Public Works and Government Services Canada

Requisition No. EZ897-201612

Buy and Sell No. _____

SPECIFICATIONS
for

PEC Site FY201920 Excavation

West Vancouver, BC

Project No. R.044582.016 Sep 2019

APPROVED BY:

_____ 2019/09/20
Regional Manager ES Date

_____ 19.09.24
Construction Safety Coordinator Date

TENDER:

_____ 2019 Sep 20
Project Manager Date

Real Property Services Branch, Professional and Technical Services, Pacific Region
#219 – 800 Burrard Street, Vancouver, B.C. V6Z 0B9

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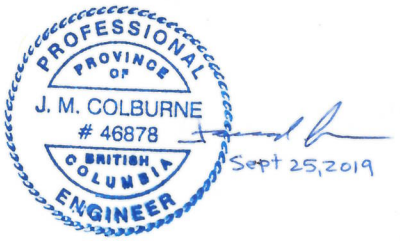

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1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Not Used.

1.4. Work Covered by Contract

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

1.4.1.1. Site access restrictions are as follows:

1.4.1.1.1. Site is accessed from Bridge Road under the Lions Gate Bridge

1.4.1.1.2. Use of the roadways on the Squamish Nation lands are the responsibility of the Contactor to secure use. In 2018-19 the Squamish Nation policy was that Lower Capilano was not to be used by PEC Site Contractors. This Is not expected to change in the foreseeable future.

1.4.1.1.3. The North Shore Conveyance Project (NSCP) will be occurring at the Lions Gate Wastewater Treatment Plant during the entire duration of this project. Coordination with the NSCP contractor is the responsibility of the Site Contractor

1.4.1.2. Neighbouring or sensitive sites restrictions are as follows:

1.4.1.2.1. Metro Vancouver Right of Way on site

1.4.1.2.2. District of North Vancouver (DNV) Right of Way (ROW) on site. The water line within the DNV ROW was recently cut and capped along the eastern edge of the Metro Vancouver ROW.

1.4.1.2.3. To mitigate potential damage to the water main pipes, heavy equipment movement is limited across the ROWs, parking or storage of materials over top of the ROWs is prohibited, and excavations anywhere within or across the ROWs are prohibited. The Contractor shall also maintain 24 hour access to the Metro Vancouver ROW. The Contractor is to ascertain and abide by all DNV and Metro Vancouver requirements for work in and around the ROWs. This project shall not include any excavation within the Metro Vancouver or DNV right of ways.

1.4.1.3. Classes of Soil based on Environmental Quality Criteria are:

1.4.1.3.1. Hazardous Waste Quality

1.4.1.3.2. Waste Quality

1.4.1.3.3. Amended Hazardous Waste

1.4.1.3.4. Non-Contaminated Quality

1.4.1.4. Soil classification based on exsitu testing; additional testing may be required as directed by the Departmental Representative.
1.4.1.5. Excavation of Contaminated Soil as per Drawings. Contractor solely responsible for excavating to Contaminated Material Limits. Excavation Limits on Drawings based on a nominal 1:1 slope for volume estimating purposes only; actual shoring and/or slope requirements responsibility of the Contractor.
1.4.1.6. Transportation of Contaminated Soil to facilities.
1.4.1.7. Disposal of Contaminated Soil. All material identified as Contaminated on the Site must be disposed of at a Disposal Facility, including material that has been Treated.
1.4.1.8. Contaminated Soil Placement in Onsite Cells and Transfer Facility.
1.4.1.9. Construction of a new Onsite Cell on property under the control of PSPC.

1.5. Location

1.5.1. The Site location is shown on Drawings.

1.6. Project/Site Conditions

1.6.1. Contractor must provide personnel and equipment with appropriate experience for site conditions, including experience in remediating site-specific Contaminated Material. Contractor to provide specialized material handling, health and safety, and environmental protection procedures, and must have knowledge of appropriate regulations.
1.6.2. Work at Site involves Work with Contaminated Material. Complete list of anticipated contaminants and concentration levels on the Site available separately in Appendices and/or Drawings.
1.6.3. Existing condition on the Site identified according to Drawings.

1.7. Other Contracts

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

1.8. Contractor's Use of Site

1.8.1. Use of Site:
1.8.1.1. For the sole benefit of Canada.

1.8.1.2. Exclusive and only for completion of the execution of Work.
1.8.1.3. Assume responsibility of Prime Contractor and control for assigned premises for performance of this Work.
1.8.1.4. Be responsible for coordination of all Work activities onsite, including the Work of other contractors engaged by the Departmental Representative.
1.8.2. There are no pre-existing arrangements for access or encroachment on neighbouring properties. Offsite access, occupancy, or encroachment is the responsibility of the Contractor.
1.8.3. Perform Work in accordance with Contract. Ensure Work is carried out in accordance with schedule accepted by Departmental Representative.
1.8.4. Do not unreasonably encumber Site with material or equipment.
1.8.5. Accommodate common areas with other Site users, including roadways.
1.8.6. Segregate Contractor's work area from common areas to prevent unintentional multiple employer worksite, as required.

1.9. Existing Permits

1.9.1. Existing permits are:
1.9.1.1. None
1.9.2. Contractor assumes responsibility for relevant portions of existing permits.
1.9.3. Changes to existing permits must be approved by Departmental Representative. Changes to existing permits responsibility of Contractor, including resubmission to regulators as determined by the Contractor's Qualified Professional. Contractor assumes all responsibility for changed permits.
1.9.4. Permits required other than the existing permits responsibility of Contractor.

1.10. Schedule Requirements

1.10.1. Work to be initiated: as soon as practical after Contract Award.
1.10.2. Pre-Mobilization Submittals: within 10 Working Days of Contract Award.
1.10.3. Site Works: Final Completion no later than 2020 January 15.
1.10.4. Completion of the Work: no later than 2020 February 29. Includes all final Submittals including as-built documents, the Certificate of Completion, and the Statutory Declaration at Final Completion.

1.11. Hours of Work

1.11.1. Restrictive as follows:
1.11.1.1. Working Days are Monday to Saturday.
1.11.1.2. Working Hours are 07:00 to 19:00.
1.11.2. Work outside of Working Day and Working Hours must be approved by Departmental Representative by Submission.

1.12. Security Clearances

1.12.1. Not Used.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. Advisory: notices, instructions, or directions issued by the Departmental Representative to the Contractor.

1.2.2. Amended Hazardous Waste: material that exceeded the BC hazardous Waste Regulation, but has been treated to reduce the leachability of the contaminants. Current classification to be confirmed by the Contractor.

1.2.3. Certificate of Completion: see General Conditions.

1.2.4. Change Order: PWGSC form issued by the Departmental Representative to the Contractor as per the relevant Contemplated Change Notice.

1.2.5. Classification: material (including soil and water) categorized into different classes based on Environmental Quality Criteria. Includes Hazardous Waste Quality, Amended Hazardous Waste, Waste Quality, Non-Contaminated Quality. Sub-classification based on specific parameters as identified in Contract. Re-classification must have approval of Departmental Representative.

1.2.6. 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.

1.2.7. Contaminated Material: material where substances occur at concentrations that: (i) are above background levels and pose, or are likely to pose, an immediate or long-term hazard to human health or the environment, or (ii) exceed the levels specified in policies and regulations. Includes Hazardous Waste Quality and Waste Quality. Does not include Non-Contaminated Quality material. Relevant regulations, unless otherwise in accordance with the Contract or as directed by the Departmental Representative, include:

1.2.7.1. Canadian Council of Ministers of the Environment (CCME) *Canadian Environmental Quality Guidelines*, the CCME *Canada-wide Standard for Petroleum Hydrocarbons (PHC) in Soil*, and the Federal Contaminated Sites Action Plan (FCSAP) *Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites*.

1.2.7.2. BC *Hazardous Waste Regulation*, BC *Contaminated Sites Regulation*, and BC *Approved Water Quality Guidelines*.

1.2.8. Contaminated Soil Extents: lateral and vertical extents of Contaminated Soil to be remediated to meet remediation objectives. Does not include Topsoil, Overburden, or other Non-Contaminated Quality Soil excavated incidentally. Extents on Drawings are approximate and may vary based on field observations or Confirmation Samples.

1.2.9. Contemplated Change Notice: PWGSC form issued by the Departmental Representative to the Contractor requesting Contractor to provide a quote, which may result in a Change Order.
1.2.10. Contract: see General Conditions.
1.2.11. Contract Amount: see General Conditions.
1.2.12. Contractor: see General Conditions.
1.2.13. Departmental Representative: see General Conditions.
1.2.14. Discharge Approval: permit, certificate, approval, license, or other required form of authorization issued by appropriate federal agency, province, territory, or municipality having jurisdiction and authorizing discharge.
1.2.15. Disposal Facility: an offsite facility specifically used to introduce Contaminated Material into the environment for the purpose of final burial.
1.2.16. 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.
1.2.17. 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.
1.2.18. Environmental Protection Plan: plan developed by the Contractor to ensure Environmental Protection and prevent Environmental Pollution and Damage identifying all environmental risks and mitigation measures, including: personnel requirements, emergency contacts, Environmental Protection methods, procedures, and equipment, and emergency response including a Spill Control Plan.
1.2.19. Environmental Quality Criteria: numerical material criteria used on Site based on Standards and/or Guidelines specified by the Canadian Council of Ministers of the Environment and/or BC *Contaminated Sites Regulation*, as applicable, using appropriate Land Use and Site-specific Factors.
1.2.20. Excavation Extents: lateral and vertical extents of Soil to be excavated to meet Contaminated Soil Extents. Includes Overburden. Extents on Drawings are approximate and may vary based on field observations or Confirmation Samples.
1.2.21. Extension of Time: see General Conditions.
1.2.22. Extension of Time on Contracts: PWGSC form requesting an Extension of Time.
1.2.23. Facility Authority:
1.2.23.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.

1.2.23.2. For facilities on First Nation reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.
1.2.23.3. For facilities on First Nations land in Canada subject to the First Nation Land Management Act regime: the relevant First Nation Council. Documentation must be provided that the facility is on land subject to the First Nation Land Management Act regime.
1.2.23.4. For facilities in the United States of America: either or both of the Environmental Protection Agency and the relevant State, as appropriate.
1.2.24. Final Completion: see General Conditions.
1.2.25. Hazardous Waste Quality: Contaminated material which meets the applicable Regulatory definition of Hazardous Waste.
1.2.26. Land Treatment Facility (LTF): equivalent of Soil Treatment Facility.
1.2.27. Landfill Facility: an offsite facility specifically used to introduce Non-Contaminated Quality Soil into the environment for the purpose of final burial.
1.2.28. Master Plan: baseline schedule determined by Contractor compliant with Schedule Requirements. Duration for any portion of the Work based on Master Plan.
1.2.29. 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.
1.2.30. Non-Contaminated Quality: material that does not exceed applicable Environmental Quality Criteria.
1.2.31. Onsite Soil Cells: a cell constructed and operated on property under the control of PWGSC specifically used to store Contaminated Soil originating only from federal Sites.
1.2.32. Overburden: Non-Contaminated Quality Soil excavated incidentally as required above or adjacent to Contaminated Soil. Includes Topsoil.
1.2.33. 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). Includes bedrock, boulders, pilings, pipes, building structures, and concrete foundations.
1.2.34. Prime Contractor: see General Conditions “Contractor”, BC Occupational Health and Safety Regulations “Prime Contractor”, and Yukon Occupational Health and Safety Act “Constructor”.
1.2.35. Progress Payment: see General Conditions.
1.2.36. Progress Survey: Survey conducted using equipment such as tape measurements, non-differential GPS, theodolite, or truck counts. Not a survey conducted by a Qualified Professional Surveyor.
1.2.37. PWGSC: Public Works and Government Services Canada (also known as PSPC: Public Services and Procurement Canada). Representative of Canada with control of the Site.
1.2.38. Qualified Professional: a person who is registered in relevant jurisdiction (BC) with his or her appropriate professional college/association, acts under that

professional college/association's code of ethics, and is subject to disciplinary action by that professional college/association, and through suitable education, experience, accreditation and knowledge can be reasonably relied on to provide advice within his or her area of expertise. Only full membership will be considered to be a Qualified Professional (ie no "in training" designations). Includes:

1.2.38.1. Association of the Chemical Profession of British Columbia.
1.2.38.2. British Columbia College of Applied Biology.
1.2.38.3. British Columbia Institute of Agrologists.
1.2.38.4. Engineers and Geoscientists British Columbia.
1.2.38.5. Engineers Yukon.

1.2.39. Qualified Professional Surveyor: a person who is registered in relevant jurisdiction (BC, Yukon, or Canada, as appropriate) with his or her appropriate professional college/association, acts under that professional college/association's code of ethics, and is subject to disciplinary action by that professional college/association, and through suitable education, experience, accreditation and knowledge can be reasonably relied on to provide advice within his or her area of expertise. Only full membership will be considered to be a Qualified Professional (ie no "in training" designations). Includes:

1.2.39.1. Association of British Columbia Land Surveyors.
1.2.39.2. Association of Canada Lands Surveyors.
1.2.39.3. Applied Science Technologists & Technicians of British Columbia registered in Site Improvements Surveys.
1.2.39.4. Engineers and Geoscientists British Columbia.

1.2.40. Quote: Quotation for Design Change or Additional Work. Contractor’s cost proposal issued to the Departmental Representative as per the relevant Contemplated Change Notice. May be either a Lump Sum Arrangement or a Unit Price Arrangement.

1.2.41. Remediation by Excavation: complete excavation of Contaminated Soil and incidental Non-Contaminated Quality Soil 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.

1.2.42. Request For Information: notice or other communication issued by the Contractor to the Departmental Representative.

1.2.43. Sewage: liquid waste which is not suitable for direct discharge to the environment, and which must be either treated offsite or discharged to a sanitary sewer. Includes water from hand basin, shower, personal hygiene facilities, or other liquid waste from sanitary facilities.

1.2.44. Site: work area available to Contractor according to Drawings. Does not include shared or public areas, including common roads.

1.2.45. Soil: unconsolidated mineral or organic material, rock, fill, and sediment deposited on land, and other solid material excavated incidentally. Includes Topsoil and Overburden. Includes cleared and grubbed vegetation, litter,

rubbish, debris, cobbles, boulders, excess construction material, lumber, steel, plastic, concrete, and asphalt and other waste material.

1.2.46. Soil Treatment Facility: facility for bioremediating contaminated soil. Includes Treatment Cells, Staging Cells, and ancillary Access Roads.

1.2.47. Subcontractor: see General Conditions.

1.2.48. Submit/Submittals: documents from the Contractor to the Departmental Representative as: required by Contract; stipulated in permit, certificate, approval, license, or any other form of authorization; by convention or industry practice. Submittals are final only after review and accepted in writing by Departmental Representative.

1.2.49. Substantial Performance: see General Conditions.

1.2.50. Superintendent: see General Conditions

1.2.51. Supplier: see General Conditions.

1.2.52. Topsoil: Overburden excavated incidentally above Contaminated Soil Extents that is a surface organic layer to facilitate vegetation growth.

1.2.53. Transfer/Interim Storage Facility: an offsite facility specifically used to transfer or short term storage Contaminated Soil during offsite transport.

1.2.54. Treatment Facility: an offsite facility specifically used to treat Contaminated Soil or Contaminated Water. Treatment Facility may treat soil, sediment, or water. All material Treated at a Treatment Facility is still considered Contaminated Material in the Contract. All material Treated at a Treatment Facility must be Disposed at a Disposal Facility.

1.2.55. Waste Quality: material that exceeds applicable Environmental Quality Criteria.

1.2.56. Wastewater: Non-Contaminated Quality Water that is not Sewage.

1.2.57. Work: see General Conditions.

1.3. Action and Informational Submittals

1.3.1. Permits: at least 10 Working Days prior to mobilization to Site, Submit copies of all permits, certificates, approvals, or any other form of authorizations and all reporting required.

