4. No warranty or guarantee, whether expressed or implied, is made with respect to the data or the reported findings, observations, and conclusions, which are based solely upon site conditions in existence at the time of investigation.
5. EHS^P assessment reports present professional opinions and findings of a scientific and technical nature. While attempts were made to relate the data and findings to applicable environmental laws and regulations, the report shall not be construed to offer legal opinion or representations as to the requirements of, nor compliance with, environmental laws, rules, regulations or policies of federal, provincial, or local governmental agencies. Any use of the assessment report constitutes acceptance of the limits of EHS^P's liability. EHS^P's liability extends only to its client and not to other parties who may obtain this assessment report. Issues raised by the report should be reviewed by appropriate legal counsel.

Appendix A

Laboratory Certificates of Analysis

Hazardous Materials Assessment
Waterton National Park, Alberta
Project #: 456BB-18-009

Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 1.1-1.10
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 2 of 3, 3 of 3

Report Date: 2019/01/15

Report #: R2674287

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B2114

Received: 2018/12/26, 17:12

Sample Matrix: PAINT
Samples Received: 87

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Asbestos by PLM - 1.0 RDL (1, 2)	87	N/A	2019/01/09	COR3SOP-00002	EPA 600R-93/116

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.

Maxxam Analytics' Asbestos Laboratory is accredited by NVLAP for bulk asbestos analysis by polarized light microscopy, NVLAP Code 600163-0.

This report may not be reproduced, except in full, without the written approval of Maxxam Analytics. This report may not be used by the client to claim product endorsement by NVLAP, NIST or any other agency of the U.S. Government.

Maxxam Analytics' scope of accreditation includes EPA-600/M4-82-020: "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" and EPA-600/R-93/116: "Method for the Determination of Asbestos in Bulk Building Materials".

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.

(1) This test was performed by Maxxam Vancouver

(2) The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method.

Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 1.1-1.10
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 2 of 3, 3 of 3

Report Date: 2019/01/15
Report #: R2674287
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B2114

Received: 2018/12/26, 17:12

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Carmen McKay, Project Manager

Email: CMcKay@maxxam.ca

Phone# (403)219-3683

=====

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 #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.1-A1						
Maxxam ID: VA1674			Date Analyzed: 2019/01/10			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>		<u>Particulate</u>
Layer 1	60	Homogeneous dark grey siding	Not Detected	Synthetic Fibres	5%	Non-Fibrous
Layer 2	40	Homogeneous brown-grey siding	Not Detected			Non-Fibrous

1.1-A2						
Maxxam ID: VA1675			Date Analyzed: 2019/01/10			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>		<u>Particulate</u>
Layer 1	60	Homogeneous dark grey siding	Not Detected	Synthetic Fibres	5%	Non-Fibrous
Layer 2	40	Homogeneous brown-grey siding	Not Detected			Non-Fibrous

1.1-A3						
Maxxam ID: VA1676			Date Analyzed: 2019/01/10			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>		<u>Particulate</u>
Layer 1	60	Homogeneous dark grey siding	Not Detected	Synthetic Fibres	5%	Non-Fibrous
Layer 2	40	Homogeneous brown-grey siding	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.1-A4					
Maxxam ID: VA1677			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey caulking	Not Detected		Non-Fibrous

1.1-A5					
Maxxam ID: VA1678			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey caulking	Not Detected		Non-Fibrous

1.1-A6					
Maxxam ID: VA1679			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey caulking	Not Detected		Non-Fibrous

1.1-A7					
Maxxam ID: VA1680			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous light grey concrete	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.1-A8					
Maxxam ID: VA1681			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous light grey concrete	Not Detected		Non-Fibrous

1.1-A9					
Maxxam ID: VA1682			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous light grey concrete	Not Detected		Non-Fibrous

1.3-A1					
Maxxam ID: VA1683			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey plaster	Not Detected		Non-Fibrous

1.3-A10					
Maxxam ID: VA1684			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey ashed shingles	Not Detected	Glass Fibres 20%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.3-A11						
Maxxam ID: VA1685			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey ashed shingles	Not Detected	Glass Fibres	5%	Non-Fibrous

1.3-A12						
Maxxam ID: VA1686			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey ashed shingles	Not Detected	Glass Fibres	20%	Non-Fibrous

1.3-A13						
Maxxam ID: VA1687			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black roof seal	Not Detected	Cellulose	5%	Non-Fibrous

1.3-A14						
Maxxam ID: VA1688			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black roof seal	Not Detected	Cellulose	5%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.3-A15						
Maxxam ID: VA1689			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black roof seal	Not Detected	Cellulose	5%	Non-Fibrous

1.3-A2						
Maxxam ID: VA1690			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey plaster	Not Detected			Non-Fibrous

1.3-A3						
Maxxam ID: VA1691			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey plaster	Not Detected			Non-Fibrous

1.3-A4						
Maxxam ID: VA1692			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous reddish concrete	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.3-A5					
Maxxam ID: VA1693			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish concrete	Not Detected		Non-Fibrous

1.3-A6					
Maxxam ID: VA1694			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish concrete	Not Detected		Non-Fibrous

1.3-A7					
Maxxam ID: VA1695			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black ashed pipe packing compound	Not Detected	Cellulose 80%	Non-Fibrous

1.3-A8					
Maxxam ID: VA1696			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black ashed pipe packing compound	Not Detected	Cellulose 80%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.3-A9						
Maxxam ID: VA1697			Date Analyzed: 2019/01/11			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black ashed pipe packing compound	Not Detected	Cellulose	80%	Non-Fibrous

1.4-A1						
Maxxam ID: VA1698			Date Analyzed: 2019/01/11			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous light grey concrete	Not Detected			Non-Fibrous

1.4-A10						
Maxxam ID: VA1699			Date Analyzed: 2019/01/11			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black ashed pipe packing compound	Not Detected	Cellulose	80%	Non-Fibrous

1.4-A11						
Maxxam ID: VA1700			Date Analyzed: 2019/01/11			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black ashed pipe packing compound	Not Detected	Cellulose	80%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.4-A12						
Maxxam ID: VA1701			Date Analyzed: 2019/01/11			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black ashed pipe packing compound	Not Detected	Cellulose	80%	Non-Fibrous

1.4-A13						
Maxxam ID: VA1702			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black roof seal	Not Detected	Cellulose	5%	Non-Fibrous

1.4-A14						
Maxxam ID: VA1703			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black roof seal	Not Detected	Cellulose	5%	Non-Fibrous

1.4-A15						
Maxxam ID: VA1704			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black roof seal	Not Detected	Cellulose	5%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.4-A2					
Maxxam ID: VA1705			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected		Non-Fibrous

1.4-A3					
Maxxam ID: VA1706			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected		Non-Fibrous

1.4-A4					
Maxxam ID: VA1707			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish plaster	Not Detected		Non-Fibrous

1.4-A5					
Maxxam ID: VA1708			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish plaster	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.4-A6					
Maxxam ID: VA1709			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish plaster	Not Detected		Non-Fibrous

1.4-A7					
Maxxam ID: VA1710			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey ashed shingles	Not Detected	Glass Fibres 20%	Non-Fibrous

1.4-A8					
Maxxam ID: VA1711			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey ashed shingles	Not Detected	Glass Fibres 50%	Non-Fibrous

1.4-A9					
Maxxam ID: VA1712			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey ashed shingles	Not Detected	Glass Fibres 80%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.5-A1					
Maxxam ID: VA1713			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected		Non-Fibrous

1.5-A2					
Maxxam ID: VA1714			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected		Non-Fibrous

1.5-A3					
Maxxam ID: VA1715			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected		Non-Fibrous

1.5-A4					
Maxxam ID: VA1716			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish concrete	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.5-A5					
Maxxam ID: VA1717			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish concrete	Not Detected		Non-Fibrous

1.5-A6					
Maxxam ID: VA1718			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish concrete	Not Detected		Non-Fibrous

1.5-A7					
Maxxam ID: VA1719			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey ashed shingles	Not Detected	Glass Fibres 10%	Non-Fibrous

1.5-A8					
Maxxam ID: VA1720			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres 20%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

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Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.5-A9						
Maxxam ID: VA1721			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey ashed shingles	Not Detected	Glass Fibres	20%	Non-Fibrous

1.6-A1						
Maxxam ID: VA1722			Date Analyzed: 2019/01/11			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous reddish grey mortar	Not Detected			Non-Fibrous

1.6-A2						
Maxxam ID: VA1868			Date Analyzed: 2019/01/11			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous reddish grey mortar	Not Detected			Non-Fibrous

1.6-A3						
Maxxam ID: VA1869			Date Analyzed: 2019/01/11			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous reddish grey mortar	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

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Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.6-A4					
Maxxam ID: VA1870			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

1.6-A5					
Maxxam ID: VA1871			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

1.6-A6					
Maxxam ID: VA1872			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

1.6-A7					
Maxxam ID: VA1873			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres 20%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

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Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.6-A8						
Maxxam ID: VA1874			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres	20%	Non-Fibrous

1.6-A9						
Maxxam ID: VA1875			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres	20%	Non-Fibrous

1.7-A1						
Maxxam ID: VA1876			Date Analyzed: 2019/01/11			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected			Non-Fibrous

1.7-A2						
Maxxam ID: VA1877			Date Analyzed: 2019/01/11			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

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Client Project #: 203.02356.00000
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Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.7-A3					
Maxxam ID: VA1878			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected		Non-Fibrous

1.7-A4					
Maxxam ID: VA1879			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

1.7-A5					
Maxxam ID: VA1880			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

1.7-A6					
Maxxam ID: VA1881			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

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Client Project #: 203.02356.00000
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Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.7-A7						
Maxxam ID: VA1882			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres	20%	Non-Fibrous

1.7-A8						
Maxxam ID: VA1883			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres	20%	Non-Fibrous

1.7-A9						
Maxxam ID: VA1884			Date Analyzed: 2019/01/10			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres	20%	Non-Fibrous

1.8-A1						
Maxxam ID: VA1885			Date Analyzed: 2019/01/11			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

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Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.8-A2					
Maxxam ID: VA1886			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected		Non-Fibrous

1.8-A3					
Maxxam ID: VA1887			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected		Non-Fibrous

1.8-A4					
Maxxam ID: VA1888			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

1.8-A5					
Maxxam ID: VA1889			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.8-A6					
Maxxam ID: VA1890			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

1.8-A7					
Maxxam ID: VA1891			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey ashed shingles	Not Detected	Glass Fibres 20%	Non-Fibrous

1.8-A8					
Maxxam ID: VA1892			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey ashed shingles	Not Detected	Glass Fibres 20%	Non-Fibrous

1.8-A9					
Maxxam ID: VA1893			Date Analyzed: 2019/01/10		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey ashed shingles	Not Detected	Glass Fibres 60%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.9-A1					
Maxxam ID: VA1894			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected		Non-Fibrous

1.9-A2					
Maxxam ID: VA1895			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

1.9-A3					
Maxxam ID: VA1896			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

1.9-A4					
Maxxam ID: VA1897			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous red-grey parging	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.9-A5					
Maxxam ID: VA1898			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous red-grey parging	Not Detected		Non-Fibrous

1.9-A6					
Maxxam ID: VA1899			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous red-grey parging	Not Detected		Non-Fibrous

1.9-A7					
Maxxam ID: VA1900			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected		Non-Fibrous

1.9-A8					
Maxxam ID: VA1901			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

1.9-A9					
Maxxam ID: VA1902			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected		Non-Fibrous

1.10-A2					
Maxxam ID: VA1903			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected		Non-Fibrous

1.10-A1					
Maxxam ID: VA1904			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected		Non-Fibrous

1.10-A3					
Maxxam ID: VA1905			Date Analyzed: 2019/01/11		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2114
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Rob Reinert, B.Sc., Scientific Spécialist

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.

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Edmonton: 9331-48 St. T6B 2R4. Toll Free (800) 386-7247

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CHAIN OF CUSTODY RECORD

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Invoice Information				Report Information (if differs from invoice)				Project Information				Turnaround Time (TAT) Required																																																																																																																																																																																																																																																																																																									
Company: <u>Public Works and Procurement Canada</u>				Company: <u>SLR Consulting (Canada) Ltd.</u>				Quotation #: <u>B81219</u>				<input checked="" type="checkbox"/> 5 - 7 Days Regular (Most analyses)																																																																																																																																																																																																																																																																																																									
Contact Name: <u>Karen Hill</u>				Contact Name: <u>Kate Lindfield</u>				P.O. #/ AFE#: <u>700425615</u>				PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS																																																																																																																																																																																																																																																																																																									
Address: <u>100-167 Lombard Ave</u>				Address: <u>1185-120201 Southport Road SW</u>				Project #: <u>203.02356.00000</u>				Rush TAT (Surcharges will be applied)																																																																																																																																																																																																																																																																																																									
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Email: <u>Karen.Hill@pwgsc-tpsgc.gc.ca</u>				Email: <u>jernst@ehsp.ca</u>				Sampled By: <u>JE</u>				Rush Confirmation #: _____																																																																																																																																																																																																																																																																																																									
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<small>Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/tr</small>																																																																																																																																																																																																																																																																																																																					

26-Dec-18 17:12
 Carmen McKay

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JOH INS-0001

Sample Type	Sample Number	Description	Sample Date
Asbestos	1.1-A1	Siding	2018-12-04
Asbestos	1.1-A2	Siding	2018-12-04
Asbestos	1.1-A3	Siding	2018-12-04
Asbestos	1.1-A4	Door Caulking	2018-12-04
Asbestos	1.1-A5	Door Caulking	2018-12-04
Asbestos	1.1-A6	Door Caulking	2018-12-04
Asbestos	1.1-A7	Concrete Slab	2018-12-04
Asbestos	1.1-A8	Concrete Slab	2018-12-04
Asbestos	1.1-A9	Concrete Slab	2018-12-04
Asbestos	1.3-A1	Wall Plaster	2018-12-04
Asbestos	1.3-A10	Asphalt Shingles	2018-12-04
Asbestos	1.3-A11	Asphalt Shingles	2018-12-04
Asbestos	1.3-A12	Asphalt Shingles	2018-12-04
Asbestos	1.3-A13	Powerhouse Roof Seal	2018-12-04
Asbestos	1.3-A14	Powerhouse Roof Seal	2018-12-04
Asbestos	1.3-A15	Powerhouse Roof Seal	2018-12-04
Asbestos	1.3-A2	Wall Plaster	2018-12-04
Asbestos	1.3-A3	Wall Plaster	2018-12-04
Asbestos	1.3-A4	Concrete Slab	2018-12-04
Asbestos	1.3-A5	Concrete Slab	2018-12-04
Asbestos	1.3-A6	Concrete Slab	2018-12-04
Asbestos	1.3-A7	Pipe Packing Compound	2018-12-04
Asbestos	1.3-A8	Pipe Packing Compound	2018-12-04
Asbestos	1.3-A9	Pipe Packing Compound	2018-12-04
Asbestos	1.4-A1	Concrete Slab	2018-12-04
Asbestos	1.4-A10	Pipe Packing Compound	2018-12-04
Asbestos	1.4-A11	Pipe Packing Compound	2018-12-04
Asbestos	1.4-A12	Pipe Packing Compound	2018-12-04
Asbestos	1.4-A13	Powerhouse Roof Seal	2018-12-04
Asbestos	1.4-A14	Powerhouse Roof Seal	2018-12-04
Asbestos	1.4-A15	Powerhouse Roof Seal	2018-12-04
Asbestos	1.4-A2	Concrete Slab	2018-12-04
Asbestos	1.4-A3	Concrete Slab	2018-12-04
Asbestos	1.4-A4	Wall Plaster	2018-12-04
Asbestos	1.4-A5	Wall Plaster	2018-12-04
Asbestos	1.4-A6	Wall Plaster	2018-12-04
Asbestos	1.4-A7	Asphalt Shingles	2018-12-04
Asbestos	1.4-A8	Asphalt Shingles	2018-12-04
Asbestos	1.4-A9	Asphalt Shingles	2018-12-04
Asbestos	1.5-A1	Chimney Mortar	2018-12-04
Asbestos	1.5-A2	Chimney Mortar	2018-12-04
Asbestos	1.5-A3	Chimney Mortar	2018-12-04
Asbestos	1.5-A4	Concrete Slab	2018-12-04
Asbestos	1.5-A5	Concrete Slab	2018-12-04
Asbestos	1.5-A6	Concrete Slab	2018-12-04
Asbestos	1.5-A7	Asphalt Shingles	2018-12-04
Asbestos	1.5-A8	Asphalt Shingles	2018-12-04
Asbestos	1.5-A9	Asphalt Shingles	2018-12-04
Asbestos	1.6-A1	Chimney Mortar	2018-12-04

26-Dec-18 17:12

Carmen McKay



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JOH INS-0001

2015

Sample Type	Sample Number	Description	Sample Date
Asbestos	1.6-A2	Chimney Mortar	2018-12-04
Asbestos	1.6-A3	Chimney Mortar	2018-12-04
Asbestos	1.6-A4	Concrete Slab	2018-12-04
Asbestos	1.6-A5	Concrete Slab	2018-12-04
Asbestos	1.6-A6	Concrete Slab	2018-12-04
Asbestos	1.6-A7	Asphalt Shingles	2018-12-04
Asbestos	1.6-A8	Asphalt Shingles	2018-12-04
Asbestos	1.6-A9	Asphalt Shingles	2018-12-04
Asbestos	1.7-A1	Chimney Mortar	2018-12-04
Asbestos	1.7-A2	Chimney Mortar	2018-12-04
Asbestos	1.7-A3	Chimney Mortar	2018-12-04
Asbestos	1.7-A4	Concrete Slab	2018-12-04
Asbestos	1.7-A5	Concrete Slab	2018-12-04
Asbestos	1.7-A6	Concrete Slab	2018-12-04
Asbestos	1.7-A7	Asphalt Shingles	2018-12-04
Asbestos	1.7-A8	Asphalt Shingles	2018-12-04
Asbestos	1.7-A9	Asphalt Shingles	2018-12-04
Asbestos	1.8-A1	Chimney Mortar	2018-12-04
Asbestos	1.8-A2	Chimney Mortar	2018-12-04
Asbestos	1.8-A3	Chimney Mortar	2018-12-04
Asbestos	1.8-A4	Concrete Slab	2018-12-04
Asbestos	1.8-A5	Concrete Slab	2018-12-04
Asbestos	1.8-A6	Concrete Slab	2018-12-04
Asbestos	1.8-A7	Asphalt Shingles	2018-12-04
Asbestos	1.8-A8	Asphalt Shingles	2018-12-04
Asbestos	1.8-A9	Asphalt Shingles	2018-12-04
Asbestos	1.9-A1	Concrete Walls	2018-12-04
Asbestos	1.9-A2	Concrete Walls	2018-12-04
Asbestos	1.9-A3	Concrete Walls	2018-12-04
Asbestos	1.9-A4	Parging - Exterior	2018-12-04
Asbestos	1.9-A5	Parging - Exterior	2018-12-04
Asbestos	1.9-A6	Parging - Exterior	2018-12-04
Asbestos	1.9-A7	Mortar - Top of Wall	2018-12-04
Asbestos	1.9-A8	Mortar - Top of Wall	2018-12-04
Asbestos	1.9-A9	Mortar - Top of Wall	2018-12-04
Asbestos	1.1-A1 1.10-A1	Concrete Site Site A8 PICNIC TABLE	2018-12-04
Asbestos	1.1-A2 1.10-A2	Concrete Site Site B15 PICNIC TABLE	2018-12-04
Asbestos	1.1-A3 1.10-A3	Concrete Site Site C7 PICNIC TABLE	2018-12-04

26-Dec-18 17:12

Carmen McKay



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JOH INS-0001

3 of 3

Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 2.1,5.1,5.2,8.1,8.2,9.1,9.2,10
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 1 of 2

Report Date: 2019/01/09

Report #: R2672297

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B2124

Received: 2018/12/26, 17:12

Sample Matrix: PAINT
Samples Received: 51

Analyses	Date		Date Analyzed	Laboratory Method	Analytical Method
	Quantity	Extracted			
Asbestos by PLM - 1.0 RDL (1, 2)	21	N/A	2019/01/08	COR3SOP-00002	EPA 600R-93/116
Asbestos by PLM - 1.0 RDL (1, 2)	30	N/A	2019/01/09	COR3SOP-00002	EPA 600R-93/116

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.

Maxxam Analytics' Asbestos Laboratory is accredited by NVLAP for bulk asbestos analysis by polarized light microscopy, NVLAP Code 600163-0.

This report may not be reproduced, except in full, without the written approval of Maxxam Analytics. This report may not be used by the client to claim product endorsement by NVLAP, NIST or any other agency of the U.S. Government.

Maxxam Analytics' scope of accreditation includes EPA-600/M4-82-020: "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" and EPA-600/R-93/116: "Method for the Determination of Asbestos in Bulk Building Materials".

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.

(1) This test was performed by Maxxam Vancouver

(2) The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method.

Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 2.1,5.1,5.2,8.1,8.2,9.1,9.2,10
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 1 of 2

Report Date: 2019/01/09

Report #: R2672297

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B2124

Received: 2018/12/26, 17:12

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Carmen McKay, Project Manager

Email: CMcKay@maxxam.ca

Phone# (403)219-3683

=====

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 #: B8B2124
Report Date: 2019/01/09

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

2.1-A1						
Maxxam ID: VA1801			Date Analyzed: 2019/01/08			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>		<u>Particulate</u>
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres	10%	Tar Non-Fibrous

2.1-A2						
Maxxam ID: VA1802			Date Analyzed: 2019/01/08			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>		<u>Particulate</u>
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres	10%	Tar Non-Fibrous

2.1-A3						
Maxxam ID: VA1803			Date Analyzed: 2019/01/08			
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>		<u>Particulate</u>
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres	10%	Tar Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2124
Report Date: 2019/01/09

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

2.1-A4					
Maxxam ID: VA1804			Date Analyzed: 2019/01/08		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish concrete piles	Not Detected		Non-Fibrous

2.1-A5					
Maxxam ID: VA1805			Date Analyzed: 2019/01/08		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish concrete piles	Not Detected		Non-Fibrous

2.1-A6					
Maxxam ID: VA1806			Date Analyzed: 2019/01/08		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish concrete piles	Not Detected		Non-Fibrous

5.1-A1					
Maxxam ID: VA1807			Date Analyzed: 2019/01/08		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black moisture barrier	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2124
Report Date: 2019/01/09

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

5.1-A2					
Maxxam ID: VA1808			Date Analyzed: 2019/01/08		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black moisture barrier	Not Detected		Non-Fibrous

5.1-A3					
Maxxam ID: VA1809			Date Analyzed: 2019/01/08		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black moisture barrier	Not Detected		Non-Fibrous

5.1-A4					
Maxxam ID: VA1810			Date Analyzed: 2019/01/08		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected		Non-Fibrous

5.1-A5					
Maxxam ID: VA1811			Date Analyzed: 2019/01/08		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2124
Report Date: 2019/01/09

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

5.1-A6					
Maxxam ID: VA1812			Date Analyzed: 2019/01/08		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected		Non-Fibrous

5.2-A1					
Maxxam ID: VA1813			Date Analyzed: 2019/01/08		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected		Non-Fibrous

5.2-A2					
Maxxam ID: VA1814			Date Analyzed: 2019/01/08		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected		Non-Fibrous

5.2-A3					
Maxxam ID: VA1815			Date Analyzed: 2019/01/08		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2124
Report Date: 2019/01/09

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

8.1-A1						
Maxxam ID: VA1816			Date Analyzed: 2019/01/08			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black roofing felt	Not Detected	Cellulose	60%	Tar

8.1-A2						
Maxxam ID: VA1817			Date Analyzed: 2019/01/08			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black roofing felt	Not Detected	Cellulose	60%	Tar

8.1-A3						
Maxxam ID: VA1818			Date Analyzed: 2019/01/08			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected			Non-Fibrous

8.1-A4						
Maxxam ID: VA1819			Date Analyzed: 2019/01/08			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2124
Report Date: 2019/01/09

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

8.1-A5						
Maxxam ID: VA1820			Date Analyzed: 2019/01/08			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black roofing felt	Not Detected	Cellulose	60%	Tar

8.1-A6						
Maxxam ID: VA1821			Date Analyzed: 2019/01/08			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected			Non-Fibrous

8.2-A1						
Maxxam ID: VA1822			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Non-homogeneous light and dark brown siding	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2124
Report Date: 2019/01/09

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

8.2-A2						
Maxxam ID: VA1823			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	60	Homogeneous dark grey siding	Not Detected	Synthetic Fibres	5%	Non-Fibrous
Layer 2	40	Homogeneous off-white siding	Not Detected			Non-Fibrous

8.2-A3						
Maxxam ID: VA1824			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey concrete	Not Detected			Non-Fibrous

8.2-A4						
Maxxam ID: VA1825			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2124
Report Date: 2019/01/09

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

9.1-A1					
Maxxam ID: VA1826			Date Analyzed: 2019/01/09		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	95	Homogeneous grey mortar	Not Detected		Non-Fibrous
Layer 2	5	Homogeneous black coat	Not Detected		Non-Fibrous

9.1-A10					
Maxxam ID: VA1827			Date Analyzed: 2019/01/09		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous white caulking	Not Detected		Non-Fibrous

9.1-A11					
Maxxam ID: VA1828			Date Analyzed: 2019/01/09		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous white caulking	Not Detected		Non-Fibrous

9.1-A12					
Maxxam ID: VA1829			Date Analyzed: 2019/01/09		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous white caulking	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2124
Report Date: 2019/01/09

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

9.1-A2					
Maxxam ID: VA1830			Date Analyzed: 2019/01/09		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected		Non-Fibrous

9.1-A3					
Maxxam ID: VA1831			Date Analyzed: 2019/01/09		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	90	Homogeneous grey mortar	Not Detected		Non-Fibrous
Layer 2	10	Homogeneous black coat	Not Detected		Non-Fibrous

9.1-A4					
Maxxam ID: VA1832			Date Analyzed: 2019/01/09		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

9.1-A5					
Maxxam ID: VA1833			Date Analyzed: 2019/01/09		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2124
Report Date: 2019/01/09

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

9.1-A6						
Maxxam ID: VA1834			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous reddish grey concrete	Not Detected			Non-Fibrous

9.1-A7						
Maxxam ID: VA1835			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous dark grey cement board	Not Detected	Synthetic Fibres	5%	Non-Fibrous

9.1-A8						
Maxxam ID: VA1836			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey cement board	Not Detected	Synthetic Fibres	5%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2124
Report Date: 2019/01/09

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Client Project #: 203.02356.00000
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Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

9.1-A9						
Maxxam ID: VA1837			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	60	Homogeneous dark grey cement	Not Detected	Synthetic Fibres	5%	Non-Fibrous
Layer 2	40	Homogeneous light brown cement	Not Detected			Non-Fibrous

9.2-A1						
Maxxam ID: VA1838			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey cement board	Not Detected	Synthetic Fibres	5%	Non-Fibrous

9.2-A10						
Maxxam ID: VA1839			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous white concrete	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2124
Report Date: 2019/01/09

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Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

9.2-A11					
Maxxam ID: VA1840			Date Analyzed: 2019/01/09		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous white concrete	Not Detected		Non-Fibrous

9.2-A12					
Maxxam ID: VA1841			Date Analyzed: 2019/01/09		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous white concrete	Not Detected		Non-Fibrous

9.2-A13					
Maxxam ID: VA1842			Date Analyzed: 2019/01/09		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey mortar	Not Detected		Non-Fibrous

9.2-A2					
Maxxam ID: VA1843			Date Analyzed: 2019/01/09		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous grey cement board	Not Detected	Synthetic Fibres 5%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

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Your P.O. #: 700425615
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Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

9.2-A3						
Maxxam ID: VA1844			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous grey cement board	Not Detected	Synthetic Fibres	5%	Non-Fibrous

9.2-A4						
Maxxam ID: VA1845			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous white caulking	Not Detected			Non-Fibrous

9.2-A5						
Maxxam ID: VA1846			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous white caulking	Not Detected			Non-Fibrous

9.2-A6						
Maxxam ID: VA1847			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous white caulking	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

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SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
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Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

9.2-A7						
Maxxam ID: VA1848			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres	20%	Non-Fibrous

9.2-A8						
Maxxam ID: VA1849			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres	20%	Non-Fibrous

9.2-A9						
Maxxam ID: VA1850			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous black shingles	Not Detected	Glass Fibres	20%	Non-Fibrous

10.0-A1						
Maxxam ID: VA1851			Date Analyzed: 2019/01/09			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous brown concrete	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

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SLR CONSULTING (CANADA) LTD.
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Sampler Initials: JE

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Rob Reinert, B.Sc., Scientific Spécialist

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.

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CHAIN OF CUSTODY RECORD

Page 1 of 2

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required																																																																									
Company: Public Works and Procurement Canada		Company: SLR Consulting (Canada) Ltd.		Quotation #: B81219		<input checked="" type="checkbox"/> 5 - 7 Days Regular (Most analyses)																																																																									
Contact Name: Karen Hill		Contact Name: Kate Lindfield		P.O. #/ AFE#: 700425615		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS																																																																									
Address: 100-167 Lombard Ave		Address: 1185-120201 Southport Road SW				Rush TAT (Surcharges will be applied)																																																																									
Winnipeg, MB R3B 0T6		Calgary, AB T2W 4X9		Project #: 203.02356.00000		<input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days																																																																									
Phone: 204-984-4510		Phone: 403-385-1323		Site Location: Waterton National Park		<input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days																																																																									
Email: Karen.Hill@pwqsc-tpsgc.gc.ca		Email: jernst@ehsp.ca		Site #: 2, 1, 5, 1, 5, 2, 8, 1, 8, 2, 9, 1, 9, 2, 10		Date Required: _____																																																																									
Copies: _____		Copies: klindfield@slrconsulting.com		Sampled By: JE		Rush Confirmation #: _____																																																																									
Laboratory Use Only				Analysis Requested																																																																											
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Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms

06-Dec-18 17:12
Carmen McKay
B8B2124
SBZ INS-0001

Sample Type	Sample Number	Description	Sample Date
Asbestos	2.1-A1	Asphalt Shingles	2018-11-30
Asbestos	2.1-A2	Asphalt Shingles	2018-11-30
Asbestos	2.1-A3	Asphalt Shingles	2018-11-30
Asbestos	2.1-A4	Concrete Piles	2018-11-30
Asbestos	2.1-A5	Concrete Piles	2018-11-30
Asbestos	2.1-A6	Concrete Piles	2018-11-30
Asbestos	5.1-A1	Moisture Barrier	2018-12-05
Asbestos	5.1-A2	Moisture Barrier	2018-12-05
Asbestos	5.1-A3	Moisture Barrier	2018-12-05
Asbestos	5.1-A4	Foundation Concrete	2018-12-05
Asbestos	5.1-A5	Foundation Concrete	2018-12-05
Asbestos	5.1-A6	Foundation Concrete	2018-12-05
Asbestos	5.2-A1	Concrete Slab	2018-12-05
Asbestos	5.2-A2	Concrete Slab	2018-12-05
Asbestos	5.2-A3	Concrete Slab	2018-12-05
Asbestos	8.1-A1	Roofing Felt Kitchen Shelter	2018-11-29
Asbestos	8.1-A2	Roofing Felt Kitchen Shelter	2018-11-29
Asbestos	8.1-A3	Chimney Mortar Kitchen Shelter	2018-11-29
Asbestos	8.1-A4	Concrete Picnic Table	2018-11-29
Asbestos	8.1-A5	Roofing Felt Outhouse	2018-11-29
Asbestos	8.1-A6	Concrete Bin Slab	2018-11-29
Asbestos	8.2-A1	Siding Outhouse	2018-11-29
Asbestos	8.2-A2	Siding Outhouse	2018-11-29
Asbestos	8.2-A3	Concrete Slab Kitchen Shelter	2018-11-29
Asbestos	8.2-A4	Chimney Mortar Kitchen Shelter	2018-11-29
Asbestos	9.1-A1	Chimney Mortar	2018-11-30
Asbestos	9.1-A10	Caulking (White)	2018-11-30
Asbestos	9.1-A11	Caulking (White)	2018-11-30
Asbestos	9.1-A12	Caulking (White)	2018-11-30
Asbestos	9.1-A2	Chimney Mortar	2018-11-30
Asbestos	9.1-A3	Chimney Mortar	2018-11-30
Asbestos	9.1-A4	Concrete Slab	2018-11-30
Asbestos	9.1-A5	Concrete Slab	2018-11-30
Asbestos	9.1-A6	Concrete Slab	2018-11-30
Asbestos	9.1-A7	Cement Board Siding	2018-11-30
Asbestos	9.1-A8	Cement Board Siding	2018-11-30
Asbestos	9.1-A9	Cement Board Siding	2018-11-30
Asbestos	9.2-A1	Cement Board Siding Outhouse	2018-11-30
Asbestos	9.2-A10	Concrete Slab	2018-11-30
Asbestos	9.2-A11	Concrete Slab	2018-11-30
Asbestos	9.2-A12	Concrete Slab	2018-11-30
Asbestos	9.2-A13	Chimney Mortar	2018-11-30
Asbestos	9.2-A2	Cement Board Siding Outhouse	2018-11-30
Asbestos	9.2-A3	Cement Board Siding Outhouse	2018-11-30
Asbestos	9.2-A4	Caulking (White) Outhouse	2018-11-30
Asbestos	9.2-A5	Caulking (White) Outhouse	2018-11-30
Asbestos	9.2-A6	Caulking (White) Outhouse	2018-11-30
Asbestos	9.2-A7	Asphalt Shingles	2018-11-30
Asbestos	9.2-A8	Asphalt Shingles	2018-11-30
Asbestos	9.2-A9	Asphalt Shingles	2018-11-30
Asbestos	10.1-A1	Bench Concrete Pile	2018-11-29

06-Dec-18 17:12

Carmen McKay



B8B2124

Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 7.1, 7.2, 7.3, 7.4
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 1 of 2

Report Date: 2019/01/15

Report #: R2674288

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B2138

Received: 2018/12/26, 17:12

Sample Matrix: Soil
Samples Received: 41

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Asbestos by PLM - 1.0 RDL (1, 2)	41	N/A	2019/01/11	COR3SOP-00002	EPA 600R-93/116

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.

Maxxam Analytics' Asbestos Laboratory is accredited by NVLAP for bulk asbestos analysis by polarized light microscopy, NVLAP Code 600163-0.

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Maxxam Analytics' scope of accreditation includes EPA-600/M4-82-020: "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" and EPA-600/R-93/116: "Method for the Determination of Asbestos in Bulk Building Materials".

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.

(1) This test was performed by Maxxam Vancouver

(2) The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method.

Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 7.1, 7.2, 7.3, 7.4
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 1 of 2

Report Date: 2019/01/15

Report #: R2674288

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B2138

Received: 2018/12/26, 17:12

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Carmen McKay, Project Manager

Email: CMcKay@maxxam.ca

Phone# (403)219-3683

=====

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 #: B8B2138
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

7.1-A1						
Maxxam ID: VA1953			Date Analyzed: 2019/01/14			
	P.O.B	Sample Morphology	Asbestos		Other Fibres	Particulate
Layer 1	100	Homogeneous Green Cement board wall	Chrysotile	12%		Non-Fibrous

7.1-A10						
Maxxam ID: VA1954			Date Analyzed: 2019/01/14			
	P.O.B	Sample Morphology	Asbestos		Other Fibres	Particulate
Layer 1	100	Homogeneous Black Asphalt Shingles	Not Detected		Cellulose 30%	Non-Fibrous

7.1-A11						
Maxxam ID: VA1955			Date Analyzed: 2019/01/14			
	P.O.B	Sample Morphology	Asbestos		Other Fibres	Particulate
Layer 1	100	Homogeneous Black Asphalt Shingles	Not Detected		Cellulose 30%	Non-Fibrous

7.1-A12						
Maxxam ID: VA1956			Date Analyzed: 2019/01/14			
	P.O.B	Sample Morphology	Asbestos		Other Fibres	Particulate
Layer 1	100	Homogeneous Grey Mortar	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2138
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

7.1-A13					
Maxxam ID: VA1957			Date Analyzed: 2019/01/14		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Grey Mortar	Not Detected		Non-Fibrous

7.1-A14					
Maxxam ID: VA1958			Date Analyzed: 2019/01/14		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Grey Mortar	Not Detected		Non-Fibrous

7.1-A15					
Maxxam ID: VA1959			Date Analyzed: 2019/01/14		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Greyish Pipe packing Compound	Not Detected		Non-Fibrous

7.1-A2					
Maxxam ID: VA1960			Date Analyzed: 2019/01/14		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Grey Cement Board Ceiling	Chrysotile 15%		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2138
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

7.1-A3						
Maxxam ID: VA1961			Date Analyzed: 2019/01/14			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous Black Building Paper	Not Detected	Cellulose	60%	Non-Fibrous

7.1-A4						
Maxxam ID: VA1962			Date Analyzed: 2019/01/14			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous Black Building Paper	Not Detected	Cellulose	60%	Non-Fibrous

7.1-A5						
Maxxam ID: VA1963			Date Analyzed: 2019/01/14			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous Black Building Paper	Not Detected	Cellulose	60%	Non-Fibrous

7.1-A6						
Maxxam ID: VA1964			Date Analyzed: 2019/01/14			
	P.O.B	Sample Morphology	Asbestos	Other Fibres		Particulate
Layer 1	100	Homogeneous Grey Glazing Putty	Not Detected			Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2138
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

7.1-A7					
Maxxam ID: VA1965			Date Analyzed: 2019/01/14		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Grey Glazing Putty	Not Detected		Non-Fibrous

7.1-A8					
Maxxam ID: VA1966			Date Analyzed: 2019/01/14		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Grey Glazing Putty	Not Detected		Non-Fibrous

7.1-A9					
Maxxam ID: VA1967			Date Analyzed: 2019/01/14		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Black Asphalt Shingles	Not Detected	Cellulose 10%	Non-Fibrous

7.2-A1					
Maxxam ID: VA1968			Date Analyzed: 2019/01/15		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Green Cement board walls	Chrysotile 15%		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2138
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

7.2-A10					
Maxxam ID: VA1969			Date Analyzed: 2019/01/15		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Beige Glazing Putty	Not Detected		Non-Fibrous

7.2-A11					
Maxxam ID: VA1970			Date Analyzed: 2019/01/15		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Beige Glazing Putty	Not Detected		Non-Fibrous

7.2-A2					
Maxxam ID: VA1971			Date Analyzed: 2019/01/15		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Grey Cement board Ceiling	Chrysotile 15%		Non-Fibrous

7.2-A3					
Maxxam ID: VA1972			Date Analyzed: 2019/01/15		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Grey Mortar	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2138
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

7.2-A4						
Maxxam ID: VA1973			Date Analyzed: 2019/01/15			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate	
Layer 1	100	Homogeneous Grey Mortar	Not Detected		Non-Fibrous	

7.2-A5						
Maxxam ID: VA1974			Date Analyzed: 2019/01/15			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate	
Layer 1	100	Homogeneous Grey Mortar	Not Detected		Non-Fibrous	

7.2-A6						
Maxxam ID: VA1975			Date Analyzed: 2019/01/15			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate	
Layer 1	100	Homogeneous Black Asphalt Shingles	Not Detected	Cellulose 25%	Non-Fibrous	

7.2-A7						
Maxxam ID: VA1976			Date Analyzed: 2019/01/15			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate	
Layer 1	100	Homogeneous Black Asphalt Shingles	Not Detected	Cellulose 25%	Non-Fibrous	

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2138
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SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

7.2-A8						
Maxxam ID: VA1977			Date Analyzed: 2019/01/15			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate	
Layer 1	100	Homogeneous Black Asphalt Shingles	Not Detected	Cellulose 25%	Non-Fibrous	

7.2-A9						
Maxxam ID: VA1978			Date Analyzed: 2019/01/15			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate	
Layer 1	100	Homogeneous White Glazing Putty	Not Detected		Non-Fibrous	

7.3-A1						
Maxxam ID: VA1979			Date Analyzed: 2019/01/15			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate	
Layer 1	100	Homogeneous Grey Cement board Walls	Chrysotile 15%		Non-Fibrous	

7.3-A2						
Maxxam ID: VA1980			Date Analyzed: 2019/01/15			
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate	
Layer 1	100	Homogeneous White Cement board Ceiling	Chrysotile 15%		Non-Fibrous	

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2138
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

7.3-A3					
Maxxam ID: VA1981			Date Analyzed: 2019/01/15		
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous White Cement board Ceiling	Chrysotile 15%		Non-Fibrous

7.3-A4					
Maxxam ID: VA1982			Date Analyzed: 2019/01/15		
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous White Cement board Ceiling	Chrysotile 15%		Non-Fibrous

7.3-A5					
Maxxam ID: VA1983			Date Analyzed: 2019/01/15		
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous White Glazing Putty	Not Detected		Non-Fibrous

7.3-A6					
Maxxam ID: VA1984			Date Analyzed: 2019/01/15		
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous White Glazing Putty	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2138
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

7.3-A7					
Maxxam ID: VA1985			Date Analyzed: 2019/01/15		
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous White Glazing Putty	Not Detected		Non-Fibrous

7.4-A1					
Maxxam ID: VA1986			Date Analyzed: 2019/01/15		
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous Green Cement Board Walls	Chrysotile 15%		Non-Fibrous

7.4-A2					
Maxxam ID: VA1987			Date Analyzed: 2019/01/15		
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous Grey Cement board Ceiling	Chrysotile 15%		Non-Fibrous

7.4-A3					
Maxxam ID: VA1988			Date Analyzed: 2019/01/15		
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>	<u>Particulate</u>
Layer 1	100	Homogeneous Greyish Glazing Putty	Not Detected		Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2138
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

7.4-A4					
Maxxam ID: VA1989			Date Analyzed: 2019/01/15		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Greyish Glazing Putty	Not Detected		Non-Fibrous

7.4-A5					
Maxxam ID: VA1990			Date Analyzed: 2019/01/15		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Greyish Glazing Putty	Not Detected		Non-Fibrous

7.4-A6					
Maxxam ID: VA1991			Date Analyzed: 2019/01/15		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Black Asphalt Shingles	Not Detected	Glass Fibres 10%	Non-Fibrous

7.4-A7					
Maxxam ID: VA1992			Date Analyzed: 2019/01/15		
	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous Black Asphalt Shingles	Not Detected	Glass Fibres 10%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2138
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

Asbestos Analytical Results

The Asbestos Analysis is based on NIOSH 9002 method and EPA/600R-93/116 Method. P.O.B. - Percent of Bulk Percent of Bulk

7.4-A8						
Maxxam ID: VA1993		Date Analyzed: 2019/01/15				
	<u>P.O.B</u>	<u>Sample Morphology</u>	<u>Asbestos</u>	<u>Other Fibres</u>		<u>Particulate</u>
Layer 1	100	Homogeneous Black Asphalt Shingles	Not Detected	Glass Fibres	10%	Non-Fibrous

The limit of quantitation is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples for which asbestos is detected at <1% are reported as trace, "<1%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

Maxxam Job #: B8B2138
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B8B2138
Report Date: 2019/01/15

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Rob Reinert, B.Sc., Scientific Spécialist

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.

CHAIN OF CUSTODY RECORD

Page 1 of 2

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required																																																																																																																																																																																																												
Company: Public Works and Procurement Canada		Company: SLR Consulting (Canada) Ltd.		Quotation #: B81219		<input checked="" type="checkbox"/> 5 - 7 Days Regular (Most analyses)																																																																																																																																																																																																												
Contact Name: Karen Hill		Contact Name: Kate Lindfield		P.O. #/ AFE#: 700425615		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS																																																																																																																																																																																																												
Address: 100-167 Lombard Ave		Address: 1185-120201 Southport Road SW		Project #: 203.02356.00000		Rush TAT (Surcharges will be applied)																																																																																																																																																																																																												
Winnipeg, MB R3B 0T6		Calgary, AB T2W 4X9		Site Location: Waterton National Park		<input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days																																																																																																																																																																																																												
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Email: Karen.Hill@pwgsc-tpsgc.gc.ca		Email: jernst@ehsp.ca		Sampled By: JE		Rush Confirmation #: _____																																																																																																																																																																																																												
Copies: _____		Copies: klindfield@slrconsulting.com																																																																																																																																																																																																																
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06-Dec-18 17:12
Carmen McKay
B8B2138

SBZ INS-0230

Sample Type	Sample Number	Description	Sample Date
Asbestos	7.1-A1	Cement Board Walls	2018-12-05
Asbestos	7.1-A10	Asphalt Shingles	2018-12-05
Asbestos	7.1-A11	Asphalt Shingles	2018-12-05
Asbestos	7.1-A12	Riverstone Mortar	2018-12-05
Asbestos	7.1-A13	Riverstone Mortar	2018-12-05
Asbestos	7.1-A14	Riverstone Mortar	2018-12-05
Asbestos	7.1-A15	Pipe Packing Compound	2018-12-05
Asbestos	7.1-A2	Cement Board Ceiling	2018-12-05
Asbestos	7.1-A3	Building Paper	2018-12-05
Asbestos	7.1-A4	Building Paper	2018-12-05
Asbestos	7.1-A5	Building Paper	2018-12-05
Asbestos	7.1-A6	Glazing Putty	2018-12-05
Asbestos	7.1-A7	Glazing Putty	2018-12-05
Asbestos	7.1-A8	Glazing Putty	2018-12-05
Asbestos	7.1-A9	Asphalt Shingles	2018-12-05
Asbestos	7.2-A1	Cement Board Walls	2018-12-05
Asbestos	7.2-A10	Glazing Putty	2018-12-05
Asbestos	7.2-A11	Glazing Putty	2018-12-05
Asbestos	7.2-A2	Cement Board Ceiling	2018-12-05
Asbestos	7.2-A3	Riverstone Mortar	2018-12-05
Asbestos	7.2-A4	Riverstone Mortar	2018-12-05
Asbestos	7.2-A5	Riverstone Mortar	2018-12-05
Asbestos	7.2-A6	Asphalt Shingles	2018-12-05
Asbestos	7.2-A7	Asphalt Shingles	2018-12-05
Asbestos	7.2-A8	Asphalt Shingles	2018-12-05
Asbestos	7.2-A9	Glazing Putty	2018-12-05
Asbestos	7.3-A1	Cement Board Walls	2018-12-05
Asbestos	7.3-A2	Cement Board Ceiling	2018-12-05
Asbestos	7.3-A3	Cement Board Ceiling	2018-12-05
Asbestos	7.3-A4	Cement Board Ceiling	2018-12-05
Asbestos	7.3-A5	Glazing Putty	2018-12-05
Asbestos	7.3-A6	Glazing Putty	2018-12-05
Asbestos	7.3-A7	Glazing Putty	2018-12-05
Asbestos	7.4-A1	Cement Board Walls	2018-12-05
Asbestos	7.4-A2	Cement Board Ceiling	2018-12-05
Asbestos	7.4-A3	Glazing Putty	2018-12-05
Asbestos	7.4-A4	Glazing Putty	2018-12-05
Asbestos	7.4-A5	Glazing Putty	2018-12-05
Asbestos	7.4-A6	Asphalt Shingles	2018-12-05
Asbestos	7.4-A7	Asphalt Shingles	2018-12-05
Asbestos	7.4-A8	Asphalt Shingles	2018-12-05

06-Dec-18 17:12

Carmen McKay



B8B2138

SBZ INS-0230

2 of 2

Certificate of Analysis

EHS Partnerships Ltd. (Calgary)

4303-11 St. SE
Calgary, AB T2G 4X1
Attn: Jon Ernst

Client PO: 456BB18009

Project: 456BB18009

Custody:

Report Date: 23-May-2019

Order Date: 17-May-2019

Order #: 1920766

This Certificate of Analysis contains analytical data applicable to the following samples as submitted :

Paracel ID	Client ID
1920766-01	6.1-A1
1920766-02	6.1-A2
1920766-03	6.1-A3
1920766-04	6.1-A4
1920766-05	6.1-A5
1920766-06	6.1-A6
1920766-07	6.1-A7
1920766-08	6.1-A8
1920766-09	6.1-A9
1920766-10	6.1-A10
1920766-11	6.1-A11
1920766-12	6.1-A12
1920766-13	6.1-A13
1920766-14	1.11-A1
1920766-15	1.11-A2
1920766-16	1.11-A3
1920766-17	1.11-A4
1920766-18	1.11-A5
1920766-19	1.11-A6
1920766-20	1.11-A7
1920766-21	1.11-A8
1920766-22	1.11-A9
1920766-23	1.11-A10
1920766-24	1.11-A11
1920766-25	1.11-A12
1920766-26	1.11-A13

Approved By:



Harling Caro

Senior Analyst

Certificate of Analysis

Client: EHS Partnerships Ltd. (Calgary)

Client PO: 456BB18009

Report Date: 23-May-2019

Order Date: 17-May-2019

Project Description: 456BB18009

1920766-27	1.11-A14
1920766-28	1.11-A15
1920766-29	1.12-A1
1920766-30	1.12-A2
1920766-31	1.12-A3
1920766-32	1.13-A1
1920766-33	1.13-A2
1920766-34	1.13-A3
1920766-35	1.14-A1
1920766-36	1.14-A2
1920766-37	1.14-A3
1920766-38	1.14-A4
1920766-39	1.14-A5
1920766-40	1.14-A6
1920766-41	1.15-A1
1920766-42	1.15-A2
1920766-43	1.15-A3
1920766-44	1.15-A4
1920766-45	1.15-A5
1920766-46	1.15-A6
1920766-47	1.15-A7
1920766-48	1.15-A8
1920766-49	1.15-A9
1920766-50	1.16-A1
1920766-51	1.16-A2
1920766-52	1.16-A3
1920766-53	1.16-A4
1920766-54	1.16-A5
1920766-55	1.16-A6
1920766-56	1.16-A7
1920766-57	1.16-A8
1920766-58	1.16-A9
1920766-59	1.17-A1
1920766-60	1.17-A2
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1920766-62	1.18-A1
1920766-63	1.18-A2
1920766-64	1.18-A3
1920766-65	1.18-A4
1920766-66	1.18-A5
1920766-67	1.18-A6
1920766-68	1.18-A7
1920766-69	1.18-A8
1920766-70	1.18-A9

Certificate of Analysis

Client: EHS Partnerships Ltd. (Calgary)

Client PO: 456BB18009

Report Date: 23-May-2019

Order Date: 17-May-2019

Project Description: 456BB18009

1920766-71	1.19-A1
1920766-72	1.19-A2
1920766-73	1.19-A3
1920766-74	1.19-A4
1920766-75	1.19-A5
1920766-76	1.19-A6
1920766-77	1.19-A7
1920766-78	1.19-A8
1920766-79	1.19-A9
1920766-80	1.21-A1
1920766-81	1.21-A2
1920766-82	1.21-A3

Certificate of Analysis

Client: EHS Partnerships Ltd. (Calgary)

Client PO: 456BB18009

Report Date: 23-May-2019

Order Date: 17-May-2019

Project Description: 456BB18009

Asbestos, PLM Visual Estimation **MDL - 1.0%**

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
1920766-01	13-May-19	Grey	Block Mortar Walls	No	Client ID: 6.1-A1	
					Non-Fibers	100
1920766-02	13-May-19	Grey	Block Mortar Walls	No	Client ID: 6.1-A2	
					Non-Fibers	100
1920766-03	13-May-19	Grey	Block Mortar Walls	No	Client ID: 6.1-A3	
					Non-Fibers	100
1920766-04	13-May-19	Black/Brown	Vermiculite	Yes	Client ID: 6.1-A4	
					Actinolite	3
					Non-Fibers	97
1920766-05	13-May-19	Black/Brown	Vermiculite	Yes	Client ID: 6.1-A5	
					Actinolite	3
					Non-Fibers	97
1920766-06	13-May-19	Black/Brown	Vermiculite	Yes	Client ID: 6.1-A6	
					Actinolite	3
					Non-Fibers	97
1920766-07	13-May-19	Black/Brown	Vermiculite	Yes	Client ID: 6.1-A7	
					Actinolite	3
					Non-Fibers	97
1920766-08	13-May-19	Off-white	Penetration Caulking Walls	No	Client ID: 6.1-A8	
					[AS-PRE]	100
1920766-09	13-May-19	Black	Penetration Caulking Walls	Yes	Client ID: 6.1-A9	
					[AS-PRE]	
					[ASTrc]Chrysotile	<MDL
1920766-10	13-May-19	Black	Penetration Caulking Walls	Yes	Client ID: 6.1-A10	
					[AS-PRE]	
					[ASTrc]Chrysotile	<MDL
					Non-Fibers	100

Certificate of Analysis

Report Date: 23-May-2019

Client: EHS Partnerships Ltd. (Calgary)

Order Date: 17-May-2019

Client PO: 456BB18009

Project Description: 456BB18009

Asbestos, PLM Visual Estimation **MDL - 1.0%**

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
1920766-11	13-May-19	Brown	Concrete Slab Floor	No	Client ID: 6.1-A11	
					Non-Fibers	100
1920766-12	13-May-19	Brown	Concrete Slab Floor	No	Client ID: 6.1-A12	
					Non-Fibers	100
1920766-13	13-May-19	Brown	Concrete Slab Floor	Yes	Client ID: 6.1-A13	
					[ASTrc]Chrysotile	<MDL
1920766-14	14-May-19	Grey	Parging - Exterior Foundation	No	Client ID: 1.11-A1	
					Non-Fibers	100
1920766-15	14-May-19	Grey	Parging - Exterior Foundation	No	Client ID: 1.11-A2	
					Non-Fibers	100
1920766-16	14-May-19	Grey	Parging - Exterior Foundation	No	Client ID: 1.11-A3	
					Non-Fibers	100
1920766-17	14-May-19	Off-white	Caulking (White) Windows	No	Client ID: 1.11-A4	
					[AS-PRE]	100
1920766-18	14-May-19	Off-white	Caulking (White) Windows	No	Client ID: 1.11-A5	
					[AS-PRE]	100
1920766-19	14-May-19	Off-white	Caulking (White) Windows	No	Client ID: 1.11-A6	
					[AS-PRE]	100
1920766-20	14-May-19	Black	Glazing Putty Windows	No	Client ID: 1.11-A7	
					[AS-PRE]	100
1920766-21	14-May-19	Black	Glazing Putty Windows	No	Client ID: 1.11-A8	
					[AS-PRE]	100
1920766-22	14-May-19	Black	Glazing Putty Windows	No	Client ID: 1.11-A9	
					[AS-PRE]	100

Certificate of Analysis

Client: EHS Partnerships Ltd. (Calgary)

Client PO: 456BB18009

Report Date: 23-May-2019

Order Date: 17-May-2019

Project Description: 456BB18009

Asbestos, PLM Visual Estimation **MDL - 1.0%**

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
1920766-23	14-May-19	Pink	Concrete Slab Floor	No	Client ID: 1.11-A10	
					Non-Fibers	100
1920766-24	14-May-19	Pink	Concrete Slab Floor	No	Client ID: 1.11-A11	
					Non-Fibers	100
1920766-25	14-May-19	Pink	Concrete Slab Floor	No	Client ID: 1.11-A12	
					Non-Fibers	100
1920766-26	14-May-19	Green	Vinyl Sheet Flooring (Green) Floor	No	Client ID: 1.11-A13	
						[AS-PRE]
					MMVF	6
1920766-27	14-May-19	Green	Vinyl Sheet Flooring (Green) Floor	No	Client ID: 1.11-A14	
						[AS-PRE]
					MMVF	6
1920766-28	14-May-19	Green	Vinyl Sheet Flooring (Green) Floor	No	Client ID: 1.11-A15	
						[AS-PRE]
					MMVF	6
1920766-29	14-May-19	Grey	Concrete Slab Floor	No	Client ID: 1.12-A1	
					Non-Fibers	100
1920766-30	14-May-19	Grey	Concrete Slab Floor	No	Client ID: 1.12-A2	
					Non-Fibers	100
1920766-31	14-May-19	Grey	Concrete Slab Floor	No	Client ID: 1.12-A3	
					Non-Fibers	100
1920766-32	14-May-19	Grey	Concrete Slab Floor	No	Client ID: 1.13-A1	
					Non-Fibers	100
1920766-33	14-May-19	Grey	Concrete Slab Floor	No	Client ID: 1.13-A2	
					Non-Fibers	100

Certificate of Analysis

Report Date: 23-May-2019

Client: EHS Partnerships Ltd. (Calgary)

Order Date: 17-May-2019

Client PO: 456BB18009

Project Description: 456BB18009

Asbestos, PLM Visual Estimation **MDL - 1.0%**

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
1920766-34	14-May-19	Grey	Concrete Slab Floor	No	Client ID: 1.13-A3	
					Non-Fibers	100
1920766-35	14-May-19	Black	Roof Seal Ceiling	No	Client ID: 1.14-A1	
						[AS-PRE]
					Cellulose	3
1920766-36	14-May-19	Black	Roof Seal Ceiling	No	Client ID: 1.14-A2	
						[AS-PRE]
					Cellulose	3
1920766-37	14-May-19	Black	Roof Seal Ceiling	No	Client ID: 1.14-A3	
						[AS-PRE]
					Cellulose	3
1920766-38	14-May-19	Grey	Concrete Slab Floor	No	Client ID: 1.14-A4	
						[AS-PRE]
					Cellulose	3
1920766-39	14-May-19	Grey	Concrete Slab Floor	No	Client ID: 1.14-A5	
						[AS-PRE]
					Cellulose	3
1920766-40	14-May-19	Grey	Concrete Slab Floor	No	Client ID: 1.14-A6	
						[AS-PRE]
					Cellulose	3
1920766-41	14-May-19	Black	Roof Seal Ceiling	No	Client ID: 1.15-A1	
						[AS-PRE]
					Cellulose	5
1920766-42	14-May-19	Black	Roof Seal Ceiling	No	Client ID: 1.15-A2	
						[AS-PRE]
					Cellulose	5
1920766-43	14-May-19	Black	Roof Seal Ceiling	No	Client ID: 1.15-A3	
						[AS-PRE]
					Cellulose	5

Certificate of Analysis

Client: EHS Partnerships Ltd. (Calgary)

Client PO: 456BB18009

Report Date: 23-May-2019

Order Date: 17-May-2019

Project Description: 456BB18009

Asbestos, PLM Visual Estimation **MDL - 1.0%**

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
1920766-44	14-May-19	Grey	Concrete Slab Floor	No	Client ID: 1.15-A4	
					Non-Fibers	100
1920766-45	14-May-19	Grey	Concrete Slab Floor	No	Client ID: 1.15-A5	
					Non-Fibers	100
1920766-46	14-May-19	Grey	Concrete Slab Floor	No	Client ID: 1.15-A6	
					Non-Fibers	100
1920766-47	14-May-19	Grey	Penetration Parging Walls	No	Client ID: 1.15-A7	
					Non-Fibers	100
1920766-48	14-May-19	Grey	Penetration Parging Walls	No	Client ID: 1.15-A8	
					Non-Fibers	100
1920766-49	14-May-19	Grey	Penetration Parging Walls	No	Client ID: 1.15-A9	
					Non-Fibers	100
1920766-50	14-May-19	Black	Roof Seal Ceiling	No	Client ID: 1.16-A1	[AS-PRE]
					Cellulose	5
					Non-Fibers	95
1920766-51	14-May-19	Black	Roof Seal Ceiling	No	Client ID: 1.16-A2	[AS-PRE]
					Cellulose	5
					Non-Fibers	95
1920766-52	14-May-19	Black	Roof Seal Ceiling	No	Client ID: 1.16-A3	[AS-PRE]
					Cellulose	5
					Non-Fibers	95
1920766-53	14-May-19	Grey	Penetration Parging Walls	No	Client ID: 1.16-A4	
					Non-Fibers	100
1920766-54	14-May-19	Grey	Penetration Parging Walls	No	Client ID: 1.16-A5	
					Non-Fibers	100

Certificate of Analysis

Report Date: 23-May-2019

Client: EHS Partnerships Ltd. (Calgary)

Order Date: 17-May-2019

Client PO: 456BB18009

Project Description: 456BB18009

Asbestos, PLM Visual Estimation ****MDL - 1.0%****

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
1920766-55	14-May-19	Grey	Penetration Parging Walls	No	Client ID: 1.16-A6	
					Non-Fibers	100
1920766-56	14-May-19	Light Grey	Concrete Slab Floor	No	Client ID: 1.16-A7	
					Non-Fibers	100
1920766-57	14-May-19	Light Grey	Concrete Slab Floor	No	Client ID: 1.16-A8	
					Non-Fibers	100
1920766-58	14-May-19	Light Grey	Concrete Slab Floor	No	Client ID: 1.16-A9	
					Non-Fibers	100
1920766-59	14-May-19	Light Grey	Concrete Slab Floor	No	Client ID: 1.17-A1	
					Non-Fibers	100
1920766-60	14-May-19	Light Grey	Concrete Slab Floor	No	Client ID: 1.17-A2	
					Non-Fibers	100
1920766-61	14-May-19	Light Grey	Concrete Slab Floor	No	Client ID: 1.17-A3	
					Non-Fibers	100
1920766-62	14-May-19	Black	Asphalt Shingles Roof	No	Client ID: 1.18-A1	[AS-PRE]
					MMVF	30
					Non-Fibers	70
1920766-63	14-May-19	Black	Asphalt Shingles Roof	No	Client ID: 1.18-A2	[AS-PRE]
					MMVF	40
					Non-Fibers	60
1920766-64	14-May-19	Black	Asphalt Shingles Roof	No	Client ID: 1.18-A3	[AS-PRE]
					MMVF	30
					Non-Fibers	70
1920766-65	14-May-19	Pink	Concrete Slab Floor	No	Client ID: 1.18-A4	
					Non-Fibers	100

Certificate of Analysis

Client: EHS Partnerships Ltd. (Calgary)

Client PO: 456BB18009

Report Date: 23-May-2019

Order Date: 17-May-2019

Project Description: 456BB18009

Asbestos, PLM Visual Estimation **MDL - 1.0%**

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
1920766-66	14-May-19	Pink	Concrete Slab Floor	No	Client ID: 1.18-A5	
					Non-Fibers	100
1920766-67	14-May-19	Pink	Concrete Slab Floor	No	Client ID: 1.18-A6	
					Non-Fibers	100
1920766-68	14-May-19	Red	Tile Grout (Red) Walls	Yes	Client ID: 1.18-A7	[AS-PRE]
					[ASTrc]Chrysotile	<MDL
					Cellulose	5
					Non-Fibers	95
1920766-69	14-May-19	Red	Tile Grout (Red) Walls	No	Client ID: 1.18-A8	[AS-PRE]
					Cellulose	3
					Non-Fibers	97
1920766-70	14-May-19	Red	Tile Grout (Red) Walls	No	Client ID: 1.18-A9	[AS-PRE]
					Cellulose	3
					Non-Fibers	97
1920766-71	14-May-19	Pink	Concrete Slab Floor	No	Client ID: 1.19-A1	
					Non-Fibers	100
1920766-72	14-May-19	Pink	Concrete Slab Floor	No	Client ID: 1.19-A2	
					Non-Fibers	100
1920766-73	14-May-19	Pink	Concrete Slab Floor	No	Client ID: 1.19-A3	
					Non-Fibers	100
1920766-74	14-May-19	Black	Asphalt Shingles Roof	No	Client ID: 1.19-A4	[AS-PRE]
					Cellulose	15
					MMVF	1
					Non-Fibers	84

Certificate of Analysis

Client: EHS Partnerships Ltd. (Calgary)

Client PO: 456BB18009

Report Date: 23-May-2019

Order Date: 17-May-2019

Project Description: 456BB18009

Asbestos, PLM Visual Estimation **MDL - 1.0%**

Parcel ID	Sample Date	Colour	Description	Asbestos Detected	Material Identification	% Content
1920766-75	14-May-19	Black	Asphalt Shingles Roof	No	Client ID: 1.19-A5	
						[AS-PRE]
					Cellulose	15
					MMVF	1
					Non-Fibers	84
1920766-76	14-May-19	Black	Asphalt Shingles Roof	No	Client ID: 1.19-A6	
						[AS-PRE]
					Cellulose	10
					MMVF	1
					Non-Fibers	89
1920766-77	14-May-19	Red	Tile Grout (Red) Walls	No	Client ID: 1.19-A7	
						[AS-PRE]
					Cellulose	2
					Non-Fibers	98
1920766-78	14-May-19	Red	Tile Grout (Red) Walls	No	Client ID: 1.19-A8	
						[AS-PRE]
					Cellulose	2
					Non-Fibers	98
1920766-79	14-May-19	Red	Tile Grout (Red) Walls	No	Client ID: 1.19-A9	
						[AS-PRE]
					Cellulose	2
					Non-Fibers	98
1920766-80	14-May-19	Grey	Cementitious Tile Debris	No	Client ID: 1.21-A1	
						[AS-PRE]
					Non-Fibers	100
1920766-81	14-May-19	Grey	Cementitious Tile Debris	No	Client ID: 1.21-A2	
						[AS-PRE]
					Non-Fibers	100
1920766-82	14-May-19	Grey	Cementitious Tile Debris	No	Client ID: 1.21-A3	
						[AS-PRE]
					Non-Fibers	100

* MMVF: Man Made Vitreous Fibers: Fiberglass, Mineral Wool, Rockwool, Glasswool

** Analytes in bold indicate asbestos mineral content.

Certificate of Analysis

Client: EHS Partnerships Ltd. (Calgary)

Client PO: 456BB18009

Report Date: 23-May-2019

Order Date: 17-May-2019

Project Description: 456BB18009

Analysis Summary Table

Analysis	Method Reference/Description	Lab Location	Analysis Date
Asbestos, PLM Visual Estimation	by EPA 600/R-93/116	3 - Calgary	21-May-19

Qualifier Notes

Sample Qualifiers :

AS-PRE: Due to the difficult nature of the bulk sample (interfering fibers/binders), additional NOB preparation was required prior to analysis

ASTrc: Trace asbestos was observed below the noted detection limit but could not be accurately quantified.

Work Order Revisions | Comments

None

1920766



ce
St. Laurent Blvd.
ntario K1G 4J8
49-1947
@paracellabs.com

Chain of Custody (Lab Use Only)

Page 1 of 4

Client Name: EHS Partnerships Ltd.	Project Reference: 456BB18009	Turnaround Time: <input type="checkbox"/> Immediate <input type="checkbox"/> 1 Day <input type="checkbox"/> 4 Hour <input type="checkbox"/> 2 Day <input type="checkbox"/> 8 Hour <input type="checkbox"/> 3 Day <input checked="" type="checkbox"/> Regular Date Required: May 23, 2019
Contact Name: Jon Ernst	Quote #: 19-393 EHSP Waterton	
Address: 4303 - 11 Street SE Calgary, Alberta T2G 4X1	PO #: 456BB18009	
Telephone: 403.605.9685	Email Address: jernst@ehsp.ca, bburwash@ehsp.ca	

ASBESTOS & MOLD ANALYSIS

Matrix: ☐ Air ☒ Bulk ☐ Tape Lift ☐ Swab ☐ Other **Regulatory Guideline:** ☐ ON ☐ QC ☒ AB ☐ SK ☐ Other: _____
Analyses: ☐ Microscopic Mold ☐ Culturable Mold ☐ Bacteria GRAM ☐ PCM Asbestos ☒ PLM Asbestos ☐ Chatfield Asbestos ☐ TEM Asbestos

Parcel Order Number:		Asbestos - Bulk				
Sample ID		Sampling Date	Air Volume (L)	Analysis Required	Identify Distinct Building Materials to Be Analyzed * see below	Combine Identified Materials? **see below
1920766						
1	See Attached 82 Samples	May 13 - 14, 2019		PLM		<input checked="" type="checkbox"/>
2						<input type="checkbox"/>
3						<input type="checkbox"/>
4						<input type="checkbox"/>
5						<input type="checkbox"/>
6						<input type="checkbox"/>
7						<input type="checkbox"/>
8						<input type="checkbox"/>
9						<input type="checkbox"/>
10						<input type="checkbox"/>
11						<input type="checkbox"/>
12						<input type="checkbox"/>

* If left blank, Paracel will analyze all materials identified during analysis ** If left blank, Paracel will analyze all materials as individual samples (at additional cost) per EPA 600/R -93/116

Comments: Do not Point Count

Method of Delivery:
Fedex
Walk-in

Relinquished By (Sign):	Received at Depot:	Received at Lab: H. Cano @ 0810	Verified By: A. LANUZO
Relinquished By (Print): Jon Ernst		Date/Time: May 17/2019	Date/Time: MAY 17/19 @ 1148
Date/Time: May 16, 2019	Date/Time:		



Sample Type	Sample Number	Description	
Asbestos	6.1-A1	Block Mortar Walls	2019-05-13
Asbestos	6.1-A2	Block Mortar Walls	2019-05-13
Asbestos	6.1-A3	Block Mortar Walls	2019-05-13
Asbestos	6.1-A4	Vermiculite Walls	2019-05-13
Asbestos	6.1-A5	Vermiculite Walls	2019-05-13
Asbestos	6.1-A6	Vermiculite Walls	2019-05-13
Asbestos	6.1-A7	Vermiculite Walls	2019-05-13
Asbestos	6.1-A8	Penetration Caulking Walls	2019-05-13
Asbestos	6.1-A9	Penetration Caulking Walls	2019-05-13
Asbestos	6.1-A10	Penetration Caulking Walls	2019-05-13
Asbestos	6.1-A11	Concrete Slab Floor	2019-05-13
Asbestos	6.1-A12	Concrete Slab Floor	2019-05-13
Asbestos	6.1-A13	Concrete Slab Floor	2019-05-13
Asbestos	1.11-A1	Parging - Exterior Foundation	2019-05-14
Asbestos	1.11-A2	Parging - Exterior Foundation	2019-05-14
Asbestos	1.11-A3	Parging - Exterior Foundation	2019-05-14
Asbestos	1.11-A4	Caulking (White) Windows	2019-05-14
Asbestos	1.11-A5	Caulking (White) Windows	2019-05-14
Asbestos	1.11-A6	Caulking (White) Windows	2019-05-14
Asbestos	1.11-A7	Glazing Putty Windows	2019-05-14
Asbestos	1.11-A8	Glazing Putty Windows	2019-05-14
Asbestos	1.11-A9	Glazing Putty Windows	2019-05-14
Asbestos	1.11-A10	Concrete Slab Floor	2019-05-14
Asbestos	1.11-A11	Concrete Slab Floor	2019-05-14
Asbestos	1.11-A12	Concrete Slab Floor	2019-05-14
Asbestos	1.11-A13	Vinyl Sheet Flooring (Green) Floor	2019-05-14
Asbestos	1.11-A14	Vinyl Sheet Flooring (Green) Floor	2019-05-14
Asbestos	1.11-A15	Vinyl Sheet Flooring (Green) Floor	2019-05-14
Asbestos	1.12-A1	Concrete Slab Floor	2019-05-14

1920766

Sample Type	Sample Number	Description	
Asbestos	1.12-A2	Concrete Slab Floor	2019-05-14
Asbestos	1.12-A3	Concrete Slab Floor	2019-05-14
Asbestos	1.13-A1	Concrete Slab Floor	2019-05-14
Asbestos	1.13-A2	Concrete Slab Floor	2019-05-14
Asbestos	1.13-A3	Concrete Slab Floor	2019-05-14
Asbestos	1.14-A1	Roof Seal Ceiling	2019-05-14
Asbestos	1.14-A2	Roof Seal Ceiling	2019-05-14
Asbestos	1.14-A3	Roof Seal Ceiling	2019-05-14
Asbestos	1.14-A4	Concrete Slab Floor	2019-05-14
Asbestos	1.14-A5	Concrete Slab Floor	2019-05-14
Asbestos	1.14-A6	Concrete Slab Floor	2019-05-14
Asbestos	1.15-A1	Roof Seal Ceiling	2019-05-14
Asbestos	1.15-A2	Roof Seal Ceiling	2019-05-14
Asbestos	1.15-A3	Roof Seal Ceiling	2019-05-14
Asbestos	1.15-A4	Concrete Slab Floor	2019-05-14
Asbestos	1.15-A5	Concrete Slab Floor	2019-05-14
Asbestos	1.15-A6	Concrete Slab Floor	2019-05-14
Asbestos	1.15-A7	Penetration Parging Walls	2019-05-14
Asbestos	1.15-A8	Penetration Parging Walls	2019-05-14
Asbestos	1.15-A9	Penetration Parging Walls	2019-05-14
Asbestos	1.16-A1	Roof Seal Ceiling	2019-05-14
Asbestos	1.16-A2	Roof Seal Ceiling	2019-05-14
Asbestos	1.16-A3	Roof Seal Ceiling	2019-05-14
Asbestos	1.16-A4	Penetration Parging Walls	2019-05-14
Asbestos	1.16-A5	Penetration Parging Walls	2019-05-14
Asbestos	1.16-A6	Penetration Parging Walls	2019-05-14
Asbestos	1.16-A7	Concrete Slab Floor	2019-05-14
Asbestos	1.16-A8	Concrete Slab Floor	2019-05-14
Asbestos	1.16-A9	Concrete Slab Floor	2019-05-14