1.3.2. Daily Work Records: at the end of each shift Submit daily Work records, during onsite Work. Include:

1.3.2.1. Quantities for each Description of Work identified in the Unit Price Table and Change Orders.

1.3.2.2. Description of Work performed.

1.3.2.3. Current Site conditions.

1.3.2.4. General information including: date, time shift started and ended, Subcontractor(s) onsite, Health and Safety items, and Environmental Protection items.

1.3.2.5. Signature of Superintendent.

1.3.3. Cash Flow: with each Progress Payment, Submit a cash flow forecast. Include:

1.3.3.1. Calculation of planned cost versus actual cost and schedule forecasting and cash flow projections on a monthly basis, indicating anticipated value of

future Progress Payments, for each Description of Work identified in the Unit Price Table.

1.3.3.2. Progress Payments will not be processed until cash flow has been accepted by the Departmental Representative.

1.3.4. Coordination Meeting Minutes and Drawings: at least 5 Working Days prior to relevant Work commencing, Submit final meeting minutes and drawings from coordination with Subcontractors.

1.3.5. Quality Management Plan: within 10 Working Days after Contract award, Submit a quality management plan. Include:

1.3.5.1. Details on planned review, inspection and testing to provide Quality Assurance and Quality Control for the Work.

1.3.5.2. Subcontractors responsible for review, inspection and testing.

1.3.5.3. Schedule of submittals of review, inspection and testing results.

1.3.6. Review, Inspection, and Testing Results: within 5 Working Days of receipt, Submit all results of reviews, inspection, and testing performed as part of the Work, including laboratory reports and sampling chains of custody.

1.3.7. Weigh Scale Certification: at least 5 Working Days prior to use, Submit a copy of the Measurement Canada, Weigh Scale Certification for any onsite or offsite weigh scale used during excavation, transportation, treatment or disposal.

1.3.8. Weigh Scale Slips: within 10 Working Days of measurement, Submit all onsite and offsite weigh scale slips for material.

1.4. Laws and Regulations

1.4.1. Generally, provincial, territorial and municipal laws, regulations, bylaws and other requirements do not apply to federal lands, works or undertakings. Soil, sediment, water or other materials that are removed from federal lands may become subject to provincial, territorial or municipal laws and regulations.

1.4.2. Provincial, territorial or municipal standards may be used in relation to federal lands only as guidelines for the purpose of establishing remediation goals and objectives. The term "standards" is used in this part in order to maintain consistency in terminology throughout this document, and does not imply that standards contained in provincial, territorial or municipal laws and regulations apply on Federal lands, activities or undertakings.

1.5. Green Requirements

1.5.1. Use only environmentally responsible green materials/products with no Volatile Organic Compounds (VOC) emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality – subject of acceptance of Submittal of Materials Safety Data Sheet (MSDS) Product Data.

1.5.2. Use materials/products containing highest percentage of recycled and recovered materials practicable – consistent with maintaining cost effective satisfactory levels of competition.

1.5.3. Adhere to waste reduction requirement for reuse or recycling of waste materials, not including soil or water, thus diverting materials from Landfill Facility.

1.6. Smoking Environment

1.6.1. Smoking on the Site is not permitted.

1.7. System of Measurement

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

1.8. Documents Required

1.8.1. Maintain 1 copy each of the following posted at the job Site:
1.8.1.1. General Conditions.
1.8.1.2. Drawings.
1.8.1.3. Specifications.
1.8.1.4. Addenda or other modifications to Contract.
1.8.1.5. Change orders.
1.8.1.6. Current Work schedule.
1.8.1.7. Reviewed and final Shop Drawings Submittals.
1.8.1.8. One set of record Shop Drawings and Specifications for "as-built" purposes.
1.8.1.9. Field and laboratory test reports.
1.8.1.10. Reviewed and accepted Submittals.
1.8.1.11. Health and Safety documents, including all daily toolbox meetings, Notice of Project, and utility clearances.
1.8.1.12. Environmental Protection Plan.
1.8.1.13. Final Meeting Minutes, Agendas and associated attachments.
1.8.1.14. Permits and other approvals.

1.9. Setting out of Work

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

1.10. Works Coordination

1.10.1. Coordinate Work of Subcontractors.
1.10.1.1. Designate one person to be responsible for review of Contract and Shop Drawings and managing coordination of Work.
1.10.2. Convene meetings between Subcontractors whose Work interfaces and ensure awareness of areas and extent of interface required.
1.10.2.1. Provide each Subcontractor with complete Drawings and Specifications for Contract, to assist them in planning and carrying out their respective work.
1.10.2.2. Develop coordination drawings when required, illustrating potential interference between Work of various trades and distribute to affected parties.
1.10.2.3. Facilitate meeting and review coordination drawings. Ensure Subcontractors agree and sign off on coordination drawings.

1.10.2.4. Publish minutes of each meeting.
1.10.2.5. Submit a copy of coordination drawings and meeting minutes as directed by the Departmental Representative.
1.10.3. Submit Shop Drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.
1.10.4. Work coordination:
1.10.4.1. Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.
1.10.4.2. Ensure that each trade provides all other trades reasonable opportunity for Final Completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed Work.
1.10.4.3. Ensure disputes between Subcontractors are resolved.
1.10.5. Failure to coordinate Work is responsibility of Contractor.

1.11. Record Keeping

1.11.1. Advisory: Contractual correspondence from the Departmental Representative to the Contractor. Does not include Change Documents. To be sequentially numbered. Include cross references to applicable Request For Information. The status of the Contractor, including the function of Prime Contractor, must not change by reason of any Advisory.
1.11.2. Request For Information: Contractual correspondence from Contractor to the Departmental Representative. Includes Submittals. Does not include Change Documents. Must be sequentially numbered. Include cross references to applicable Advisory. Status of the Contractor, including the function of Prime Contractor, must not change by reason of any Request For Information.
1.11.3. Maintain adequate records to support information provided to Departmental Representative.
1.11.4. Maintain asbestos waste shipment records or other Hazardous Waste Manifests for minimum of 3 years from date of shipment or longer period required by applicable law or regulation.
1.11.5. Maintain bills of ladings for minimum of 300 Working Days from date of shipment or longer period required by applicable law or regulation.

1.12. Change Documents

1.12.1. Change Documents do not relieve Contractor of any obligation.
1.12.2. Change Documents do not change the Contractor's responsibility for sequencing, methods and means.
1.12.3. Change Documents do not change by any reason the status of the Contractor, including the function of Prime Contractor or as supervisor.
1.12.4. Change Documents include:
1.12.4.1. Change Order: There may be a change to the Contract Amount by reason of any Change Order. No Extension of Time for completion of the Work by reason of any Change Order.

1.12.4.2. Contemplated Change Notice: No increase to the Contract Amount by reason of any Contemplated Change Notice. No Extension of Time for completion of the Work by reason of any Contemplated Change Notice.

1.12.4.3. Extension of Time on Contracts: There may be a change to the completion of the Work by reason of an Extension of Time on Contracts. No increase to the Contract Amount by reason of any Extension of Time on Contracts.

1.12.4.4. Quote: No increase to the Contract Amount by reason of any Quote. No Extension of Time for completion of the Work by reason of any Quote.

1.13. Inspection

1.13.1. Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Site, allow access to such Work whenever it is in progress. Work at locations other than Site includes offsite Facilities.

1.13.2. Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative or applicable law.

1.13.3. If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

1.13.4. Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

2. PART 2 - PRODUCTS

2.1. Asbestos Containing Materials Prohibition

2.1.1. Any material containing any degree of asbestos is banned from use in any and all sites, designs and projects.

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. Pre-Mobilization Submittals will be paid in accordance with lump sum price established for all Preconstruction Meetings, final design, planning, health and safety, and other Submittals in accordance with the Contract or required and accepted by the Departmental Representative as in accordance with the Contract prior to mobilization to Site. Also includes Preconstruction Condition Survey and Preconstruction As-Built Documents.

1.1.2. Mobilization will be paid in accordance with lump sum price established for mobilizing all necessary equipment, materials, supplies, facilities, and personnel associated with the Works to the Site.

1.1.3. Site Preparation will be paid in accordance with lump sum prices established to prepare the Site for planned construction works. Includes clearing and grubbing, demolition, temporary removal of existing infrastructure, utility location, rerouting, and protection, and construction of temporary onsite access roads. The existing gravel/cobble stockpiles on-site are not available for Contractor use unless otherwise specified. Also includes removal of any incidental or generated material. Specific stand-alone Site Preparation items are:

1.1.3.1. Vegetation – Excavation, loading and transport offsite for disposal

1.1.3.2. Stockpile Consolidation – moving of stockpile G and stockpile E to stockpile Q. Moving of stockpile S and T to stockpile D.

1.1.3.3. Debris Removal – loading, transport and disposal of materials as labeled on the drawings.

1.1.3.4. Remove, Transport and Dispose of Light Poles as labeled on the drawings.

1.1.4. Standby Time will be paid in accordance with unit rate price established for time when construction Work is unable to proceed and that is directly attributable to any neglect or delay that occurs after the date of the Contract on the part of the Departmental Representative in providing any information or in doing any act that the Contract expressly requires the Departmental Representative. Measurement as recorded time by Departmental Representative. Includes machinery and labour standby costs. Does not include items covered by Site Facilities Operation. Standby Time may be pro-rated based on hours of work. Make all efforts to minimize impacts due to delays caused by the Departmental Representative, including re-sequencing Work. Provide documentation of a sufficient description of the facts and circumstances of the occurrence to enable the Departmental Representative to determine whether or not the Standby Time is justified. No Standby Time charges or increases to Contract Amount or Extension of Time for completion of the Work for reviews, sampling, or other work conducted by the Departmental Representative that have time allowances in accordance with the Contract.

1.1.5. Site Restoration will be paid in accordance with the lump sum price established to restore the Site to make suitable for post-Work use according to Drawings.

Includes re-establishment of pre-existing infrastructure, final grading, topsoil reuse or supply and placement, revegetation, and deconstructing and removal from Site all temporary facilities and removal of any incidental or generated material.

1.1.6. Demobilization will be paid in accordance with lump sum price established for demobilizing all equipment and personnel associated with the Works from the Site. Includes decontaminating all equipment prior to removal from Site.

1.1.7. Closeout Submittals will be paid in accordance with lump sum price established for Final Site Inspection (for Certificate of Completion purposes), Closeout Meetings, Postconstruction Condition Survey and final As-Built Documents as directed by the Departmental Representative.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Preconstruction As-Built Documents: at least 5 Working Days prior to commencing any disturbance, Submit drawings identifying all infrastructure, including utilities, on the Site. Update drawings as directed by the Departmental Representative.

1.3.2. Preconstruction Condition Survey: at least 5 Working Days prior to commencing any disturbance, Submit a report documenting condition of buildings, utilities, roadways, pathways, landscaping, significant vegetation, and other infrastructure both onsite and adjacent sites that may be potentially impacted by the Work.

1.3.3. Breakdown of Lump Sum Prices: at least 5 Working Days prior to submitting the first Progress Payment, Submit a breakdown of the Contract lump sum prices including labour, material and time, in detail as directed by the Departmental Representative and aggregating Contract Amount.

1.3.4. As-Built Documents: within 10 days of completing site Work, provide Drawings showing all Work, including infrastructure, utilities, excavation limits, backfill material limits and compaction, final grades, and any other improvements or reinstatements.

1.3.5. Postcontruction Condition Survey: within 10 days of completing site Work, Submit a report documenting condition of buildings, utilities, roadways, pathways, landscaping, significant vegetation, and other infrastructure both onsite and adjacent sites that may be potentially impacted by the Work.

1.3.6. Closeout Documents: within 20 Working Days of Final Completion of Site Restoration, Submit Completion Documents.

1.4. Mobilization and Demobilization

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

1.5. Site Preparation

1.5.1. Vegetation:

1.5.1.1. All vegetation is to be removed from the two Vegetation Site Preparation Areas as shown on the drawings, including from overtop of existing stockpiles, and any vegetation currently stockpiled in the areas from previous clearing. All this vegetation is to be transported and disposed of offsite.

1.5.2. Stockpile Movement:

1.5.2.1. Following the vegetation site preparation activities listed in 1.5.1, in the area east of Cell #3, the following work is to be completed:

1.5.2.1.1. The cobbles in stockpiles "S" and "T" are to be moved and consolidated with the cobbles in stockpile "D"

1.5.2.1.2. The soil in stockpiles "E" and "G" is to be moved and consolidated with the soil in stockpile "Q

1.5.3. Disposal:

1.5.3.1. Following the vegetation site preparation activities at the Lysimeter Pad area, all wood, plastic, and metal materials are to be transported and disposed of offsite.

1.5.3.2. The concrete pipe waste pile east of stockpile "X" is to be transported and disposed of offsite.

1.5.3.3. The Contractor must dismantle and dispose off-site of the utility poles marked as Utility Pole to be Dismantled in the drawings.

1.5.3.4. The wood, plastic, and metals waste pile north of Cell #5 is to be transported and disposed of offsite.

1.5.3.5. The compost, and the pea gravel mixed with iron piles within the leftover treatment wall media stockpile, also north of Cell #5 are to be transported and disposed of offsite.

1.5.4. Protection:

1.5.4.1. Protect existing features with temporary barriers and enclosures as required by applicable local regulations.

1.5.4.2. Protect natural and man-made features required to remain undisturbed. Protect existing trees from damage unless otherwise required or located in an area to be occupied by new construction.

1.5.4.3. Protect buried utilities that are required to remain undisturbed or in continuous operation during the Work, as identified on Drawings.

1.5.4.4. Provide temporary structures to divert flow of surface water as appropriate.

1.5.5. Security and Safety:

1.5.5.1. Provide safety measures to ensure worker and public safety.

1.5.5.2. Ensure Site is secure during onsite Work, provide, install, and remove fencing, temporary hoarding, and other security measures as appropriate. Provide onsite personnel security 24 hours/ day 7 days/week as appropriate or in accordance with Contract.

1.5.5.3. Site including all construction areas should be secured with locked fencing, temporary hoarding and security personnel as required.

1.6. Existing Services

1.6.1. Size, depth and location of existing utilities and structures as specified are for guidance only. Completeness and accuracy are not guaranteed.

1.6.2. Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative. All utilities entering Site must be confirmed prior to subsurface disturbance (ie do not rely on as-built documents). As appropriate, confirm locations of buried utilities by independent utility locator and using hand test excavations or hydrovac methods.

1.6.3. Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.6.4. Maintain and protect from damage all utilities and structures encountered, unless Work involves temporarily breaking, rerouting, or connecting existing utilities.

1.6.5. Where Work involves temporarily breaking, rerouting, or connecting into existing utilities, obtain permission from utility companies of intended interruption of services, and carry out Work at times determined by the authorities having jurisdiction.

1.6.6. Submit schedule to and obtain approval for any shutdown or closure of active service. Adhere to schedule accepted by Departmental Representative and provide notice to affected parties.

1.6.7. Provide temporary services as required to maintain critical systems.

1.6.8. Where unknown utilities are encountered, immediately verbally notify Departmental Representative and confirm findings in writing.

1.6.9. More than 100 groundwater-monitoring wells (MWs) have been installed across the Site, including within and near the work areas. The Contractor must make all reasonable efforts to maintain the integrity of the MWs located within the excavation areas; approximately 57 MWs are located within or immediately adjacent to the two excavation areas. If necessary, the Contractor may cut and cap the MWs polyvinyl chloride (PVC) well pipes as the excavation progresses. The Contractor is responsible for the cost of repairs and/or replacement necessary to the MWs in the event they are damaged or destroyed during their activities. An effort has been made to identify and mark the MWs on-site; however, extreme caution must be exercised during the moving of equipment, placing of materials, foot traffic, etc.

1.7. As-Built Documents

1.7.1. The Departmental Representative will provide paper copies of the Construction Documents as per the Special Instructions to Bidders. Electronic copies of data and drawings in their native format are available on request.

1.7.2. As directed by Departmental Representative or as required by Contractor, preconstruction survey to be completed by Contractor's Qualified Professional Surveyor to confirm existing site including property lines, structures, infrastructure, surface elevation contours, physical features, and other relevant items.

1.7.3. As Work progresses, maintain accurate records to show all deviations from the Contract. Note changes as they occur on as-built Specifications, Drawings and Shop Drawings.

1.7.4. Drawings and Shop Drawings: legibly mark each item to record actual construction, including:
1.7.4.1. Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
1.7.4.2. Field changes of dimension and detail.
1.7.4.3. Changes made by change orders.
1.7.4.4. Details not on original Drawings.
1.7.4.5. References to related Shop Drawings and modifications.
1.7.5. Contract Specifications: legibly mark each item to record actual workmanship of construction, including:
1.7.5.1. Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
1.7.5.2. Changes made by addenda and change orders.
1.7.6. As-built information:
1.7.6.1. Record changes in red ink.
1.7.6.2. Mark on 1 set of Drawings, Specifications and Shop Drawings at Final Completion of project and, before final inspection, neatly transfer notations to second set.
1.7.6.3. Submit 1 set in editable AutoCAD file format with all as-built information.
1.7.6.4. Submit all sets as directed by the Departmental Representative.
1.7.7. As required, surveying to be completed by Contractor's Qualified Professional Surveyor for as-built documents.

1.8. Pre-existing Stockpile or Onsite Soil Treatment Facility Preparation
1.8.1. As required, prior to working soil in pre-existing stockpile or Onsite Soil Treatment Facility:
1.8.1.1. Remove vegetation that could potentially damage liner, including roots.
1.8.1.2. Inspect berms. Grade or place material to maintain height and integrity of berms.
1.8.1.3. Inspect granular base protective layer of liner. Grade base layer to allow uniform slope to sump. Notify Departmental Representative if less than 0.5m thick at any location.
1.8.1.4. Inspect visually liner for damage, including both the base and the berms. Excavate protective base layer in suspect areas (eg depressions that may be due to piping through a liner hole or areas where previous excavations may have led to a liner tear) to inspect liner for damage. Notify Departmental Representative of any significant damage.
1.8.1.5. Make good repairs of any pre-existing damage to liner, both berms and base. Be prepared to repair a minimum of 10 square meters of liner or as shown on Drawings.
1.8.1.6. Pump any collected or sump water from pre-existing stockpile or Onsite Soil Cell. Treat or otherwise discharge water as required according to Contract or as directed by Departmental Representative.
1.8.1.7. Grade surface of soil to allow stockpiling or bioremediation activities.

1.9. Onsite Access Roads

1.9.1. Maintain onsite access roads as follows:

1.9.1.1. Obtain permission to use existing onsite access roads or to construct temporary roads.

1.9.1.2. Maintain and clean roads for duration of Work, keep dry and free of mud.

1.9.1.3. Repair damage incurred from use of roads.

1.9.1.4. Provide photographic documentation of roads used by construction vehicles before, during and after Work.

1.9.1.5. Clean onsite access roads as directed by the Departmental Representative.

1.10. Site Restoration

1.10.1. Final site grades must be within 5 cm of pre-existing grades before Work commenced, unless otherwise specified.

1.10.2. Re-establish pre-existing drainage, unless otherwise specified.

1.10.3. Re-establish topsoil reusing existing stripped topsoil. If insufficient existing topsoil, import additional topsoil as required. Imported topsoil must, at a minimum, contain: between 50% and 70% sand, less than 25% silt and clay, and between 4% and 15% organic matter (dry weight basis) unless otherwise identified according to Drawings.

1.10.4. Clean permanent access roads of contamination resulting from project activity as required or as directed of Departmental Representative, with no increases to Contract Amount or Extension of Time for completion of the Work.

1.10.5. Collect and dispose of offsite the water remaining in the onsite wheel wash. Sediments in the bottom of the wheel wash can be placed onsite at the direction of the Departmental Representative.

1.10.6. Upon Final Completion of Work, remove Non-Contaminated Quality Soil and Debris, trim slopes, and correct defects as directed by the Departmental Representative.

1.10.7. Protect newly graded areas from traffic and erosion and maintain free of trash or debris until demobilization is completed and accepted by the Departmental Representative.

1.10.8. Reinstate pre-existing utilities and other infrastructure to original location and condition, meeting current standards, codes, and other requirements, unless otherwise identified according to Drawings or as directed by the Departmental Representative.

1.10.9. Reinstate surface to pre-existing conditions, including surface material (eg vegetation, gravel, pavement), unless otherwise identified according to Drawings or as directed by the Departmental Representative.

1.10.10. Seeding, to be consistent with *Canadian Landscape Standards* for lawns or current version of BC Ministry of Transportation and Infrastructure *Standard Specifications for Highway Construction* unless otherwise identified according to Drawings.

1.11. Completion Documents

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

1.11.1.1. Work has been completed, and inspected and accepted by the Departmental Representative, in accordance with the Contract.

1.11.1.2. Treatment and Disposal of treatable soils have been completed and Disposal of all other soils has been completed.

1.11.1.3. Damage has been repaired, deficiencies have been completed, missing items have been provided, and non-conformance has been corrected, in the opinion of the Departmental Representative.

1.11.1.4. Contractor's Qualified Professional report documenting backfilling has met all requirements of the Contract.

1.11.2. Defective products will be rejected, regardless of previous inspections. Replace defective products.

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

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

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

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

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

1.3.3.1. Agenda for the proposed Progress Meeting.

1.3.3.2. Updated Project Schedule.

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

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

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

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

1.4. Administrative

1.4.1. Schedule and administer project meetings throughout the progress of the Work 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 2 Working Days in advance of meeting date as directed by the Departmental Representative.

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

1.4.5. Preside at meetings.

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

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

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

1.5. Preconstruction (Kickoff) Meeting

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

1.6. Progress Meetings

1.6.1. During course of Work schedule progress meetings weekly subject to approval by Departmental Representative.
1.6.2. Contractor, Superintendent, major Subcontractor(s) involved in Work, and Departmental Representative are to be in attendance.
1.6.3. Agenda to include:
1.6.3.1. Review and acceptance of minutes of previous meeting.
1.6.3.2. Review health and safety, including incidents, near misses, and corrective measures.
1.6.3.3. Review Environmental Protection, including incidents, near misses, and corrective measures.
1.6.3.4. Review contractual compliance.
1.6.3.5. Review regulatory compliance.
1.6.3.6. Review communications, problems or concerns with community.
1.6.3.7. Review of Work progress since previous meeting.
1.6.3.8. Field observations, problems, conflicts.
1.6.3.9. Updated progress schedule detailing activities planned over next 2 week

period. Include review of progress with respect to previously established dates for starting and stopping various stages of Work.

1.6.3.10. Problems which impede construction schedule.

1.6.3.11. Corrective measures and procedures to regain projected schedule.

1.6.3.12. Revision to construction schedule.

1.6.3.13. Progress schedule, during succeeding Work period.

1.6.3.14. Review submittal schedules: expedite as required.

1.6.3.15. Maintenance of quality standards.

1.6.3.16. Quantities of material transported, treated, and disposed.

1.6.3.17. Review proposed changes for effect on construction schedule and on Final Completion date.

1.6.3.18. Other business.

1.6.4. Submit draft Progress Meeting Minutes for review and comment by Departmental Representative. Incorporate comments into final Progress Meeting Minutes.

1.7. Toolbox Meetings

1.7.1. During the course of the Work, schedule daily toolbox (tailgate) meetings at the start of each Work shift. Multiple meetings are required if the Contractor works multiple shifts within a 24-hour period.

1.7.2. All on Site workers to attend, including Contractor, Superintendent, major Subcontractor(s), and 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, including hazards, mitigation measures, and emergency procedures.

1.7.3.2. Review previous relevant incident or near-miss reports, both from Site and other Sites.

1.7.3.3. Coordination activities, and roles and responsibilities, required between Contractor, Subcontractor(s), Departmental Representative, other contractor(s) including environmental consultant, site users, and protection of general public and offsite resources.

1.7.3.4. Health and Safety items, including PPE requirements.

1.7.3.5. Environmental Protection items, including emergency equipment.

1.8. Final Site Inspection

1.8.1. Within 5 Working Days of completion of Site Works but prior to Demobilization, 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 final surface grades.
1.8.4.3. Inspect final vegetation.
1.8.4.4. Inspect permanent facilities for performance and damage.
1.8.4.5. 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. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

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

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

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

1.4. Requirements

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

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

1.4.3. Limit activity durations to maximum of approximately 10 Working Days, to allow for progress reporting.

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

1.4.5. Include Work sequencing description and schedule:

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

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

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

1.5. Master Plan

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

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

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

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

1.6. Project Schedule

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

1.7. Project Schedule Reporting

1.7.1. Update Project Schedule on monthly basis reflecting activity changes and completions, as well as activities in progress.
1.7.2. Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.8. Project Meetings

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

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

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

1.4. General

1.4.1. Submission details to be commensurate for type of Work and Site conditions. Details depend on Work performed and Contractor's methods, means, and sequences.

1.4.2. Contractor’s responsibility for errors and omissions in Submittals is not relieved by the Departmental Representative’s review of Submittals.

1.4.3. Notify Departmental Representative in writing at time of Submittals, identifying deviations from requirements of Contract and stating reasons for deviations.

1.4.4. Contractor’s responsibility for deviations in Submittals from requirements of Contract is not relieved by the Departmental Representative’s review of Submittals unless Departmental Representative gives written acceptance of specific deviations.

1.4.5. Make any changes in Submittals which Departmental Representative requires to be in accordance with the Contract and resubmit.

1.4.6. Notify Departmental Representative in writing, when resubmitting, of any revisions other than those directed by the Departmental Representative.

1.4.7. Do not proceed with Work until relevant Submittals are finalized and have been accepted.

1.4.8. Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to Submit in ample time is responsibility of Contractor.

1.4.9. Review Submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each Submittal has been checked and coordinated with requirements of Work and Contract. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

1.4.10. Verify field measurements and affected adjacent Work are coordinated.

1.4.11. Adjustments made on Submittals by the Departmental Representative will not result in an increase the Contract Amount nor an Extension of Time for completion of the Work.

1.4.12. Keep one final copy of each Submittal onsite.

1.5. Submission Requirements

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

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

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

1.3.1.1. Personnel and equipment decontamination.

1.3.1.2. Segregation of different Classifications are segregated.

1.4. Sequencing and Scheduling

1.4.1. Commence Work involving contact with Contaminated or potentially Contaminated Soil or Water after all applicable Environmental Protection procedures (including those identified in Contaminated Soil Management Plan and Environmental Protection Plan) 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. Personnel Decontamination Facility

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

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

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

1.6. Equipment Decontamination Facility

1.6.1. Prior to commencing Work involving equipment contact with potentially Contaminated Soil, construct equipment decontamination facilities to accommodate the largest potentially contaminated equipment onsite.

1.6.2. Collect and contain equipment decontamination wastewater and sediment. Transfer collected wastewater and sediment to treatment facilities accepted by Departmental Representative.

1.7. Equipment Decontamination

1.7.1. At minimum, perform following steps during equipment decontamination: mechanically remove packed dirt, grit, and debris by scraping and brushing without using steam or high-pressure water to reduce amount of water needed and to reduce amount of contaminated rinsate generated.

1.7.2. If required, as directed by the Departmental Representative, use high-pressure, low-volume, hot water or steam supplemented by detergents or solvents as appropriate. Pay particular attention to tire treads, equipment tracks, springs, joints, sprockets, and undercarriages. Scrub surfaces with long handle scrub brushes and cleaning agent. Rinse off and collect cleaning agent. Air dry equipment in clean area before removing from Site or travelling on clean areas. Perform assessment as directed by the Departmental Representative to determine effectiveness of decontamination.

1.7.2.1. Take appropriate measures necessary to minimize drift of mist and spray during decontamination including provision of wind screens.

1.7.2.2. Collect decontamination wastewater and sediment which accumulate in decontamination location. Treat collected wastewater as Contaminated Water. Manage decontamination sediment as Hazardous Waste Quality.

1.7.3. 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.

1.7.4. Furnish and equip personnel engaged in equipment decontamination with protective equipment including suitable disposable clothing, respiratory protection, and face shields.

1.8. Progress Decontamination

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

1.9. Final Decontamination

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

1.10. Contaminated Soil and Water Management

1.10.1. Remove all Contaminated Soil and Water within Work areas in accordance with the Contract and as directed by the Departmental Representative. Remove Non-

Contaminated Quality Soil and Water incidental to the Work or as directed by the Departmental Representative.

1.10.2. Material and Water will be Classified by the Departmental Representative based on insitu results, field observations, field measurements, and/or ex-situ characterization. Departmental Representative responsible for Classification. Contractor cannot re-Classify material.

1.10.3. Handle (including Excavate, Transport, Treat, and Dispose) material separately into the classifications in accordance with the Contract or as directed by the Departmental Representative. Take necessary precautions to avoid mixing of different classifications. Do not blend, or mix and dilute, different material Classifications.

1.10.4. Contractor responsible for Transportation, Treatment, and Disposal based on Classification by Departmental Representative. Contractor responsible for material blended, or mixed and diluted, based on re-Classification by Departmental Representative. No increases to Contract Amount or Extension of Time due to material blended, or mixed and diluted.

1.10.5. Material characterization (eg sampling and testing) of parameters additional to information provided in Contract as required by the Contractor (eg for Transportation, Treatment Facility or Disposal Facility purposes) responsibility of Contractor.

1.10.6. Material segregation additional to Contract as required for Transportation, Treatment Facility or Disposal Facility responsibility of Contractor.

1.11. Soil Stockpile Construction

1.11.1. Stockpile material within work area in locations identified by Departmental Representative. The Departmental Representative will direct which material will be placed in which stockpile cell.

1.11.2. Provide, maintain, and operate temporary storage/stockpiling facilities as per Contractor's Site Layout.

1.11.3. Segregate Contaminated Soil into separate Classifications, and segregate Contaminated Soil from Non-Contaminated Quality Soil, into separate stockpiles to prevent cross-contamination.

1.11.4. Prevent precipitation into Stockpiles 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 directed by the Departmental Representative.

1.11.5. Securely fasten covers over stockpiled material until material is loaded for transport.

1.11.6. Store excavated Non-Contaminated Quality Soil only on Non-Contaminated Quality surface areas. Ensure no contact between Non-Contaminated Quality Soil and Contaminated Soil.

1.11.7. Store excavated Contaminated Soil in temporary stockpiles.

1.11.7.1. Install impermeable liner (eg asphalt or minimum 20 mil (0.5mm) polyethylene) below proposed stockpile locations to prevent contact between stockpile material and ground.
1.11.7.2. 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. Cover to be impermeable (eg minimum 5 mil polyethylene) and securely fashioned to prevent blowing off.
1.11.7.3. Prevent Non-Contaminated Quality Water, including surface runoff water, from coming into contact with Contaminated Soil stockpiles.
1.11.7.4. Upon completion of the project the covers must be securely fixed to prevent the wind from blowing the covers off. It is the contractors responsibility to acquire materials to securely fasten the covers.
1.11.8. Segregate different suspect material in discrete stockpiles to facilitate ex-situ characterization for Classification as directed by the Departmental Representative.
1.11.9. Assist Departmental Representative in collection of stockpile samples for exsitu 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 Samples results provided within 5 Working Days, not counting the day the sample is collected.
1.11.10. Do not remove Contaminated Soil from stockpiles until exsitu characterization completed and as directed by Departmental Representative.