Sample Type	Sample Number	Description	Sample Date
Asbestos	1.17-A1	Concrete Slab Floor	2019-05-14
Asbestos	1.17-A2	Concrete Slab Floor	2019-05-14
Asbestos	1.17-A3	Concrete Slab Floor	2019-05-14
Asbestos	1.18-A1	Asphalt Shingles Roof	2019-05-14
Asbestos	1.18-A2	Asphalt Shingles Roof	2019-05-14
Asbestos	1.18-A3	Asphalt Shingles Roof	2019-05-14
Asbestos	1.18-A4	Concrete Slab Floor	2019-05-14
Asbestos	1.18-A5	Concrete Slab Floor	2019-05-14
Asbestos	1.18-A6	Concrete Slab Floor	2019-05-14
Asbestos	1.18-A7	Tile Grout (Red) Walls	2019-05-14
Asbestos	1.18-A8	Tile Grout (Red) Walls	2019-05-14
Asbestos	1.18-A9	Tile Grout (Red) Walls	2019-05-14
Asbestos	1.19-A1	Concrete Slab Floor	2019-05-14
Asbestos	1.19-A2	Concrete Slab Floor	2019-05-14
Asbestos	1.19-A3	Concrete Slab Floor	2019-05-14
Asbestos	1.19-A4	Asphalt Shingles Roof	2019-05-14
Asbestos	1.19-A5	Asphalt Shingles Roof	2019-05-14
Asbestos	1.19-A6	Asphalt Shingles Roof	2019-05-14
Asbestos	1.19-A7	Tile Grout (Red) Walls	2019-05-14
Asbestos	1.19-A8	Tile Grout (Red) Walls	2019-05-14
Asbestos	1.19-A9	Tile Grout (Red) Walls	2019-05-14
Asbestos	1.21-A1	Cementitious Tile Debris	2019-05-14
Asbestos	1.21-A2	Cementitious Tile Debris	2019-05-14
Asbestos	1.21-A3	Cementitious Tile Debris	2019-05-14

1920766



Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 1.1-2.1, 8.1-9.2
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 1 of 2

Report Date: 2019/01/07

Report #: R2671326

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B2121

Received: 2018/12/26, 17:12

Sample Matrix: PAINT
Samples Received: 38

Analyses	Date		Laboratory Method	Analytical Method
	Quantity	Date		
Lead in Paint	38	2019/01/02	2019/01/03 AB SOP-00001 / AB SOP-00043	EPA 6020b R2 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. 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.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 1.1-2.1, 8.1-9.2
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 1 of 2

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CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B2121

Received: 2018/12/26, 17:12

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Carmen McKay, Project Manager

Email: CMcKay@maxxam.ca

Phone# (403)219-3683

=====

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 #: B8B2121
Report Date: 2019/01/07

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

RESULTS OF CHEMICAL ANALYSES OF PAINT

Maxxam ID		VA1758	VA1759	VA1760		VA1761		VA1762		VA1763		
Sampling Date		2018/12/04	2018/12/04	2018/12/04		2018/12/04		2018/12/04		2018/12/04		
COC Number		1 of 2	1 of 2	1 of 2		1 of 2		1 of 2		1 of 2		
	UNITS	1.1-PB1	1.1-PB2	1.1-PB3	RDL	1.4-PB1	RDL	1.5-PB1	RDL	1.5-PB2	RDL	QC Batch

Elements												
Lead (Pb)	mg/kg	11	300	14	10	<13	13	<10	10	61	15	9280675

RDL = Reportable Detection Limit

Maxxam ID		VA1764		VA1765	VA1766	VA1767	VA1768	VA1769		
Sampling Date		2018/12/04		2018/12/04	2018/12/04	2018/12/04	2018/12/04	2018/12/04		
COC Number		1 of 2		1 of 2	1 of 2	1 of 2	1 of 2	1 of 2		
	UNITS	1.6-PB1	QC Batch	1.7-PB1	1.8-PB1	1.8-PB2	1.10-PB1	1.10-PB2	RDL	QC Batch

Elements										
Lead (Pb)	mg/kg	<10	9280685	76	<10	56	<10	<10	10	9280675

RDL = Reportable Detection Limit

Maxxam ID		VA1770		VA1771	VA1772	VA1773	VA1774	VA1775		
Sampling Date		2018/12/04		2018/12/04	2018/12/04	2018/11/30	2018/11/29	2018/11/29		
COC Number		1 of 2		1 of 2	1 of 2	1 of 2	1 of 2	1 of 2		
	UNITS	1.10-PB3	QC Batch	1.10-PB4	1.10-PB5	2.1-PB1	8.1-PB1	8.1-PB2	RDL	QC Batch

Elements										
Lead (Pb)	mg/kg	<10	9280675	510	<10	86	800	980	10	9280685

RDL = Reportable Detection Limit

Maxxam ID		VA1776		VA1777			VA1778			VA1779		
Sampling Date		2018/11/29		2018/11/29			2018/11/29			2018/11/29		
COC Number		1 of 2		1 of 2			1 of 2			1 of 2		
	UNITS	8.1-PB3	RDL	8.1-PB4	RDL	QC Batch	8.1-PB5	RDL	QC Batch	8.1-PB6	RDL	QC Batch

Elements												
Lead (Pb)	mg/kg	<17 (1)	17	<210 (1)	210	9280685	<48 (1)	48	9280818	<18 (1)	18	9280685

RDL = Reportable Detection Limit

(1) Detection limits raised based on sample weight used for analysis.

Maxxam ID		VA1780			VA1781	VA1782	VA1783		VA1784		
Sampling Date		2018/11/29			2018/11/29	2018/11/29	2018/11/29		2018/11/29		
COC Number		1 of 2			1 of 2	1 of 2	1 of 2		1 of 2		
	UNITS	8.1-PB7	RDL	QC Batch	8.2-PB1	8.2-PB2	8.2-PB3	RDL	8.2-PB5	RDL	QC Batch

Elements											
Lead (Pb)	mg/kg	<45 (1)	45	9280818	<10	<10	2100	10	<23 (1)	23	9280685

RDL = Reportable Detection Limit

(1) Detection limits raised based on sample weight used for analysis.

Maxxam Job #: B8B2121
Report Date: 2019/01/07

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

RESULTS OF CHEMICAL ANALYSES OF PAINT

Maxxam ID		VA1785	VA1786	VA1787		VA1788		VA1789	VA1790		
Sampling Date		2018/11/29	2018/11/30	2018/11/30		2018/11/30		2018/11/30	2018/11/30		
COC Number		1 of 2	1 of 2	1 of 2		1 of 2		1 of 2	1 of 2		
	UNITS	8.2-PB6	9.1-PB1	9.1-PB2	RDL	9.1-PB3	RDL	9.2-PB1	9.2-PB2	RDL	QC Batch
Elements											
Lead (Pb)	mg/kg	4800	1900	<10	10	<80 (1)	80	<10	<10	10	9280685
RDL = Reportable Detection Limit											
(1) Detection limits raised based on sample weight used for analysis.											

Maxxam ID		VA1791	VA1792		VA1793			VA1794		
Sampling Date		2018/11/30	2018/11/30		2018/11/30			2018/11/30		
COC Number		1 of 2	1 of 2		1 of 2			1 of 2		
	UNITS	9.2-PB3	9.2-PB4	RDL	9.2-PB5	RDL	QC Batch	9.2-PB6	RDL	QC Batch
Elements										
Lead (Pb)	mg/kg	<10	<10	10	1500 (1)	15	9280818	<28 (1)	28	9280685
RDL = Reportable Detection Limit										
(1) Detection limits raised based on sample weight used for analysis.										

Maxxam ID		VA1795		
Sampling Date		2018/11/30		
COC Number		1 of 2		
	UNITS	9.2-PB7	RDL	QC Batch
Elements				
Lead (Pb)	mg/kg	660 (1)	30	9280818
RDL = Reportable Detection Limit				
(1) Detection limits raised based on sample weight used for analysis.				

Maxxam Job #: B8B2121
Report Date: 2019/01/07

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

GENERAL COMMENTS

RESULTS OF CHEMICAL ANALYSES OF PAINT Comments

Sample VA1761 [1.4-PB1] Lead in Paint: Detection limits raised due to insufficient sample volume.

Sample VA1763 [1.5-PB2] Lead in Paint: Detection limits raised due to insufficient sample volume.

Results relate only to the items tested.

Maxxam Job #: B8B2121
Report Date: 2019/01/07

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9280675	ANE	Matrix Spike	Lead (Pb)	2019/01/03		NC	%	75 - 125
9280675	ANE	QC Standard	Lead (Pb)	2019/01/03		107	%	75 - 125
9280675	ANE	Spiked Blank	Lead (Pb)	2019/01/03		91	%	80 - 120
9280675	ANE	Method Blank	Lead (Pb)	2019/01/03	<10		mg/kg	
9280675	ANE	RPD	Lead (Pb)	2019/01/03	7.6		%	35
9280685	ANE	Matrix Spike [VA1787-01]	Lead (Pb)	2019/01/03		77	%	75 - 125
9280685	ANE	QC Standard	Lead (Pb)	2019/01/03		113	%	N/A
9280685	ANE	Spiked Blank	Lead (Pb)	2019/01/03		91	%	80 - 120
9280685	ANE	Method Blank	Lead (Pb)	2019/01/03	<10		mg/kg	
9280685	ANE	RPD [VA1787-01]	Lead (Pb)	2019/01/03	NC		%	35
9280818	ANE	Matrix Spike [VA1791-01]	Lead (Pb)	2019/01/03		88	%	75 - 125
9280818	ANE	QC Standard	Lead (Pb)	2019/01/03		105	%	75 - 125
9280818	ANE	Spiked Blank	Lead (Pb)	2019/01/03		93	%	80 - 120
9280818	ANE	Method Blank	Lead (Pb)	2019/01/03	<10		mg/kg	
9280818	ANE	RPD [VA1791-01]	Lead (Pb)	2019/01/03	NC		%	35

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)

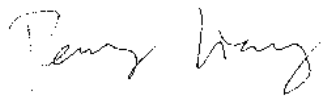
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Maxxam Job #: B8B2121
Report Date: 2019/01/07

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Harry (Peng) Liang, Senior Analyst

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620



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 Edmonton: 9331-48 St. T6B 2R4. Toll Free (800) 386-7247
 maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 2

Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required																																																																	
Company: Public Works and Procurement Canada		Company: SLR Consulting (Canada) Ltd.		Quotation #: B81219		<input checked="" type="checkbox"/> 5 - 7 Days Regular (Most analyses)																																																																	
Contact Name: Karen Hill		Contact Name: Kate Lindfield		P.O. #/ AFE#: 700425615		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS																																																																	
Address: 100-167 Lombard Ave Winnipeg, MB R3B 0T6		Address: 1185-120201 Southport Road SW Calgary, AB T2W 4X9		Project #: 203.02356.00000		Rush TAT (Surcharges will be applied) <input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days																																																																	
Phone: 204-984-4510		Phone: 403-385-1323		Site Location: Waterton National Park		Date Required: _____																																																																	
Email: Karen.Hill@pwqsc-tpsgc.gc.ca		Email: jernst@ehsp.ca		Site #: <u>11-5-2, 11-2-1, 8, 1-9, 2</u>		Rush Confirmation #: _____																																																																	
Copies: _____		Copies: k.lindfield@slrconsulting.com		Sampled By: JE																																																																			
Laboratory Use Only				Analysis Requested												Regulatory Criteria																																																							
<table border="1"> <tr> <td>Seal Present</td> <td>YES</td> <td>NO</td> <td>Cooler ID</td> </tr> <tr> <td>Seal Intact</td> <td></td> <td></td> <td>Temp</td> </tr> <tr> <td>Cooling Media</td> <td></td> <td></td> <td>13 16 14</td> </tr> <tr> <td>Seal Present</td> <td>YES</td> <td>NO</td> <td>Cooler ID</td> </tr> <tr> <td>Seal Intact</td> <td></td> <td></td> <td>Temp</td> </tr> <tr> <td>Cooling Media</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Seal Present</td> <td>YES</td> <td>NO</td> <td>Cooler ID</td> </tr> <tr> <td>Seal Intact</td> <td></td> <td></td> <td>Temp</td> </tr> <tr> <td>Cooling Media</td> <td></td> <td></td> <td></td> </tr> </table>				Seal Present	YES	NO	Cooler ID	Seal Intact			Temp	Cooling Media			13 16 14	Seal Present	YES	NO	Cooler ID	Seal Intact			Temp	Cooling Media				Seal Present	YES	NO	Cooler ID	Seal Intact			Temp	Cooling Media				Depot Reception				<table border="1"> <tr> <td>Asbestos (PLM)</td> <td>Lead by ICP-AES</td> <td>PCB in Paint Chips</td> <td>Silica</td> <td colspan="10"></td> </tr> </table>												Asbestos (PLM)	Lead by ICP-AES	PCB in Paint Chips	Silica											<input type="checkbox"/> AT1 <input checked="" type="checkbox"/> CCME <input type="checkbox"/> Drinking Water <input type="checkbox"/> D50 (Drilling Waste) <input type="checkbox"/> Saskatchewan <input type="checkbox"/> Other:	
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1 See Attached <u>38 SAMPLES</u>								<div style="writing-mode: vertical-rl; transform: rotate(180deg);">HOLD - DO NOT ANALYZE</div>												PHONE 403.605.9685 JON ERNST																																																			
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				26/12/2018								2018/12/26		17:12																																																									

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms

26-Dec-18 17:12
 Carmen McKay

 B8B2121

TL8 INS-0200

Sample Type	Sample Number	Description	Sample Date
Lead Paint	1.1-Pb1	Pink / Beige Paint on Siding	2018-12-04
Lead Paint	1.1-Pb2	Pink / Beige Paint on Siding	2018-12-04
Lead Paint	1.1-Pb3	Green Paint on siding	2018-12-04
Lead Paint	1.4-Pb1	Beige on Metal Door (Powerhouse)	2018-12-04
Lead Paint	1.5-Pb1	Black Paint on Stove	2018-12-04
Lead Paint	1.5-Pb2	Beige Paint on Food Bin	2018-12-04
Lead Paint	1.6-Pb1	Black Paint on Stove	2018-12-04
Lead Paint	1.7-Pb1	Beige Paint on Food Bin	2018-12-04
Lead Paint	1.8-Pb1	Black Paint on Stove	2018-12-04
Lead Paint	1.8-Pb2	Beige Paint on Food Bin	2018-12-04
Lead Paint	1.1-Pb1 1.10-Pb1	Brown on Metal Food Storage Bin Site C7	2018-12-04
Lead Paint	1.1-Pb2 1.10-Pb2	Brown on Metal Food Storage Bin Site D11	2018-12-04
Lead Paint	1.1-Pb3 1.10-Pb3	Brown on Metal Food Storage Bin Site E01	2018-12-04
Lead Paint	1.1-Pb4 1.10-Pb4	Brown on Metal Food Storage Bin Site G6	2018-12-04
Lead Paint	1.1-Pb5 1.10-Pb5	Brown on Metal Food Storage Bin Site I1	2018-12-04
Lead Paint	2.1-Pb1	Beige on Metal Flashing	2018-11-30
Lead Paint	8.1-Pb1	Beige Paint on Picnic Shelter Trim	2018-11-29
Lead Paint	8.1-Pb2	Green and Brown on Picnic Shelter Walls	2018-11-29
Lead Paint	8.1-Pb3	Black Paint on Picnic Table	2018-11-29
Lead Paint	8.1-Pb4	Black Paint on Stove	2018-11-29
Lead Paint	8.1-Pb5	Green Paint on siding Outhouse	2018-11-29
Lead Paint	8.1-Pb6	Beige Paint on Metal Door Outhouse	2018-11-29
Lead Paint	8.1-Pb7	White Paint Outhouse Interior	2018-11-29
Lead Paint	8.2-Pb1	Green Siding Outhouse	2018-11-29
Lead Paint	8.2-Pb2	Beige Siding Outhouse	2018-11-29
Lead Paint	8.2-Pb3	Green and Brown on Picnic Shelter Walls	2018-11-29
Lead Paint	8.2-Pb5	Black Paint on Picnic Table	2018-11-29
Lead Paint	8.2-Pb6	Green on Wood Sign Post	2018-11-29
Lead Paint	9.1-Pb1	Brown on Wood Beams Kitchen Shelter	2018-11-30
Lead Paint	9.1-Pb2	Green on Cement Board Outhouse	2018-11-30
Lead Paint	9.1-Pb3	Brown on Plastic Vent Stack Outhouse	2018-11-30
Lead Paint	9.2-Pb1	Green on Cement Board Outhouse	2018-11-30
Lead Paint	9.2-Pb2	Brown on Plastic Vent Stack Outhouse	2018-11-30
Lead Paint	9.2-Pb3	Beige on siding Outhouse	2018-11-30
Lead Paint	9.2-Pb4	Brown on Wood Beams Kitchen Shelter	2018-11-30
Lead Paint	9.2-Pb5	Black on Wood Table Picnic Table	2018-11-30
Lead Paint	9.2-Pb6	Beige on Wood Trim Kitchen Shelter	2018-11-30
Lead Paint	9.2-Pb7	Green on Wood Facia Kitchen Shelter	2018-11-30

26-Dec-18 17:12

Carmen McKay



B8B2121

TL8 INS-0200

202

Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 7.1, 7.2, 7.3, 7.4
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 1 of 2

Report Date: 2019/01/07

Report #: R2671324

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B2120

Received: 2018/12/26, 17:12

Sample Matrix: PAINT
Samples Received: 28

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Lead in Paint	27	2019/01/02	2019/01/03	AB SOP-00001 / AB SOP-00043	EPA 6020b R2 m
Lead in Paint	1	2019/01/02	2019/01/04	AB SOP-00001 / AB SOP-00043	EPA 6020b R2 m

Remarks:

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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.

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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.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Carmen McKay, Project Manager

Email: CMcKay@maxxam.ca

Phone# (403)219-3683

Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 7.1, 7.2, 7.3, 7.4
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 1 of 2

Report Date: 2019/01/07

Report #: R2671324

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B2120

Received: 2018/12/26, 17:12

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Maxxam Job #: B8B2120
Report Date: 2019/01/07

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

RESULTS OF CHEMICAL ANALYSES OF PAINT

Maxxam ID		VA1732		VA1733		VA1734		VA1735			VA1736		
Sampling Date		2018/12/05		2018/12/05		2018/12/05		2018/12/05			2018/12/05		
COC Number		1 of 2		1 of 2		1 of 2		1 of 2			1 of 2		
	UNITS	7.1-PB1	RDL	7.1-PB2	RDL	7.1-PB3	RDL	7.1-PB4	RDL	QC Batch	7.1-PB5	RDL	QC Batch

Elements													
Lead (Pb)	mg/kg	2900	10	2900	23	140000	500	120000	200	9280675	5700	68	9280826
RDL = Reportable Detection Limit													

Maxxam ID		VA1737			VA1738	VA1739		VA1856		VA1740		
Sampling Date		2018/12/05			2018/12/05	2018/12/05		2018/12/05		2018/12/05		
COC Number		1 of 2			1 of 2	1 of 2		1 of 2		1 of 2		
	UNITS	7.1-PB6	RDL	QC Batch	7.1-PB7	7.1-PB8	RDL	7.1-PB9	RDL	7.2-PB1	RDL	QC Batch

Elements												
Lead (Pb)	mg/kg	36000	100	9280675	73000	91000	200	35000	27	2000	19	9280826
RDL = Reportable Detection Limit												

Maxxam ID		VA1741		VA1742			VA1743		VA1744		VA1745		
Sampling Date		2018/12/05		2018/12/05			2018/12/05		2018/12/05		2018/12/05		
COC Number		1 of 2		1 of 2			1 of 2		1 of 2		1 of 2		
	UNITS	7.2-PB2	RDL	7.2-PB3	RDL	QC Batch	7.2-PB4	RDL	7.2-PB5	RDL	7.2-PB6	RDL	QC Batch

Elements													
Lead (Pb)	mg/kg	16000	100	40000	200	9280826	3700	69	4800	10	110000	200	9280675
RDL = Reportable Detection Limit													

Maxxam ID		VA1746		VA1747		VA1748		VA1749	VA1750		
Sampling Date		2018/12/05		2018/12/05		2018/12/05		2018/12/05	2018/12/05		
COC Number		1 of 2		1 of 2		1 of 2		1 of 2	1 of 2		
	UNITS	7.2-PB7	RDL	7.3-PB1	RDL	7.3-PB2	RDL	7.3-PB3	7.3-PB4	RDL	QC Batch

Elements											
Lead (Pb)	mg/kg	130000	500	12000	20	15000	50	23000	31000	100	9280826
RDL = Reportable Detection Limit											

Maxxam ID		VA1946		VA1751		VA1752		VA1753		VA1754		
Sampling Date		2018/12/05		2018/12/05		2018/12/05		2018/12/05		2018/12/05		
COC Number		1 of 2		1 of 2		1 of 2		1 of 2		1 of 2		
	UNITS	7.3-PB5	RDL	7.3-PB6	RDL	7.4-PB1	RDL	7.4-PB2	RDL	7.4-PB3	RDL	QC Batch

Elements												
Lead (Pb)	mg/kg	21000	50	88000	200	1800	21	1200	13	26000	140	9280826
RDL = Reportable Detection Limit												

Maxxam Job #: B8B2120
Report Date: 2019/01/07

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

RESULTS OF CHEMICAL ANALYSES OF PAINT

Maxxam ID		VA1755		VA1756	VA1757		
Sampling Date		2018/12/05		2018/12/05	2018/12/05		
COC Number		1 of 2		1 of 2	1 of 2		
	UNITS	7.4-PB4	RDL	7.4-PB5	7.4-PB6	RDL	QC Batch
Elements							
Lead (Pb)	mg/kg	32000	100	110000	110000	200	9280826
RDL = Reportable Detection Limit							

Maxxam Job #: B8B2120
Report Date: 2019/01/07

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

GENERAL COMMENTS

RESULTS OF CHEMICAL ANALYSES OF PAINT Comments

Sample VA1733 [7.1-PB2] Lead in Paint: Detection limits raised due to insufficient sample volume.
Sample VA1734 [7.1-PB3] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1735 [7.1-PB4] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1736 [7.1-PB5] Lead in Paint: Detection limits raised due to insufficient sample volume.
Sample VA1737 [7.1-PB6] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1738 [7.1-PB7] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1739 [7.1-PB8] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1856 [7.1-PB9] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1740 [7.2-PB1] Lead in Paint: Detection limits raised due to insufficient sample volume.
Sample VA1741 [7.2-PB2] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1742 [7.2-PB3] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1743 [7.2-PB4] Lead in Paint: Detection limits raised due to insufficient sample volume.
Sample VA1745 [7.2-PB6] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1746 [7.2-PB7] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1747 [7.3-PB1] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1748 [7.3-PB2] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1749 [7.3-PB3] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1750 [7.3-PB4] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1946 [7.3-PB5] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1751 [7.3-PB6] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1752 [7.4-PB1] Lead in Paint: Detection limits raised due to insufficient sample volume.
Sample VA1753 [7.4-PB2] Lead in Paint: Detection limits raised due to insufficient sample volume.
Sample VA1754 [7.4-PB3] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1755 [7.4-PB4] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1756 [7.4-PB5] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.
Sample VA1757 [7.4-PB6] Lead in Paint: Detection limits raised due to dilution to bring analyte within the calibrated range.

Results relate only to the items tested.

Maxxam Job #: B8B2120
Report Date: 2019/01/07

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9280675	ANE	Matrix Spike [VA1744-01]	Lead (Pb)	2019/01/03		NC	%	75 - 125
9280675	ANE	QC Standard	Lead (Pb)	2019/01/03		107	%	75 - 125
9280675	ANE	Spiked Blank	Lead (Pb)	2019/01/03		91	%	80 - 120
9280675	ANE	Method Blank	Lead (Pb)	2019/01/03	<10		mg/kg	
9280675	ANE	RPD [VA1744-01]	Lead (Pb)	2019/01/03	7.6		%	35
9280826	LQ1	Matrix Spike [VA1739-01]	Lead (Pb)	2019/01/03		NC	%	75 - 125
9280826	LQ1	QC Standard	Lead (Pb)	2019/01/03		115	%	75 - 125
9280826	LQ1	Spiked Blank	Lead (Pb)	2019/01/03		92	%	80 - 120
9280826	LQ1	Method Blank	Lead (Pb)	2019/01/03	<10		mg/kg	
9280826	LQ1	RPD [VA1739-01]	Lead (Pb)	2019/01/04	11		%	35

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.

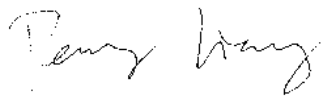
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

Maxxam Job #: B8B2120
Report Date: 2019/01/07

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Harry (Peng) Liang, Senior Analyst

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.

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CHAIN OF CUSTODY RECORD

Page 1 of 2

Invoice Information				Report Information (if differs from invoice)				Project Information				Turnaround Time (TAT) Required			
Company: <u>Public Works and Procurement Canada</u>				Company: <u>SLR Consulting (Canada) Ltd.</u>				Quotation #: <u>B81219</u>				<input checked="" type="checkbox"/> 5 - 7 Days Regular (Most analyses)			
Contact Name: <u>Karen Hill</u>				Contact Name: <u>Kate Lindfield</u>				P.O. #/ AFE#: <u>700425615</u>				PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS			
Address: <u>100-167 Lombard Ave</u> <u>Winnipeg, MB R3B 0T6</u>				Address: <u>1185-120201 Southport Road SW</u> <u>Calgary, AB T2W 4X9</u>				Project #: <u>203.02356.00000</u>							
Phone: <u>204-984-4510</u>				Phone: <u>403-385-1323</u>				Site Location: <u>Waterton National Park</u>				Rush TAT (Surcharges will be applied)			
Email: <u>Karen.Hill@pwgsc-lpsqc.gc.ca</u>				Email: <u>jernst@ehsp.ca</u>				Site #: <u>7.1, 7.2, 7.3, 7.4</u>				<input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days			
Copies: _____				Copies: <u>k.lindfield@slrconsulting.com</u>				Sampled By: <u>JE</u>				Date Required: _____			
												Rush Confirmation #: _____			

Laboratory Use Only				Depot Reception				Analysis Requested												Regulatory Criteria			
Seal Present	YES	NO	Cooler ID	Temp	14	15	12	<div style="display: flex; justify-content: space-between;"> <div> Asbestos (PLM) Lead by ICP-AES PCB in Paint Chips Silica </div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">HOLD - DO NOT ANALYZE</div> </div>												<input type="checkbox"/> AT1 <input checked="" type="checkbox"/> CCME <input type="checkbox"/> Drinking Water <input type="checkbox"/> D50 (Drilling Waste) <input type="checkbox"/> Saskatchewan <input type="checkbox"/> Other:			
Seal Intact																							
Cooling Media																							
Seal Present	YES	NO	Cooler ID	Temp																Special Instructions <u>Phone</u> <u>403.605.9685</u> <u>Jon ERNST</u>			
Seal Intact																							
Cooling Media																							
Seal Present	YES	NO	Cooler ID	Temp																			
Seal Intact																							
Cooling Media																							

Sample Identification				Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix
1	See Attached	<u>29 SAMPLES</u>	<u>30 SAMPLES</u>				
2							
3							
4							
5							
6							
7							
8							
9							
10							

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)	DATE (YYYY/MM/DD)	Time (HH:MM)
	26/12/2018		<u>Tannis Vegso</u>	2018/12/26	17:12

26-Dec-18 17:12

Carmen McKay



B8B2120

AV2

INS-0001

Sample Type	Sample Number	Description	Sample Date
Lead Paint	7.1-Pb1	Beige Wood Stalls	2018-12-05
Lead Paint	7.1-Pb2	Beige Wood Stalls	2018-12-05
Lead Paint	7.1-Pb3	Grey wood Ceiling	2018-12-05
Lead Paint	7.1-Pb4	Grey wood Ceiling	2018-12-05
Lead Paint	7.1-Pb5	Brown Metal Door	2018-12-05
Lead Paint	7.1-Pb6	Brown Exterior Siding	2018-12-05
Lead Paint	7.1-Pb7	White Exterior Door Trim & Roof Facia	2018-12-05
Lead Paint	7.1-Pb8	White Wood Exterior Windows	2018-12-05
Lead Paint	7.1-Pb9	Green Wood Door & Window Covers	2018-12-05
Lead Paint	7.2-Pb1	Beige Wood Stalls	2018-12-05
Lead Paint	7.2-Pb2	Grey wood Ceiling	2018-12-05
Lead Paint	7.2-Pb3	Grey wood Ceiling	2018-12-05
Lead Paint	7.2-Pb4	Brown Metal Door	2018-12-05
Lead Paint	7.2-Pb5	Brown Exterior Siding	2018-12-05
Lead Paint	7.2-Pb6	White Exterior Door Trim & Roof Facia	2018-12-05
Lead Paint	7.2-Pb7	White Wood Exterior Windows and Trim	2018-12-05
Lead Paint	7.2-Pb8	Green Wood Door & Window Covers	2018-12-05
Lead Paint	7.3-Pb1	Beige Wood Stalls	2018-12-05
Lead Paint	7.3-Pb2	Beige Wood Stalls	2018-12-05
Lead Paint	7.3-Pb3	Brown Wood Door	2018-12-05
Lead Paint	7.3-Pb4	Brown Exterior Siding	2018-12-05
Lead Paint	7.3-Pb5	White Exterior Door Trim & Roof Facia	2018-12-05
Lead Paint	7.3-Pb6	White Wood Exterior Windows and Trim	2018-12-05
Lead Paint	7.4-Pb1	Beige Wood Stalls	2018-12-05
Lead Paint	7.4-Pb2	Beige Wood Stalls	2018-12-05
Lead Paint	7.4-Pb3	Brown Wood Door	2018-12-05
Lead Paint	7.4-Pb4	Brown Exterior Siding	2018-12-05
Lead Paint	7.4-Pb5	White Exterior Door Trim & Roof Facia	2018-12-05
Lead Paint	7.4-Pb6	White Wood Exterior Windows	2018-12-05

26-Dec-18 17:12
Carmen McKay

B8B2120
AV2 INS-0001

2 of 2

Certificate of Analysis

EHS Partnerships Ltd. (Calgary)

4303-11 St. SE
Calgary, AB T2G 4X1
Attn: Jon Ernst

Client PO:
Project: 456BB18009
Custody:

Report Date: 23-May-2019
Order Date: 17-May-2019

Order #: 1920769

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
------------	-----------

1920769-01	6.1-Pb1
1920769-02	6.1-Pb2
1920769-03	1.11-Pb1
1920769-04	1.11-Pb2
1920769-05	1.11-Pb3
1920769-06	1.11-Pb4
1920769-07	1.11-Pb5
1920769-08	1.11-Pb6
1920769-09	1.18-Pb1
1920769-10	1.18-Pb2
1920769-11	1.18-Pb3
1920769-12	1.18-Pb4
1920769-13	1.19-Pb1
1920769-14	1.19-Pb2
1920769-15	1.19-Pb3
1920769-16	1.19-Pb4
1920769-17	1.20-Pb1

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of Analysis
Client: EHS Partnerships Ltd. (Calgary)
Client PO:

Report Date: 23-May-2019
Order Date: 17-May-2019
Project Description: 456BB18009

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-OES	based on MOE E3470, ICP-OES	22-May-19	22-May-19

Sample and QC Qualifiers Notes

- 1- Gen-19 :Complete separation of paint from substrate not possible for this sample and a small amount of substrate has been included in the paint digestion.

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Certificate of Analysis
 Client: EHS Partnerships Ltd. (Calgary)
 Client PO:

Report Date: 23-May-2019
 Order Date: 17-May-2019
 Project Description: 456BB18009

Sample Results

Lead				Matrix: Paint
				Sample Date: 13-May-19
Paracel ID	Client ID	Units	MDL	Result
1920769-01	6.1-Pb1	ug/g	20	288
1920769-02	6.1-Pb2	ug/g	20	333

Lead				Matrix: Paint
				Sample Date: 14-May-19
Paracel ID	Client ID	Units	MDL	Result
1920769-03	1.11-Pb1	ug/g	20	11400
1920769-04	1.11-Pb2	ug/g	20	4710
1920769-05	1.11-Pb3	ug/g	20	<20
1920769-06	1.11-Pb4	ug/g	20	<20
1920769-07	1.11-Pb5	ug/g	20	<20 [1]
1920769-08	1.11-Pb6	ug/g	20	<20
1920769-09	1.18-Pb1	ug/g	20	23700
1920769-10	1.18-Pb2	ug/g	20	28400
1920769-11	1.18-Pb3	ug/g	20	620
1920769-12	1.18-Pb4	ug/g	20	3980
1920769-13	1.19-Pb1	ug/g	20	11100
1920769-14	1.19-Pb2	ug/g	20	9140
1920769-15	1.19-Pb3	ug/g	20	9360
1920769-16	1.19-Pb4	ug/g	20	8280
1920769-17	1.20-Pb1	ug/g	20	6890

Laboratory Internal QA/QC

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Matrix Blank									
Lead	ND	20	ug/g						
Matrix Duplicate									
Lead	315	20	ug/g	299			5.4	30	
Matrix Spike									
Lead	372		ug/L	149	89.1	70-130			

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Page 1 of 2

Client Name: EHS Partnerships Ltd.	Project Reference: 456BB18009	TAT: <input checked="" type="checkbox"/> Regular <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day Date Required: <u>MAY 23, 2019</u>
Contact Name: <u>Jon Ernst</u>	Quote #: 19-393 EHSP Waterton	
Address: 4303 - 11 Street SE Calgary, Alberta T2E 4X1	PO #	
Telephone: 403.243.0700	Email Address: jernst@ehsp.ca; bburwash@ehsp.ca	

Criteria: ☐ O. Reg. 153 (As Amended) Table ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Parcel Order Number:		Matrix	Air Volume	# of Containers	Sample Taken		Pb in Paint											
Sample ID/Location Name					Date	Time												
1	See Attached 16 Paint Samples	Paint			May 13, 14, 2019		<input checked="" 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"/>
2							<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"/>
3							<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"/>
4							<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"/>
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"/>
6							<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"/>
7							<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"/>
8							<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"/>
9							<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"/>
10							<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"/>

Comments: Received Ex-fro Sample, Sample ID on bag read = 1.20 Pb 1.

Method of Delivery:

Puroletor

Relinquished By (Sign): <u>[Signature]</u>	Received by Driver/Depot:	Received at Lab: <u>Sumeeporn Dokmal</u>	Verified By: <u>D. Gannon</u>
Relinquished By (Print): <u>Jon Ernst</u>	Date/Time:	Date/Time: <u>May 17, 2019 10:45</u>	Date/Time: <u>17 May 19 14:05</u>
Date/Time: <u>May 16, 2019</u>	Temperature: _____ °C	Temperature: _____ °C	pH Verified [] By: _____

Parcel ID: 1920769



Sample Type	Sample Number		Sample Date
Lead Paint	6.1-Pb1	Green Concrete Block Walls	2019-05-13 ✓
Lead Paint	6.1-Pb2	Green Concrete Block Walls	2019-05-13 ✓
Lead Paint	1.11-Pb1	Beige Exterior Wood Window Frames and Trim	2019-05-14 ✓
Lead Paint	1.11-Pb2	Beige Exterior Wood Window Frames and Trim	2019-05-14 ✓
Lead Paint	1.11-Pb3	Green Siding	2019-05-14 ✓
Lead Paint	1.11-Pb4	Green Siding	2019-05-14 ✓
Lead Paint	1.11-Pb5	Beige Interior Wood Walls	2019-05-14 ✓
Lead Paint	1.11-Pb6	White Interior Wood Trim	2019-05-14 ✓
Lead Paint	1.18-Pb1	Green Wood Siding Exterior Walls	2019-05-14 ✓
Lead Paint	1.18-Pb2	Green Wood Siding Exterior Walls	2019-05-14 ✓
Lead Paint	1.18-Pb3	Beige Wood Trim Exterior Walls	2019-05-14 ✓
Lead Paint	1.18-Pb4	Beige Wood Trim Exterior Walls	2019-05-14 ✓
Lead Paint	1.19-Pb1	Green Wood Siding Exterior Walls	2019-05-14 ✓
Lead Paint	1.19-Pb2	Green Wood Siding Exterior Walls	2019-05-14 ✓
Lead Paint	1.19-Pb3	Beige Wood Trim Exterior Walls	2019-05-14 ✓
Lead Paint	1.19-Pb4	Beige Wood Trim Exterior Walls	2019-05-14 ✓

-2 pack
bag.

Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 1.6-8.2
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 1 of 1

Report Date: 2019/01/04

Report #: R2671126

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B1742

Received: 2018/12/26, 17:12

Sample Matrix: PAINT
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Non Routine/Non Validated Matrix Tested (1)	10	N/A	2018/12/26		
PCB with Silica Gel Clean-up	10	2018/12/28	2018/12/29	CAL SOP-00149	EPA 8082A R1 m
Total PCB with SG cleanup in Soil (2)	10	N/A	2019/01/02	CAL SOP-00149	Auto Calc

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.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Sample(s) analyzed using methodologies that have not been subjected to Maxxam's standard validation process for the submitted matrix and is not an accredited method.

Analysis performed with client consent, however results should be viewed with discretion.

(2) Total PCB in Soil, BC Reg. 375/96 - Calculated parameter, including Arochlor mixtures 1242, 1248, 1254 and 1260.

Attention: Kate Lindfield

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#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
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Report Date: 2019/01/04

Report #: R2671126

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B1742

Received: 2018/12/26, 17:12

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Carmen McKay, Project Manager

Email: CMcKay@maxxam.ca

Phone# (403)219-3683

=====

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 #: B8B1742
Report Date: 2019/01/04

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

RESULTS OF CHEMICAL ANALYSES OF PAINT

Maxxam ID		UZ9693	UZ9694	UZ9695	UZ9696	UZ9697	UZ9698	UZ9699	
Sampling Date		2018/12/04	2018/12/04	2018/12/04	2018/12/04	2018/12/05	2018/12/05	2018/12/05	
COC Number		1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	
	UNITS	1.6-PCB1	1.7-PCB1	1.8-PCB1	1.10-PCB1	7.1-PCB1	7.2-PCB1	7.3-PCB1	QC Batch

MISCELLANEOUS									
Sample Matrix	N/A	PAINT	PAINT	PAINT	PAINT	PAINT	PAINT	PAINT	ONSITE

Maxxam ID		UZ9700	UZ9701	UZ9702	
Sampling Date		2018/12/05	2018/11/29	2018/11/29	
COC Number		1 of 1	1 of 1	1 of 1	
	UNITS	7.4-PCB1	8.1-PCB1	8.2-PCB1	QC Batch

MISCELLANEOUS					
Sample Matrix	N/A	PAINT	PAINT	PAINT	ONSITE

Maxxam Job #: B8B1742
Report Date: 2019/01/04

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

POLYCHLORINATED BIPHENYLS BY GC-ECD (PAINT)

Maxxam ID		UZ9693	UZ9694	UZ9695	UZ9696	UZ9697	UZ9698		
Sampling Date		2018/12/04	2018/12/04	2018/12/04	2018/12/04	2018/12/05	2018/12/05		
COC Number		1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1		
	UNITS	1.6-PCB1	1.7-PCB1	1.8-PCB1	1.10-PCB1	7.1-PCB1	7.2-PCB1	RDL	QC Batch
Polychlorinated Biphenyls									
Silica Gel Aroclor 1016	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1221	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1232	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1242	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1248	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1254	mg/kg	<0.20	<0.20	<0.20	<0.20	0.21	<0.20	0.20	9278418
Silica Gel Aroclor 1260	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1262	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1268	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Total PCB	mg/kg	<0.20	<0.20	<0.20	<0.20	0.21	<0.20	0.20	9277058
Surrogate Recovery (%)									
Silica Gel NONACHLOROBIPHENYL (sur.)	%	92	91	119	80	87	87		9278418
RDL = Reportable Detection Limit									

Maxxam ID		UZ9699	UZ9700	UZ9701	UZ9702		
Sampling Date		2018/12/05	2018/12/05	2018/11/29	2018/11/29		
COC Number		1 of 1	1 of 1	1 of 1	1 of 1		
	UNITS	7.3-PCB1	7.4-PCB1	8.1-PCB1	8.2-PCB1	RDL	QC Batch
Polychlorinated Biphenyls							
Silica Gel Aroclor 1016	mg/kg	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1221	mg/kg	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1232	mg/kg	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1242	mg/kg	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1248	mg/kg	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1254	mg/kg	<0.20	0.71	0.43	<0.20	0.20	9278418
Silica Gel Aroclor 1260	mg/kg	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1262	mg/kg	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Aroclor 1268	mg/kg	<0.20	<0.20	<0.20	<0.20	0.20	9278418
Silica Gel Total PCB	mg/kg	<0.20	0.71	0.43	<0.20	0.20	9277058
Surrogate Recovery (%)							
Silica Gel NONACHLOROBIPHENYL (sur.)	%	63	93	85	91		9278418
RDL = Reportable Detection Limit							

Maxxam Job #: B8B1742
Report Date: 2019/01/04

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

GENERAL COMMENTS

Sample UZ9693 [1.6-PCB1] : Sample was not submitted in an appropriate container for PCB analysis.

Sample UZ9694 [1.7-PCB1] : Sample was not submitted in an appropriate container for PCB analysis.

Sample UZ9695 [1.8-PCB1] : Sample was not submitted in an appropriate container for PCB analysis.

Sample UZ9696 [1.10-PCB1] : Sample was not submitted in an appropriate container for PCB analysis.

Sample UZ9697 [7.1-PCB1] : Sample was not submitted in an appropriate container for PCB analysis.

Sample UZ9698 [7.2-PCB1] : Sample was not submitted in an appropriate container for PCB analysis.

Sample UZ9699 [7.3-PCB1] : Sample was not submitted in an appropriate container for PCB analysis.

Sample UZ9700 [7.4-PCB1] : Sample was not submitted in an appropriate container for PCB analysis.

Sample UZ9701 [8.1-PCB1] : Sample was not submitted in an appropriate container for PCB analysis.

Sample UZ9702 [8.2-PCB1] : Sample was not submitted in an appropriate container for PCB analysis.

POLYCHLORINATED BIPHENYLS BY GC-ECD (PAINT) Comments

Sample UZ9693 [1.6-PCB1] PCB with Silica Gel Clean-up: Detection limits raised due to sample matrix.

Sample UZ9694 [1.7-PCB1] PCB with Silica Gel Clean-up: Detection limits raised due to sample matrix.

Sample UZ9695 [1.8-PCB1] PCB with Silica Gel Clean-up: Detection limits raised due to sample matrix.

Sample UZ9696 [1.10-PCB1] PCB with Silica Gel Clean-up: Detection limits raised due to sample matrix.

Sample UZ9697 [7.1-PCB1] PCB with Silica Gel Clean-up: Detection limits raised due to sample matrix.

Sample UZ9698 [7.2-PCB1] PCB with Silica Gel Clean-up: Detection limits raised due to sample matrix.

Sample UZ9699 [7.3-PCB1] PCB with Silica Gel Clean-up: Detection limits raised due to sample matrix.

Sample UZ9700 [7.4-PCB1] PCB with Silica Gel Clean-up: Detection limits raised due to sample matrix.

Sample UZ9701 [8.1-PCB1] PCB with Silica Gel Clean-up: Detection limits raised due to sample matrix.

Sample UZ9702 [8.2-PCB1] PCB with Silica Gel Clean-up: Detection limits raised due to sample matrix.

Results relate only to the items tested.

Maxxam Job #: B8B1742
Report Date: 2019/01/04

SLR CONSULTING (CANADA) LTD.
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Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JE

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9278418	SJ1	Matrix Spike [UZ9693-01]	Silica Gel Aroclor 1260	2018/12/29		92	%	50 - 130
			Silica Gel NONACHLOROBIPHENYL (sur.)	2018/12/29		97	%	50 - 130
9278418	SJ1	Spiked Blank	Silica Gel Aroclor 1260	2018/12/29		83	%	50 - 130
			Silica Gel NONACHLOROBIPHENYL (sur.)	2018/12/29		95	%	50 - 130
9278418	SJ1	Method Blank	Silica Gel Aroclor 1016	2018/12/29	<0.010		mg/kg	
			Silica Gel Aroclor 1221	2018/12/29	<0.010		mg/kg	
			Silica Gel Aroclor 1232	2018/12/29	<0.010		mg/kg	
			Silica Gel Aroclor 1242	2018/12/29	<0.010		mg/kg	
			Silica Gel Aroclor 1248	2018/12/29	<0.010		mg/kg	
			Silica Gel Aroclor 1254	2018/12/29	<0.010		mg/kg	
			Silica Gel Aroclor 1260	2018/12/29	<0.010		mg/kg	
			Silica Gel Aroclor 1262	2018/12/29	<0.010		mg/kg	
			Silica Gel Aroclor 1268	2018/12/29	<0.010		mg/kg	
			Silica Gel NONACHLOROBIPHENYL (sur.)	2018/12/29		89	%	50 - 130
9278418	SJ1	RPD [UZ9693-01]	Silica Gel Aroclor 1016	2018/12/29	NC		%	50
			Silica Gel Aroclor 1221	2018/12/29	NC		%	50
			Silica Gel Aroclor 1232	2018/12/29	NC		%	50
			Silica Gel Aroclor 1242	2018/12/29	NC		%	50
			Silica Gel Aroclor 1248	2018/12/29	NC		%	50
			Silica Gel Aroclor 1254	2018/12/29	NC		%	50
			Silica Gel Aroclor 1260	2018/12/29	NC		%	50
			Silica Gel Aroclor 1262	2018/12/29	NC		%	50
			Silica Gel Aroclor 1268	2018/12/29	NC		%	50

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.

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.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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 $\leq 2 \times \text{RDL}$).

Maxxam Job #: B8B1742
Report Date: 2019/01/04

SLR CONSULTING (CANADA) LTD.
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Your P.O. #: 700425615
Sampler Initials: JE

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

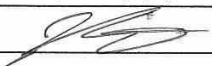



Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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.

CHAIN OF CUSTODY RECORD

Page 1 of 2

Invoice Information			Report Information (if differs from invoice)			Project Information			Turnaround Time (TAT) Required																																																																																				
Company: <u>Public Works and Procurement Canada</u>			Company: <u>SLR Consulting (Canada) Ltd.</u>			Quotation #: <u>B81219</u>			<input checked="" type="checkbox"/> 5 - 7 Days Regular (Most analyses)																																																																																				
Contact Name: <u>Karen Hill</u>			Contact Name: <u>Kate Lindfield</u>			P.O. #/ AFE#: <u>700425615</u>			PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS																																																																																				
Address: <u>100-167 Lombard Ave</u> <u>Winnipeg, MB R3B 0T6</u>			Address: <u>1185-120201 Southport Road SW</u> <u>Calgary, AB T2W 4X9</u>			Project #: <u>203.02356.00000</u>			Rush TAT (Surcharges will be applied)																																																																																				
Phone: <u>204-984-4510</u>			Phone: <u>403-385-1323</u>			Site Location: <u>Waterton National Park</u>			<input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days																																																																																				
Email: <u>Karen.Hill@pwqsc-tpsgc.gc.ca</u>			Email: <u>jernst@ehsp.ca</u>			Site #: <u>1.6-8.2</u>			<input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days																																																																																				
Copies: _____			Copies: <u>klindfield@slrconsulting.com</u>			Sampled By: <u>JE</u>			Date Required: _____																																																																																				
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Maxxam Job #																																																																																													

26-Dec-18 17:12

Carmen McKay



B8B1742

TV2 INS-0001

Sample Type	Sample#	Sample Number	Description	Sample Date
PCB in Paint	PCB1	1.6-PCB1	Black Paint on Stove	2018-12-04
PCB in Paint	PCB1	1.7-PCB1	Beige Paint on Food Bin	2018-12-04
PCB in Paint	PCB1	1.8-PCB1	Beige Paint on Food Bin	2018-12-04
PCB in Paint	PCB1	1.1-PCB1 1.10-PCB1	Brown on Metal Food Storage Bin	2018-12-04
PCB in Paint	PCB1	7.1-PCB1	White Wood Exterior Windows	2018-12-05
PCB in Paint	PCB1	7.2-PCB1	Brown Exterior Siding	2018-12-05
PCB in Paint	PCB1	7.3-PCB1	White Wood Exterior Windows and Trim	2018-12-05
PCB in Paint	PCB1	7.4-PCB1	Brown Wood Siding	2018-12-05
PCB in Paint	PCB1	8.1-PCB1	Beige Paint on Picnic Shelter Trim	2018-11-29
PCB in Paint	PCB1	8.2-PCB1	Green on Wood Sign Post	2018-11-29

2 of 2

26-Dec-18 17:12

Carmen McKay



B8B1742

TV2 INS-0001

Certificate of Analysis

EHS Partnerships Ltd. (Calgary)

4303-11 St. SE
Calgary, AB T2G 4X1
Attn: Jon Ernst

Client PO:
Project: 456BB18009
Custody:

Report Date: 22-May-2019
Order Date: 17-May-2019

Order #: 1920749

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1920749-01	6.1-PCB1
1920749-02	1.11-PCB1
1920749-03	1.12-PCB1
1920749-04	1.18-PCB1
1920749-05	1.19-PCB1

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: EHS Partnerships Ltd. (Calgary)
Client PO:

Report Date: 22-May-2019
Order Date: 17-May-2019
Project Description: 456BB18009

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PCBs, total	based on SW846 8082A - GC-ECD	17-May-19	21-May-19

Certificate of Analysis
Client: EHS Partnerships Ltd. (Calgary)
Client PO:

Report Date: 22-May-2019

Order Date: 17-May-2019

Project Description: 456BB18009

Client ID:	6.1-PCB1	1.11-PCB1	1.12-PCB1	1.18-PCB1
Sample Date:	13-May-19 09:00	14-May-19 09:00	14-May-19 09:00	14-May-19 09:00
Sample ID:	1920749-01	1920749-02	1920749-03	1920749-04
MDL/Units	Paint	Paint	Paint	Paint

PCBs

PCBs, total	0.2 ug/g	<0.2	<0.2	<0.2	<0.2
Decachlorobiphenyl	Surrogate	111%	61.4%	110%	111%

Client ID:	1.19-PCB1	-	-	-
Sample Date:	14-May-19 09:00	-	-	-
Sample ID:	1920749-05	-	-	-
MDL/Units	Paint	-	-	-

PCBs

PCBs, total	0.2 ug/g	<0.2	-	-	-
Decachlorobiphenyl	Surrogate	121%	-	-	-

Certificate of Analysis
 Client: EHS Partnerships Ltd. (Calgary)
 Client PO:

Report Date: 22-May-2019
 Order Date: 17-May-2019
 Project Description: 456BB18009

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
PCBs									
PCBs, total	ND	0.2	ug/g						
Surrogate: Decachlorobiphenyl	0.442		ug/g		88.4	43-142			

Certificate of Analysis
 Client: EHS Partnerships Ltd. (Calgary)
 Client PO:

Report Date: 22-May-2019
 Order Date: 17-May-2019
 Project Description: 456BB18009

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
PCBs									
PCBs, total	ND	0.2	ug/g	ND				35	
Surrogate: Decachlorobiphenyl	0.548		ug/g		110	43-142			

Certificate of Analysis
 Client: EHS Partnerships Ltd. (Calgary)
 Client PO:

Report Date: 22-May-2019
 Order Date: 17-May-2019
 Project Description: 456BB18009

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
PCBs									
PCBs, total	2.25	0.2	ug/g	ND	112	58-147			
Surrogate: Decachlorobiphenyl	0.543		ug/g		109	43-142			

Certificate of Analysis
Client: EHS Partnerships Ltd. (Calgary)
Client PO:

Report Date: 22-May-2019
Order Date: 17-May-2019
Project Description: 456BB18009

Qualifier Notes:

None

Sample Data Revisions

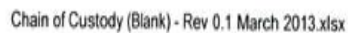
None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.



Sample Type	Sample Number	Description	Sample Date
PCB in Paint	6.1-PCB1	Green Concrete Block Walls	2019-05-13 ✓
PCB in Paint	1.11-PCB1	Beige Exterior Wood Window Frames and Trim	2019-05-14 ✓
PCB in Paint	1.12-PCB1	Beige Metal Door	2019-05-14 ✓
PCB in Paint	1.18-PCB1	Green Wood Siding Exterior Walls	2019-05-14 ✓
PCB in Paint	1.19-PCB1	Green Wood Siding Exterior Walls	2019-05-14 ✓

2.19.05.14
↓



Parcel ID: 1920749

Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 1.1-10.1
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 1 of 1

Report Date: 2019/01/29

Report #: R2679871

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B1744

Received: 2018/12/26, 17:12

Sample Matrix: PAINT
Samples Received: 28

Analyses	Date		Date Analyzed	Laboratory Method	Analytical Method
	Quantity	Extracted			
Reactive Silica (Soil) (1)	25	N/A	2019/01/22		
Reactive Silica (Soil) (1)	3	N/A	2019/01/29		

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.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Bedford(From Calgary)

Attention: Kate Lindfield

SLR CONSULTING (CANADA) LTD.
#1185-10201 Southport Road SW
CALGARY, AB
Canada T2W 4X9

Your P.O. #: 700425615
Your Project #: 203.02356.00000
Site#: 1.1-10.1
Site Location: WATERTON NATIONAL PARK
Your C.O.C. #: 1 of 1

Report Date: 2019/01/29

Report #: R2679871

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8B1744

Received: 2018/12/26, 17:12

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Carmen McKay-Mat Leave, Project Manager

Email: CMcKay@maxxam.ca

Phone# (403)219-3683

=====

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 #: B8B1744
Report Date: 2019/01/29

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JH

RESULTS OF CHEMICAL ANALYSES OF PAINT

Maxxam ID		UZ9711	UZ9712	UZ9713	UZ9714	UZ9715	UZ9716	
Sampling Date		2018/12/04	2018/12/04	2018/12/04	2018/12/04	2018/12/04	2018/12/04	
COC Number		1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	
	UNITS	1.1-S1	1.5-S1	1.7-S1	1.8-S1	1.10-S1	1.10-S2	QC Batch

Parameter								
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	9307225

Maxxam ID		UZ9717	UZ9718	UZ9719	UZ9720	UZ9721	UZ9722	
Sampling Date		2018/12/04	2018/12/04	2018/12/04	2018/12/04	2018/12/04	2018/12/04	
COC Number		1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	
	UNITS	1.10-S3	1.10-S4	1.10-S5	1.10-S6	1.10-S7	1.10-S8	QC Batch

Parameter								
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	9307225

Maxxam ID		UZ9723	UZ9724	UZ9725	UZ9726	UZ9727	UZ9728	
Sampling Date		2018/12/04	2018/12/04	2018/12/04	2018/12/04	2018/11/30	2018/12/05	
COC Number		1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	
	UNITS	1.10-S9	1.10-S10	1.10-S11	1.10-S12	2.1-S1	5.1-S1	QC Batch

Parameter								
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	9307225

Maxxam ID		UZ9729	UZ9730	UZ9731	UZ9732	UZ9733	UZ9734	
Sampling Date		2018/11/29	2018/11/29	2018/11/30	2018/11/29	2018/12/04	2018/12/04	
COC Number		1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	1 of 1	
	UNITS	8.1-S1	8.2-S1	9.2-S1	10.1-S1	1.3-S1	1.4-S1	QC Batch

Parameter								
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	9307225

Maxxam ID		UZ9735		UZ9736	UZ9737	UZ9738	
Sampling Date		2018/12/04		2018/12/04	2018/12/05	2018/11/30	
COC Number		1 of 1		1 of 1	1 of 1	1 of 1	
	UNITS	1.6-S1	QC Batch	1.9-S1	5.2-S1	9.1-S1	QC Batch

Parameter							
Subcontract Parameter	N/A	ATTACHED	9307225	ATTACHED	ATTACHED	ATTACHED	9307231

Maxxam Job #: B8B1744
Report Date: 2019/01/29

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JH

GENERAL COMMENTS

Reactive Silica Results attached, Reference number from BV Mineral Lab is VAN19000133.1

Sample UZ9711 [1.1-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9712 [1.5-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9713 [1.7-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9714 [1.8-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9715 [1.10-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9716 [1.10-S2] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9717 [1.10-S3] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9718 [1.10-S4] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9719 [1.10-S5] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9720 [1.10-S6] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9721 [1.10-S7] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9722 [1.10-S8] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9723 [1.10-S9] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9724 [1.10-S10] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9725 [1.10-S11] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9726 [1.10-S12] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9727 [2.1-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9728 [5.1-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9729 [8.1-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9730 [8.2-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9731 [9.2-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9732 [10.1-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9733 [1.3-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9734 [1.4-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9735 [1.6-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9736 [1.9-S1] : Please see attachment for Reactive Silica (Soil) results.

Maxxam Job #: B8B1744
Report Date: 2019/01/29

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JH

Sample UZ9737 [5.2-S1] : Please see attachment for Reactive Silica (Soil) results.

Sample UZ9738 [9.1-S1] : Please see attachment for Reactive Silica (Soil) results.

Results relate only to the items tested.

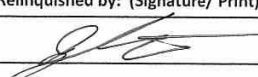
Maxxam Job #: B8B1744
Report Date: 2019/01/29

SLR CONSULTING (CANADA) LTD.
Client Project #: 203.02356.00000
Site Location: WATERTON NATIONAL PARK
Your P.O. #: 700425615
Sampler Initials: JH

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

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.

Invoice Information						Report Information (if differs from invoice)							Project Information								Turnaround Time (TAT) Required																																																																																																																																																																																																																																																																																								
Company : Public Works and Procurement Canada						Company: SLR Consulting (Canada) Ltd.							Quotation #: B81219								<input checked="" type="checkbox"/> 5 - 7 Days Regular (Most analyses)																																																																																																																																																																																																																																																																																								
Contact Name: Karen Hill						Contact Name: Kate Lindfield							P.O. #/ AFE#: 700425615								PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS																																																																																																																																																																																																																																																																																								
Address: 100-167 Lombard Ave Winnipeg, MB. R3B 0T6						Address: 1185-120201 Southport Road SW Calgary, AB T2W 4X9							Project #: 203.02356.00000								Rush TAT (Surcharges will be applied) <input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days																																																																																																																																																																																																																																																																																								
Phone: 204-984-4510						Phone: 403-385-1323							Site Location: Waterton National Park								Date Required:																																																																																																																																																																																																																																																																																								
Email: Karen.Hill@pwgsc-tps.gc.ca						Email: jernst@ehsp.ca							Site #: 1.1-10.1								Rush Confirmation #:																																																																																																																																																																																																																																																																																								
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Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Splice of this Chain of Custody document is acknowledged and acceptance of contents which constitute final results.

Sample Type	Sample#	Sample Number	Description	Sample Date
Silica	S1	1.1-S1	Concrete Slab	2018-12-04
Silica	S1	1.5-S1	Concrete Slab	2018-12-04
Silica	S1	1.7-S1	Concrete Slab	2018-12-04
Silica	S1	1.8-S1	Concrete Slab	2018-12-04
Silica	S1	1.1-S1 1.10-S1	Concrete Slab Site A8	2018-12-04
Silica	S2	1.1-S2 1.10-S2	Concrete Slab Site B15	2018-12-04
Silica	S3	1.1-S3 1.10-S3	Concrete Slab Site C7	2018-12-04
Silica	S4	1.1-S4 1.10-S4	Concrete Slab Site D11	2018-12-04
Silica	S5	1.1-S5 1.10-S5	Concrete Slab Site E10	2018-12-04
Silica	S6	1.1-S6 1.10-S6	Concrete Slab Site F9	2018-12-04
Silica	S7	1.1-S7 1.10-S7	Concrete Slab Site G6	2018-12-04
Silica	S8	1.1-S8 1.10-S8	Concrete Slab Site H10	2018-12-04
Silica	S9	1.1-S9 1.10-S9	Concrete Slab Site I1	2018-12-04
Silica	S10	1.1-S10 1.10-S10	Concrete Slab Site J18	2018-12-04
Silica	S11	1.1-S11 1.10-S11	Concrete Slab Site K14	2018-12-04
Silica	S12	1.1-S12 1.10-S12	Concrete Slab Site L12	2018-12-04
Silica	S1	2.1-S1	Concrete Piles	2018-11-30
Silica	S1	5.1-S1	Foundation Concrete	2018-12-05
Silica	S1	8.1-S1	Concrete Slab Bin Slab	2018-11-29
Silica	S1	8.2-S1	Concrete Slab Kitchen Shelter	2018-11-29
Silica	S1	9.2-S1	Concrete Slab	2018-11-30
Silica	S1	10.1-S1	Bench Concrete Pile	2018-11-29

2 of 2

26-Dec-18 17:12
Carmen McKay
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Sample Type	Sample#	Sample Number	Description	Sample Date
Silica	S1	1.1-S1	Concrete Slab	2018-12-04
Silica	S1	1.3-S1	Concrete Slab	2018-12-04
Silica	S1	1.4-S1	Concrete Slab	2018-12-04
Silica	S1	1.5-S1	Concrete Slab	2018-12-04
Silica	S1	1.6-S1	Concrete Slab	2018-12-04
Silica	S1	1.7-S1	Concrete Slab	2018-12-04
Silica	S1	1.8-S1	Concrete Slab	2018-12-04
Silica	S1	1.9-S1	Concrete Slab	2018-12-04
Silica	S1	1.1-S1	Concrete Slab Site A8	2018-12-04
Silica	S2	1.1-S2	Concrete Slab Site B15	2018-12-04
Silica	S3	1.1-S3	Concrete Slab Site C7	2018-12-04
Silica	S4	1.1-S4	Concrete Slab Site D11	2018-12-04
Silica	S5	1.1-S5	Concrete Slab Site E10	2018-12-04
Silica	S6	1.1-S6	Concrete Slab Site F9	2018-12-04
Silica	S7	1.1-S7	Concrete Slab Site G6	2018-12-04
Silica	S8	1.1-S8	Concrete Slab Site H10	2018-12-04
Silica	S9	1.1-S9	Concrete Slab Site I1	2018-12-04
Silica	S10	1.1-S10	Concrete Slab Site J18	2018-12-04
Silica	S11	1.1-S11	Concrete Slab Site K14	2018-12-04
Silica	S12	1.1-S12	Concrete Slab Site L12	2018-12-04
Silica	S1	2.1-S1	Concrete Piles	2018-11-30
Silica	S1	5.1-S1	Foundation Concrete	2018-12-05
Silica	S1	5.2-S1	Concrete Slab	2018-12-05
Silica	S1	8.1-S1	Concrete Slab Bin Slab	2018-11-29
Silica	S1	8.2-S1	Concrete Slab Kitchen Shelter	2018-11-29
Silica	S1	9.1-S1	Concrete Slab	2018-11-30
Silica	S1	9.2-S1	Concrete Slab	2018-11-30
Silica	S1	10.1-S1	Bench Concrete Pile	2018-11-29

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Bureau Veritas Commodities Canada Ltd.

9050 Shaughnessy St Vancouver British Columbia V6P 6E5 Canada

PHONE (604) 253-3158

Client: Maxxam - Calgary, AB

4000 19th Street N.E.

Calgary Alberta T2E 6P8 Canada

Submitted By: Carmen McKay

Receiving Lab: Maxxam - Calgary, AB

Received: January 16, 2019

Report Date: January 29, 2019

Page: 1 of 2

CERTIFICATE OF ANALYSIS

VAN19000133.1

CLIENT JOB INFORMATION

Project: None Given
Shipment ID:
P.O. Number B8B1744
Number of Samples: 28

SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

Procedure Code	Number of Samples	Code Description	Test Wgt (g)	Report Status	Lab
PULHP	28	Hand Pulverize samples mortar and pestle			VAN
LF300	28	LiBO2/Li2B4O7 fusion ICP-ES analysis	0.2	Completed	VAN

SAMPLE DISPOSAL

STOR-PLP Store After 90 days Invoice for Storage

ADDITIONAL COMMENTS

Bureau Veritas does not accept responsibility for samples left at the laboratory after 90 days without prior written instructions for sample storage or return.

Invoice To: Maxxam - Calgary, AB
4000 19th Street N.E.
Calgary Alberta T2E 6P8
Canada

CC:



This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only. All results are considered the confidential property of the client. Bureau Veritas assumes the liabilities for actual cost of analysis only. Results apply to samples as submitted. *** asterisk indicates that an analytical result could not be provided due to unusually high levels of interference from other elements.



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Page: 2 of 2

Part: 1 of 2

CERTIFICATE OF ANALYSIS

VAN19000133.1

	Method Analyte Unit MDL	WGHT	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300
		Wgt	SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Cr2O3	Ba	Ni	Sr	Zr	Y	Nb	Sc	LOI
		kg	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
		0.01	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.002	5	20	2	5	3	5	1	-5.1
UZ9711-1.1-S1	Rock Pulp	<0.01	52.07	4.07	5.07	1.94	18.96	0.63	0.83	0.31	0.08	0.07	0.006	516	<20	207	96	11	<5	3	15.8
UZ9712-1.5-S1	Rock Pulp	<0.01	47.35	6.93	2.89	5.76	16.02	0.44	1.98	0.37	0.08	0.05	0.004	334	<20	80	113	19	<5	6	17.9
UZ9713-1.7-S1	Rock Pulp	<0.01	47.98	7.38	3.79	4.37	16.79	0.61	2.13	0.54	0.13	0.06	0.005	378	<20	107	143	19	6	6	16.0
UZ9714-1.8-S1	Rock Pulp	<0.01	54.00	7.36	3.55	3.62	13.85	0.84	2.06	0.45	0.10	0.07	0.005	504	<20	119	111	16	<5	5	13.9
UZ9715-1.10-S1	Rock Pulp	<0.01	45.85	7.91	4.84	4.25	16.27	0.64	2.50	0.54	0.13	0.07	0.006	446	<20	112	166	21	<5	7	16.8
UZ9716-1.10-S2	Rock Pulp	<0.01	49.94	7.95	6.04	4.25	13.78	0.71	2.28	0.47	0.10	0.09	0.009	490	<20	110	156	20	<5	6	14.2
UZ9717-1.10-S3	Rock Pulp	<0.01	49.52	8.61	6.00	4.66	13.16	0.71	2.19	0.78	0.13	0.08	0.010	370	44	104	156	21	7	8	13.9
UZ9718-1.10-S4	Rock Pulp	<0.01	52.26	6.20	4.07	3.28	16.48	0.76	1.42	0.36	0.08	0.07	0.007	583	21	345	137	15	<5	5	14.8
UZ9719-1.10-S5	Rock Pulp	<0.01	55.93	6.10	3.22	2.37	15.53	0.76	1.45	0.34	0.08	0.06	0.006	675	<20	340	97	13	<5	4	13.9
UZ9720-1.10-S6	Rock Pulp	<0.01	55.06	8.14	6.31	3.69	11.68	0.78	2.15	1.06	0.21	0.07	0.005	726	<20	260	167	22	7	9	10.6
UZ9721-1.10-S7	Rock Pulp	<0.01	55.60	6.35	3.45	2.62	15.02	0.84	1.52	0.37	0.10	0.06	0.005	638	<20	303	107	14	<5	5	13.8
UZ9722-1.10-S8	Rock Pulp	<0.01	55.66	6.88	5.40	2.71	14.77	0.81	1.56	0.40	0.10	0.07	0.007	700	24	311	128	15	<5	5	11.4
UZ9723-1.10-S9	Rock Pulp	<0.01	58.21	6.95	4.22	2.40	12.99	0.90	1.75	0.46	0.10	0.06	0.008	755	<20	296	137	17	<5	5	11.7
UZ9724-1.10-S10	Rock Pulp	<0.01	57.78	6.60	3.06	2.17	14.38	0.86	1.66	0.34	0.09	0.06	0.006	602	<20	274	154	16	<5	5	12.8
UZ9725-1.10-S11	Rock Pulp	<0.01	57.01	7.87	4.88	2.53	12.95	0.91	2.09	0.57	0.13	0.07	0.007	1119	<20	268	136	19	<5	6	10.7
UZ9726-1.10-S12	Rock Pulp	<0.01	59.44	6.65	3.40	2.22	13.65	0.83	1.62	0.44	0.11	0.06	0.005	619	<20	264	142	18	<5	5	11.4
UZ9727-2.1-S1	Rock Pulp	<0.01	51.49	9.07	3.22	4.23	13.34	0.86	2.64	0.39	0.09	0.04	0.004	429	<20	95	169	20	<5	6	14.4
UZ9728-5.1-S1	Rock Pulp	<0.01	46.08	6.48	2.70	5.10	18.20	0.58	2.08	0.29	0.08	0.05	0.004	596	<20	98	122	15	<5	5	18.2
UZ9729-8.1-S1	Rock Pulp	<0.01	44.74	5.68	3.28	2.88	22.21	0.57	1.04	0.45	0.13	0.05	0.005	306	<20	241	120	14	6	5	18.8
UZ9730-8.2-S1	Rock Pulp	<0.01	51.01	7.04	3.01	4.02	17.00	0.53	1.91	0.36	0.12	0.05	0.006	509	<20	410	120	17	<5	5	14.8
UZ9731-9.2-S1	Rock Pulp	<0.01	72.86	2.85	1.78	0.53	12.29	0.40	0.61	0.14	0.14	0.03	0.004	263	<20	123	70	9	<5	2	8.3
UZ9732-10.1-S1	Rock Pulp	<0.01	76.21	3.22	2.69	0.71	8.93	0.50	0.81	0.13	0.13	0.04	0.005	377	<20	135	82	10	<5	2	6.5
UZ9733-1.3-S1	Rock Pulp	<0.01	48.70	7.26	3.09	4.36	16.53	0.54	2.24	0.39	0.09	0.06	0.005	358	<20	103	126	19	5	6	16.6
UZ9734-1.4-S1	Rock Pulp	<0.01	50.14	7.76	3.53	4.15	14.94	0.71	2.41	0.43	0.09	0.05	0.005	474	<20	105	133	18	<5	6	15.6
UZ9735-1.6-S1	Rock Pulp	<0.01	48.22	7.12	3.08	4.29	16.66	0.56	2.09	0.39	0.10	0.04	0.005	385	<20	95	163	20	<5	6	17.3
UZ9736-1.9-S1	Rock Pulp	<0.01	49.72	7.61	3.64	4.39	15.40	1.01	2.10	0.60	0.13	0.06	0.005	633	<20	130	125	18	<5	6	15.0
UZ9737-5.2-S1	Rock Pulp	<0.01	46.92	7.41	3.00	4.85	16.21	0.70	2.46	0.39	0.09	0.05	0.005	437	<20	94	143	19	<5	6	17.7
UZ9738-9.1-S1	Rock Pulp	<0.01	49.67	8.02	4.05	4.12	15.60	0.52	2.21	0.42	0.10	0.05	0.006	513	<20	109	135	19	<5	6	15.0



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9050 Shaughnessy St Vancouver British Columbia V6P 6E5 Canada

PHONE (604) 253-3158

Client: **Maxxam - Calgary, AB**
4000 19th Street N.E.
Calgary Alberta T2E 6P8 Canada

Project: None Given
Report Date: January 29, 2019

Page: 2 of 2

Part: 2 of 2

CERTIFICATE OF ANALYSIS

VAN19000133.1

Method	LF300
Analyte	Sum
Unit	%
MDL	0.01
UZ9711-1.1-S1	Rock Pulp 99.90
UZ9712-1.5-S1	Rock Pulp 99.88
UZ9713-1.7-S1	Rock Pulp 99.90
UZ9714-1.8-S1	Rock Pulp 99.92
UZ9715-1.10-S1	Rock Pulp 99.90
UZ9716-1.10-S2	Rock Pulp 99.90
UZ9717-1.10-S3	Rock Pulp 99.89
UZ9718-1.10-S4	Rock Pulp 99.91
UZ9719-1.10-S5	Rock Pulp 99.92
UZ9720-1.10-S6	Rock Pulp 99.91
UZ9721-1.10-S7	Rock Pulp 99.87
UZ9722-1.10-S8	Rock Pulp 99.94
UZ9723-1.10-S9	Rock Pulp 99.93
UZ9724-1.10-S10	Rock Pulp 99.94
UZ9725-1.10-S11	Rock Pulp 99.93
UZ9726-1.10-S12	Rock Pulp 99.94
UZ9727-2.1-S1	Rock Pulp 99.90
UZ9728-5.1-S1	Rock Pulp 99.90
UZ9729-8.1-S1	Rock Pulp 99.92
UZ9730-8.2-S1	Rock Pulp 99.92
UZ9731-9.2-S1	Rock Pulp 99.95
UZ9732-10.1-S1	Rock Pulp 99.97
UZ9733-1.3-S1	Rock Pulp 99.88
UZ9734-1.4-S1	Rock Pulp 99.92
UZ9735-1.6-S1	Rock Pulp 99.91
UZ9736-1.9-S1	Rock Pulp 99.82
UZ9737-5.2-S1	Rock Pulp 99.89
UZ9738-9.1-S1	Rock Pulp 99.90



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Page: 1 of 1

Part: 1 of 2

QUALITY CONTROL REPORT

VAN19000133.1

	Method	WGHT	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300
	Analyte	Wgt	SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Cr2O3	Ba	Ni	Sr	Zr	Y	Nb	Sc	LOI
	Unit	kg	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
	MDL	0.01	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.002	5	20	2	5	3	5	1	-5.1
UZ9721-1.10-S7	Rock Pulp	<0.01	55.60	6.35	3.45	2.62	15.02	0.84	1.52	0.37	0.10	0.06	0.005	638	<20	303	107	14	<5	5	13.8
Pulp Duplicates																					
UZ9733-1.3-S1	Rock Pulp	<0.01	48.70	7.26	3.09	4.36	16.53	0.54	2.24	0.39	0.09	0.06	0.005	358	<20	103	126	19	5	6	16.6
REP UZ9733-1.3-S1	QC		48.76	7.23	3.07	4.35	16.55	0.54	2.23	0.39	0.09	0.06	0.005	360	<20	103	122	19	<5	6	16.6
Reference Materials																					
STD SO-19	Standard		60.36	14.08	7.41	2.96	5.97	4.06	1.30	0.70	0.31	0.13	0.490	460	456	314	116	34	66	26	1.9
STD SO-19	Standard		60.34	14.02	7.49	2.94	5.98	4.05	1.31	0.70	0.31	0.13	0.491	463	459	311	116	35	64	26	1.9
STD SO-19 Expected			61.13	13.95	7.47	2.88	6	4.11	1.29	0.69	0.32	0.13	0.5	486	470	317.1	112	35.5	68.5	27	
BLK	Blank		0.04	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	<5	<20	<2	<5	<3	<5	<1	0.0
Prep Wash																					
ROCK-VAN	Prep Blank		70.49	14.18	3.45	0.81	2.25	4.38	2.22	0.34	0.08	0.08	<0.002	831	<20	199	140	15	<5	6	1.6
ROCK-VAN	Prep Blank		70.55	14.11	3.42	0.80	2.24	4.46	2.22	0.33	0.08	0.08	<0.002	829	<20	199	138	15	<5	6	1.6



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Page: 1 of 1

Part: 2 of 2

QUALITY CONTROL REPORT

VAN19000133.1

Method	LF300
Analyte	Sum
Unit	%
MDL	0.01
UZ9721-1.10-S7	Rock Pulp
Pulp Duplicates	
UZ9733-1.3-S1	Rock Pulp
REP UZ9733-1.3-S1	QC
Reference Materials	
STD SO-19	Standard
STD SO-19	Standard
STD SO-19 Expected	
BLK	Blank
Prep Wash	
ROCK-VAN	Prep Blank
ROCK-VAN	Prep Blank

Subcontracted Analysis

EHS Partnerships Ltd. (Calgary)

4303-11 St. SE
Calgary, AB T2G 4X1
Attn: Jon Ernst

Tel: 403-243-0700
Fax: (403) 243-0760

Paracel Report No.: **1920750**

Client Project(s): **456BB18009**

Client PO:

Reference: **#19-393 EHSP Waterton**

Order Date: 17-May-19

Report Date: 3-Jun-19

CoC Number:

Sample(s) from this project were subcontracted for the listed parameters. A copy of the subcontractor's report is attached

Paracel ID	Client ID	
1920750-01	6.1-S1	Silica - solid
1920750-02	1.11-S1	Silica - solid
1920750-03	1.12-S1	Silica - solid
1920750-04	1.13-S1	Silica - solid
1920750-05	1.14-S1	Silica - solid
1920750-06	1.15-S1	Silica - solid
1920750-07	1.16-S1	Silica - solid
1920750-08	1.17-S1	Silica - solid
1920750-09	1.18-S1	Silica - solid
1920750-10	1.19-S1	Silica - solid



SGS Canada Inc.