1.12. Storage Cells or Onsite Transfer Facility Loading

1.12.1. Place Contaminated Soil in Onsite cell or the Onsite Transfer Facility in locations and thicknesses according to Contract.
1.12.2. Soil cannot be placed within 1.5m of the berms to maintain adequate drainage and to avoid damaging the liner or geotextile material
1.12.3. Mechanical equipment cannot work within 1.5m of the sump or berms.
1.12.4. Trucks are only to operate in Storage Cells when there is a minimum of 1m of soil present. Trucks should minimize or eliminate turning while in facility. Trucks cannot dump directly on liner but only on areas with 1m of soil present and the dumped soil must remain 1.5m from the berms when placed.
1.12.5. Tracked equipment is only to operate in Stockpiles or Onsite Soil Treatment Facility when there is a minimum of 0.5m of soil present.
1.12.6. Be responsible for, and make good repairs of, any damage to Stockpiles or Onsite Soil Treatment Facility caused by placement or amendment.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Submit to Departmental Representative Submittals listed for review.
1.3.2. Work affected by Submittal must not proceed until review is complete.
1.3.3. Submit the following:
1.3.3.1. Health and Safety Plan.
1.3.3.2. Copies of reports or directions issued by federal and provincial health and safety inspectors.
1.3.3.3. Copies of incident and accident reports.
1.3.3.4. Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
1.3.3.5. Emergency Procedures.
1.3.3.6. Notice of Project.
1.3.4. 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.
1.3.5. If changes are required, revise the plan as appropriate and resubmit to Departmental Representative within 5 Working Days.
1.3.6. 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:
1.3.6.1. Be construed to imply approval by the Departmental Representative.
1.3.6.2. Be interpreted as a warranty of being complete, accurate and legislatively compliant.
1.3.6.3. Relieve the Contractor of his legal obligations for the provision of health and safety on the project.
1.3.7. Upon contract award, the Contractor shall fulfill the following health and safety requirements:
1.3.7.1. The Contractor shall review the most recent PEC Site Master Health and Safety Plan
1.3.7.2. The Contractor shall supply and maintain a temporary First Aid Station
1.3.7.3. The Contractor shall familiarize all employees and subcontractors with the PEC Site Master Health and Safety Plan and PEC Site management procedures

1.3.8. The Contactor shall not conduct any type of work in the Work Exclusion Zone without the written consent of Departmental Representative

1.4. References

1.4.1. Government of Canada:
1.4.1.1. Canada Labour Code - Part II.
1.4.1.2. Canada Occupational Health and Safety Regulations.
1.4.2. National Building Code of Canada (NBC):
1.4.2.1. Part 8, Safety Measures at Construction and Demolition Sites.
1.4.3. 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. American National Standards Institute (ANSI):
1.4.5.1. ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
1.4.6. Province of British Columbia (as appropriate):
1.4.6.1. Workers Compensation Act Part 3-Occupational Health and Safety.
1.4.6.2. Occupational Health and Safety Regulation.

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 direct on the course of action to be followed.

1.6. Worker's Coverage

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

1.7. Compliance with Regulations

1.7.1. PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, 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. 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.

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

1.13. Filing of Notice

1.13.1. The Prime Contractor must complete and submit a Notice of Project as required by Provincial or Territorial authorities.
1.13.2. Provide copies of all notices to the Departmental Representative.

1.14. Health and Safety Plan

1.14.1. 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.
1.14.2. Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
1.14.2.1. Primary requirements:
1.14.2.1.1. Contractor's safety policy.
1.14.2.1.2. Identification of applicable compliance obligations.
1.14.2.1.3. Definition of responsibilities for project safety/organization chart for project.
1.14.2.1.4. General safety rules for project.
1.14.2.1.5. Job-specific safe work procedures.
1.14.2.1.6. Inspection policy and procedures.
1.14.2.1.7. Incident reporting and investigation policy and procedures.
1.14.2.1.8. Occupational Health and Safety Committee/Representative procedures.
1.14.2.1.9. Occupational Health and Safety meetings.
1.14.2.1.10. Occupational Health and Safety communications and record keeping procedures.
1.14.2.2. 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.
1.14.2.3. List hazardous materials to be brought onsite as required by Work.
1.14.2.4. Indicate engineering and administrative control measures to be implemented at the Site for managing identified risks and hazards.
1.14.2.5. Identify personal protective equipment (PPE) to be used by workers.
1.14.2.6. Identify personnel and alternates responsible for site safety and health.
1.14.2.7. Identify personnel training requirements and training plan, including site orientation for new workers.
1.14.3. 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.
1.14.4. Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.
1.14.5. Departmental Representative's review: the review of Health and Safety Plan by Public Service and Procurement Canada (PWGSC) 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.

1.15. Emergency Procedures

1.15.1. List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (ie names/telephone numbers) of:
1.15.1.1. Designated personnel from own company.
1.15.1.2. Regulatory agencies applicable to Work and as per legislated regulations.
1.15.1.3. Local emergency resources.
1.15.1.4. Departmental Representative and site staff.
1.15.2. Include the following provisions in the emergency procedures:
1.15.2.1. Notify workers and the first-aid attendant, of the nature and location of the emergency.
1.15.2.2. Evacuate all workers safely.
1.15.2.3. Check and confirm the safe evacuation of all workers.
1.15.2.4. Notify the fire department or other emergency responders.
1.15.2.5. Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
1.15.2.6. Notify Departmental Representative and Site staff.
1.15.3. Provide written rescue/evacuation procedures as required for, but not limited to:
1.15.3.1. Work at high angles.
1.15.3.2. Work in confined spaces or where there is a risk of entrapment.
1.15.3.3. Work with hazardous substances.
1.15.3.4. Underground work.
1.15.3.5. Work on, over, under and adjacent to water.
1.15.3.6. Workplaces where there are persons who require physical assistance to be moved.
1.15.4. Design and mark emergency exit routes to provide quick and unimpeded exit.
1.15.5. Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

1.16. Hazardous Products

1.16.1. Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
1.16.2. Where use of hazardous and toxic products cannot be avoided:
1.16.2.1. Notify Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as required.
1.16.2.2. As required, in conjunction with Departmental Representative, schedule to carry out Work during "off hours" when tenants have left the building.
1.16.2.3. Provide adequate means of ventilation as required.

1.17. Unforeseen Hazards

1.17.1. 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.

1.18. Posted Documents

1.18.1. Post legible versions of the following documents onsite:
1.18.1.1. Health and Safety Plan.
1.18.1.2. Sequence of Work.
1.18.1.3. Emergency procedures.
1.18.1.4. Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
1.18.1.5. Notice of Project.
1.18.1.6. Floor plans or Site plans.
1.18.1.7. Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the Site for review by employees and workers.
1.18.1.8. Workplace Hazardous Materials Information System (WHMIS) documents.
1.18.1.9. Material Safety Data Sheets (MSDS).
1.18.1.10. List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
1.18.2. Post all Material Safety Data Sheets (MSDS) 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.
1.18.3. 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.

1.19. Meetings

1.19.1. Attend health and safety preconstruction meeting and all subsequent meetings called by the Departmental Representative.
1.19.2. Ensure all site personnel attend a health and safety toolbox meeting at the beginning of each shift, which must include:
1.19.2.1. Sign-in of all attendees.
1.19.2.2. Planned Work activities and environmental considerations for that shift.
1.19.2.3. Hazards associated with these Work activities, including environmental hazards (eg potential for hypothermia, heat exhaustion, heat stroke).
1.19.2.4. Appropriate job-specific safe work procedures.
1.19.2.5. Required personal protective equipment (PPE).
1.19.2.6. Appropriate emergency procedures.
1.19.2.7. Review recent accidents on Site, including near misses.
1.19.3. 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.

1.20. Correction of Non-Compliance

1.20.1. Immediately address health and safety non-compliance issues identified by the Departmental Representative.
1.20.2. Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.
1.20.3. 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.
1.20.4. Correct non-compliance.

1.21. Hazardous Occurrence Investigation and Reporting

1.21.1. Hazard includes:
1.21.1.1. 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.
1.21.2. Hazardous Occurrence includes:
1.21.2.1. An event occurring at a PWGSC managed building or worksite, or through the course of an employee's work that results in, or has the potential to result in, a fatality, injury, illness, exposure to a hazardous substance or property damage or an escapement of a hazardous material. For the purpose of investigating, recording and reporting hazardous occurrences, the following are included under this term: disabling injuries, minor injuries and near-misses.
1.21.3. Hazardous Occurrence Investigation and Reporting Procedures:
1.21.3.1. Includes information regarding the person involved and the basic circumstances surrounding the hazardous occurrence.
1.21.3.2. Provides a detailed and thorough description of the hazardous occurrence and the sequence of events.
1.21.3.3. Indicates corrective measures that have been taken since the occurrence.
1.21.3.4. Requires the appointment of a qualified investigator.
1.21.3.5. Provides recommendations for additional corrective measures, if required.
1.21.4. Fatal or Serious Accidents Procedures:
1.21.4.1. Call emergency number to advise the police organization having jurisdiction to secure the scene and investigate the matter.
1.21.4.2. Advise the Departmental Representative of the fatality or serious accident within 1 hour.

1.21.4.3. No investigation will be conducted at the scene until the police service having jurisdiction has released the scene.
1.21.4.4. Unless authorized to do so, do not allow anyone to remove or in any way interfere with or disturb any wreckage, article or thing related to the incident except to the extent necessary to: save a life, prevent injury or relieve human suffering in the vicinity; maintain an essential public service; or prevent unnecessary damage to or loss of property.

1.22. Utility Clearance

1.22.1. Contractor is solely responsible for utility clearance.
1.22.2. Contractor will not rely upon Drawings or other information provided with utility locations.

1.23. Personal Protective Equipment Program

1.23.1. Submit Personal Protective Equipment (PPE) program to the Departmental Representative addressing as appropriate:
1.23.1.1. Donning and doffing procedures.
1.23.1.2. PPE selection based upon Site hazards.
1.23.1.3. PPE use and limitations of equipment.
1.23.1.4. Work mission duration, PPE maintenance and storage.
1.23.1.5. PPE decontamination and disposal.
1.23.1.6. PPE inspection procedures prior to, during, and after use.
1.23.1.7. Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.
1.23.1.8. Medical surveillance requirements for personnel assigned to work at Site.
1.23.1.9. 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.
1.23.1.10. 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.
1.23.1.11. Decontamination procedures for both personnel and equipment.
1.23.1.12. 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.
1.23.1.13. Written respiratory protection program for project activities.

1.23.1.14. Procedures dealing with heat and/or cold stress.
1.23.1.15. Spill containment program if waste material is generated, excavated, stored, or managed onsite.

1.24. Offsite Contingency and Emergency Response Plan

1.24.1. Prior to commencing Work involving handling of hazardous materials, develop offsite Contingency and Emergency Response Plan.
1.24.2. 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.

1.25. Personnel Health, Safety, and Hygiene

1.25.1. Training: ensure personnel entering Site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer.
1.25.2. Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity.
1.25.3. Personal Protective Equipment:
1.25.3.1. Ensure all site personnel are furnished with appropriate PPE.
1.25.3.2. Unless identified otherwise in site-specific health and safety plan, minimum PPE to include: industrial protective headwear, high-visibility safety apparel, and protective footwear.
1.25.3.3. Ensure that safety equipment and protective clothing is kept clean and maintained.
1.25.4. Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:
1.25.4.1. Ensure industrial protective headwear is of appropriate CSA Standard and meets other appropriate standards.
1.25.4.2. Ensure high-visibility safety apparel is of appropriate CSA Standard and meets other appropriate standards.
1.25.4.3. Ensure protective footwear is of appropriate CSA Standard and meets other appropriate standards.
1.25.4.4. Dispose of or decontaminate PPE worn onsite at end of each workday.
1.25.4.5. Decontaminate reusable PPE before reissuing.
1.25.4.6. Ensure site personnel have passed respirator fit test prior to entering potentially volatile contaminated work areas, as appropriate.
1.25.4.7. Ensure facial hair does not interfere with proper respirator fit.
1.25.5. Respiratory Protection:
1.25.5.1. 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.
1.25.5.2. Develop, implement, and maintain respirator program.
1.25.5.3. Monitor, evaluate, and provide respiratory protection for site personnel.

1.25.5.4. Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified onsite.
1.25.5.5. In absence of additional air monitoring information or substance identification, retain an industrial hygiene specialist to determine minimum levels of respiratory protection required.
1.25.5.6. Immediately notify Departmental Representative when level of respiratory protection required increases.
1.25.5.7. Ensure appropriate respiratory protection during Work activities. As minimum requirement, ensure that persons entering potentially contaminated work areas are supplied with and use appropriate respiratory protection.
1.25.6. Heat Stress/Cold Stress: implement heat stress or cold stress monitoring program as applicable and include in site-specific Health and Safety Plan.
1.25.7. Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows:
1.25.7.1. Suitable containers for storage and disposal of used disposable PPE.
1.25.7.2. Potable water and suitable sanitation facility.
1.25.8. Emergency and First-Aid Equipment:
1.25.8.1. 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.
1.25.9. Site Communications:
1.25.9.1. Identify, supply and implement appropriate dedicated communication devices for Site and post emergency numbers near dedicated devices.
1.25.9.2. Ensure personnel use of "buddy" system and develop hand signal system appropriate for site activities.
1.25.9.3. Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary.
1.25.9.4. Furnish selected personnel with 2-way radios.
1.25.9.5. Safety Meetings: conduct mandatory daily safety meetings for personnel, and additionally as required by special or Work-related conditions; include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new site conditions as encountered. Hold additional safety meetings on as-needed basis.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Non-Contaminated Quality Soil Transport and Disposal will be paid in accordance with unit rate price established for weight of material disposed. Measurement as recorded on weigh scale certified by Measurement Canada and results provided to Departmental Representative on Certificates of Disposal. Includes Treatment or any other processing of material required by Disposal Facility but not required by the Contract.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Environmental Protection Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit a plan detailing protection of the environment. Include:

1.3.1.1. Comprehensive overview of known or potential environmental issues to be addressed during Work.

1.3.1.2. Identify requirements that plan complies with. Includes: permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract.

1.3.1.3. Communications identifying emergency contact list and conditions for implementing emergency contact. Emergency contact to include: Contractor emergency response team including Superintendent; Departmental Representative and alternate, and other contractor(s) and individuals as directed by the Departmental Representative; and federal, provincial, and municipal emergency contacts.

1.3.1.4. Work Area showing proposed activity in each portion of areas, such as exclusion zone(s), decontamination zone(s) and clean zone(s), and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized Work areas.

1.3.1.5. Drawings showing locations of proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials onsite.

1.3.1.6. Historical, Archaeological, Cultural Resources, Biological Resources and Valued Habitat Protection that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and valued habitat. Include procedures if previously unknown historical, archaeological, cultural, and biological resources are discovered during Work. Includes Species At Risk.

1.3.1.7. Non-Contaminated Quality Soil and Water Management including onsite handling to manage Solid Waste, Sewage, and Wastewater.

1.3.1.8. Non-Contaminated Quality Soil Transport and Disposal including transportation frequency and identifying offsite disposal facilities to manage Solid Waste.

1.3.1.9. Traffic Control including signage and traffic control personnel for Site ingress and egress. Vehicles and vehicle traffic must comply with all federal, provincial, and municipal laws and regulations.

1.3.1.10. Noise Control identifying methods, means, and sequences for preventing, monitoring, and controlling noise for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include thresholds and procedures if: noise does not comply with appropriate levels, or if there are public complaints.

1.3.1.11. Vibration Control identifying methods, means, and sequences for preventing, monitoring, and controlling vibration for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; in accordance with the Contract; in accordance with recommendations from the Contractor's Qualified Professional. Include thresholds and procedures if: vibration does not comply with appropriate levels, there are public complaints, or if onsite or offsite damage occurs.

1.3.1.12. Vapours, Dust, and Particulate Control identifying methods, means, and sequences for preventing, monitoring, and controlling vapours, dust and other airborne particulates for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include thresholds and procedures if: vapours, dust, and particulates do not comply with appropriate levels, there are public complaints, or if onsite or offsite damage occurs.

1.3.1.13. Spill Control identifying methods, means, and sequences for preventing, monitoring, and controlling spills for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Identify reporting requirements for spills. Identify locations and contents of spill kits.

1.3.1.14. Erosion and Sediment Control identifying methods, means, and sequences for preventing, monitoring, and controlling erosion and sedimentation for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract.

1.3.1.15. Work in or Adjacent to Waterways Control, as required, identifying methods, means, and sequences for preventing, monitoring, and controlling work in or adjacent to waterways for compliance with: applicable permits, certificates,

approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract.

1.3.1.16. Monitoring requirements for general compliance with Environmental Protection Plan.

1.3.2. Submit amended Environmental Protection Plan if there changes to the assumed site conditions, changes to the Work procedures, or in the event that any methods and procedures are inadequate as directed by the Departmental Representative.

1.3.3. Submit Spill and Response Report for all Spills. Include: description of spill (location, time, quantity and quality), notifications (including copies of any reports forwarded to regulatory agencies), and describe any remediation activities (time, quantity, quality, and fate of spill impacted material). Include environmental analytical results for spill or other environmental testing.

1.3.4. After hours work: at least 5 Working Days prior to commencing after hours work Submit a schedule showing requested dates, times, and reasons for after hours work. Approval will only be granted for reasons valid, if request can be reasonably accommodated by other contractors and Site users, and third parties are not adversely affected, in the sole opinion of the Departmental Representative.

1.4. Contractor's Qualified Professional

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

1.5. Cleaning

1.5.1. Maintain cleanliness of Work and surrounding Site to comply with federal, provincial, and municipal fire and safety laws, ordinances, codes, and regulations applicable to the performance of the Work.

1.5.2. Coordinate cleaning operations with disposal operations to prevent accumulation of dust, dirt, debris, rubbish, and waste materials.

1.5.3. Ensure cleanup of the Work areas each day after Final Completion of Work.

1.6. Site Clearing and Plant Protection

1.6.1. Minimize stripping of Topsoil and vegetation. Use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction.

1.6.2. Restrict tree and plant removal to areas in accordance with the Contract or as directed by the Departmental Representative. To greatest extent practicable, prune or top the vegetation instead of grubbing/uprooting. Protect all other trees and plants onsite and offsite.

1.6.3. Salvage all trees and plants to be removed in accordance with the Contract or as directed by the Departmental Representative.

1.6.4. Wrap salvaged trees in burlap, trees and shrubs adjacent to construction Work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.
1.6.5. Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
1.6.6. Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.
1.6.7. Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.
1.6.8. Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.
1.6.9. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.

1.7. Archaeological

1.7.1. Attend archaeological awareness training provided by Departmental Representative.
1.7.2. Abide by Chance Find Procedures developed by Departmental Representative, as appropriate.

1.8. Species At Risk

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

1.9. Non-Contaminated Quality Soil and Water Management

1.9.1. Solid waste
1.9.1.1. Remove all Non-Contaminated Quality Soil within Work areas in accordance with the Contract and as directed by the Departmental Representative.
1.9.1.2. Remove surplus materials and temporary facilities from Site.
1.9.1.3. Do not burn or bury any waste onsite.
1.9.1.4. Do not discharge wastes into streams or waterways.
1.9.1.5. Do not dispose of volatile or hazardous materials such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
1.9.1.6. Dispose of all Non-Contaminated Quality Soil at a Landfill Facility.

1.9.2. Sewage

1.9.2.1. Store Sewage from toilet facilities with wastewater from handbasins, and/or showers, for ultimate disposal.

1.9.2.2. Provide, operate, and maintain Sewage storage tanks to store Sewage.

1.9.2.3. Transport and dispose of Sewage at a Disposal Facility, or discharge to municipal sanitary sewer system in compliance with Municipal requirements, as accepted by Departmental Representative.

1.9.2.4. Discharges: comply with applicable discharge limitations and requirements; do not discharge Sewage to Site sewer systems that do not conform to or are in violation of such limitations or requirements; and obtain approval prior to discharge of Sewage.

1.9.3. Wastewater

1.9.3.1. Dewater various parts of Work including, excavations, structures, foundations, and Work areas, unless otherwise specified or directed by Departmental Representative.

1.9.3.2. Employ construction methods, plant procedures, and precautions that ensure Work, including excavations, are stable, free from disturbance, and dry.

1.9.3.3. Direct surface waters that have not contacted potentially Contaminated Material to surface drainage systems.

1.9.3.4. Control surface drainage including ensuring that gutters are kept open, wastewater is not allowed across or over pavements or sidewalks except through accepted pipes or properly constructed troughs, and runoff from unstabilized areas is intercepted and diverted to suitable outlet.

1.9.3.5. Dispose of Wastewater in manner not injurious to public health or safety, to the environment, to onsite or offsite property, or to any part of Work completed or under construction.

1.9.3.6. Control disposal or runoff of Wastewater containing suspended materials or other harmful substances in accordance with local authority requirements.

1.9.3.7. Ensure pumped Wastewater into waterways, sewer or drainage systems is free of suspended materials. Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

1.9.3.8. Obtain permits to discharge Wastewater to environment or municipal system (sewer, ditches).

1.9.3.9. Do not discharge water which may have come in contact with potentially Contaminated Soil or otherwise be Contaminated directly offsite to the environment or to municipal system.

1.10. Non-Contaminated Quality Soil Transport and Disposal

1.10.1. Assume ownership of, and be responsible for, Non-Contaminated Quality Soil once it is loaded on a vehicle, barge, or other vessel for Transport. Assume ownership of, and be responsible for, Non-Contaminated Quality Soil Disposed.

1.10.2. Transport material as soon as practical; do not unreasonably stockpile onsite.

1.10.3. Cover material while being transported to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation from material.
1.10.4. Excess water in material must not be allowed to flow out of vehicle or vessel during transport.
1.10.5. Stabilize material as necessary.
1.10.6. All vehicles, vessels and operators must be appropriately licensed and equipped to transport Non-Contaminated Quality Soil.
1.10.7. Barges must be inspected by an independent Marine Surveyor for stability and safety.
1.10.8. Non-Contaminated Quality Soil Disposal: dispose all Non-Contaminated Quality Soil, at Landfill Facility provided by Contractor and accepted by the Departmental Representative.
1.10.9. Landfill Facility must:
1.10.9.1. Be an existing offsite facility located in British Columbia or the Yukon.
1.10.9.2. 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.
1.10.9.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by the BC government or the Yukon government, as appropriate, for the Disposal of relevant Non-Contaminated Quality Soil.
1.10.9.4. Comply with the BC Environmental Management Act and BC Landfill Criteria for Municipal Solid Waste, or Yukon Environment Act and Yukon Solid Waste Regulations, as appropriate.
1.10.9.5. Comply with applicable municipal zoning, bylaws, and other applicable requirements.
1.10.10. Dispose material as soon as practical and within 100 Working Days of leaving Site or as required by Contract unless otherwise accepted by Departmental Representative.
1.10.11. Material sent to a Landfill Facility must be permanently stored at that facility.
1.10.12. If proposed Landfill Facility is not acceptable to Departmental Representative, provide an alternate Landfill Facility that is acceptable.

1.11. Traffic Control

1.11.1. Ensure pedestrians have safe and unencumbered access in public areas. Provide traffic control personnel as required or as directed by Departmental Representative.
1.11.2. Comply with requirements of acts, regulations and bylaws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
1.11.3. Comply with current version of WorkSafeBC Occupational Health and Safety Regulation *Part 18 Traffic Control* or Yukon Workers' Compensation Health

and Safety Board Occupational Health and Safety Act and Regulations *Public Way 1.46 and 1.47*, as appropriate.

1.11.4. Comply with current version of BC Ministry of Transportation and Infrastructure *2015 Interim Traffic Management Manual for Work on Roadways*.

1.11.5. Obtain all necessary permits or other authorizations regarding traffic control, including access and road usage.

1.11.6. Provide and maintain road access and egress to property fronting Site and in other areas in accordance with the Contract, except where other means of road access exist that are accepted.

1.11.7. Prevent tracking or spilling of debris or material onto public roads.

1.11.8. Immediately sweep or scrape up debris or material on public roads.

1.11.9. Clean public roads within a minimum 200 m radius of the Site entrance or as required at least once per shift, or as directed by Departmental Representative.

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

1.12. Noise, Vibration, Vapours, and Dust Control

1.12.1. Maintain acceptable levels not injurious or objectionable to public health or safety or to the environment.

1.12.2. Comply with applicable municipal bylaws and other applicable requirements unless otherwise specified or directed by Departmental Representative; otherwise Contractor's Qualified Professional to determine acceptable levels (eg noise greater than 65 dBa, vibration greater than 0.315 m/s^2 (based on ISO 2631-1)).

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

1.12.4. Specific procedures to prevent dust:

1.12.4.1. Cover or wet down relevant Work to prevent vapours and blowing dust and debris, including temporary roads, excavations, and stockpiles. In urban environments or if sensitive neighbouring properties (eg residences) provide full time coverage or wetting down.

1.12.4.2. Covers to be impermeable (eg minimum 5 mil polyethylene) and securely fashioned to prevent blowing off. Use fresh (non-saline) water for dust and particulate control.

1.12.4.3. Use appropriate covers on vehicles, including trucks, barges, and trains, hauling vapour-generating or fine or dusty material. Use watertight vehicles to haul wet materials.

1.13. Spill Control

1.13.1. Pollution includes spills or other releases from Contractor's activities that could potentially contaminate soil, sediment, water, and atmosphere from discharge of hazardous, deleterious or regulated substances, including from equipment and material handling.

1.13.2. Prevent spills or releases.

1.13.2.1. Maintain temporary erosion and pollution control features.

1.13.2.2. Do not store fuel onsite other than tanks forming part of the equipment.

1.13.2.3. Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, poured concrete or other chemicals do not enter the watercourse.

1.13.2.4. Control emissions from equipment and plant to meet applicable authorities' emission requirements.

1.13.2.5. Contractor to regularly inspect all machinery on the Site to ensure it is in good repair and free of leaks.

1.13.3. Be prepared to intercept, cleanup, and dispose of spills or other releases that can occur whether on land or water.

1.13.4. Spill kits and containment are to be maintained onsite and ready for deployment in the event of spills or other releases.

1.13.4.1. Spill kits are to include sufficient quantities of absorbent material, containers, booms, shovels and other tools, and personal protective equipment.

1.13.4.2. Spill response materials must be compatible with type of equipment being used or type of material being handled.

1.13.4.3. Spill kits are to be in close proximity to machinery.

1.13.4.4. During the Work there are to be trained and qualified personnel available that are ready to deploy spill kits when necessary.

1.13.5. Take immediate action using available resources to contain and mitigate effects on environment and persons from spill or release.

1.13.6. Promptly report spills and releases potentially causing damage to environment to:

1.13.6.1. Authority having jurisdiction or interest in spill or other release including conservation authority, water supply authorities, drainage authority, road authority, and fire department.

1.13.6.2. Contractor emergency response team including Superintendent

1.13.6.3. Departmental Representative and other contractor(s) and individuals as directed by the Departmental Representative.

1.13.7. Departmental Representative can collect samples for chemical analyses prior to, during, and upon Final Completion of Work to monitor potential pollution caused by Contractor's activities. Assist Departmental Representative in collection of samples.

1.13.8. Remediation of soil, sediment or water contaminated by Contractor's activities.
1.13.8.1. Remediate all soil, sediment or water contaminated by Contractor's activities associated with the Work onsite and offsite.
1.13.8.2. Remediation includes excavation, pumping, testing, transport, treatment and disposal as appropriate for the type of contamination incurred, and at a minimum in accordance with the Contract.
1.13.8.3. Submit procedures for remediating soil, sediment or water contaminated by Contractor's activities.
1.13.8.4. Remediate as directed by the Departmental Representative.
1.13.8.5. Contractor is responsible for any additional investigation, testing, and assessments required as acceptable to the Departmental Representative.
1.13.9. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.

1.14. Erosion and Sediment Control

1.14.1. Implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear.
1.14.2. Install effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
1.14.3. Manage water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system.
1.14.4. Implement site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required (e.g., dredging, underwater cable installation).
1.14.5. Contain and stabilize waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
1.14.6. Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction.
1.14.7. Repair erosion and sediment control measures and structures if damage occurs.
1.14.8. Remove non-biodegradable erosion and sediment control materials once site is stabilized.
1.14.9. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of

neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.

1.15. Work In or Adjacent to Waterways

1.15.1. Approvals and Practices:

1.15.1.1. As required, comply with Fisheries Act Authorization and other relevant authorizations and in accordance with the Contract.

1.15.1.2. Restrict Work as described in, and follow requirements in, Contract including Environmental Effects Determination, Environmental Management Plan, Aquatic Effects Assessment, Environmental Mitigation Strategy, or similar documents. Variations allowed only if recommended by Contractor's Qualified Professional and approved by Departmental Representative.

1.15.1.3. Follow practices described in *Land Development Guidelines for the Protection of Aquatic Habitat* (Fisheries and Oceans Canada, 1993 September) and *Measures to avoid causing harm to fish and fish habitat including aquatic species at risk* (Fisheries and Oceans Canada, 2016 November 18).

1.15.1.4. Follow practices described in *Standards and Best Practices for Instream Works* (BC Ministry of Environment, 2004 March).

1.15.2. Timing

1.15.2.1. Time work in water to respect timing windows to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed.

1.15.2.2. Minimize duration of in-water work.

1.15.2.3. Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.

1.15.2.4. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.

1.15.3. Site Selection

1.15.3.1. Design and plan activities and works in wetland and waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided.

1.15.3.2. Design and construct approaches to wetland and waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation.

1.15.3.3. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or the built structures.

1.15.3.4. Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.

1.15.4. Shoreline/bank Re-vegetation and Stabilization

1.15.4.1. Clearing of riparian vegetation should be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting.

1.15.4.2. Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.

1.15.4.3. Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.

1.15.4.4. Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.

1.15.4.5. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.

1.15.4.6. Remove all construction materials from site upon project completion.

1.15.4.7. Do not remove riparian vegetation if the riparian area is identified as part of critical habitat of an aquatic listed Species At Risk.

1.15.5. Aquatic Life Protection

1.15.5.1. Ensure that all in-water activities, or associated in-water structures, do not interfere with aquatic life passage, constrict the channel width, or reduce flows, or result in the stranding or death of aquatic life.

1.15.5.2. Contractor's Qualified Professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the site.

1.15.5.3. Any capture and relocation of an endangered or threatened aquatic Species At Risk will require approval from Department of Fisheries and Oceans.

1.15.6. Water Intake or Outlet Pipe Screening:

1.15.6.1. Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself.

1.15.6.2. Screens should be located in areas and depths of water with low concentrations of fish throughout the year.

1.15.6.3. Screens should be located away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.

1.15.6.4. The screen face should be oriented in the same direction as the flow.

1.15.6.5. Ensure openings in the guides and seals are less than the opening criteria to make "fish tight".

1.15.6.6. Screens should be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.

1.15.6.7. Structural support should be provided to the screen panels to prevent sagging and collapse of the screen.

1.15.6.8. Large cylindrical and box-type screens should have a manifold installed in them to ensure even water velocity distribution across the screen surface. The ends of the structure should be made out of solid materials and the end of the manifold capped.

1.15.6.9. Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where there is debris loading (woody material, leaves, algae mats, etc.). A 150 mm (6 in.) spacing between bars is typical.

1.15.6.10. Provision should be made for the removal, inspection, and cleaning of screens.

1.15.6.11. Ensure regular maintenance and repair of cleaning apparatus, seals, and screens is carried out to prevent debris-fouling and impingement of fish.

1.15.6.12. Pumps should be shut down when fish screens are removed for inspection and cleaning.

1.15.7. Explosives:

1.15.7.1. Avoid using explosives in or near water. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.

1.15.7.2. Do not use explosives where SARA-listed aquatic species, their residences or critical habitat occur, without review by Department of Fisheries and Oceans.

1.15.8. Operation of Machinery

1.15.8.1. Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds.

1.15.8.2. Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody.

1.15.8.3. Limit machinery fording of the watercourse to a one-time event (ie over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure.