P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2000 FAX: 705-652-6365

Paracel Laboratories

Attn : Dale Robertson, Mark Foto

300-2319 St.Laurent Blvd.
Ottawa, ON
K1G 4K6,

Phone: 613-731-9577
Fax:613-731-9064, pdf

03-June-2019

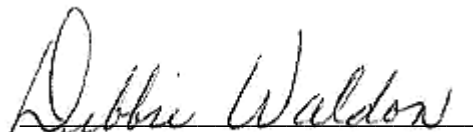
Date Rec. : 22 May 2019
LR Report : CA12963-MAY19
Client Ref : Project#: 1920750

CERTIFICATE OF ANALYSIS

Final Report

Sample ID	Si %	Weight g
9: 6.1-S1	21.7	26.5
10: 1.11-S1	22.6	8.00
11: 1.12-S1	27.4	7.90
12: 1.13-S1	26.5	6.30
13: 1.14-S1	24.4	2.10
14: 1.15-S1	25.9	4.40
15: 1.16-S1	26.9	3.70
16: 1.17-S1	26.4	10.3
17: 1.18-S1	24.3	7.40
18: 1.19-S1	24.7	11.0

Control Quality Analysis - not suitable for commercial exchange


Debbie Waldon
Project Coordinator,
Minerals Services, Analytical

Appendix B

Photographic Log

Hazardous Materials Assessment
Waterton National Park, Alberta
Project #: 456BB-18-009



Photograph 1.1-1: Site 1.1 Crandell Campground Generator House



Photograph 1.1-2: Site 1.1 Crandell Campground Generator House Asbestos Samples A1-A3, None Detected.



Photograph 1.1-3: Site 1.1 Crandell Campground Generator House Asbestos Samples A4-A6, None Detected.



Photograph 1.1-4: Site 1.1 Crandell Campground Generator House Asbestos Samples A7-A9, None Detected.
Silica Sample S1, 52.07% SiO₂.



Photograph 1.1-5: Site 1.1 Crandell Campground Generator House Lead Sample Pb1, 11mg/kg.



Photograph 1.1-6: Site 1.1 Crandell Campground Generator House Lead Sample Pb2, 300mg/kg.



Photograph 1.1-7: Site 1.1 Crandell Campground Generator House Lead Sample Pb3, 14mg/kg.



Photograph 1.1-8: Site 1.1 Crandell Campground Generator House, Example of Melted Battery Bank.



Photograph 1.1-9: Site 1.1 Crandell Campground Generator House



Photograph 1.1-10: Site 1.1 Crandell Campground Generator House



Photograph 1.2.-1: Site 1.2 Crandell Campground Wood Storage Shed, Heater and Propane Cylinders.



Photograph 1.2-2: Site 1.2 Crandell Campground Wood Storage Shed.



Photograph 1.2-3: Site 1.2 Crandell Campground Wood Storage Shed



Photograph 1.2-4: Site 1.2 Crandell Campground Wood Storage Shed



Photograph 1.2-5: Site 1.2 Crandell Campground Wood Storage Shed



Photograph 1.2-6: Site 1.2 Crandell Campground Wood Storage Shed



Photograph 1.3-1: Site 1.3 Crandell Campground Washroom 1



Photograph 1.3-2: Site 1.3 Crandell Campground Washroom 1 Asbestos Samples 1.4-A1 to 1.4-A3, None Detected.



Photograph 1.3-3: Site 1.3 Crandell Campground Washroom 1 Asbestos Samples 1.4-A4 to 1.4-A6, None Detected. Silica Sample 1.4-S1, 50.14% SiO₂.



Photograph 1.3-4: Site 1.3 Crandell Campground Washroom 1 Asbestos Samples 1.4-A7 to 1.4-A9, None Detected.



Photograph 1.3-5: Site 1.3 Crandell Campground Washroom 1 Asbestos Samples 1.4-A10 to 1.4-A12, None Detected.



Photograph 1.4-1: Site 1.4 Crandell Campground Washroom 2



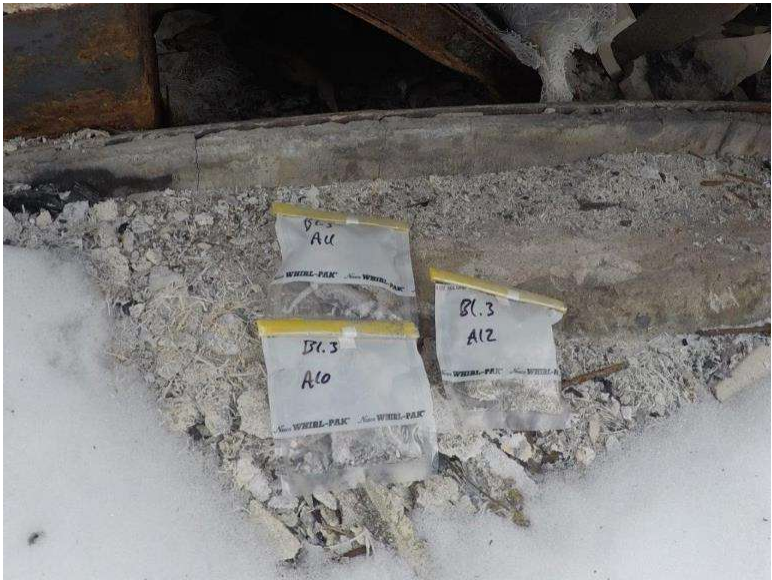
Photograph 1.4-2: Site 1.4 Crandell Campground Washroom 2 Asbestos Samples 1.3-A1 to 1.3-A3, None Detected.



Photograph 1.4-3: Site 1.4 Crandell Campground Washroom 2 Asbestos Samples 1.3-A4 to 1.3-A6, None Detected.



Photograph 1.3-4: Site 1.3 Crandell Campground Washroom 2 Asbestos Samples 1.3-A7 to 1.3-A9, None Detected.



Photograph 1.4-4: Site 1.4 Crandell Campground Washroom 2 Asbestos Samples 1.3-A10 to 1.3-A12, None Detected.



Photograph 1.4-5: Site 1.4 Crandell Campground Washroom 2 Silica Sample 1.3-S1, 48.70% SiO₂.



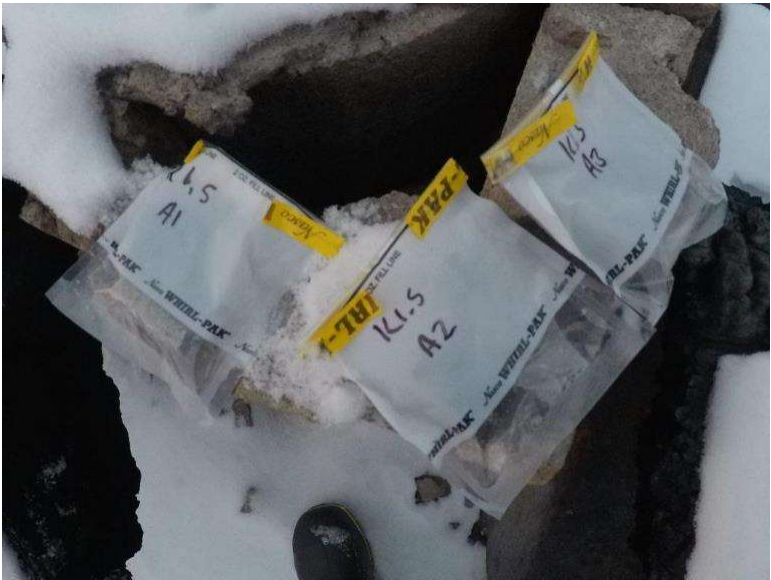
Photograph 1.4-6: Site 1.4 Crandell Campground Washroom 2



Photograph 1.4-7: Site 1.4 Crandell Campground Washroom 2



Photograph 1.5-1: Site 1.5 Crandell Campground Kitchen Shelter 1



Photograph 1.5-2: Site 1.5 Crandell Campground Kitchen Shelter 1 Asbestos Samples A1-A3, None Detected.



Photograph 1.5-3: Site 1.5 Crandell Campground Kitchen Shelter 1 Asbestos Samples A4-A6, None Detected.
Silica Sample S1 47.35% SiO₂.



Photograph 1.5-4: Site 1.5 Crandell Campground Kitchen Shelter 1 Asbestos Samples A7-A9, None Detected.



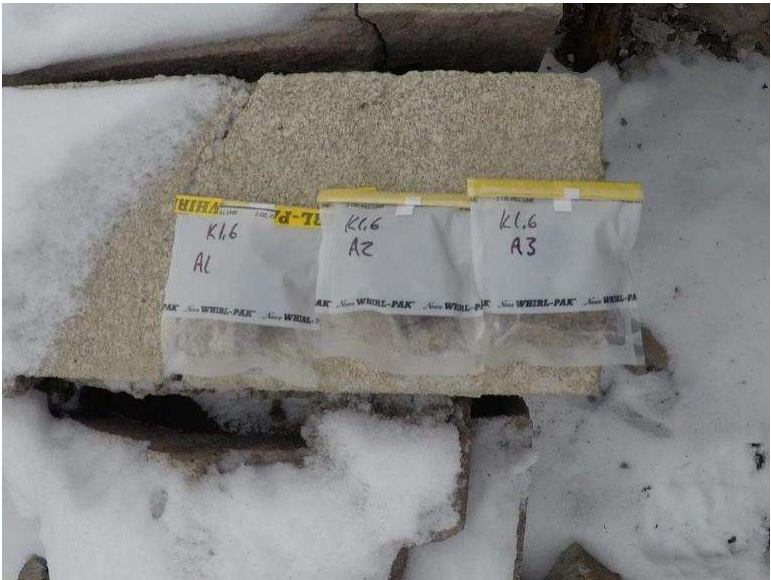
Photograph 1.5-5: Site 1.5 Crandell Campground Kitchen Shelter 1 Lead Sample Pb1, <10mg/kg, and Pb2, 60mg/kg..



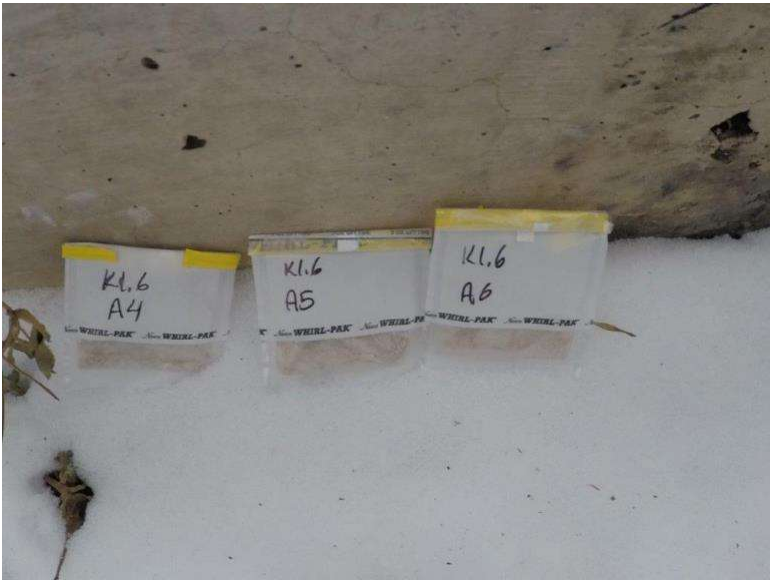
Photograph 1.6-1: Site 1.6 Crandell Campground Kitchen Shelter 2



Photograph 1.6-2: Site 1.6 Crandell Campground Kitchen Shelter 2



Photograph 1.6-3: Site 1.6 Crandell Campground Kitchen Shelter 2 Asbestos Samples A1-A3, None Detected.



Photograph 1.6-4: Site 1.6 Crandell Campground Kitchen Shelter 2 Asbestos Samples A4-A6, None Detected.



Photograph 1.6-5: Site 1.6 Crandell Campground Kitchen Shelter 2 Asbestos Samples A7-A9, None Detected.



Photograph 1.6-6: Site 1.6 Crandell Campground Kitchen Shelter 2 Silica Sample S1 48.22% SiO₂.



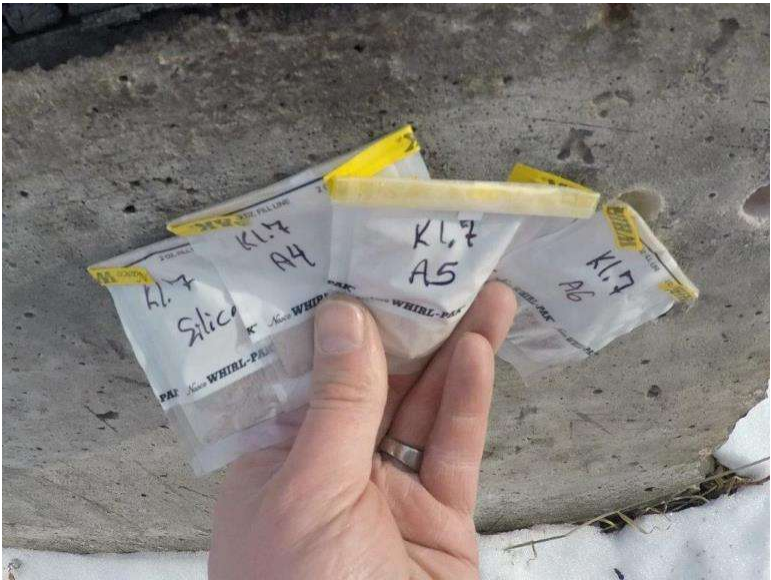
Photograph 1.6-7: Site 1.6 Crandell Campground Kitchen Shelter 2 Lead Sample Pb1, 10mg/kg. PCB sample PCB1, <0.2mg/kg.



Photograph 1.7-1: Site 1.7 Crandell Campground Kitchen Shelter



Photograph 1.7-2: Site 1.7 Crandell Campground Kitchen Shelter 3 Asbestos Samples A1-A3, None Detected.



Photograph 1.7-3: Site 1.7 Crandell Campground Kitchen Shelter 3 Asbestos Samples A4-A6, None Detected.
Silica Sample S1 47.98% SiO₂.



Photograph 1.7-4: Site 1.7 Crandell Campground Kitchen Shelter 3 Asbestos Samples A7-A9, None Detected.



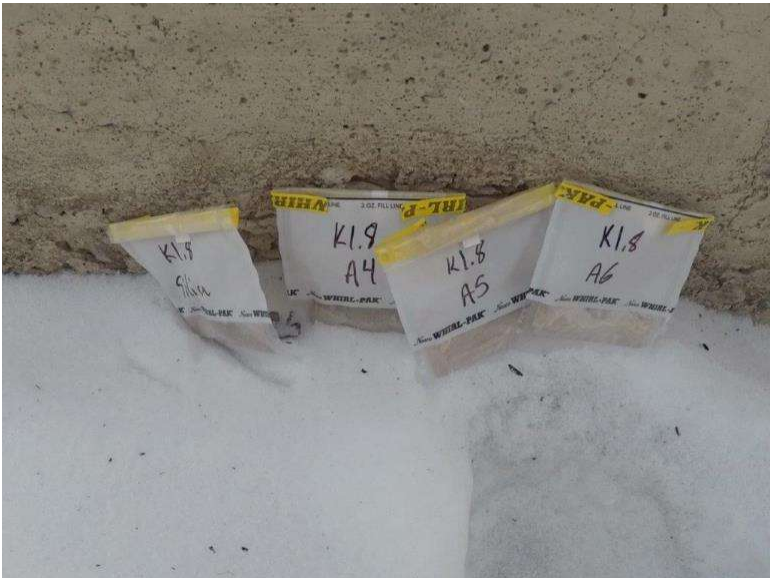
Photograph 1.7-5: Site 1.7 Crandell Campground Kitchen Shelter 3 Lead Sample Pb1, 76mg/kg. PCB Sample PCB1, <0.02mg/kg.



Photograph 1.8-1: Site 1.8 Crandell Campground Kitchen Shelter 4



Photograph 1.8-2: Site 1.8 Crandell Campground Kitchen Shelter 4 Asbestos Samples A1-A3, None Detected.



Photograph 1.8-3: Site 1.8 Crandell Campground Kitchen Shelter 4 Asbestos Samples A4-A6, None Detected.
Silica Sample S1 54.00% SiO₂.



Photograph 1.8-4: Site 1.8 Crandell Campground Kitchen Shelter 4 Asbestos Samples A7-A9, None Detected.



Photograph 1.8-5: Site 1.8 Crandell Campground Kitchen Shelter 4 Lead Sample Pb1, <10mg/kg.



Photograph 1.8-6: Site 1.8 Crandell Campground Kitchen Shelter 4 Lead Sample Pb2, 56mg/kg. PCB Sample PCB1, <0.02mg/kg.



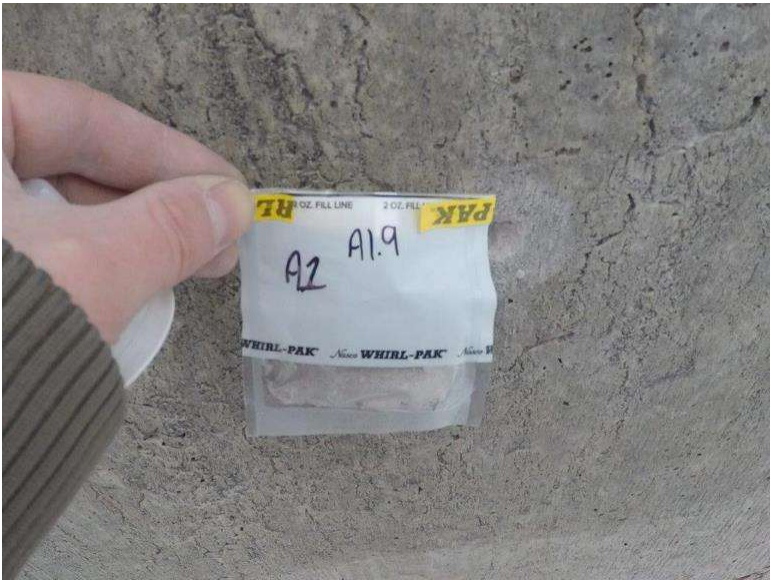
Photograph 1.8-7: Site 1.8 Crandell Campground Kitchen Shelter 4



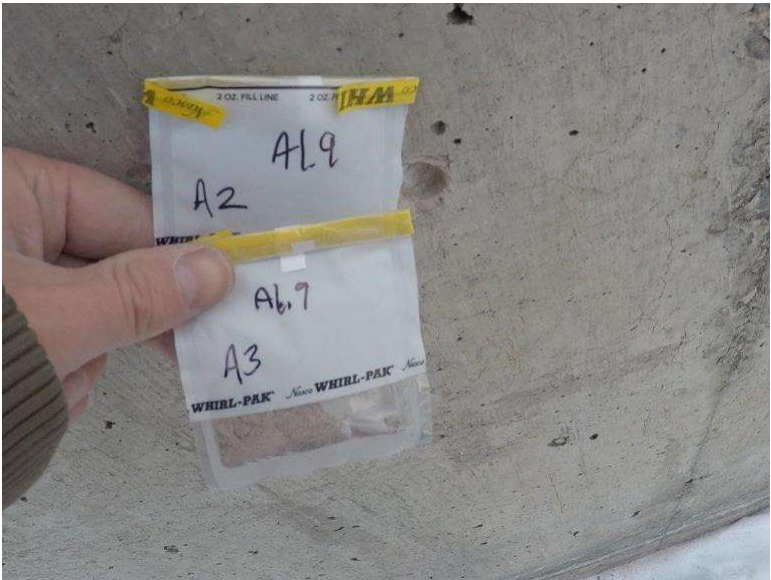
Photograph 1.8-8: Site 1.8 Crandell Campground Kitchen Shelter 4



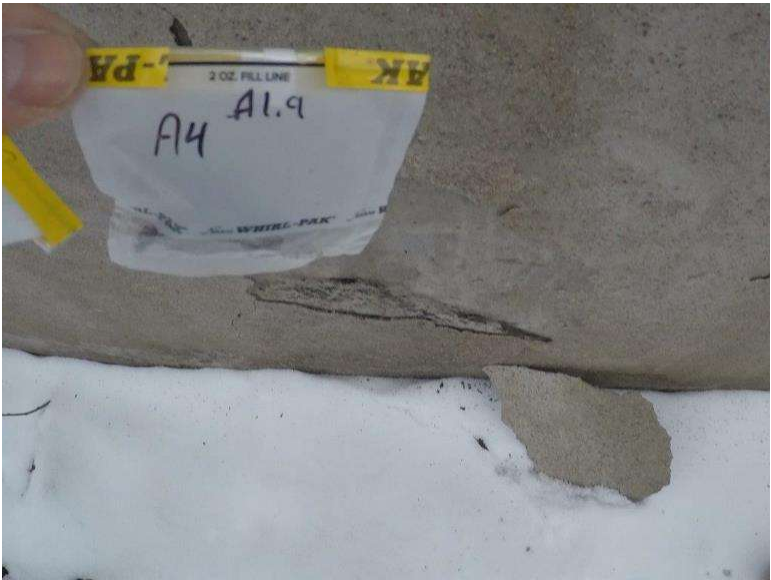
Photograph 1.9-1: Site 1.9 Crandell Campground Interpretive Theatre



Photograph 1.9-2: Site 1.9 Crandell Campground Interpretive Theatre Asbestos Sample A1, None Detected.



Photograph 1.9-3: Site 1.9 Crandell Campground Interpretive Theatre Asbestos Samples A2-A3, None Detected.



Photograph 1.9-4: Site 1.9 Crandell Campground Interpretive Theatre Asbestos Sample A4, None Detected.



Photograph 1.9-5: Site 1.9 Crandell Campground Interpretive Theatre Asbestos Sample A5, None Detected.



Photograph 1.9-6: Site 1.9 Crandell Campground Interpretive Theatre Asbestos Sample A6, None Detected.



Photograph 1.9-7: Site 1.9 Crandell Campground Interpretive Theatre Asbestos Sample A7, None Detected.



Photograph 1.9-8: Site 1.9 Crandell Campground Interpretive Theatre Asbestos Sample A8, None Detected.



Photograph 1.9-9: Site 1.9 Crandell Campground Interpretive Theatre Asbestos Sample A9, None Detected.



Photograph 1.9-10: - Site 1.9 Crandell Campground Interpretive Theatre Silica Sample S1 49.72% SiO₂.



Photograph 1.9-11: Site 1.9 Crandell Campground Interpretive Theatre



Photograph 1.10-1: Site 1.10 Crandell Campground 129 Campsites (Loop A Campsite 8)



Photograph 1.10-2: Site 1.10 Crandell Campground 129 Campsites (Loop A Campsite 8)



Photograph 1.10-3: Site 1.10 Crandell Campground 129 Campsites (Loop A Campsite 8)



Photograph 1.10-4: Site 1.10 Crandell Campground 129 Campsites (Loop B Campsite 13)



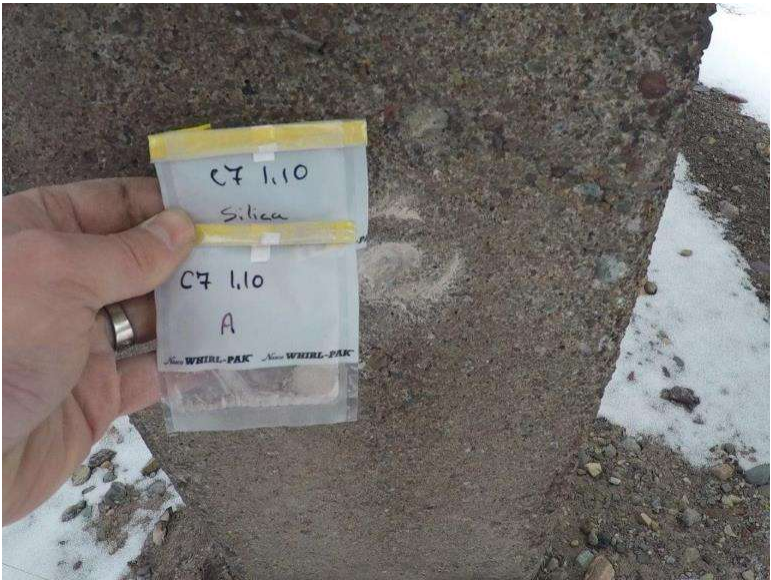
Photograph 1.10-5: Site 1.10 Crandell Campground 129 Campsites (Loop B Campsite 13)



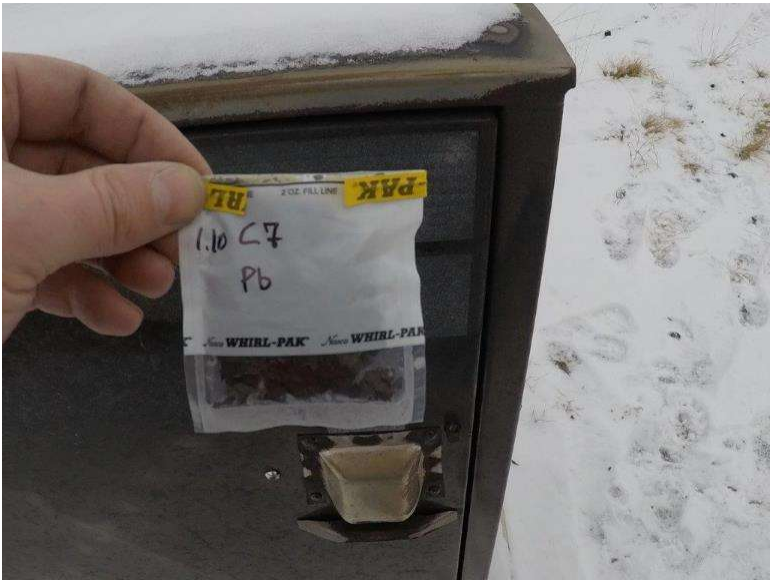
Photograph 1.10-6: Site 1.10 Crandell Campground 129 Campsites (Loop A Campsite 8) Asbestos Sample A1, None Detected.
Silica Sample S1 45.85% SiO₂.



Photograph 1.10-7: Site 1.10 Crandell Campground 129 Campsites (Loop B Campsite 13) Asbestos Sample A2, None Detected.
Silica Sample S2 49.94% SiO₂.



Photograph 1.10-8: Site 1.10 Crandell Campground 129 Campsites (Loop C Campsite 7) Asbestos Sample A3, None Detected.
Silica Sample S3 49.52% SiO₂.



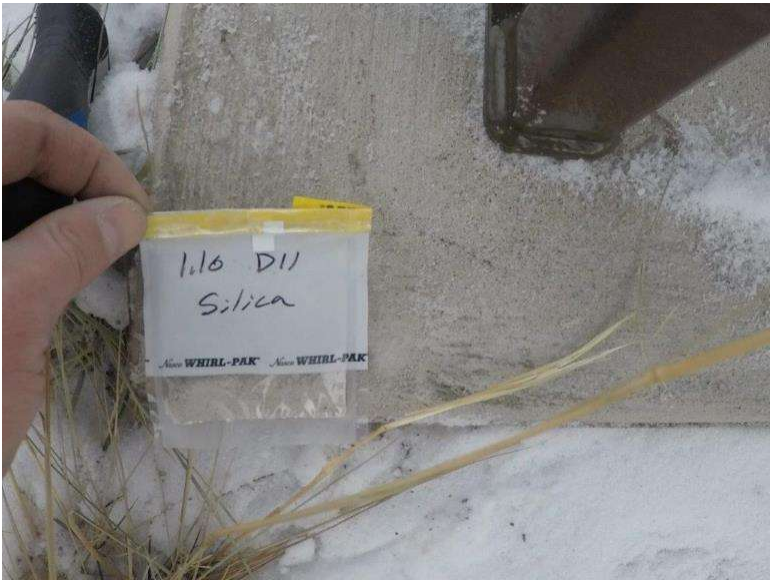
Photograph 1.10-9: Site 1.10 Crandell Campground 129 Campsites (Loop C Campsite 7) Lead Sample Pb1, <10mg/kg.



Photograph 1.10-10: Site 1.10 Crandell Campground 129 Campsites (Loop C Campsite 7)



Photograph 1.10-11: Site 1.10 Crandell Campground 129 Campsites (Loop C Campsite 7)



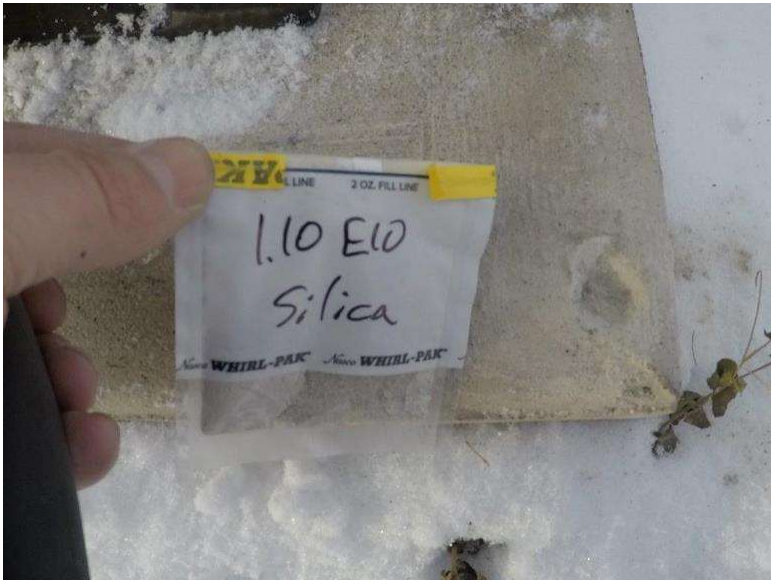
Photograph 1.10-12: Site 1.10 Crandell Campground 129 Campsites (Loop D Campsite 11) Silica Sample S4, 52.26% SiO₂.



Photograph 1.10-13: Site 1.10 Crandell Campground 129 Campsites (Loop D Campsite 11) Lead Sample Pb2, <10mg/kg.



Photograph 1.10-14: Site 1.10 Crandell Campground 129 Campsites (Loop D Campsite 11)



Photograph 1.10-15: Site 1.10 Crandell Campground 129 Campsites (Loop E Campsite 10) Silica Sample S5, 55.93% SiO₂.



Photograph 1.10-16: Site 1.10 Crandell Campground 129 Campsites (Loop E Campsite 1) Lead Sample Pb3, <10mg/kg.



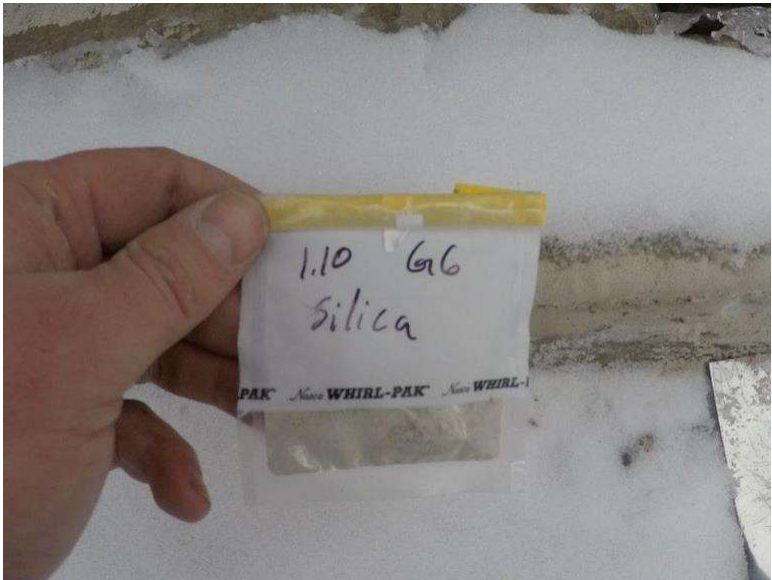
Photograph 1.10-17: Site 1.10 Crandell Campground 129 Campsites (Loop E Campsite 1)



Photograph 1.10-18: Site 1.10 Crandell Campground 129 Campsites (Loop F Campsite 9) Silica Sample S6, 55.06% SiO₂.