1.15.8.4. Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (eg dominated by organic materials and silts) banks and beds. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (eg swamp mats, pads) if minor rutting is likely to occur during fording.

1.15.8.5. Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.

1.15.8.6. Do not ford, place crossing materials or operate machinery on the bed of a waterbody where SARA-listed shellfish occur, or critical habitat or residences of freshwater SARA-listed aquatic species occur.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Site Facilities - Provision will be paid in accordance with lump sum price established to design, temporarily provide for duration of Work, and erect all infrastructure in accordance with the Contract. Includes temporary structures and facilities, environmental protection, stockpile areas, access, onsite roadways, temporary hoarding, security fencing, federal signage, office facilities, sanitary facilities, stormwater management infrastructure, lighting, and utilities.

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

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Site Layout: within 10 Working Days after Contract award and prior to mobilization to Site, Submit Site Layout drawings showing existing conditions and facilities, construction facilities and temporary controls provided by Contractor. Include:

1.3.1.1. Equipment and personnel decontamination areas.

1.3.1.2. Means of ingress, egress and temporary traffic control.

1.3.1.3. Equipment and material staging areas.

1.3.1.4. Stockpile areas and construction details, including base preparation and water control features.

1.3.1.5. Exclusion areas, contaminant handling areas, and other areas identified in Contractor's site-specific Health and Safety Plan and Environmental Protection Plan.

1.3.1.6. Grading, including contours, required to construct temporary facilities.

1.3.1.7. Location of all temporary facilities including: Onsite Contaminated Water Treatment Plant, truck wash and decontamination units, office trailers, modular camp structures, parking, storage, environmental monitoring

stations, above ground and underground utilities, roads, and other temporary facilities.

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

1.4. Utilities

1.4.1. Utilities not identified as being available on Site must be supplied at the Contractor's expense. Provide supplied utilities for entire work force, including Subcontractors and Departmental Representative and their consultants.

1.4.1.1. Electrical power is available to the PEC Site via primary overhead electrical transmission lines that are located along the MV right of way. Contractor is responsible for modification to the existing services to meet their needs. Alternatively, Contractor may supply their own generators

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 area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

1.7.2. Identify areas which have to be graveled or otherwise treated to prevent tracking of mud.

1.7.3. Indicate use of supplemental or other staging area.

1.7.4. Provide construction facilities in order to execute work expeditiously.

1.7.5. Provide temporary utilities in order to execute Work expeditiously.

1.7.6. Remove from Site all such Work after use.

1.8. Site Storage/Loading

1.8.1. Confine work and operations of employees in accordance with the Contract. Do not unreasonably encumber premises with products.

1.8.2. Storage space must be limited to the Site.

1.8.3. Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.9. Construction Parking

1.9.1. Parking of private vehicles will not be permitted on Site, unless otherwise agreed to by Departmental Representative.

1.9.2. Provide and maintain adequate access to project site.

1.10. Security

1.10.1. Be responsible security of site and contents of site after working hours and during holidays. Provide onsite security personnel as appropriate and in accordance with the Contract.

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

1.11. Office Facilities

1.12. The Contractor may only use the east room of the PEC Site office for general meetings with the Departmental Representative and the consultant. No additional office space will be provided.

1.13. If the Contractor requires additional office facilities, including meeting/project management space, phone and fax facilities, the Contractor shall supply and maintain temporary site facilities in the Contractor Support Zone Area noted on the drawing.

1.14. Electrical power is available to the PEC Site via primary overhead electrical transmission lines that are located along the MV right of way. Contractor is responsible for modification to the existing services to meet their needs. Alternatively, Contractor may supply their own generators.

1.15. Location of proposed site facilities mentioned above shall be discussed with the Departmental Representative before commencing. The Departmental Representative may restrict the location for Contractor work areas (e.g. location of field offices)

1.16. Equipment, Tools and Materials Storage

1.16.1. Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

1.16.2. Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.17. Sanitary Facilities

1.17.1. Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

1.17.1.1. The Contractor shall supply and maintain temporary toilet facilities in the Contractor Support Zone Area.

1.17.2. Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.18. Construction Signage

1.18.1. Provide and erect 2 project signs within 10 Working Days of mobilization in a location designated by Departmental Representative. Project signs must, unless otherwise directed by Departmental Representative, include: name of Client, name of Project, and information contact number in both official languages using graphic symbols to CAN/CSA-Z321. Project signs to be a minimum of 1200 x 2400mm.

1.18.2. Contractor signage must be approved by Departmental Representative.

1.18.3. Contractor signage must include at a minimum:

1.18.3.1. Name of Contractor.

1.18.3.2. Emergency contact number.

1.18.3.3. Personal Protective Equipment requirements.

1.18.3.4. Other pertinent safety warnings (eg “open excavation”).

1.18.4. 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.

1.19. Protection and Maintenance of Traffic

1.19.1. Where applicable, traffic to include pedestrian traffic.

1.19.2. Provide access and temporary relocated roads as necessary to maintain traffic.

1.19.3. Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

1.19.4. Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.

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

1.19.6. Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

1.19.7. Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

1.19.8. Construct access and haul roads necessary.

1.19.9. Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic must be avoided.

1.19.10. Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

1.19.11. Dust control: adequate to ensure safe operation at all times. The Contractor shall supply and operate a water truck/mobile street washer (or equivalent) for the purposes of dust suppression and control.

1.19.12. Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

1.19.13. Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
1.19.14. Provide snow removal during period of Work.
1.19.15. Remove, upon completion of work, haul roads designated by Departmental Representative.

1.20. Truck Wash and Decontamination Units

1.20.1. Operate existing truck wash, including the installation of a water supply.
1.20.1.1. No vehicles which have come in contact with Contaminated Material must leave the Site without passing through the truck wash.
1.20.1.2. The truck wash must provide, at a minimum, the ability to wash truck tires and load boxes to a minimum height of 1.7 m.
1.20.1.3. Truck wash must have a solid separation tank and all solids collected must be classified as Contaminated Soil and disposed of at a Disposal Facility.
1.20.1.4. Recycle or treat as Contaminated Water truck wash water.
1.20.2. Alternatives to a truck wash, including isolating truck traffic from contact with contaminated material, may be approved by the Departmental Representative. Alternatives will not be accepted if, in the opinion of the Departmental Representative, the alternatives are not adequately designed or performing.
1.20.3. Supply personnel decontamination units (minimum of 2) for use by hazardous material, testing and inspection personnel working in areas of hazardous materials and for general clean-up of personal protective equipment to remove Contaminated Material. Provide decontamination units for work force
1.20.3.1. At least one personnel decontamination unit must have overhead shower capability.
1.20.3.2. The personnel decontamination units to be available to Departmental Representative and their consultants.
1.20.3.3. The personnel decontamination units are subject to acceptance of Departmental Representative.
1.20.4. The truck wash and personnel decontamination units must be maintained in good working order during onsite Work.
1.20.5. The truck wash must be emptied and cleaned during Site Decommissioning. This includes disposing of the wastewater offsite and removing sediments from the truck wash and piling onsite at the direction of the Departmental Representative.
1.20.6. The truck wash and personnel decontamination units must be removed from the Site during Site Decommissioning.

1.21. Clean-Up

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

1.22. Storage Tanks

1.22.1. Abide by the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations for stored petroleum products and allied petroleum products tank system located on federal or Aboriginal land, or within federal jurisdiction as described in the regulations.
1.22.2. Temporary storage tanks subject to the regulations must be registered with Environment Canada.
1.22.3. Mobile tanks subject to the regulations must be certified to be mobile.
1.22.4. Storage tanks to meet the following minimum requirements:
1.22.4.1. Corrosion protection.
1.22.4.2. Secondary containment.
1.22.4.3. Containment sumps, if applicable.
1.22.4.4. Overfill protection.
1.22.5. All components of tank system must bear certification marks indicating that they conform to the standards set out in the regulations.
1.22.6. Product transfer area must be designed to contain spills.
1.22.7. Prepare an emergency plan.
1.22.8. Prior to first filling, storage tanks must:
1.22.8.1. Be registered.
1.22.8.2. Be certified and marked.
1.22.8.3. Transfer area be constructed.
1.22.8.4. Emergency plan in place.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Oversize Debris Removal will be paid in accordance with unit rate price established for time to remove oversize material from excavation. Does not include Transport or Disposal of debris. Measurement as recorded time by Departmental Representative.

1.1.2. Excavation will be paid in accordance with unit rate price established for volume of material removed to excavate to Contaminated Soil Extents according to Drawings. Includes temporary sloping and shoring design and construction. Includes removal of previous backfilled material to access Contaminated Soil excavation. Includes all onsite handling, loading, hauling, unloading and stockpiling, including hauling to Onsite Storage Cells and Transfer Facility as required. Measurement as recorded stockpile volume using Progress Survey for interim measurement and Contractor's Qualified Professional Surveyor for final stockpile volumes (As-Built).

1.1.3. Backfill–Imported will be paid in accordance with unit rate price established per weight for material imported for Backfill for Excavation. Includes Contractor's analytical testing and inspections to demonstrate compliance with Contract, provision, all onsite and offsite handling, loading, hauling, unloading, placing, grading and compacting. Measurement as recorded on weigh scale certified by Measurement Canada and results provided to Departmental Representative.

1.1.4. Backfill–Overburden will be paid in accordance with unit rate price established for volume of Overburden material suitable for reuse as Backfill for Excavation. Includes all onsite handling, loading, hauling, unloading and stockpiling. Measurement as recorded insitu Excavation volume using Progress Survey for interim measurement and Contractor's Qualified Professional Surveyor for final excavation extents (As-Built). Insitu volume is simple dimensions of excavation and does not consider exsitu bulking (expansion or swell) and insitu compaction (densifying) factors.

1.1.5. Backfill–Owner Supplied will be paid in accordance with unit rate price established for volume of material supplied by PWGSC from sources according to Contract for Backfill for Excavation. Includes all onsite and offsite handling, loading, hauling, unloading and stockpiling. Measurement as recorded stockpile volume using Progress Survey for interim measurement and Contractor's Qualified Professional Surveyor for final stockpile volume.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Excavation Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Sites Excavation for compliance with: applicable permits, certificates, approvals,

or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include:

1.3.1.1. Excavation temporary slope and/or shoring design.

1.3.1.2. Methods, means, and sequences for excavation dewatering and heave protection.

1.3.1.3. Support of structures design.

1.3.1.4. Procedures for excavations adjacent to utilities or other structures if the excavation has the potential to impact utilities or other structures.

1.3.1.5. Backfilling requirements. Meet or exceed requirements in accordance with the Contract and any other codes, bylaws, rules and regulations applicable to the performance of the Work. Backfilling requirements includes Imported Backfill and Owner Supplied Backfill.

1.3.1.6. Backfilling design for utilities or other infrastructure to be reinstated or new.

1.3.1.7. Monitoring and inspection requirements, including frequency or milestones when Contractor's Qualified Professional must inspect Works.

1.3.1.8. Excavation Plan must be signed and sealed by Contractor's Qualified Professional, as required by ground conditions, excavation depth, shoring type, or support type.

1.3.2. Import Backfill Material Quality: at least 5 Working Days prior to bringing material onsite, Submit documentation signed and sealed by Contractor's Qualified Professional verifying that material is acceptable for import and intended use. Include:

1.3.2.1. Grain-size distribution information.

1.3.2.2. Chemical analyses for Potential Contaminants of Concern, including metals.

1.3.2.3. Testing to be performed by Contractor's Qualified Professional at sufficient frequency to characterize all Imported Backfilled. Test using appropriate guidelines and practices.

1.3.3. Import Backfill Samples: at least 10 Working Days prior to bringing material to Site, Submit samples of Imported Backfilled.

1.3.3.1. Samples to be representative of all Imported Backfilled. Sample frequency subject to acceptance by Departmental Representative.

1.3.3.2. Submit sufficient sample size to allow geotechnical and environmental quality testing as directed by Departmental Representative.

1.3.4. Temporary Hoarding and Fencing: at least 5 Working Days prior to installation, Submit a description of temporary hoarding and fencing.

1.3.5. Monitoring and Testing Results: within 5 Working Days of sampling, Submit all monitoring and testing results. Include procedures, frequency of sampling, Quality Assurance and Quality Control testing and documentation to be provided. Provide monitoring and testing results, including any assessments performed by Contractor's Qualified Professional. Include:

1.3.5.1. Backfill testing results, including geotechnical and environmental quality, confirming results meet requirements in Contract and Excavation Plan.

1.3.5.2. Compaction testing results, confirming results meet requirements in Contract and Excavation Plan.

1.4. Sequencing for Free Phase Products

1.4.1. When floating free phase substance (NonAqueous Phase Liquids) is present, remove free phase from saturated soil or sediment without further contaminating soil, sediment or groundwater prior to commencing other construction Work.

1.4.2. Collect free phase product (NAPL), load, and transport to a Treatment Facility.

2. PART 2 - PRODUCTS

2.1. Materials

2.1.1. Short term temporary liners and covers to be a minimum of 4 mil plastic.

2.1.2. Erosion and sediment control materials to meet the following minimum requirements:

2.1.2.1. Hay or Straw Bale: wire bound or string tied; securely anchored by at least 2 stakes or rebars driven through bale 300 mm to 450 mm into ground; chinked (filled by wedging) with hay or straw to prevent water from escaping between bales; and entrenched minimum of 100 mm into ground.

2.1.2.2. Silt Fence: assembled, ready to install unit consisting of geotextile attached to driveable posts. Geotextile: uniform in texture and appearance, having no defects, flaws, or tears that would affect its physical properties; and contain sufficient ultraviolet ray inhibitor and stabilizers to provide minimum 2-year service life from outdoor exposure.

2.1.2.3. Net Backing: industrial polypropylene mesh joined to geotextile at both top and bottom with double stitching of heavy-duty cord, with minimum width of 750 mm.

2.1.2.4. Posts: sharpened wood, approximately 50 mm square, protruding below bottom of geotextile to allow minimum 450 mm embedment; post spacing 2.4 m maximum. Securely fasten each post to geotextile and net backing using suitable staples.

2.1.3. Gradations to be within limits specified when tested to ASTM C117-13 (Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing) and ASTM C136-06 (Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates). Sieve sizes to SCC CAN/CGSB-8.1-88 (Sieves, Testing, Woven Wire, Inch Series) and CAN/CGSB-8.2-M88 (Sieves, Testing, Woven Wire, Metric Series).

2.1.4. Import fill materials to meet the following minimum geotechnical requirements:

2.1.4.1. Import fill materials must be granular aggregate composed of inert, clean, tough, durable particles of crushed rock, gravel and sand capable of withstanding the deleterious effects of exposure to water, freeze-thaw, handling, spreading and compacting. The aggregate particles must be uniform in quality and free from clay lumps, wood and free from an excess of flat or elongated pieces.

2.1.4.2. The imported backfill total silt and clay content not to exceed 15% by mass or as required by Contract unless otherwise accepted by Departmental Representative.

2.1.5. Import fill materials to meet the following minimum environmental quality requirements for the site:

2.1.5.1. Import fill materials must originate from a clean source, and be the lesser of the Canadian Council of Ministers of the Environment Soil Quality Guidelines for Residential Land Uses, and the British Columbia Contaminated Sites Regulation Schedule 3.1 Urban Park (PL) for the top 3 m and CSR Schedule 3.1 Commercial (CL) below 3 m considering only the flow to surface water used by aquatic life or as required by Contract unless otherwise accepted by Departmental Representative.

2.1.5.2. Import fill material that is cobble sized or larger (> 64mm) brought onsite must be tested by the Contractor for Acid Rock Drainage (ARD) and Metals Leaching (ML) potential using Acid Base Accounting (ABA) for assessment of ARD potential and more specifically using the Modified Sobek Test Method. The potential for metals leaching must use Shake Flask Extraction (SFE) Method for analysis of metals leaching. See guidance document *Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials* MEND Report 1.20.1, Natural Resources Canada, Price 2009.