Photograph 1.10-19: Site 1.10 Crandell Campground 129 Campsites (Loop F Campsite 9)



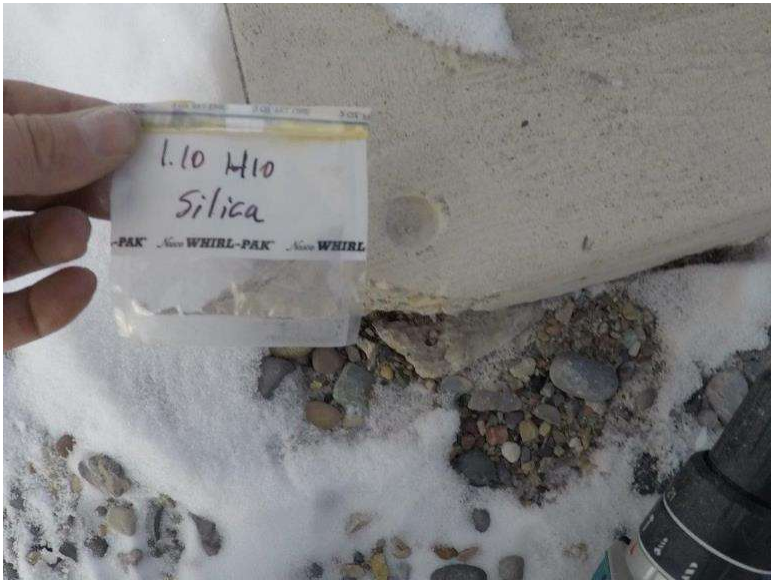
Photograph 1.10-20: Site 1.10 Crandell Campground 129 Campsites (Loop G Campsite 6) Silica Sample S7, 55.60% SiO₂.



Photograph 1.10-21: Site 1.10 Crandell Campground 129 Campsites (Loop G Campsite 6) Lead Sample Pb4, 510mg/kg.



Photograph 1.10-22 Site 1.10 Crandell Campground 129 Campsites (Loop G Campsite 6)



Photograph 1.10-23: Site 1.10 Crandell Campground 129 Campsites (Loop H Campsite 10) Silica Sample S8, 55.66% SiO₂.



Photograph 1.10-24: Site 1.10 Crandell Campground 129 Campsites (Loop H Campsite 10)



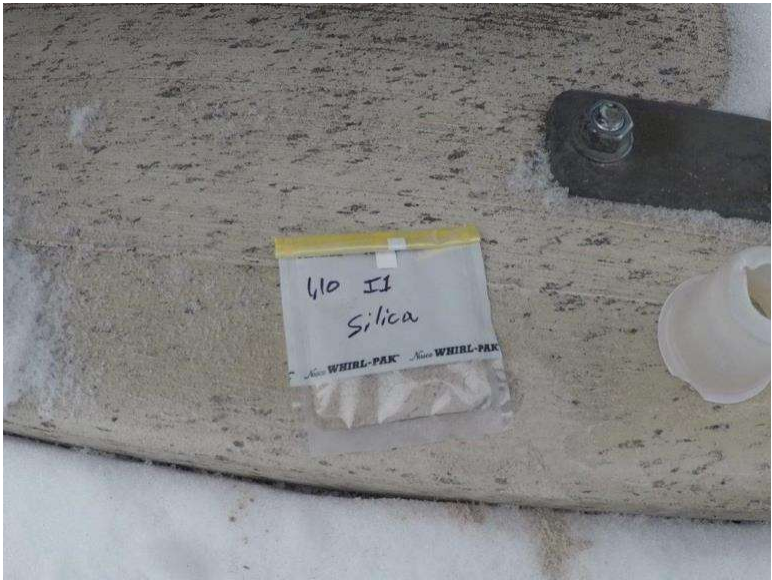
Photograph 1.10-25: Site 1.10 Crandell Campground 129 Campsites (Loop H Campsite 10)



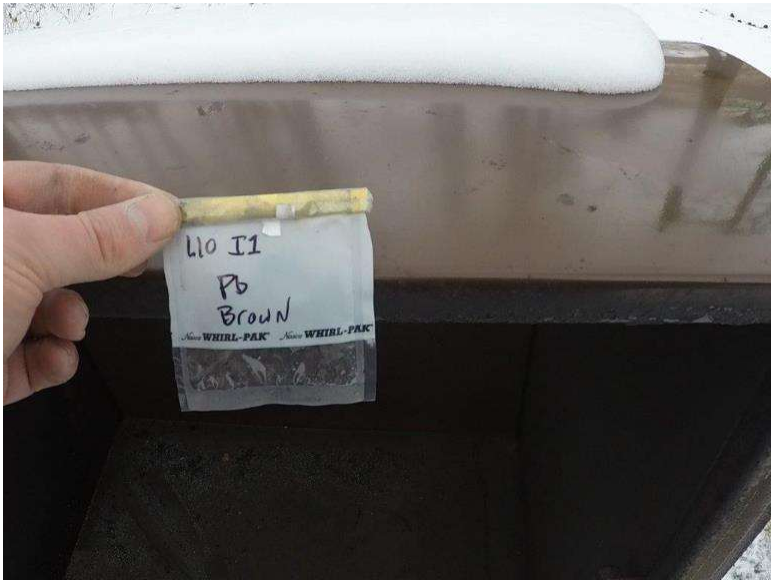
Photograph 1.10-26: Site 1.10 Crandell Campground 129 Campsites (Loop H Campsite 10)



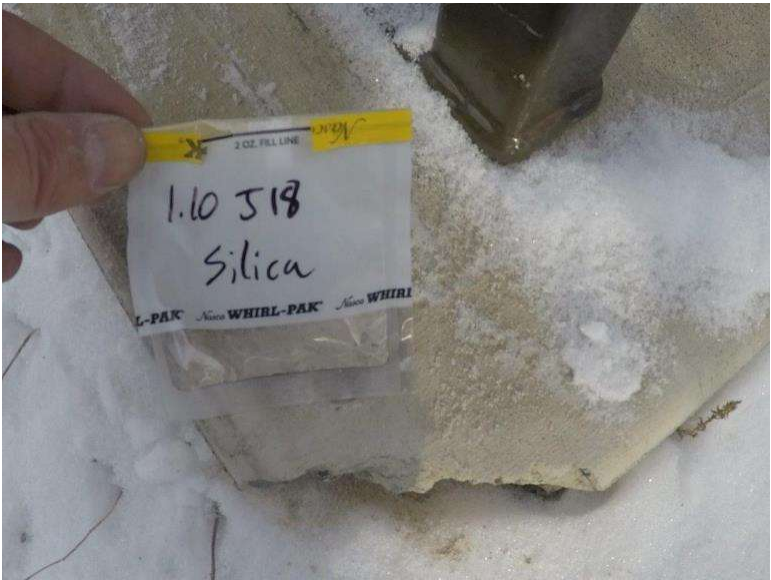
Photograph 1.10-28: Site 1.10 Crandell Campground 129 Campsites (Loop I Campsite 1)



Photograph 1.10-29: Site 1.10 Crandell Campground 129 Campsites (Loop I Campsite 1) Silica Sample S9, 58.21% SiO₂.



Photograph 1.10-30: Site 1.10 Crandell Campground 129 Campsites (Loop I Campsite 1) Lead Sample Pb5, <10mg/kg.



Photograph 1.10-31: Site 1.10 Crandell Campground 129 Campsites (Loop J Campsite 18) Silica Sample S10, 57.78% SiO₂.



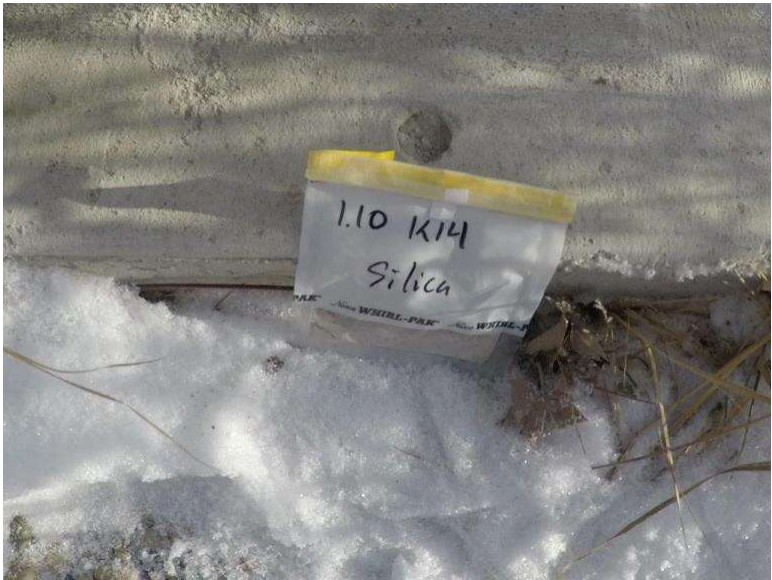
Photograph 1.10-32: Site 1.10 Crandell Campground 129 Campsites (Loop J Campsite 18)



Photograph 1.10-33: Site 1.10 Crandell Campground 129 Campsites (Loop J Campsite 18)



Photograph 1.10-34: Site 1.10 Crandell Campground 129 Campsites (Loop J Campsite 18)



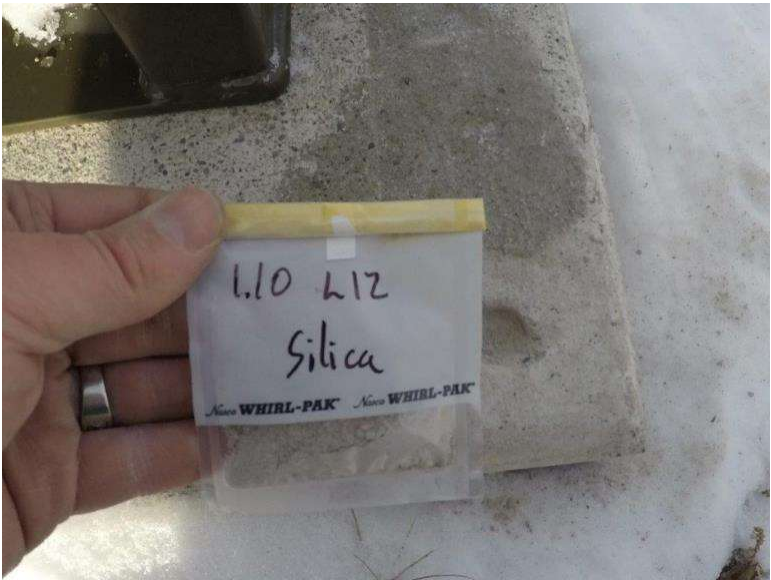
Photograph 1.10-35: Site 1.10 Crandell Campground 129 Campsites (Loop K Campsite 14) Silica Sample S11, 57.01% SiO₂.



Photograph 1.10-36: Site 1.10 Crandell Campground 129 Campsites (Loop K Campsite 14)



Photograph 1.10-37: Site 1.10 Crandell Campground 129 Campsites (Loop K Campsite 14)



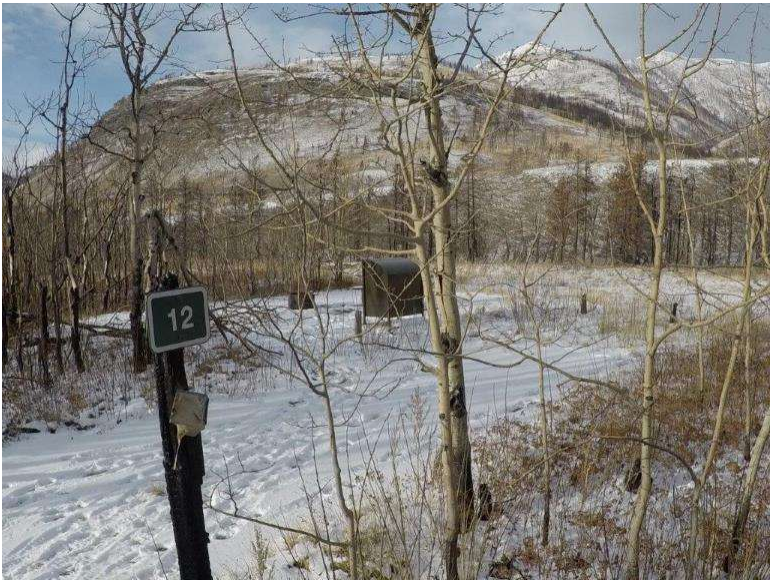
Photograph 1.10-38: Site 1.10 Crandell Campground 129 Campsites (Loop L Campsite 12) Silica Sample S12, 57.01% SiO₂.



Photograph 1.10-39: Site 1.10 Crandell Campground 129 Campsites (Loop L Campsite 12)



Photograph 1.10-39: Site 1.10 Crandell Campground 129 Campsites (Loop L Campsite 12)



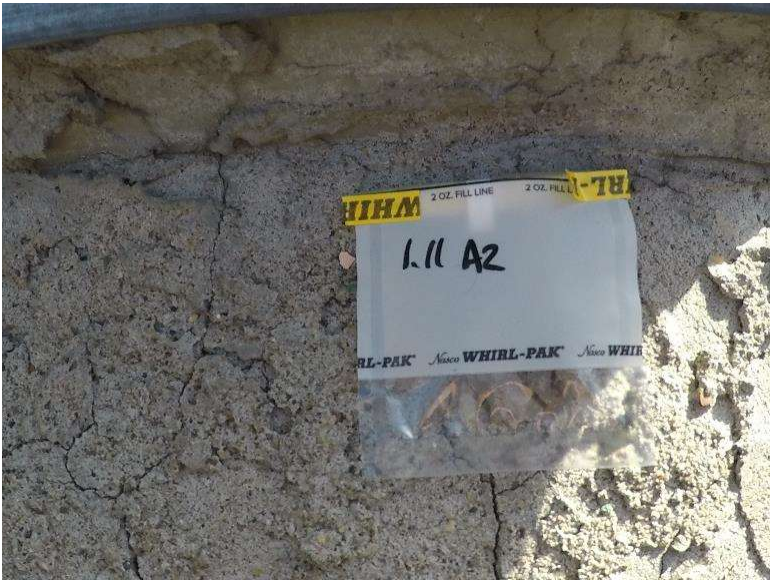
Photograph 1.10-40 Site 1.10 Crandell Campground 129 Campsites (Loop L Campsite 12)



Photograph 1.11-1: Site 1.11 Crandell Campground Entrance Kiosk.



Photograph 1.11-2: Site 1.11 Entrance Kiosk Asbestos Sample A1, None Detected.



Photograph 1.11-3: Site 1.11 Entrance Kiosk Asbestos Sample A2, None Detected.



Photograph 1.11-4: Site 1.11 Entrance Kiosk Asbestos Sample A3, None Detected.



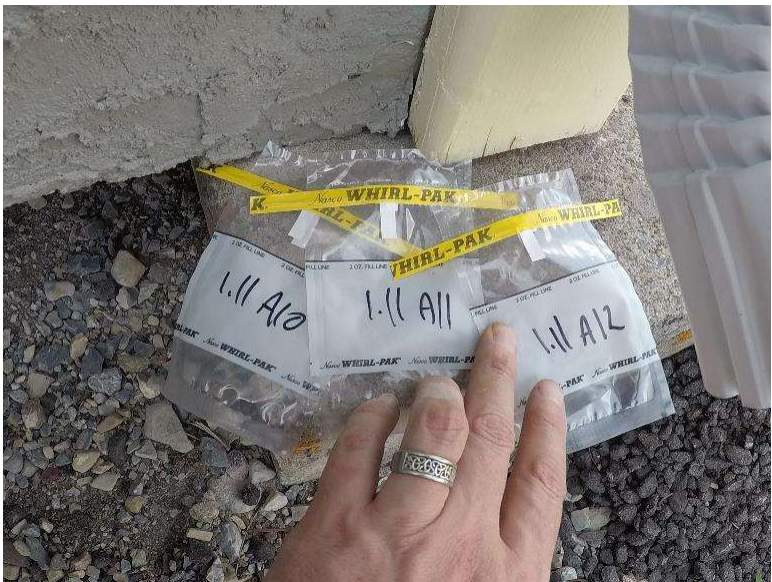
Photograph 1.11-5: Site 1.11 Entrance Kiosk Asbestos Sample A4, None Detected.



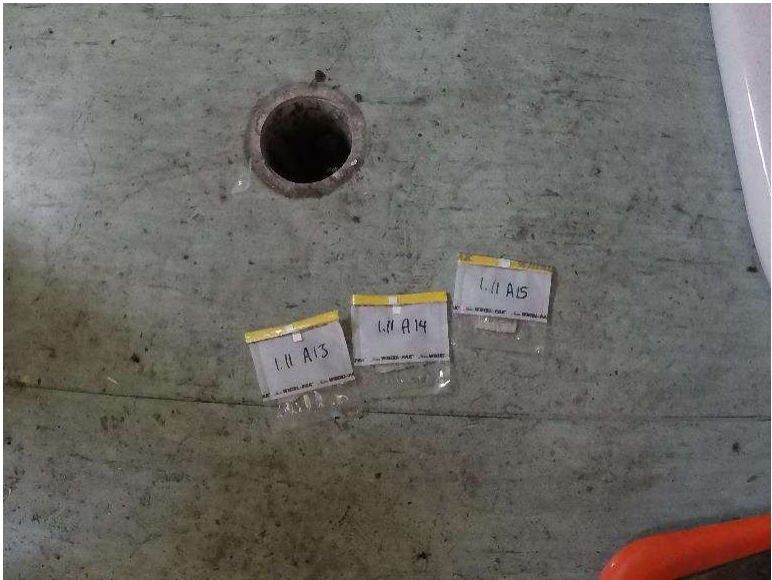
Photograph 1.11-6: Site 1.11 Entrance Kiosk Asbestos Sample A5, A6, None Detected.



Photograph 1.11-7: Site 1.11 Entrance Kiosk Asbestos Sample A7, A8, A9, None Detected.



Photograph 1.11-7: Site 1.11 Entrance Kiosk Asbestos Sample A10, A11, A12, None Detected.



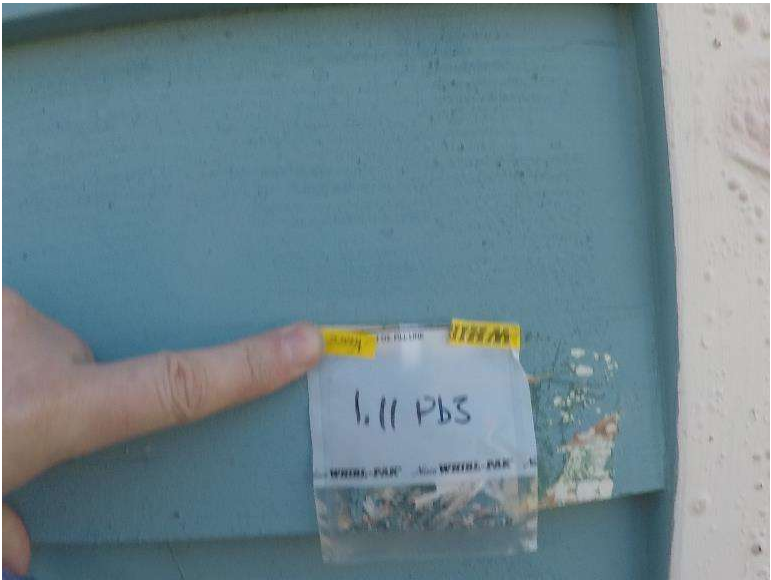
Photograph 1.11-8: Site 1.11 Entrance Kiosk Asbestos Sample A13, A14, A15, None Detected.



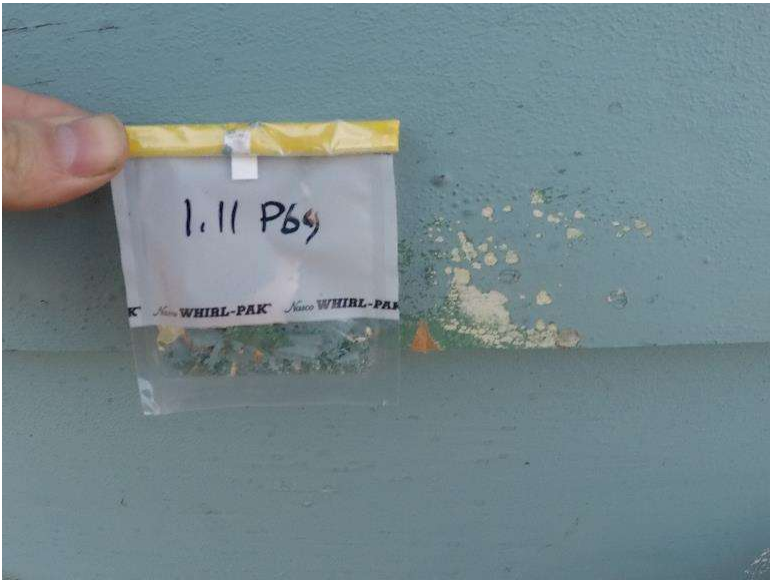
Photograph 1.11-8: Site 1.11 Entrance Kiosk Lead Sample Pb1, 11,400mg/kg.
PCB Sample PCB1, <0.02mg/kg



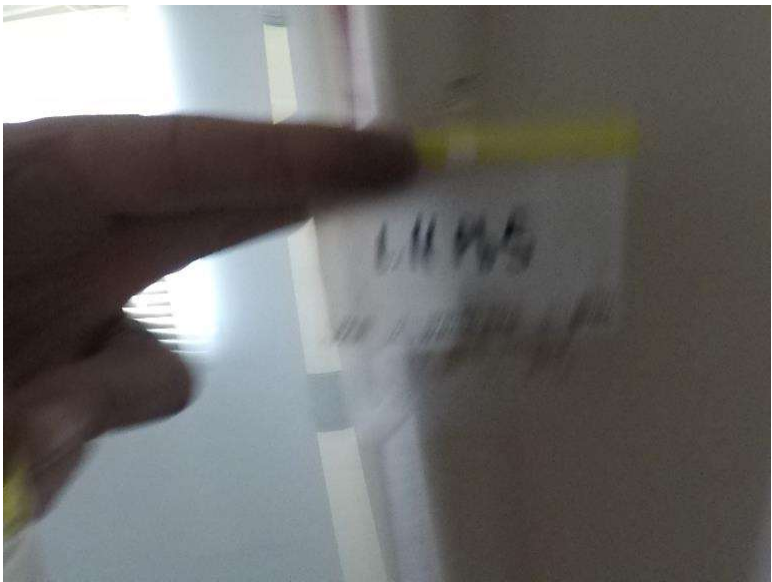
Photograph 1.11-9: Site 1.11 Entrance Kiosk Lead Sample Pb2, 4,7010mg/kg.



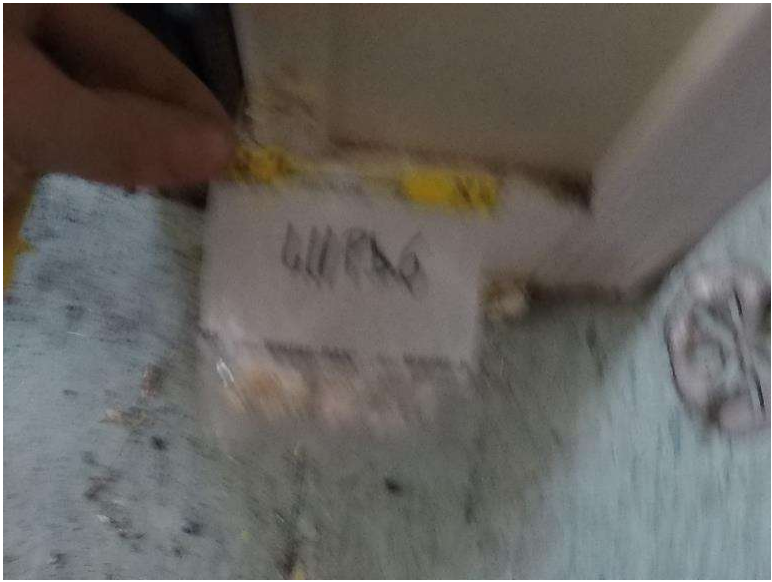
Photograph 1.11-10: Site 1.11 Entrance Kiosk Lead Sample Pb3, <20mg/kg.



Photograph 1.11-11: Site 1.11 Entrance Kiosk Lead Sample Pb4, <20mg/kg.



Photograph 1.11-12: Site 1.11 Entrance Kiosk Lead Sample Pb5, <20mg/kg.



Photograph 1.11-13: Site 1.11 Entrance Kiosk Lead Sample Pb6, <20mg/kg.



Photograph 1.11-14: Site 1.11 Entrance Kiosk Silica Sample S1, 48.4% SiO₂.



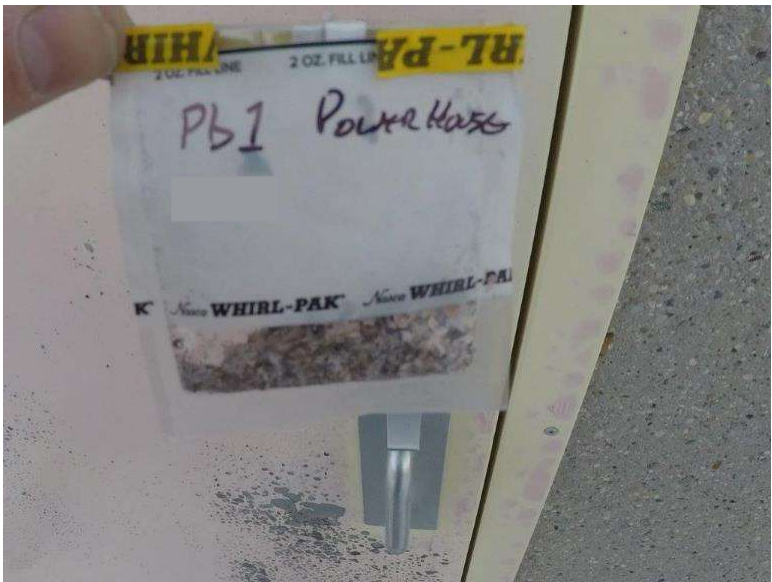
Photograph 1.12-1: Site 1.12 Crandell Campground Solar Building #1.



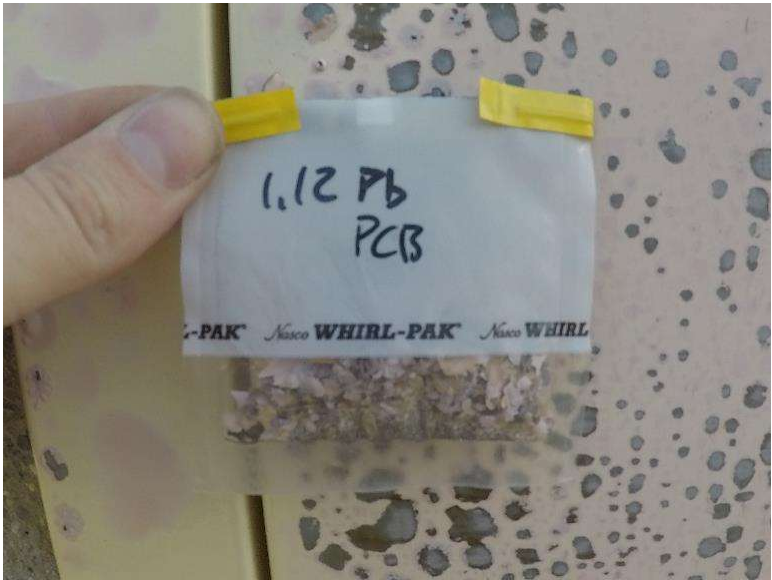
Photograph 1.11-2: Site 1.12 Solar Building #1 Asbestos Sample A1, A2, A3, None Detected.



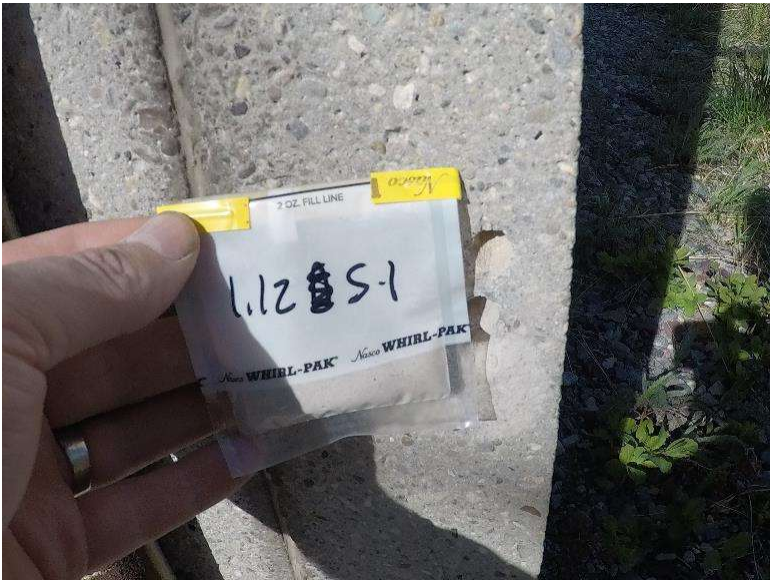
Photograph 1.12-2: Site 1.12 Solar Building #1 Asbestos Samples 1.4-A13, 1.4-A14, 1.4-A15, None Detected.



Photograph 1.12-4: Site 1.18 Solar Building # 1 Lead Sample Pb1, <13mg/kg.



Photograph 1.12-5: Site 1.12 Solar Building # 1 PCB Sample PCB1, <0.02mg/kg.



Photograph 1.12-6: Site 1.12 Solar Building # 1 Silica Sample S1, 58.6%.



Photograph 1.13-1: Site 1.13 Crandell Campground Solar Building #2.



Photograph 1.13-2: Site 1.13 Solar Building #2 Asbestos Sample A1, A2, A3, None Detected.



Photograph 1.13-3: Site 1.13 Solar Building #2 Asbestos Samples 1.3-A13, 1.3-A14, 1.3-A15, None Detected.



Photograph 1.13-4: Site 1.13 Solar Building #2 Silica Sample S1, 56.7% SiO₂.



Photograph 1.14-1: Site 1.14 Crandell Campground Solar Building #3.



Photograph 1.14-2: Site 1.14 Solar Building #3 Asbestos Sample A1, A2, A3, None Detected.



Photograph 1.14-3: Site 1.14 Solar Building #3 Asbestos Sample A4, A5, A6, None Detected.



Photograph 1.14-4: Site 1.14 Solar Building #3 Silica Sample S1, 52.2% SiO₂.



Photograph 1.15-1: Site 1.15 Crandell Campground Solar Building #4.



Photograph 1.15-2: Site 1.15 Solar Building #4 Asbestos Sample A1, A2, A3, None Detected.



Photograph 1.15-3: Site 1.15 Solar Building #4 Asbestos Sample A4, A5, A6, None Detected.



Photograph 1.15-4: Site 1.15 Solar Building #4 Asbestos Sample A7, A8, A9, None Detected.



Photograph 1.15-5: Site 1.15 Solar Building #4 Silica Sample S1, 55.4% SiO₂.



Photograph 1.16-1: Site 1.16 Crandell Campground Solar Building #5.



Photograph 1.16-2: Site 1.16 Crandell Campground Solar Building #5.



Photograph 1.16-3: Site 1.16 Crandell Campground Solar Building #5.



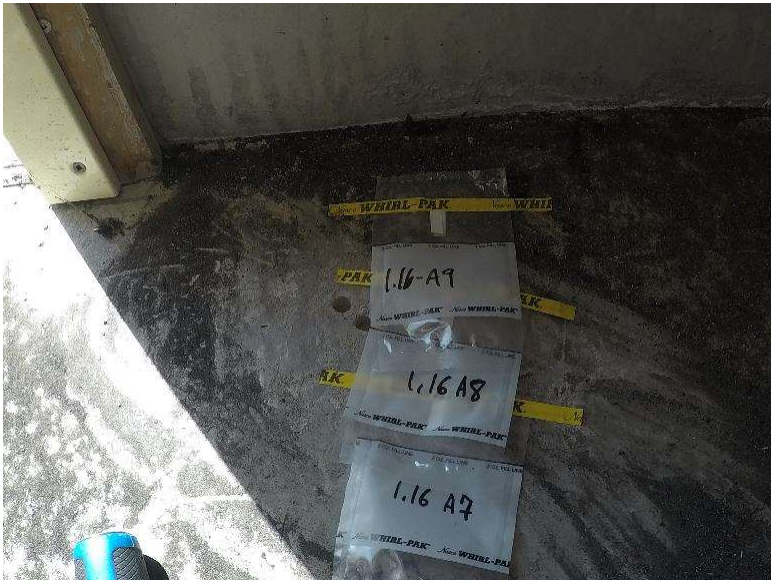
Photograph 1.16-4: Site 1.16 Crandell Campground Solar Building #5.



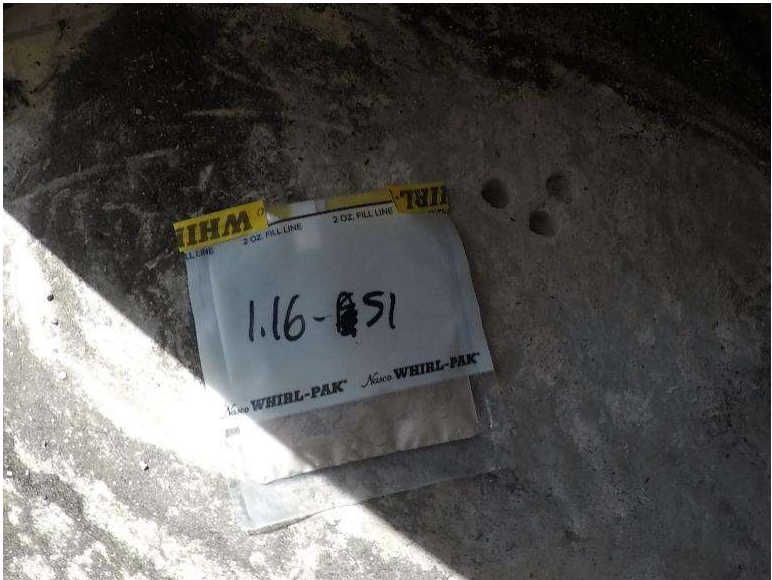
Photograph 1.16-5: Site 1.16 Solar Building #5 Asbestos Sample A1, A2, A3, None Detected.



Photograph 1.16-6: Site 1.16 Solar Building #5 Asbestos Sample A4, A5, A6, None Detected.



Photograph 1.16-7: Site 1.16 Solar Building #5 Asbestos Sample A7, A8, A9, None Detected.



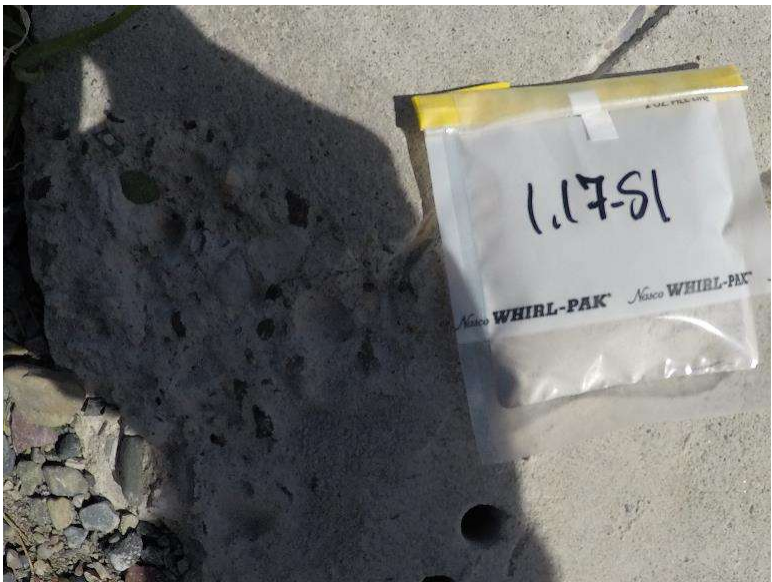
Photograph 1.16-8: Site 1.16 Solar Building #5 Silica Sample S1, 57.6% SiO₂.



Photograph 1.17-1: Site 1.17 Crandell Campground Sani-Dump Station.



Photograph 1.17-2: Site 1.17 Sani-Dump Station Asbestos Sample A1, A2, A3, None Detected.



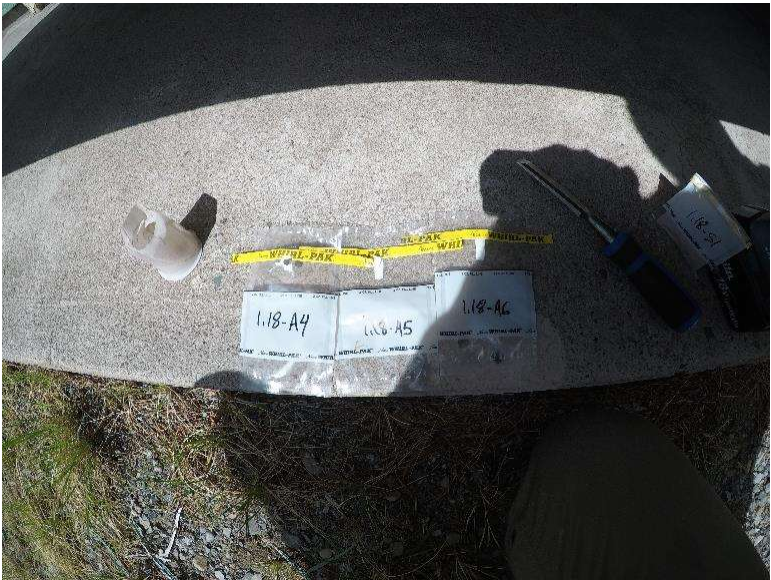
Photograph 1.17-3: Site 1.17 Sani-Dump Station Silica Sample S1, 56.5% SiO₂.



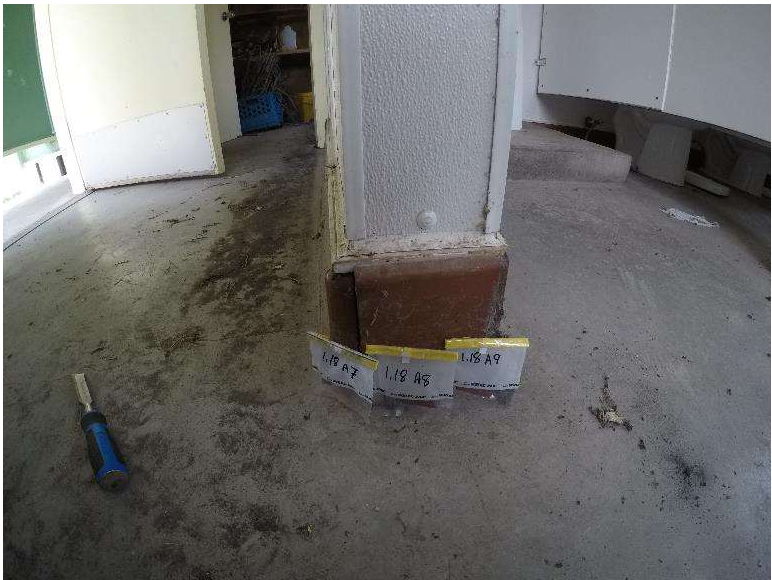
Photograph 1.18-1: Site 1.18 Crandell Campground Washroom 3.



Photograph 1.18-2: Site 1.18 Washroom 4 Asbestos Sample A1, A2, A3, None Detected.



Photograph 1.18-3: Site 1.18 Washroom 4 Asbestos Sample A4, A5, A6, None Detected.



Photograph 1.18-4: Site 1.18 Washroom 4 Asbestos Sample A7, Chrysotile, <1%, A8, A9, None Detected.



Photograph 1.18-5: Site 1.18 Washroom 4 Lead Sample Pb1, 23,700mg/kg.



Photograph 1.18-6: Site 1.18 Washroom 4 Lead Sample Pb2, 28,400mg/kg.



Photograph 1.18-7: Site 1.18 Washroom 4 Lead Sample Pb3, 620mg/kg.



Photograph 1.18-8: Site 1.18 Washroom 4 Lead Sample Pb4, 3,980mg/kg.



Photograph 1.18-9: Site 1.18 Washroom 4 Lead Sample PCB1, <0.02mg/kg.



Photograph 1.18-10: Site 1.18 Washroom 3 Silica Sample S1, 52.8% SiO₂.



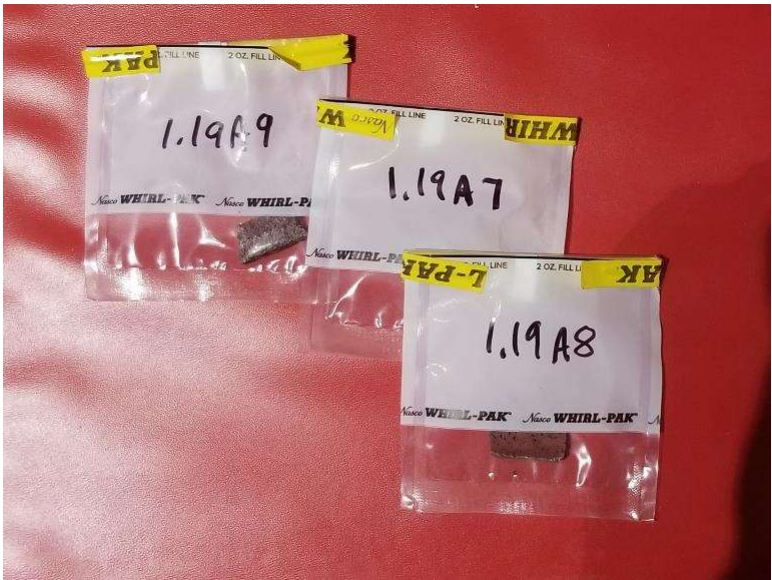
Photograph 1.19-1: Site 1.19 Crandell Campground Washroom 4.



Photograph 1.19-2: Site 1.19 Washroom 4 Asbestos Sample A1, A2, A3, None Detected.



Photograph 1.19-3: Site 1.19 Washroom 4 Asbestos Sample A4, A5, A6, None Detected.



Photograph 1.19-4: Site 1.19 Washroom 4 Asbestos Sample A7, A8, A9, None Detected.



Photograph 1.19-5: Site 1.19 Washroom 4 Lead Sample Pb1, 11,100mg/kg.



Photograph 1.19-6: Site 1.19 Washroom 4 Lead Sample Pb2, 9,140mg/kg.



Photograph 1.19-7: Site 1.19 Washroom 4 Lead Sample Pb3, 9,360mg/kg.



Photograph 1.19-8: Site 1.19 Washroom 4 Lead Sample Pb4, 8,280mg/kg.



Photograph 1.19-9: Site 1.19 Washroom 4 Lead Sample PCB1, <0.02mg/kg.



Photograph 1.19-10: Site 1.19 Washroom 4 Silica Sample S1, 52.8% SiO₂.



Photograph 1.20-1: Site 1.20 Crandell Campground Water Tower.



Photograph 1.20-1: Site 1.20 Water Tower Lead Sample Pb1, 6,890mg/kg.



Photograph 1.21-1: Site 1.17 Crandell Campground Host Campground.



Photograph 1.21-2: Site 1.17 Host Campground Asbestos Sample A1, A2, A3, None Detected.



Photograph 2.1-1: Site 2.1 Kitchen Shelter - Crandell Backcountry



Photograph 2.1-2: Site 2.1 Kitchen Shelter - Crandell Backcountry Asbestos Samples A1-A3, None Detected.



Photograph 2.1-3: Site 2.1 Kitchen Shelter - Crandell Backcountry Asbestos Samples A4-A6, None Detected.
Silica Sample S1, 51.49% SiO₂.



Photograph 2.1-4: Site 2.1 Kitchen Shelter - Crandell Backcountry Lead Sample Pb1, 86mg/kg.



Photograph 2.2-1: Site 2.2 Four Campsites - Crandell Backcountry Site 1



Photograph 2.2-2: Site 2.2 Four Campsites - Crandell Backcountry Site 2



Photograph 2.2-3: Site 2.2 Four Campsites - Crandell Backcountry Site 3



Photograph 2.2-4: Site 2.2 Four Campsites - Crandell Backcountry Outhouse 2



Photograph 2.2-5: Site 2.2 Four Campsites - Crandell Backcountry



Photograph 2.3-1: Site 2.3 Outhouse - Crandell Backcountry



Photograph 3.1-1: Site 3.1 Melted Roadside Markers



Photograph 5.1-1: Site 5.1 Waterton Golf Course Reservoir



Photograph 5.1-2: Site 5.1 Waterton Golf Course Reservoir Asbestos Samples A1-A3, None Detected.



Photograph 5.1-3: Site 5.1 Waterton Golf Course Reservoir Asbestos Samples A4-A5, None Detected.



Photograph 5.1-4: Site 5.1 Waterton Golf Course Reservoir Asbestos Sample A6, None Detected.
Silica Sample S1, 46.08% SiO₂.



Photograph 5.2-1: Site 5.2 Waterton Golf Course Lightning Shelter Shed Asbestos Sample A1, None Detected.
Silica Sample S1, 46.92% SiO₂.



Photograph 5.2-2: Site 5.2 Waterton Golf Course Lightning Shelter Shed Asbestos Samples A2-A3, None Detected.



Photograph 5.2-3: Site 5.2 Waterton Golf Course Lightning Shelter Shed



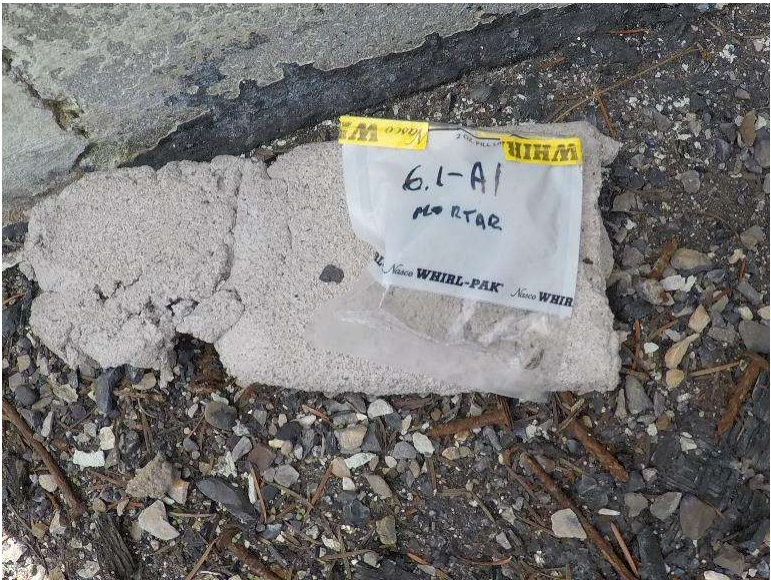
Photograph 5.2-4: Site 5.2 Waterton Golf Course Lightning Shelter Shed



Photograph 5.2-5: Site 5.2 Waterton Golf Course Lightning Shelter Shed



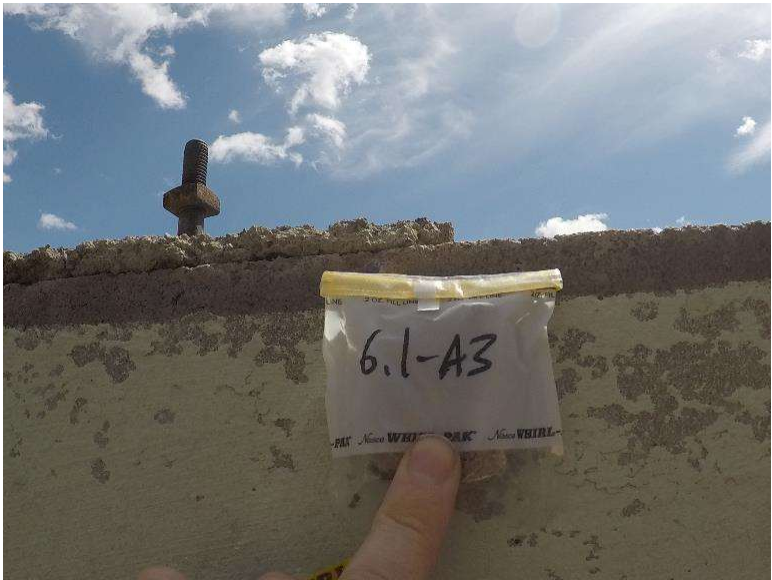
Photograph 6.1-1: Site 6.1 Bear's Hump Seismic Station.



Photograph 6.1-2: Site 6.1 Bear's Hump Seismic Station Asbestos Sample A1, None Detected.



Photograph 6.1-3: Site 6.1 Bear's Hump Seismic Station Asbestos Sample A2, None Detected.



Photograph 6.1-4: Site 6.1 Bear's Hump Seismic Station Asbestos Sample A3, None Detected.



Photograph 6.1-5: Site 6.1 Bear's Hump Seismic Station Asbestos Sample A4, Actinolite, 3%.



Photograph 6.1-6: Site 6.1 Bear’s Hump Seismic Station Asbestos Sample A5, A6, A7, Actinolite, 3%.



Photograph 6.1-7: Site 6.1 Bear’s Hump Seismic Station Asbestos Sample A8, None Detected.



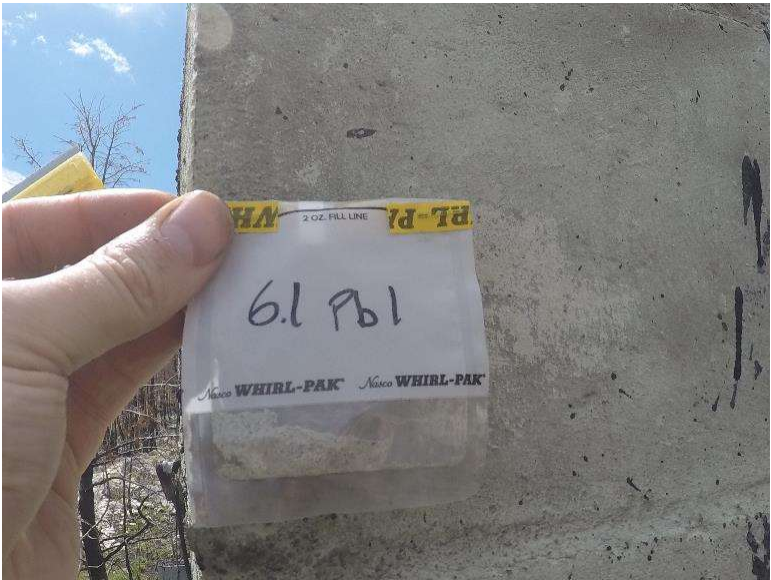
Photograph 6.1-8: Site 6.1 Bear’s Hump Seismic Station Asbestos Sample A9, Chrysotile, <1%.



Photograph 6.1-9: Site 6.1 Bear’s Hump Seismic Station Asbestos Sample A10, Chrysotile, <1%.



Photograph 6.1-10: Site 6.1 Bear’s Hump Seismic Station Asbestos Sample A11 & A12, None Detected, A13, Chrysotile, <1%.



Photograph 6.1-11: Site 6.1 Bear’s Hump Seismic Station Lead Sample Pb1, 288mg/kg.



Photograph 6.1-12: Site 6.1 Bear’s Hump Seismic Station Lead Sample Pb2, 333mg/kg.



Photograph 6.1-13: Site 6.1 Bear’s Hump Seismic Station PCB Sample PCB1, <0.02mg/kg.



Photograph 6.1-14: Site 6.1 Bear's Hump Seismic Station Silica Sample S1, 46.4% SiO₂.



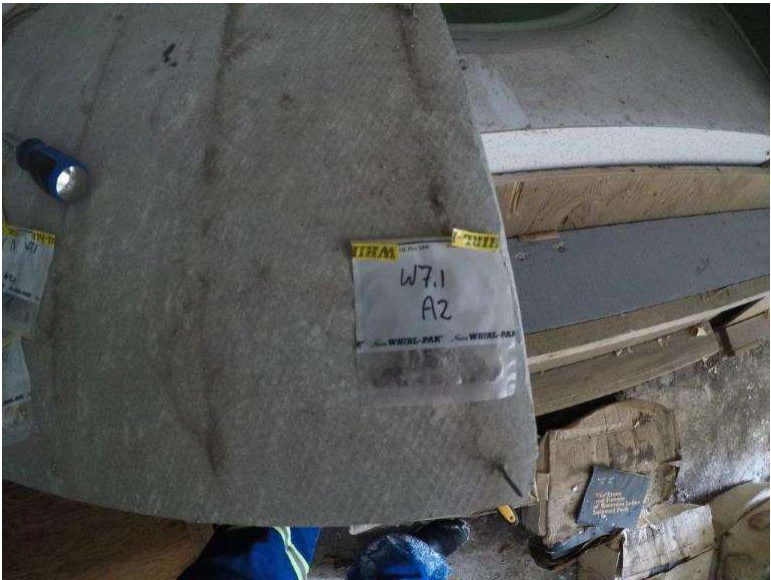
Photograph 7.1-1: Site 7.1 Waterton Townsite Campground Washroom #2



Photograph 7.1-2: Site 7.1 Waterton Townsite Campground Washroom #2



Photograph 7.1-3: Site 7.1 Waterton Townsite Campground Washroom #2 Asbestos Sample A1, Chrysotile, 12%.



Photograph 7.1-4: Site 7.1 Waterton Townsite Campground Washroom #2 Asbestos Sample A2, Chrysotile, 15%.



Photograph 7.1-5: Site 7.1 Waterton Townsite Campground Washroom Asbestos Sample A3, None Detected.



Photograph 7.1-6: Site 7.1 Waterton Townsite Campground Washroom #2 Asbestos Sample A4, None Detected.



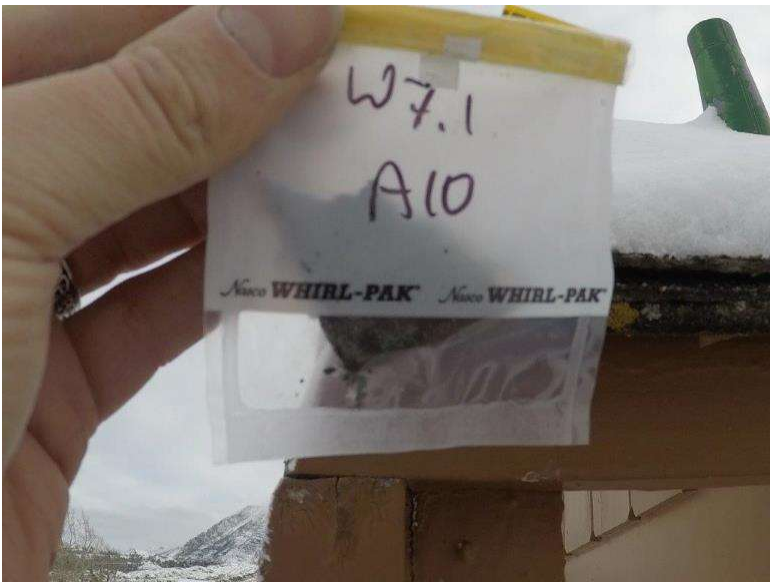
Photograph 7.1-7: Site 7.1 Waterton Townsite Campground Washroom Asbestos Sample A5, None Detected.



Photograph 7.1-8: Site 7.1 Waterton Townsite Campground Washroom Asbestos Samples A6 – A8, None Detected.



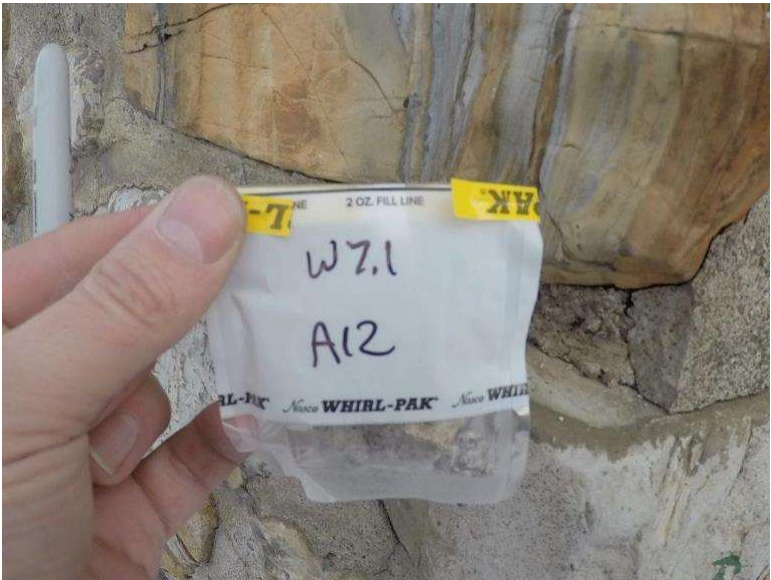
Photograph 7.1-9: Site 7.1 Waterton Townsite Campground Washroom Asbestos Sample A9, None Detected.



Photograph 7.1-10 Site 7.1 Waterton Townsite Campground Washroom #2 Asbestos Sample A10, None Detected.



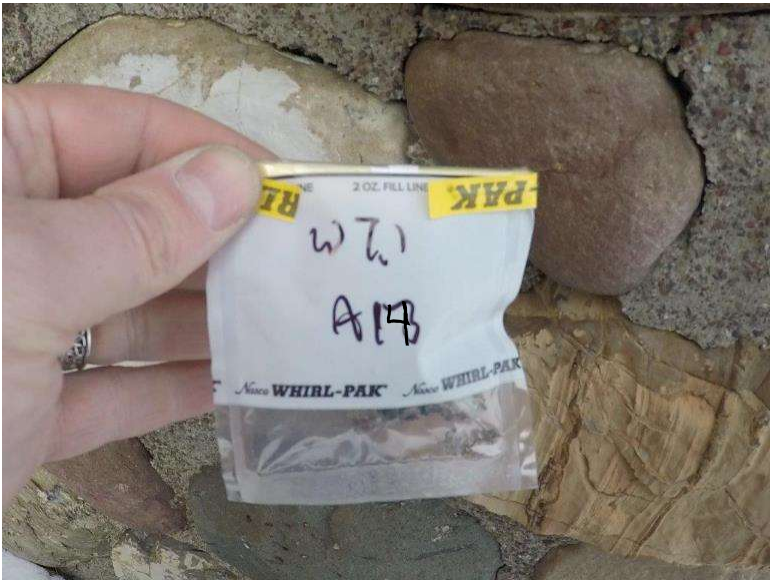
Photograph 7.1-11 Site 7.1 Waterton Townsite Campground Washroom #2 Asbestos Sample A11, None Detected.



Photograph 7.1-12 Site 7.1 Waterton Townsite Campground Washroom #2 Asbestos Sample A12, None Detected.



Photograph 7.1-13 Site 7.1 Waterton Townsite Campground Washroom #2 Asbestos Sample A13, None Detected.



Photograph 7.1-14: Site 7.1 Waterton Townsite Campground Washroom #2 Asbestos Sample A14, None Detected.



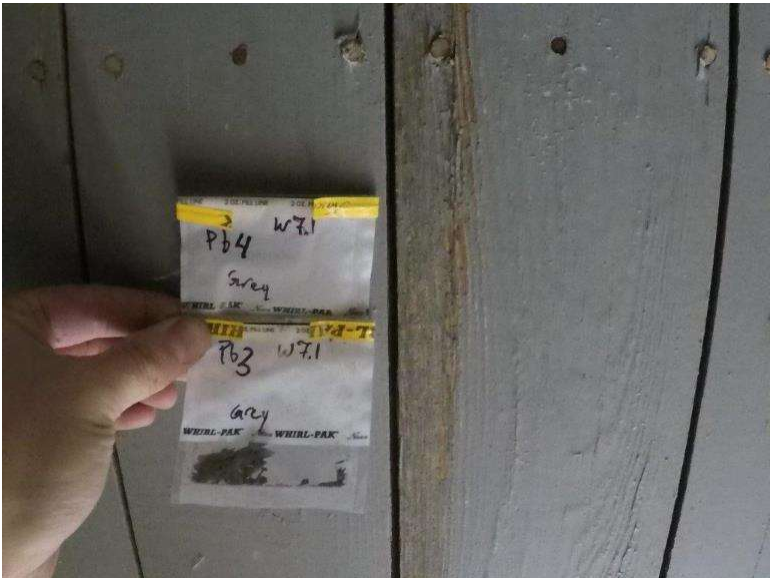
Photograph 7.1-15: Site 7.1 Waterton Townsite Campground Washroom #2 Asbestos Sample A15, None Detected.



Photograph 7.1-16: Site 7.1 Waterton Townsite Campground Washroom #2 Lead Sample Pb1, 2,900mg/kg.



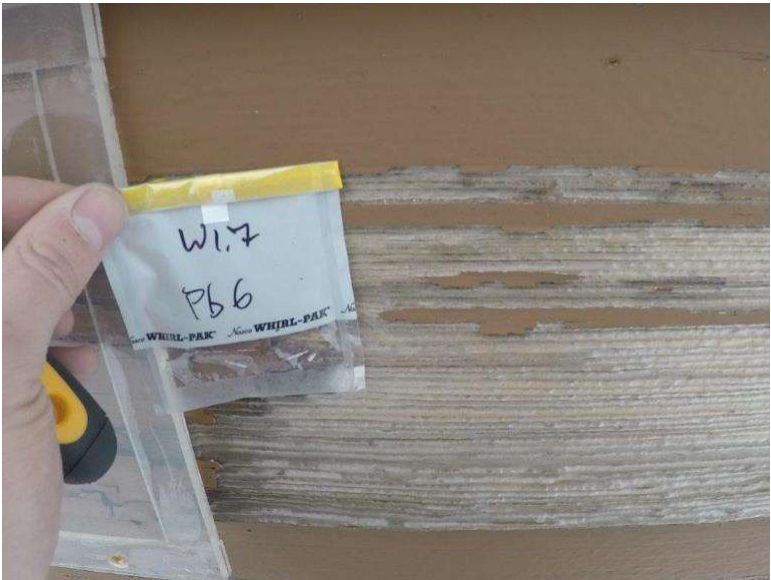
Photograph 7.1-17 Site 7.1 Waterton Townsite Campground Washroom #2 Lead Sample Pb2, 2,900mg/kg. PCB Sample PCB1, 0.21mg/kg



Photograph 7.1-18 Site 7.1 Waterton Townsite Campground Washroom #2 Lead Samples Pb3, 140,000mg/kg, & Pb4, 120,000mg/kg.



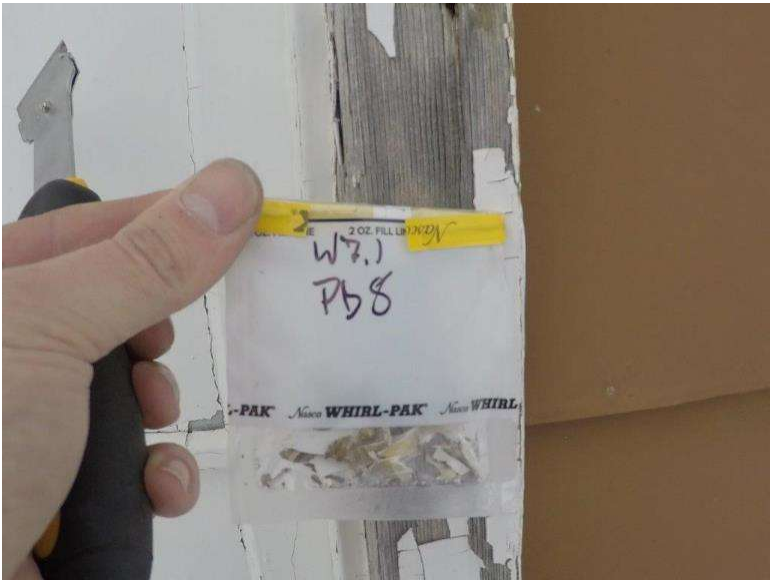
Photograph 7.1-19: Site 7.1 Waterton Townsite Campground Washroom #2 Lead Sample Pb 5, 5,700mg/kg.



Photograph 7.1-20 Site 7.1 Waterton Townsite Campground Washroom #2 Lead Sample Pb6, 36,000mg/kg.



Photograph 7.1-21: Site 7.1 Waterton Townsite Campground Washroom #2 Lead Sample Pb7, 73,000mg/kg.



Photograph 7.1-22: Site 7.1 Waterton Townsite Campground Washroom #2 Lead Sample Pb8, 91,000mg/kg.



Photograph 7.1-23: Site 7.1 Waterton Townsite Campground Washroom #2 Example of Wire Insulation.



Photograph 7.2-1 Site 7.2 Waterton Townsite Campground Washroom #6.



Photograph 7.2-2 Site 7.2 Waterton Townsite Campground Washroom #6.



Photograph 7.2-3: Site 7.2 Waterton Townsite Campground Washroom #6 Asbestos Sample A1, Chrysotile, 15%.



Photograph 7.2-4: Site 7.2 Waterton Townsite Campground Washroom #6 Asbestos Sample A2, Chrysotile, 15%.



Photograph 7.2-5: Site 7.2 Waterton Townsite Campground Washroom #6 Asbestos Sample A3, None Detected.



Photograph 7.2-6: Site 7.2 Waterton Townsite Campground Washroom #6 Asbestos Sample A4, None Detected.



Photograph 7.2-7: Site 7.2 Waterton Townsite Campground Washroom #6 Asbestos Sample A5, None Detected.



Photograph 7.2-8: Site 7.2 Waterton Townsite Campground Washroom #6 Asbestos Samples A6 – A8, None Detected



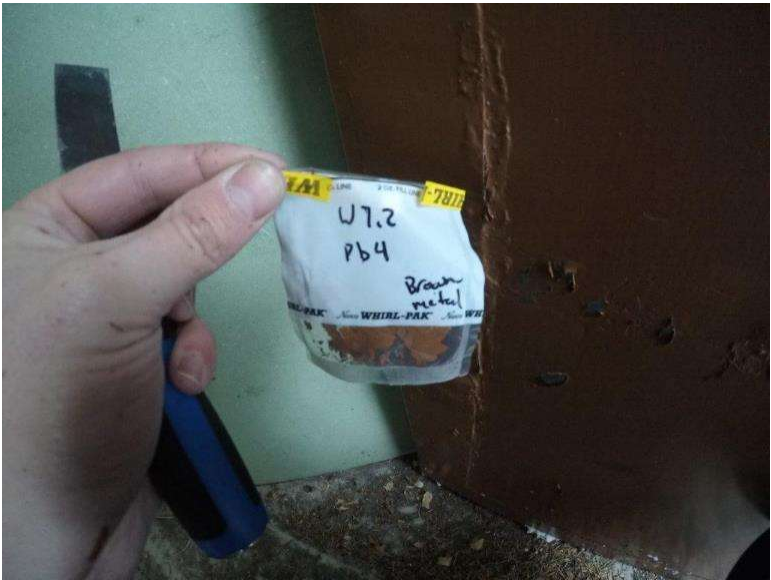
Photograph 7.2-9: Site 7.2 Waterton Townsite Campground Washroom #6 Asbestos Samples A9 – A11, None Detected



Photograph 7.9-10: Site 7.2 Waterton Townsite Campground Washroom #6 Lead Sample Pb1, 2,000mg/kg.



Photograph 7.2-11: Site 7.2 Waterton Townsite Campground Washroom #6 Lead Samples Pb2, 16,000mg/kg and Pb3, 40,000mg/kg.



Photograph 7.2-12: Site 7.2 Waterton Townsite Campground Washroom #6 Lead Sample Pb4, 3,700mg/kg.



Photograph 7.2-13: Site 7.2 Waterton Townsite Campground Washroom #6 Lead Sample Pb 5, 4,800mg/kg.



Photograph 7.2-14: Site 7.2 Waterton Townsite Campground Washroom #6 PCB sample PCB1, <0.20mg/kg.



Photograph 7.2-15 Site 7.2 Waterton Townsite Campground Washroom #6 Lead Sample Pb6, 110,000mg/kg.



Photograph 7.2-16: Site 7.2 Waterton Townsite Campground Washroom #6 Lead Sample Pb7, 130,000mg/kg.



Photograph 7.2-17 Site 7.2 Waterton Townsite Campground Washroom #6 Lead Sample Pb8, 12,000mg/kg.



Photograph 7.2-18: Site 7.2 Waterton Townsite Campground Washroom #6 Example of bird droppings



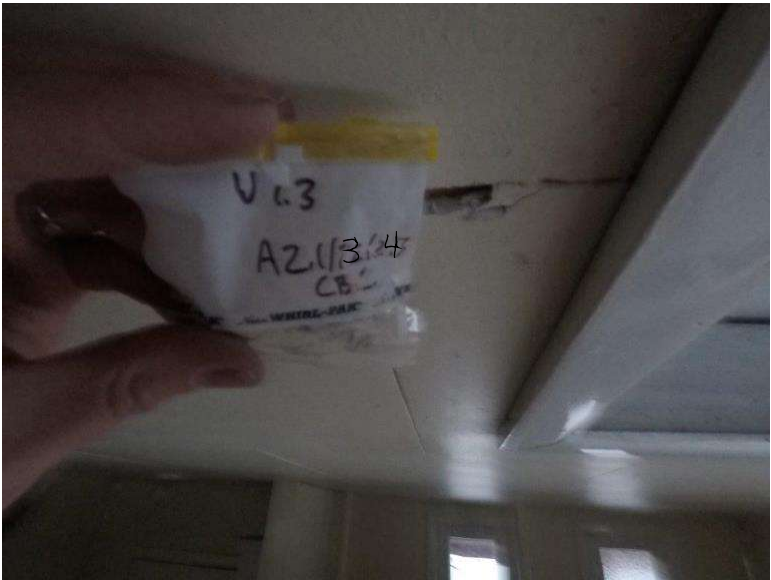
Photograph 7.3-1: Site 7.3 Waterton Townsite Campground Washroom #8.



Photograph 7.3-2: Site 7.3 Waterton Townsite Campground Washroom #8 Electrical Wiring in Attic.



Photograph 7.3-3: Site 7.3 Waterton Townsite Campground Washroom #8 Asbestos Sample A1, Chrysotile, 15%.



Photograph 7.3-4: Site 7.3 Waterton Townsite Campground Washroom #8 Asbestos Sample A2-A4, Chrysotile, 15%.



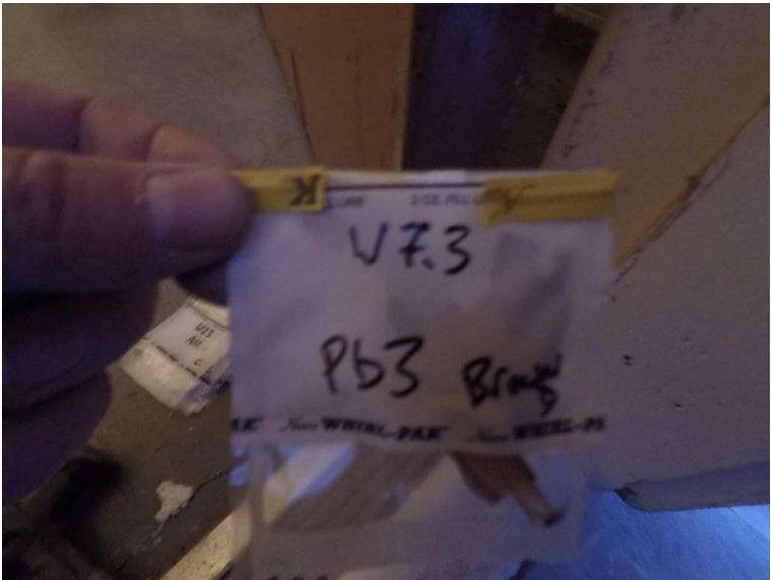
Photograph 7.3-5: Site 7.3 Waterton Townsite Campground Washroom #8 Asbestos Samples A5-A7, None Detected.



Photograph 7.3-6: Site 7.3 Waterton Townsite Campground Washroom #8 Lead Sample Pb1, 15,000mg/kg.



Photograph 7.3-7: Site 7.3 Waterton Townsite Campground Washroom #8 Lead Sample Pb2, 23,000mg/kg.



Photograph 7.3-8: Site 7.3 Waterton Townsite Campground Washroom #8 Lead Sample Pb3, 31,000mg/kg.



Photograph 7.3-9 Site 7.3 Waterton Townsite Campground Washroom #8 Lead Sample Pb4, 88,000mg/kg.



Photograph 7.3-10: Site 7.3 Waterton Townsite Campground Washroom #8 Lead Sample Pb5, 1,800mg/kg.



Photograph 7.3-11: Site 7.3 Waterton Townsite Campground Washroom #8 Lead Sample Pb6, 1,200mg/kg.



Photograph 7.3-12: Site 7.3 Waterton Townsite Campground Washroom #8 PCB Sample PCB1, <0.20mg/kg.



Photograph 7.3-1: Site 7.4 Waterton Townsite Campground Washroom #9.



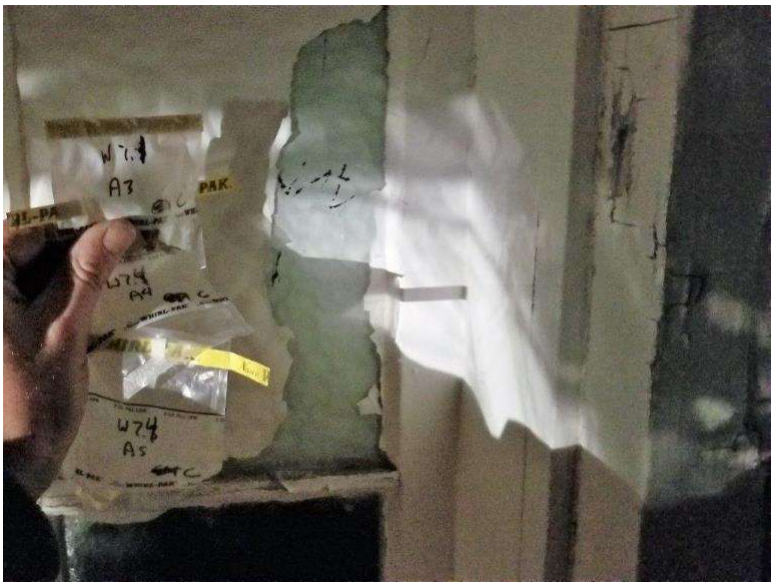
Photograph 7.4-2: Site 7.4 Waterton Townsite Campground Washroom #9.