2.1.5.3. Any import fill material which has a discrete sample exceeding the environmental quality requirements specified must be removed from the Site and replaced, including relevant placed material, as directed by the Departmental Representative. An alternate source of backfill must be provided, with no increases to Contract Amount or Extension of Time for completion of the Work.

2.1.5.4. Environmental quality requirements may be modified by the Departmental Representative taking into consideration background concentrations, commercially available material, and site-specific factors and/or land use.

2.1.6. Import fill material additional testing:

2.1.6.1. Perform additional testing as directed by the Departmental Representative to confirm suitability.

2.1.6.2. Facilitate testing by the Departmental Representative to confirm suitability.

2.1.7. Asphalt, as required, must, at minimum, meet the specifications for: Upper Course #1 mix-type as specified in Section 32 12 16, Hot Mix Asphalt Concrete Paving; of the current version of the *BC Master Municipal Construction Document (2009) Platinum Edition*.

3. PART 3 - EXECUTION

3.1. Examination

3.1.1. Site Verification of Conditions:

3.1.1.1. Contractor to determine condition of existing Site and requirements to make the Site suitable for Work.

3.2. Site Preparation and Operation

3.2.1. Site Preparation and operation includes construction, operation and maintenance for the duration of the Work,

3.2.2. Clearing and grubbing of the Site to allow access for Work.

3.2.2.1. Clearing consists of removing Non-Contaminated Quality Soil vegetation above existing ground surface to facilitate Work. Includes: cutting off trees and brush vegetative growth, felled trees, previously uprooted trees and stumps. Dispose of Non-Contaminated Quality Soil at a Landfill.

3.2.2.2. Grubbing consists of excavation of Non-Contaminated Quality Soil below existing ground surface to facilitate Work. Includes: stumps, roots, boulders and rock fragments. Dispose of Non-Contaminated Quality Soil at a Landfill.

3.2.3. Remove obstructions, ice and snow, from surfaces to be worked.

3.2.4. Stripping of Overburden

3.2.4.1. Commence Overburden stripping of areas according to Drawings after stripping of Topsoil.

3.2.4.2. Strip Overburden to depths according to Drawings. Do not mix Overburden with other soils.

3.2.4.3. Stockpile Overburden as directed by Departmental Representative.

3.2.4.4. Segregate and stockpile Topsoil separately from other Overburden.

3.2.4.5. Testing of Overburden may be required if suspected of being Contaminated. Contaminated Overburden will be considered Contaminated Soil.

3.2.4.6. Reuse Overburden as Backfill as directed by Departmental Representative and agreed to by Contractor's Qualified Professional. Dispose of unused Overburden as Non-Contaminated Quality Soil as directed by Departmental Representative.

3.2.4.7. Reuse suitable Topsoil as final grading surface, as accepted by Departmental Representative. Dispose of unsuitable or unused Topsoil as directed by Departmental Representative, and replace with suitable imported topsoil.

3.2.5. Protect monitoring wells encountered incidentally within final Contaminated Soil Extents.

3.2.5.1. Protect monitoring wells outside Contaminated Soil Extents. Replace damaged monitoring wells as directed by the Departmental Representative at Contractor's expense.

3.2.6. Protection:

3.2.6.1. Protect existing features with temporary barriers and enclosures as required by applicable local regulations.

3.2.6.2. Protect natural and man-made features required to remain undisturbed. Unless otherwise required or located in an area to be occupied by new construction, protect existing trees from damage.

3.2.6.3. Protect buried utilities that are required to remain undisturbed.

3.2.6.4. Provide temporary structures to divert flow of surface water from excavation.

3.2.7. Security and Safety:
3.2.7.1. Provide safety measures to ensure worker and public safety.
3.2.7.2. Ensure Excavations are secure during onsite Work, provide, install, and remove fencing, temporary hoarding, and other security measures as required and specified.

3.3. Import Fill Material

3.3.1. Do not import fill material until Departmental Representative has completed and analysed testing. Testing and analysis will depend on parameters. Testing will be performed at industry regular (standard) turnaround times (i.e. not priority, emergency, same day or other rush turnaround times).
3.3.2. Departmental Representative will inspect import fill material, and will not allow import of fill material that varies from Submittal samples.

3.4. Onsite Access Roads

3.4.1. Construct, operate and maintain the onsite access roads as required.
3.4.2. Design of temporary onsite access roads to be signed and sealed by Contractor's Qualified Professional.
3.4.3. Contractor's Qualified Professional to confirm that the temporary onsite access roads allow for the safe transport of materials and equipment.
3.4.4. Construction of the onsite access roads may require the removal of historic infrastructure.
3.4.5. Any temporary access, detour and haul roads associated with the project must be constructed to accommodate all required uses and be maintained throughout the course of construction operations in a safe, environmentally sound manner.
3.4.6. Location, alignment, design and construction of all detour, access and haul roads subject to the acceptance of the Departmental Representative.
3.4.7. Employ suitable measures to maintain quality, visibility, and safe conditions in the use of access, detour and haul roads associated with the Work.

3.5. Temporary Sloping and Shoring

3.5.1. Design, supply, install, and remove appropriate sloping or shoring to allow excavation of Contaminated Soil Extents according to Drawings or as directed by Departmental Representative.
3.5.2. Drawings show nominal slopes and excavation limits for volume estimating purposes only, and are not for construction. Contractor's Qualified Professional to determine safe and optimal slopes and excavation limits.
3.5.3. Design Requirements:
3.5.3.1. Act as sloping or shoring structures for excavations as well as for stability of foundations and infrastructure during remediation/construction excavation procedures.
3.5.3.2. Allow excavation of all Contaminated Soil laterally and vertically on the Site to Contaminated Soil Extents in accordance with the Contract. Allow excavation of additional Contaminated Soil beyond Contaminated Soil

Extents in order to result in no residual contamination at the Site based on field observations or Confirmation Samples.

3.5.3.3. Provide a safe working environment for personnel and equipment within the excavation area, including collection of confirmatory samples or other work that may be required at the base of the excavation.

3.5.3.4. Additional sloping or shoring may be required to extend excavation beyond Contaminated Soil Extents according to Drawings. Revise Temporary Sloping and Shoring design as required by Contractor's Qualified Professional.

3.5.3.5. Temporary shoring cannot have any tiebacks or supports which extend beyond the project Site boundary.

3.5.3.6. Temporary shoring must not flex or bend when exposed while excavations are occurring on the Site.

3.5.3.7. Sloping and shoring structures are temporary structures only. Resistance to seismic loads will be at the discretion of the Contractor's Qualified Professional. Be responsible for any failures and resultant costs should the temporary sloping or shoring fail due to a seismic event during the construction period.

3.5.3.8. All Shop Drawings of sloping and shoring design to be signed and sealed by Contractor's Qualified Professional.

3.5.3.9. Temporary sloping and shoring designs to be completed in accordance with methods in current version of Canadian Foundation Engineering Manual.

3.5.4. Installation:

3.5.4.1. All installation activities must take place on the Site. No staging or construction activities are to take place on adjacent properties.

3.5.4.2. Installation must be regularly inspected by Contractor's Qualified Professional.

3.5.5. Maintain side slopes of excavations in safe condition by appropriate methods and in accordance with relevant regulations.

3.5.6. During backfill operation:

3.5.6.1. Unless otherwise identified according to Drawings or as directed by the Departmental Representative, remove temporary shoring from excavations.

3.5.7. Temporary sloping and shoring excavated material:

3.5.7.1. Material excavated for sloping or shoring may be re-used as backfill to replace material removed as accepted by Contractor's Qualified Professional and Departmental Representative.

3.5.7.2. Material excavated for sloping or shoring that is accepted for backfilling must follow procedures in accordance with requirements of Contractor's Qualified Professional and meet Contract Documents.

3.5.7.3. Material excavated for sloping or shoring not accepted must be removed from Site at Contractor’s expense.

3.6. Dewatering and Heave Protection

3.6.1. Keep excavations free of water while Work is in progress unless otherwise identified according to Drawings or as directed by the Departmental Representative.
3.6.2. Provide to Departmental Representative details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
3.6.3. Plan for excavation below groundwater table to avoid quick conditions or heave.
3.6.4. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
3.6.5. Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
3.6.6. Keep excavations, staging pads, and other Work areas free from water. Provide standby equipment to ensure continuous operation of dewatering system.
3.6.7. Dewatering Methods: includes sheeting and shoring; groundwater control systems; surface or free water control systems employing ditches, diversions, drains, pipes and/or pumps; and other measures necessary to enable Work to be carried out in dry conditions.
3.6.8. Separate Contaminated Water from Non-Contaminated Quality Water and collect and divert to Contaminated Water Treatment Plant as required.

3.7. Excavation

3.7.1. Notify Departmental Representative at least 5 Working Days in advance of excavation operations.
3.7.2. Excavate to lines, grades, elevations and dimensions according to Drawings or as directed by Departmental Representative using methods, means, and sequences as determined by Contractor's Qualified Professional.
3.7.3. The depth of excavation from the existing grade to the groundwater table is approximately 3.5 m below grade and is expected to fluctuate with the tide
3.7.4. Excavate all Contaminated Soil laterally and vertically on the Site to Contaminated Soil Extents in accordance with the Contract. Excavate additional Contaminated Soil beyond Contaminated Soil Extents in order to result in no residual contamination at the Site based on field observations or Confirmation Samples
3.7.5. Excavation must not interfere with bearing capacity of adjacent foundations and infrastructure.
3.7.6. Machine cut banks and slopes.
3.7.7. The excavation walls must be sloped 1 horizontal (H) to 1 Vertical (V)
3.7.8. A vertical grout curtain is approximately 0 to 1.0 m east of the eastern property boundary on the Kinder Morgan Property. The contractor is required to provide PWGSC with engineering signoff on their proposed excavation method in this area.
3.7.9. A fence and asphalt curb are located on Kinder Morgan property, immediately east of the Site boundary. The contractor must ensure that there is no damage to the fence and asphalt curb as a result of any work activity.

3.7.10. Any waste materials including, but not limited to asphalt, concrete, wood, or metal encountered in the excavation areas shall be stockpiled by the Contractor in designated areas approved by Department Representative.
3.7.11. Protect bottom of excavations from excessive traffic.
3.7.12. Grade excavation top perimeter to prevent surface water run-off into excavation.
3.7.13. Keep excavated and stockpiled materials safe distance away from edge of excavation.
3.7.14. Restrict vehicle operations directly adjacent to open excavations.
3.7.15. Remove Oversize Debris.
3.7.15.1. Piles encountered during excavation must be cut off at base of excavation. Piles are not to be extracted beyond the base of the excavation.
3.7.15.2. Any utility lines which are confirmed to be abandoned and not in use may be removed during excavation activities if encountered.
3.7.15.3. Debris that impinges on infrastructure or neighbouring properties is not to be removed unless directed by Departmental Representative. Contractor's Qualified Professional to confirm debris can be removed without impacting infrastructure or neighbouring properties.
3.7.15.4. Reduce size of Oversize Debris to allow to be Transported, Treated, and Disposed, as required, as Non-Contaminated Quality Soil or Contaminated Soil, as appropriate.
3.7.16. Remove Non-Contaminated Quality Soil to Landfill Facility or re-use as Backfill - Owner Supplied according to Contract and as directed by Departmental Representative.
3.7.17. Earth bottoms of excavations to be undisturbed soil or sediment, level, free from loose, soft or organic material.
3.7.18. Notify Departmental Representative when bottom of excavation is reached based on Contaminated Soil Extents.
3.7.19. Provide assistance for collection of Confirmation Samples as directed to the Departmental Representative.
3.7.19.1. The Contractor’s excavator will be required to retrieve soils for sampling activities conducted by the Department Representative. It is expected that the Contractor is aware that the progress of the remedial excavation may be slower than typical construction excavations on sites where contaminated soils are not anticipated to be present. A minimum of two excavation floor confirmatory soil samples will be collected from within a grid of 10 m increments. The time required to retrieve samples using the excavator shall be built into the Contractors excavation and management costs in the Schedule of Items and Prices.
3.7.20. Currently there are no known recorded archaeological deposits within the proposed excavation area. If, while conducting the excavation, the Contractor finds anything of an unusual nature within the fill that cannot be identified, and which they have any reason to suspect may be an archaeological deposit, work must be stopped. The Contractor is responsible for informing the Department Representative of the situation. In such cases, an archaeologist may be required

to inspect the site, and advise of appropriate measures to be taken prior to the resumption of work on-site.

3.7.21. Groundwater and surface water may be encountered during the proposed excavation. Active dewatering for the purposes of lowering the water table during excavation is not part of the project.

3.7.22. No contaminated soil may remain between the current excavation and the former excavations (now backfilled) located around portions of the north and west perimeter of the excavation. This will require temporarily removing some of the backfill placed in the former excavation areas, removing the slope protection and lock blocks, and replacing the backfill once all contaminated soil has been excavated.

3.7.23. Any schedule changes, work plan changes or additional costs related to archaeological interruptions shall be approved by the Department Representative prior to undertaking alterations to the work plan or schedule.

3.7.24. Obtain acceptance by Departmental Representative of completed excavation.

3.8. Soil Stockpiling

3.8.1. Stockpile material within work area in locations identified by Departmental Representative.

3.8.2. A limited quantity of hazardous waste and suspect hazardous waste soils will be removed as part of the excavation program. The suspect hazardous waste soils must be segregated from the waste soils during excavation and stockpiled in a designated soil storage cell determined by the Department Representative

3.8.3. Provide, maintain, and operate temporary storage/stockpiling facilities as per Contractor's Site Layout.

3.8.4. Segregate Contaminated Soil from Non-Contaminated Quality Soil into separate stockpiles to prevent cross-contamination.

3.8.5. 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 directed by the Departmental Representative.

3.8.6. Securely fasten covers over stockpiled material until material is loaded for offsite transport.

3.8.7. Store excavated Non-Contaminated Quality Soil only on non-contaminated surface areas. Ensure no contact between excavated Non-Contaminated Quality Soil and drainage of Contaminated Water or Contaminated Soil.

3.8.8. Store excavated Contaminated Soil in temporary stockpiles.

3.8.8.1. Install impermeable liner (eg asphalt or minimum 30 mil (0.5mm) polyethylene) below proposed stockpile locations to prevent contact between stockpile material and ground.

3.8.8.2. 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. Cover to be impermeable (eg minimum 20 mil polyethylene) and securely fashioned to prevent blowing off.

3.8.8.3. Prevent Non-Contaminated Quality Water, including surface runoff water, from coming into contact with Contaminated Soil stockpiles.

3.8.9. Segregate different suspect material in discrete stockpiles to facilitate ex-situ characterization for Classification as directed by the Departmental Representative.

3.8.10. Any waste materials including, but not limited to asphalt, concrete, wood, or metal encountered in the excavation areas shall be stockpiled by the Contractor in designated areas approved by Department Representative.

3.8.11. Assist Departmental Representative in collection of stockpile samples for exsitu 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 Samples results provided within 5 Working Days, not counting the day the sample is collected.

3.8.12. Do not remove Contaminated Soil from stockpiles until exsitu characterization completed and as directed by Departmental Representative.

3.9. Backfill Types and Compaction

3.9.1. Use only Imported Backfilled, Overburden Backfill, or Owner Supplied Backfill in accordance with the Contract and which has been recommended by Contractor's Qualified Professional, and previously accepted as a Submittal.

3.9.2. Compact material in accordance with the more stringent of Excavation Plan or Contract to ensure no long term settlement and is suitable for planned post-remediation use. Machine compact all fill materials unless otherwise according to Contract.

3.10. Backfilling

3.10.1. Do not proceed with backfilling operations until completion of following:

3.10.1.1. 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. 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.

3.10.1.2. Surveying has been completed by the Contractor's Qualified Professional for final excavation limits and As-Built documents, including final utilities locations.

3.10.1.3. Departmental Representative has inspected and accepted Contaminated Material Extents by the Departmental Representative based on survey data and Confirmation Samples results.

3.10.1.4. Departmental Representative has inspected and accepted backfill material.

3.10.1.5. 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.