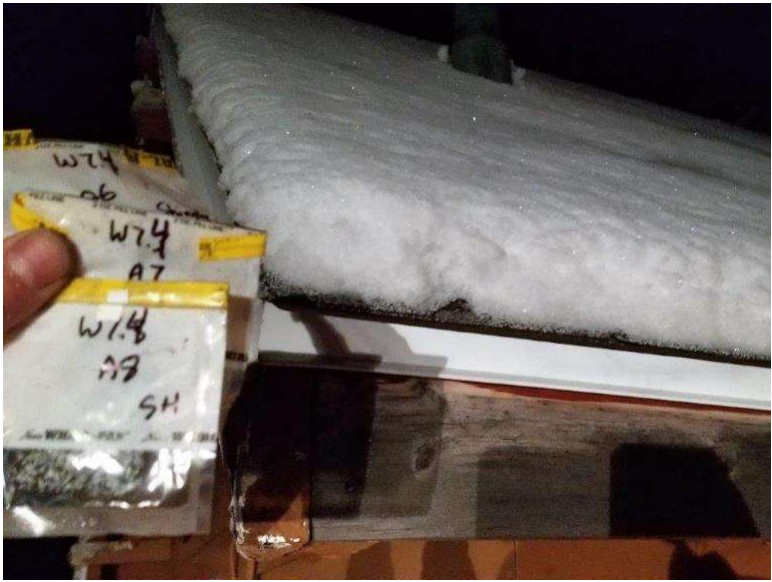
Photograph 7.4-3 Site 7.4 Waterton Townsite Campground Washroom #9 Asbestos Sample A1, Chrysotile, 15%.



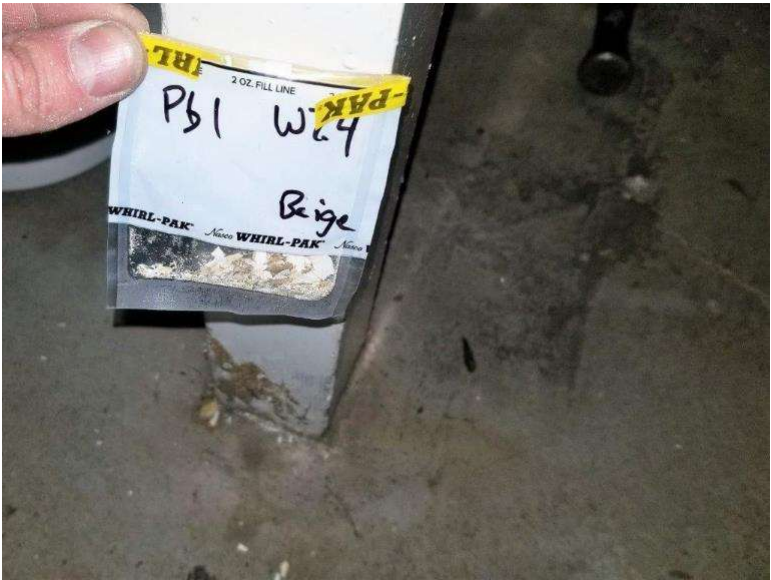
Photograph 7.4-4: Site 7.4 Waterton Townsite Campground Washroom #9 Asbestos Sample A2, Chrysotile, 15%.



Photograph 7.4-5: Site 7.4 Waterton Townsite Campground Washroom #9 Asbestos Sampes A3-A5, None Detected.



Photograph 7.4-6: Site 7.4 Waterton Townsite Campground Washroom #9 Asbestos Samples A6-A8, None Detected.



Photograph 7.4-7: Site 7.4 Waterton Townsite Campground Washroom #9 Lead Sample Pb1, 26,000mg/kg.



Photograph 7.4-8: Site 7.4 Waterton Townsite Campground Washroom #9 Lead Sample Pb2, 32,000mg/kg.



Photograph 7.4-9: Site 7.4 Waterton Townsite Campground Washroom #9 Lead Sample Pb3, 110,000mg/kg.



Photograph 7.4-10: Site 7.4 Waterton Townsite Campground Washroom #9 Lead Sample Pb4, 110,000mg/kg.



Photograph 7.4-11: Site 7.4 Waterton Townsite Campground Washroom #9 Lead Sample Pb5, 35,000mg/kg.



Photograph 7.4-12: Site 7.4 Waterton Townsite Campground Washroom #9 Lead Sample Pb6, 21,000mg/kg.



Photograph 7.4-13: Site 7.4 Waterton Townsite Campground Washroom #9 PCB Sample PCB1, 0.71mg/kg.



Photograph 8.1-1: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway.



Photograph 8.1-2: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Outhouse.



Photograph 8.1-3 Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Kitchen Shelter.



Photograph 8.1-4: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Disposal Bin Slab.



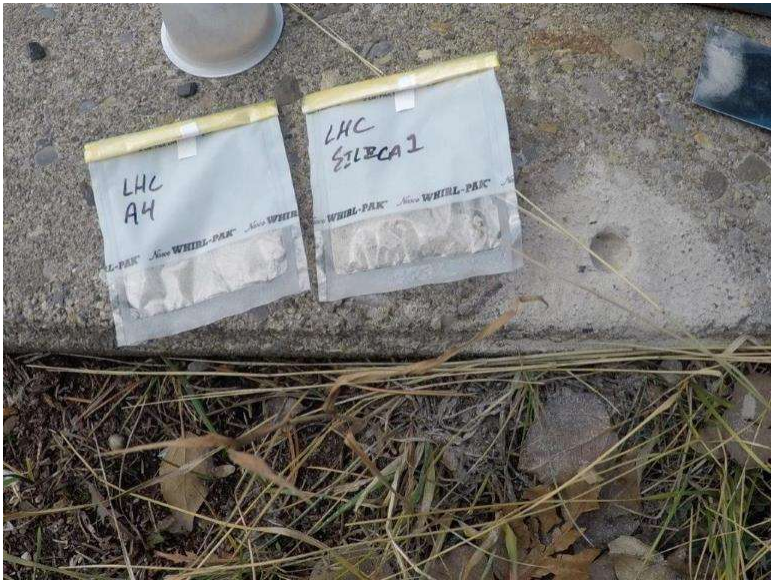
Photograph 8.1-5: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Asbestos Sample A1, None Detected.



Photograph 8.1-6: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Asbestos Sample A2, None Detected.



Photograph 8.1-7: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Asbestos Sample A3, None Detected.



Photograph 8.1-8: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Asbestos Sample A4, None Detected, Silica Sample S1, 44.74% SiO₂.



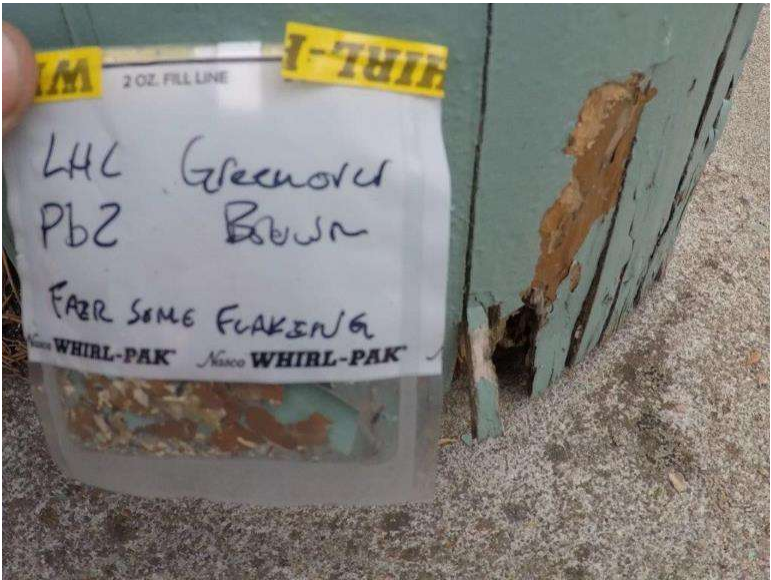
Photograph 8.1-9: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Asbestos Sample A5, None Detected.



Photograph 8.1-10: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Asbestos Sample A6, None Detected.



Photograph 8.1-11: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Lead Sample Pb1, 800mg/kg, PCB Sample PCB1, 0.43mg/kg.



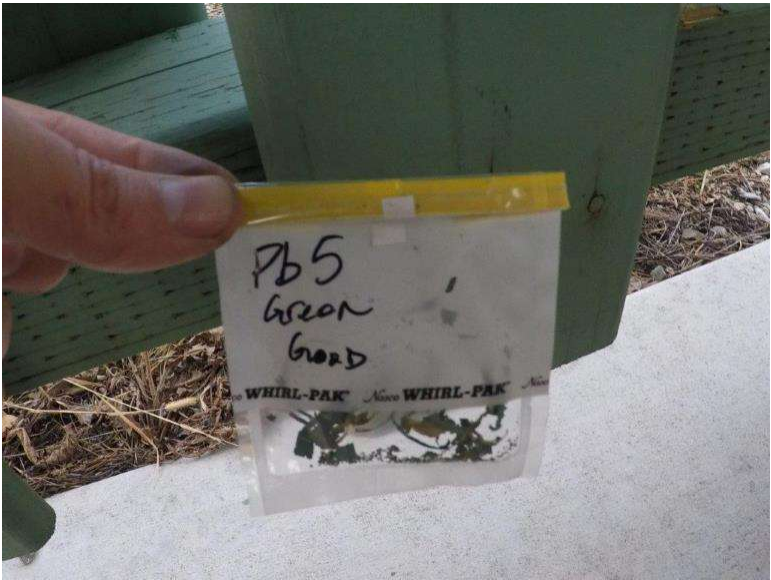
Photograph 8.1-12 Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Lead Sample Pb2, 980mg/kg.



Photograph 8.1-13: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Lead Paint Sample Pb3, <17mg/kg.



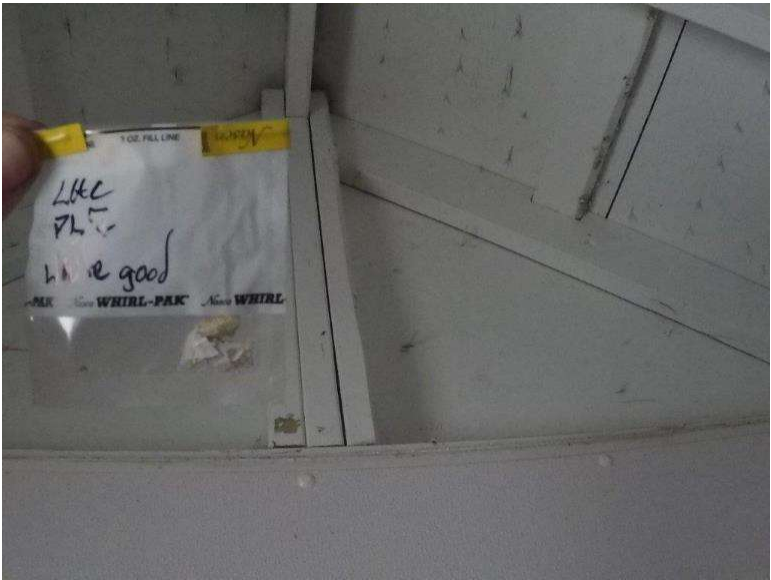
Photograph 8.1-14: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Lead Sample Pb4, <210mg/kg.



Photograph 8.1-15: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Lead Sample Pb5, <48mg/kg.



Photograph 8.1-16: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Lead Sample Pb6, <18mg/kg.



Photograph 8.1-17: Site 8.1 Lost Horse Day Use Area - Red Rock Parkway Lead Sample Pb7, <45mg/kg.



Photograph 8.2-1: Site 8.2 Coppermine Day Use Area - Red Rock Parkway Outhouse.



Photograph 8.2-2: Site 8.2 Coppermine Day Use Area - Red Rock Parkway Kitchen Shelter.



Photograph 8.2-3: Site 8.2 Coppermine Day Use Area - Red Rock Parkway Asbestos Samples A1 and A2, None Detected.



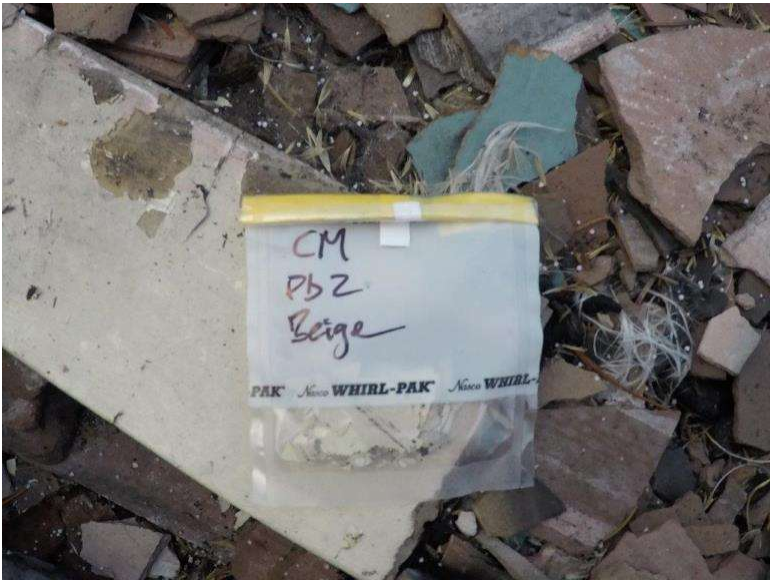
Photograph 8.2-3 Site 8.2 Coppermine Day Use Area - Red Rock Parkway Asbestos Sample A3, None Detected, Silica Sample S1, 51.01% SiO₂.



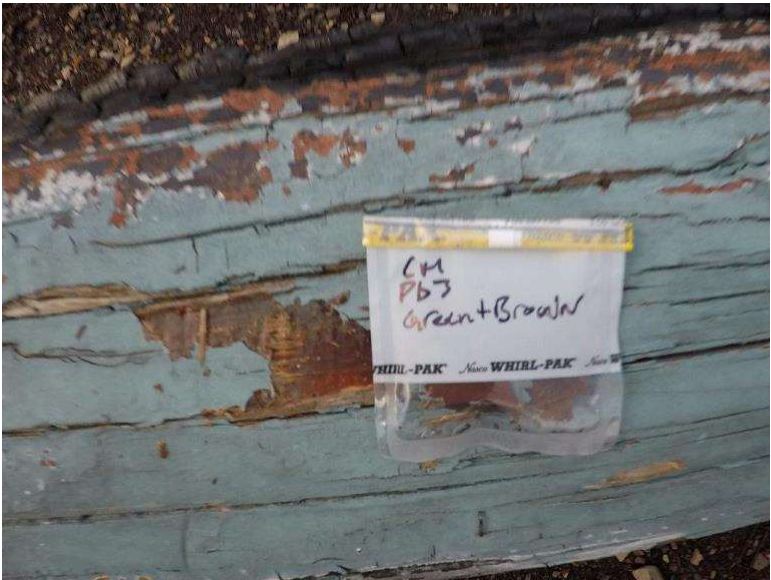
Photograph 8.2-4 Site 8.2 Coppermine Day Use Area - Red Rock Parkway Asbestos Sample A4, None Detected.



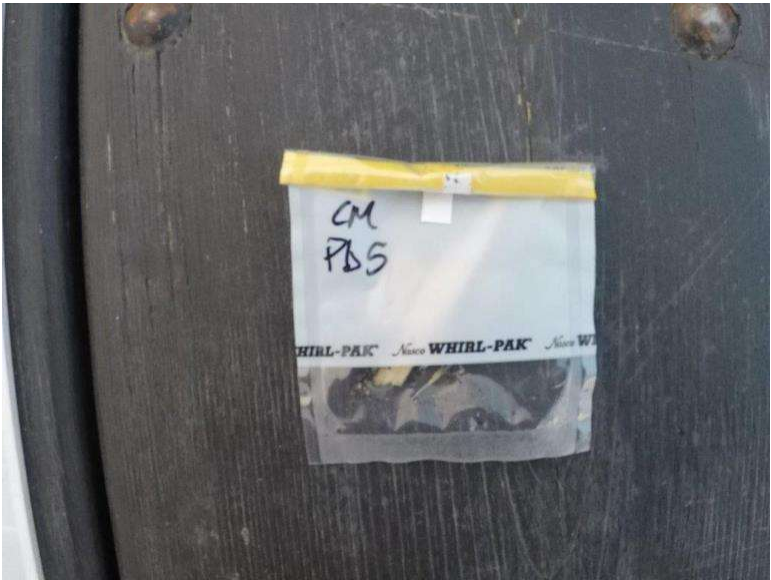
Photograph 8.2-5: Site 8.2 Coppermine Day Use Area - Red Rock Parkway Lead Sample Pb1, <10mg/kg.



Photograph 8.2-6: Site 8.2 Coppermine Day Use Area - Red Rock Parkway Lead Sample Pb2, <10mg/kg.



Photograph 8.2-7: Site 8.2 Coppermine Day Use Area - Red Rock Parkway Lead Sample Pb1, 2, 100mg/kg.



Photograph 8.2-8: Site 8.2 Coppermine Day Use Area - Red Rock Parkway Lead Sample Pb1, <23mg/kg.



Photograph 8.2-9: Site 8.2 Coppermine Day Use Area - Red Rock Parkway Lead Sample Pb6, 4,800mg/kg.



Photograph 8.2-10: Site 8.2 Coppermine Day Use Area - Red Rock Parkway PCB Sample PCB1, <0.2mg/kg.



Photograph 8.3-1: Site 8.3 Indigenous History Viewpoint - Red Rock Parkway.



Photograph 8.3-2 Site 8.3 Indigenous History Viewpoint - Red Rock Parkway Asbestos Sample A1, None Detected.
Silica Sample S1, 76.21% SiO₂.



Photograph 9.1-1: Site 9.1 McNealy's Day Use Area - Akamina Parkway Asbestos Samples A1-A3, None Detected.



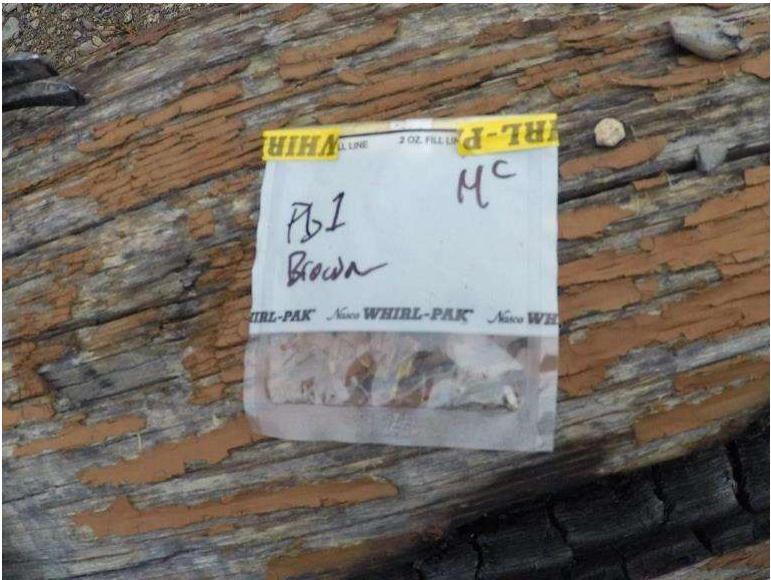
Photograph 9.1-2: Site 9.1 McNealy's Day Use Area - Akamina Parkway Asbestos Samples A4-A6, None Detected.
Silica sample S1, 49.67% SiO₂.



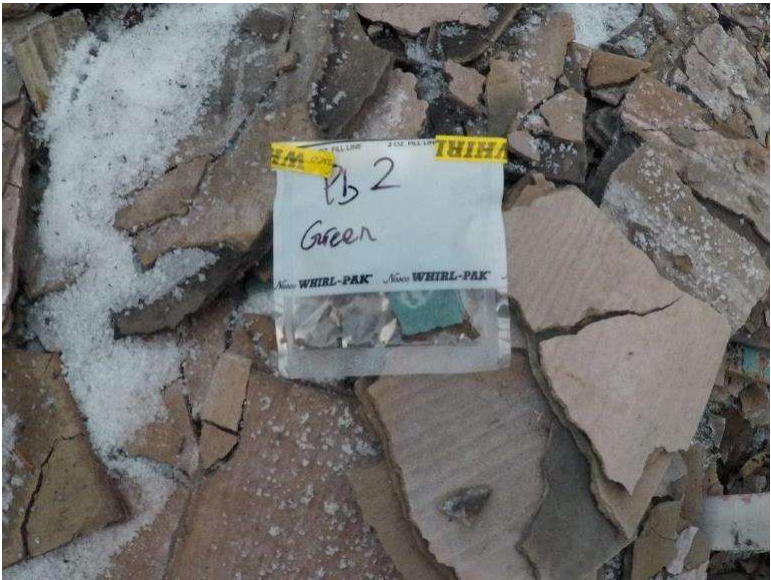
Photograph 9.1-3: Site 9.1 McNealy's Day Use Area - Akamina Parkway Asbestos Samples A7-A9, None Detected.



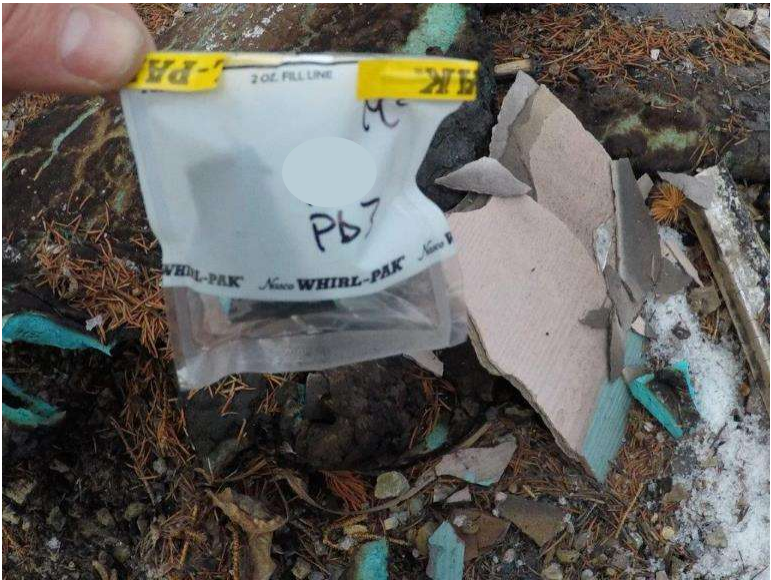
Photograph 9.1-4: Site 9.1 McNealy's Day Use Area - Akamina Parkway Asbestos Samples A10-A12, None Detected.



Photograph 9.1-5: Site 9.1 McNealy's Day Use Area - Akamina Parkway Lead Sample Pb1, 1,900mg/kg.



Photograph 9.1-6: Site 9.1 McNealy's Day Use Area - Akamina Parkway Lead Sample Pb2, <10mg/kg.



Photograph 9.1-7: Site 9.1 McNealy's Day Use Area - Akamina Parkway Lead Sample Pb3, <80mg/kg.



Photograph 9.2-1: Site 9.2 Little Prairie Day Use Area - Akamina Parkway.



Photograph 9.2.2: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Kitchen Shelter.



Photograph 9.2-3: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Partially Burnt Sign at Entrance.



Photograph 9.2-4: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Asbestos Samples A1-A3, None Detected.



Photograph 9.2-5: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Asbestos Samples A4-A6, None Detected.



Photograph 9.2-6: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Asbestos Samples A7-A9, None Detected.



Photograph 9.2-7: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Asbestos Samples A10-A12, None Detected.
Silica Sample S1, 76.21% SiO₂.



Photograph 9.2-8 Site 9.2 Little Prairie Day Use Area - Akamina Parkway Asbestos Sample A13, None Detected.



Photograph 9.2-9: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Lead Sample Pb1, <10mg/kg.



Photograph 9.2-10: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Lead Sample Pb2, <10mg/kg.



Photograph 9.2-11: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Lead Sample Pb3, <10mg/kg.



Photograph 9.2-12: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Lead Sample Pb4, <10mg/kg.



Photograph 9.2-13: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Lead Sample Pb5, 1,500mg/kg.



Photograph 9.2-14: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Lead Sample Pb6, <28mg/kg.



Photograph 9.2-15: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Lead Sample Pb7, 660mg/kg.



Photograph 9.2-16: Site 9.2 Little Prairie Day Use Area - Akamina Parkway Picnic Site.

APPENDIX E

Site Photographs



Photo 2.1 A: General overview of the Crandell backcountry kitchen shelter facing west at the east site boundary.



Photo 2.1 B: General overview of metal and melted shingle debris of the Crandell backcountry kitchen shelter facing north from the south site boundary.



Site 2.1 – Crandell Backcountry Campground Kitchen
Soil and Debris Assessment
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Photo 2.1 C: Sample location 2.1-1 under largest observed melted asphalt shingle debris pile on the southwest side of the kitchen shelter.



Photo 2.1 D: Location 2.2-2 depicting the south side delineation sample of the kitchen shelter.



Site 2.1 – Crandell Backcountry Campground Kitchen
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Photo 2.1 E: Location 2.1-3 depicting the west side delineation sample of the kitchen shelter.



Photo 2.1 F: Location 2.1-4 depicting the north side delineation sample of the kitchen shelter.



Site 2.1 – Crandell Backcountry Campground Kitchen
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Photo 2.1 G: Location 2.1-3 depicting the east side delineation sample of the kitchen shelter.



SITE PHOTOGRAPHS

Site 2.1 – Crandell Backcountry Campground Kitchen
Soil and Debris Assessment
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Photo 2.2 A: Location # 1 on the center of the camping pad located furthest to the east of the campground.



Photo 2.2 B: Location # 2 on the center of the camping pad located furthest to the north of the campground.



Site 2.2 – Crandell Backcountry Campground Kitchen
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39 Sites, Waterton Lakes National Park Alberta

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Photo 2.2 C: Location # 3 on the center of the camping pad located directly north of the lake.



Photo 2.2 D: Location # 4 on the center of the camping pad located furthest to the east of the campground.



Site 2.2 – Crandell Backcountry Campground Kitchen
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Photo 2.2 E: Location # 5 on a camping pad furthest south of the campground.



Photo 2.2 F: Sample location # 6 on the west side of all the campsites under the largest pile of debris observed at the site of the previous outhouse.


	Site 2.2 – Crandell Backcountry Campground Kitchen Soil and Debris Assessment 39 Sites, Waterton Lakes National Park Alberta
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Photo BG-1: Back-ground (1) sample taken upslope at the northeast corner of all the campsites.



Photo BG-2: Back-ground (2) sample taken downslope at the southwest corner of the campground.



Site 2.2 – Crandell Backcountry Campground Kitchen
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Photo 2.2 A: 2.2-A: Delineation sample location 2.2-17.



SITE PHOTOGRAPHS

Site 2.2 – Crandell Backcountry Campground Kitchen
Soil and Debris Assessment Addendum Letter
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Photo 2.2 B: General location of delineation sample 2.2-16.



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Site 2.2 – Crandell Backcountry Campground Kitchen
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Photo 4.1A Location of sample 4.1-1 in the centre of a tent pad.



Site 4.1 Goat Lake Backcountry Campground Campsites
Soil and Debris Assessment Addendum Letter
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Photo 4.1 B: Location of sample 4.1-3 in the centre of a tent pad.



Photo 4.1 C: Location of sample 4.1-5 in the centre of a tent pad.



Site 4.1 Goat Lake Backcountry Campground Campsites
Soil and Debris Assessment Addendum Letter
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Photo 4.1 D: Location of sample 4.1-7 in the centre of a tent pad.



Photo 4.1 E: Glass debris around one of the tent pads.



Site 4.1 Goat Lake Backcountry Campground Campsites
Soil and Debris Assessment Addendum Letter
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Photo 4.1 F: Typical campground identification signs.



Site 4.1 Goat Lake Backcountry Campground Campsites
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Photo 4.1 G: Campground location sign.



Site 4.1 Goat Lake Backcountry Campground Campsites
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Photo 4.2 A: The former outhouse structure and vicinity.



Photo 4.2 B: Debris associated with the outhouse structure.





Photo 4.2 C: Minor metal debris associated with the outhouse structure.





Photo 4.2 D: Remains of the food hang pole.



**Site 4.2 Goat Lake Backcountry Campground
Outhouse**
Soil and Debris Assessment Addendum Letter
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Photo 4.2 E: Remains of the food hang pole.



SITE PHOTOGRAPHS

**Site 4.2 Goat Lake Backcountry Campground
Outhouse**

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Photo 4.3 A: View of the picnic table and gravel pad. Note the minor superficial burning on the logs.



Photo 4.3 B: View of the picnic table and surrounding vegetation.



Site 4.3 – Goat Lake Backcountry Picnic Tables
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Photo 5.1 A: General overview of the Waterton Lakes Golf Course water reservoir site facing south at the north site boundary.



Photo 5.1 B: General overview of metal and wood debris inside the of the Waterton Lakes Golf Course water reservoir facing south from the north site boundary.



Site 5.1 – Waterton Lakes Golf Course – Water Reservoir
Soil and Debris Assessment
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Photo 5.1-1: Sample location # 1 under plastic material debris pile on the north side of the water reservoir.



Photo 5.1-2: Location # 2 depicting the north side delineation sample of the water reservoir.



Site 5.1 – Waterton Lakes Golf Course – Water Reservoir
Soil and Debris Assessment
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Photo 5.1-3: Location # 3 depicting the west side delineation sample of the water reservoir.



Photo 5.1-4: Location # 4 depicting the south side delineation sample of the water reservoir.



Site 5.1 – Waterton Lakes Golf Course – Water Reservoir
Soil and Debris Assessment
39 Sites, Waterton Lakes National Park Alberta

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Photo BG-5: Location # 5 depicting the background sample taken on the southeastern side of the water reservoir.



Photo BG-6: Location # 6 depicting the background sample taken on the northeastern side of the water reservoir.



Site 5.1 – Waterton Lakes Golf Course – Water Reservoir
Soil and Debris Assessment
39 Sites, Waterton Lakes National Park Alberta

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Photo 5.2 A: General overview of the Waterton Lakes Golf Course lightning shelter shed facing west at the east site boundary.



Photo 5.2-1: Sample location # 1 under melted shingle debris pile on the east side of the lightning shelter shed.



Site 5.2 – Lightning Shelter Shed – Waterton Golf Course
Soil and Debris Assessment
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Photo 5.2-2: Location # 2 depicting the west side delineation sample of the lightning shelter shed.



Photo 5.2-3: Location # 3 depicting the north side delineation sample of the lightning shelter shed.



Site 5.2 – Lightning Shelter Shed – Waterton Golf Course
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Photo 5.2-4: Location # 4 depicting the south side delineation sample of the lightning shelter shed.



Photo 5.2-5: Location # 5 depicting the east side delineation sample of the lightning shelter shed.



Site 5.2 – Lightning Shelter Shed – Waterton Golf Course
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Photo 6.1 A: General overview of seismic station facing south at the north site boundary.



Photo 6.1 B: View of building facing northwest from the southeast site boundary.



Site 6.1 – Bear's Hump HT Seismic Station Building
Soil and Debris Assessment
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Photo 6.1 C: General overview of ash and debris pile observed in and around the building and view of sample location 6.1-1 (pink flag) facing south.



Photo 6.1 D: View of ash and debris observed over foundation of building.



Site 6.1 – Bear's Hump HT Seismic Station Building
Soil and Debris Assessment
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Photo 6.1 E: View of satellite dish support base and antenna (background beyond the satellite dish) facing northeast from the southeast corner of the site.



Photo 6.1 F: View of heat damage to satellite dish.



Site 6.1 – Bear's Hump HT Seismic Station Building
Soil and Debris Assessment
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Photo 6.1 A: Location of delineation sample 6.1-15 with the seismic station in the background.



Site 6.1 – Bear's Hump – Seismic Station Building
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Photo 6.1 B: Location of delineation sample 6.16 located adjacent to one of the bedrock outcrops in the area.



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Site 6.1 – Bear's Hump – Seismic Station Building
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Photo 8.3 A: General overview of the indigenous lookout site debris facing south at the north site boundary.



Photo 8.3 B: General overview of the indigenous lookout site area facing south from the north site boundary.



SITE PHOTOGRAPHS

Site 8.3 – Indigenous Lookout Area
Soil and Debris Assessment
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Photo 8.3-1: Sample location # 1 under metal debris pile on the north side of the indigenous lookout.



SITE PHOTOGRAPHS

Site 8.3 – Indigenous Lookout Area
Soil and Debris Assessment
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Photo 8.3-2: Location # 2 depicting the east side delineation sample of the indigenous lookout.



Photo 8.3-3: Location # 3 depicting the north side delineation sample of the indigenous lookout.



Site 8.3 – Indigenous Lookout Area
Soil and Debris Assessment
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Photo 8.3-4: Location # 4 depicting the west side delineation sample of the indigenous lookout area.



SITE PHOTOGRAPHS

Site 8.3 – Indigenous Lookout Area
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Photo 9.1 A: General overview of the McNealy's day use area washroom facing north at the east site boundary.



Photo 9.1 B: General overview of the McNealy's day use area kitchen shelter facing north from the south site boundary.



SITE PHOTOGRAPHS

Site 9.1 – McNealy's Day Use Area
Soil and Debris Assessment
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Photo 9.1-1: Sample location # 1 taken under largest observed brick and wood debris pile on the west side of the washroom debris area.



Photo 9.1-2: Location # 2 depicting the west side delineation sample of the McNealy's day use area washroom.



SITE PHOTOGRAPHS

Site 9.1 – McNealy's Day Use Area
Soil and Debris Assessment
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Photo 9.1-3: Location # 3 depicting the east side delineation sample of the McNealy's day use area washroom.



Photo 9.1-4: Sample Location # 4 was taken under largest metal and wood debris pile observed on the north east side of the McNealy's kitchen shelter.



SITE PHOTOGRAPHS

Site 9.1 – McNealy's Day Use Area
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Photo 9.1-5: Location # 5 depicting the east side delineation sample of the McNealy's day use area kitchen shelter.



Photo 9.1-6: Location # 6 depicting the north side delineation sample of the McNealy's day use area kitchen shelter.



SITE PHOTOGRAPHS

Site 9.1 – McNealy's Day Use Area
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Photo 9.1-7: Location # 7 depicting the south side delineation sample of the McNealy's day use area kitchen shelter.



SITE PHOTOGRAPHS

Site 9.1 – McNealy's Day Use Area
Soil and Debris Assessment
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Photo 9.2 A: General overview of the Little Prairie day use area kitchen shelter facing south at the north site boundary.



Photo 9.2 B: General overview of the Little Prairie day use area washroom shelter facing south from the north site boundary.



SITE PHOTOGRAPHS

Site 9.2 – Little Prairie Day Use Area
Soil and Debris Assessment
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Photo 9.2-1: Sample location # 1 depicting the north side delineation sample of the Little Prairie day use area kitchen shelter.



Photo 9.2-2: Location # 2 depicting the east side delineation sample of the Little Prairie day use area kitchen shelter.



Site 9.2 – Little Prairie Day Use Area
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Alberta

SITE PHOTOGRAPHS

Project No: 203.02356.00000



Photo 9.2-3: Location # 3 depicting the south side delineation sample of the Little Prairie day use area kitchen shelter.



Photo 9.2-4: Location # 4 depicting the west side delineation sample of the Little Prairie day use area kitchen shelter.



SITE PHOTOGRAPHS

Site 9.2 – Little Prairie Day Use Area
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Photo 9.2-5: Sample Location # 5 taken under largest observed metal debris pile of the Little Prairie day use area washroom.



Photo 9.2-6: Location # 6 depicting the east side delineation sample of the Little Prairie day use area washroom.



Site 9.2 – Little Prairie Day Use Area
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Alberta

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Photo 9.2-7: Location # 7 depicting the south side delineation sample of the Little Prairie day use area washroom.



SITE PHOTOGRAPHS

Site 9.2 – Little Prairie Day Use Area
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