3.10.1.6. Departmental Representative has inspected and accepted compaction results for previous lift.
3.10.1.7. Removal of shoring and bracing; backfilling of voids with satisfactory backfill material.
3.10.2. Any imported backfill shall only be stored within the identified backfill storage area. All existing owner supplied backfill presently in this area should be used up in the backfilling of the excavation area prior to importing new backfill.
3.10.3. The first backfill sand placed into the excavation area shall be mixed with cobbles from stockpile SE1 with a ratio of 25% cobbles to 75% backfill sand by weight until the supply of cobbles from stockpile SE1 is exhausted. The Contractor shall employ a method of mixing backfill materials that demonstrates to the Department Representative that this ratio is being measured and adhered to.
3.10.4. Areas to be backfilled to be free from debris, snow, ice, water and frozen ground to greatest extent practicable.
3.10.5. Do not use backfill material which is frozen or contains ice, snow or debris to greatest extent practicable.
3.10.6. Place backfill material in uniform layers not exceeding 300 mm compacted thickness, or in accordance with the Contract. Compact each layer to the satisfaction of the Contractor's Qualified Professional and in accordance with the Contract before placing succeeding layer. If backfilling is allowed to proceed in the wet (ie underwater), use self-compacting backfill as required by Contractor's Qualified Professional in accordance with Excavation Plan.
3.10.7. The backfill materials shall be placed to a minimum of 95 percent of their Modified Proctor Maximum Dry Density (ASTM D1557) while at a moisture content within 2 percent of optimum for compaction
3.10.8. The Contractor is required to backfill the excavation area to pre-excavation surface elevations using backfill materials existing on site or imported by the Contractor as required. The excavation walls must be protected with 20 mil LLDPE or approved equivalent. No liner is required between the former excavation areas and the proposed excavation backfills.
3.10.8.1. The liner is to extend approximately 1.0 m onto the excavation floor and existing ground surface and must be secured by placing lock blocks (blocks sized 2.5' x 2.5' by 5') spaced evenly every 10 m on the ground surface
3.10.9. Backfill compaction to be tested by Contractor's Qualified Professional in accordance with Excavation Plan.
3.10.10. Notify Departmental Representative when final backfill grade is reached.

3.11. Overburden and Owner Supplied Material Backfilling

3.11.1. Place in locations in excavation as directed by Departmental Representative.
3.11.2. Be responsible for compacting to the satisfaction of Contractor's Qualified Professional and in accordance with the Contract.
3.11.2.1. Collect and test samples as required by Contractor's Qualified Professional prior to placement.

3.11.2.2. Identify any geotechnical concerns prior, and obtain Departmental Representative approval to proceed, prior to placement.

3.12. Work By Others

3.12.1. The Department Representative or their consultant will be on-site during the excavation program to verify and document the excavation procedures, confirm the Contractor's adherence to their construction plans and their methods to limit overall excavated soil volumes, maintain project quality assurance/quality control (QA/QC), and other Department Representative requests. Any potential changes to the contract will be discussed for recommendation and final approval by the Department Representative.

3.12.2. The Department Representative will identify suspect waste, and suspect hazardous waste soils requiring segregation during the excavation and stockpiling of excavated soil.

3.12.3.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Contaminated Material Transport: will be paid in accordance with unit rate price established for weight of material transported. Includes all handling, stabilization, loading, hauling, unloading, transfer, interim storage, and transport to and from intermediate locations and final placement location. Measurement as recorded on weigh scale certified by Measurement Canada and results provided to Departmental Representative.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

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

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

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

1.3.1.3. Letter from Transfer/Interim Storage Facility that they can accept the quantity and quality of Contaminated Material to be Transferred/Interim Stored at the Facility, signed by an authorized representative of the Facility.

1.3.2. Certificate of Seaworthiness: Prior to barge shipments, Submit a Certificate of Seaworthiness by an independent licensed Marine Surveyor for all marine vessels transporting Contaminated Soil.

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

1.3.3.1. Method of transport.

1.3.3.2. Name of transport company.

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

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

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Contaminated Soil Transport

3.1.1. Assume ownership of, and be responsible for, Contaminated Material once it is loaded on a vehicle, barge, or other vessel for transport.

3.1.2. Transport material as soon as practical; do not unreasonably stockpile onsite.

3.1.3. Cover material while being transported to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leaching from material.

3.1.4. All vehicles must be watertight. Excess water in material must not be allowed to flow out of vehicle or vessel during transport.

3.1.5. Stabilize material as necessary.

3.1.6. All vehicles, vessels and operators must be appropriately licensed and equipped to transport Contaminated Material.

3.1.7. Barges must be inspected by an independent Marine Surveyor for stability and safety.

3.1.8. Manifest and correlate quantities of all Contaminated Material transported from Site documenting quantity and quality removed from Site. Include all Transfer/Interim Storage, Treatment, and Disposal Facilities. Discrepancies in manifests must be resolved as required by regulations and as acceptable to the Departmental Representative. Discrepancies include:

3.1.8.1. No manifest or an incomplete manifest.

3.1.8.2. Material transported does not match the description in the manifest.

3.1.8.3. Amount transported differs by more than 5% in the manifest.

3.1.8.4. Material transported is in a hazardous condition.

3.1.9. Transfer/Interim Storage Facility must:

3.1.9.1. Be an existing offsite facility located in Canada or the United States.

3.1.9.2. Be designed, constructed and operated for the transfer or interim storage of Contaminated Material.

3.1.9.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the transfer or interim storage of relevant Contaminated Material.

3.1.9.4. Comply with applicable municipal zoning, bylaws, and other applicable requirements.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Contaminated Soil Disposal will be paid in accordance with unit rate price established for weight of material disposed. Includes Treatment or any other processing of material not required by the Contract but required by Regulations, Disposal Facility, or for other reasons. Measurement as recorded on weigh scale certified by Measurement Canada and results provided to Departmental Representative on Certificates of Disposal.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

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

1.3.1.1. Copy of permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the Disposal of relevant Contaminated Material.

1.3.1.2. Letter from Contractor's Qualified Professional that the Disposal Facility is appropriate for the quantity and quality of Contaminated Material to be Disposed in accordance with any authorization and complies with appropriate government requirements of a general nature (eg BC Landfill Criteria).

1.3.1.3. Letter from Disposal Facility that they can accept the quantity and quality of Contaminated Material to be Disposed at the Facility, signed by an authorized representative of the Facility.

1.3.2. Certificate of Disposal: within 30 Working Days of disposal at Disposal Facility, Submit documentation verifying that materials have been disposed by Contractor. Include:

1.3.2.1. Issued by the Disposal Facility.

1.3.2.2. On company letterhead.

1.3.2.3. Name and location of facility where the material is being disposed.

1.3.2.4. Date and weight for each shipment received and total weight received at the Disposal Facility.

1.3.2.5. Identification of acceptance of final ownership of material.

1.3.2.6. Signed by identified authorized disposal company representative..

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Contaminated Material Disposal

3.1.1. Assume ownership of, and be responsible for, Contaminated Material disposed.

3.1.2. Contaminated Material Disposal: dispose all Contaminated Soil, including onsite or offsite treated Contaminated Material that may no longer be contaminated, at Disposal Facility provided by Contractor and accepted by the Departmental Representative.

3.1.3. Disposal Facility must:

3.1.3.1. Be an existing offsite facility located in Canada or the United States.

3.1.3.2. Be designed, constructed and operated to prevent any pollution from being caused by the facility outside the area of the facility from waste placed in or on land within the facility.

3.1.3.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the Disposal of relevant Contaminated Material.

3.1.3.4. Comply with applicable municipal zoning, bylaws, and other applicable requirements.

3.1.4. Dispose material as soon as practical and within 100 Working Days of leaving Site or as required by Contract unless otherwise accepted by Departmental Representative.

3.1.5. Material sent to a Disposal Facility must be permanently stored at that facility.

3.1.6. If proposed Disposal Facility is not acceptable to Departmental Representative, provide an alternate Disposal Facility that is acceptable.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Contaminated Sites Onsite Storage Cell Construction will be paid in accordance with lump sum price established to design and construct a Soil Treatment Facility (STF). Includes design, material supply, and construction. Lump sum may be pro-rated based on surface area of Onsite Soil Storage Cell Design to determine aggregate costs.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Contaminated Sites Onsite Storage Cell Construction Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Sites Onsite Storage Cell Construction for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include:

1.3.1.1. Base Preparation

1.3.1.2. Gradients and sump location.

1.3.1.3. Granular and synthetic materials to be used.

1.3.1.4. Procedures for construction.

1.3.1.5. Monitoring and inspection requirements, including frequency or milestones when Contractor's Qualified Professional must inspect Works.

1.3.1.6. Onsite Soil Storage Cell Design must be signed and sealed by Contractor's Qualified Professional.

2. PART 2 - PRODUCTS

2.1. Synthetic Material

2.1.1. Liner material to be selected by Contractor's Qualified Professional. Liner material to meet following minimum requirements:

2.1.1.1. 10 year lifespan.

2.1.1.2. Ultraviolet resistant.

2.1.1.3. 30 mil LLDPE for base liner, 20 mil LLDPE for cover or approved equivalent

2.1.1.4. Other requirements according to Contract.

3. PART 3 - EXECUTION

3.1. Onsite Storage Cell

3.1.1. During the remedial excavation program, following the disposal of the existing soils in Cells #1 and #2 and the transfer facility, there will be four empty storage cells (Cells #1 to #4) and the transfer facility available for the Contractor to store excavated soils. Cells #5 and #6 lie within the excavation footprints and will be removed following soil disposal, and prior to the start of the excavation activities.

3.1.2. Six additional cells (Cells #7 to #12) must be created to accommodate for the additional 26,030 cubic metres of soil to be excavated. These storage cells shall be placed as directed by the Department Representative. Cell #7 will be constructed following vegetation removal, stockpile reconsolidation, and site grading and as such the dimensions of cell are unknown at this point. The dimensions of the Cells #8 to 12, to be constructed on the paved area in the northeast corner of the Site are anticipated to be:

3.1.2.1. Cell #7 – irregular shape, approximately 1,681 m² surface area

3.1.2.2. Cell #8 – approximately 67 m x 27 m

3.1.2.3. Cell #9 – approximately 65 m x 27 m

3.1.2.4. Cell #10 – irregular shape, approximately 1,478 m² surface area

3.1.2.5. Cell #11 – approximately 36 m x 31 m

3.1.2.6. Cell #12 – irregular shape, approximately 1,670 m² surface area

3.1.3. The Contractor must inspect the condition of and repair the storage cells prior to usage and report any damage to the Department Representative.

3.1.4. The Contractor must supply any products required for the repair of any storage cells. Cell liners are present in Cells #1 to #4 and overtopped by approximately 15 cm soil. While emptying the existing soil stockpiled in Cells #1 and 2, and while placing newly excavated soils into all four of these cells, the Contractor must ensure the underlying cell liners are not damaged.

3.1.5. The Contractor must remove and dispose of the existing Cell #5 and #6 cell liners and covers following emptying of the soil from these cells for off-site disposal as they will be dismantled as part of the excavation activities.

3.1.6. The newly created Cells #7 to #12 shall be constructed with new 30 mil LLDPE liners or approved equivalent, and the dimensions of required cell liner should be verified by the Contractor prior to construction.

3.1.7. Prior to filling the existing storage cells #1 to #4 with newly excavated soil, the contractor must place a marker above the existing layer (approximately 15 cm) of granular material in the base of each cell. The marker placed should be a layer of orange snow fence, or approved equivalent, spaced 2-3 m apart across the base of each cell

3.2. Staging Cells

3.2.1. Staging cells to be underlain by Liner.

3.2.2. Grade bottom to prevent leachate from migrating outside of Staging Cell.

3.3. Treatment Cells

3.3.1. Compact base material to a minimum of 100% Standard Proctor Maximum Dry Density.
3.3.2. Grade bottom to allow collection of water in corner.
3.3.3. Construct sump in corner of drainage.
3.3.4. Place a marker above the existing layer (approximately 15 cm) of granular material in the base of each cell. The marker placed should be a layer of orange snow fence, or approved equivalent, spaced 2-3 m apart across the base of each cell.
3.3.5. Berms to be a minimum of 0.75m high and to be wrapped in Liner. Place excavated granular material over Liner on berms to protect from damage from loading/unloading and weather.
3.3.6. The storage cells shall include a suitably sized cover and shall be anchored down with boulders and rocks to ensure the covers stay in place during heavy wind events. Additionally, clean soil must be placed around the base of the storage cells to further secure the cover.
3.3.7. An access ramp(s) shall be constructed to allow excavator and tandem axle dump truck access to each cell for dumping soil and/or being loaded with soil for disposal.

3.13. Onsite Access Roads

3.13.1. Construct, operate and maintain the onsite access roads as required.
3.13.2. Design of temporary onsite access roads to be signed and sealed by Contractor's Qualified Professional.
3.13.3. Contractor's Qualified Professional to confirm that the temporary onsite access roads allow for the safe transport of materials and equipment.
3.13.4. Construction of the onsite access roads may require the removal of historic infrastructure.
3.13.5. Any temporary access, detour and haul roads associated with the project must be constructed to accommodate all required uses and be maintained throughout the course of construction operations in a safe, environmentally sound manner.
3.13.6. Location, alignment, design and construction of all detour, access and haul roads subject to the acceptance of the Departmental Representative.
3.13.7. Employ suitable measures to maintain quality, visibility, and safe conditions in the use of access, detour and haul roads associated with the Work.

END OF SECTION

Appendix A

Analytical Data

MEMORANDUM

Date:	May 24, 2019
To:	Internal Memo
From:	Hemmera
File:	102655-57
Re:	Soil Analytical Results for Stockpiled Material

Laboratory analytical results for soil currently on site it as follows;

Storage Cell #1;

The amended hazardous waste soil stockpile remaining in this cell can been characterized as a mix of the following Sample IDs from Table 1: Soil Analytical Results (Matcon Environmental Ltd., March 2019);

- SP19-5-1-1,
- SP19-5-1-5,
- SP19-5-1-COMP1,
- SP19-5-1-7,
- SP19-5-1-10,
- SP19-5-1-COMP2,
- SP19-5-1-12,
- SP19-5-1-14, and
- SP19-5-1-COMP3.

Storage Cell #2;

The amended hazardous waste soil stockpile remaining in this cell can been characterized as a mix of the following Sample IDs from Table 1: Soil Analytical Results (Matcon Environmental Ltd., March 2019) attached;

- SP19-5-2-1,
- SP19-5-2-3,
- SP19-5-2-COMP1,
- SP19-5-2-8,
- SP19-5-2-10,
- SP19-5-2-COMP2,
- SP19-5-2-COMP3,
- SP19-5-3-2,
- SP19-5-3-5,
- SP19-5-3-COMP1,
- SP19-5-3-8,
- SP19-5-3-10,

- SP19-5-3-COMP2,
- SP19-5-3-COMP3,
- SP19-6-2-1 (25-Mar-19 sample only),
- SP19-6-2-2 (25-Mar-19 sample only),
- SP19-6-2-3,
- SP19-6-2-4,
- SP19-6-2-5,
- SP19-6-2-COMP1,
- SP19-6-2-6,
- SP19-6-2-9,
- SP19-6-2-COMP2, and
- SP19-6-2-COMP3.

Storage Cell #5;

The soil remaining in this cell can been characterized by the analytical data for soil samples from the following subcells;

- Field IDs C5-1 to C5-38, and C5-53 from Table 2A - Metals (Hemmera) attached, and
- Field IDs C5-2, C5-3, C5-4, C5-5, C5-6, C5-7, C5-11, C5-12, C5-13, C5-14, C5-15, C5-16, C5-17, C5-18, C5-19, C5-21, C5-22, C5-25, C5-26, C5-27, C5-30, C5-31, C5-32, C5-33, C5-34, C5-35, and C5-36 from Table 2B - TCLP Metals (Hemmera) attached.

Storage Cell #6;

The amended hazardous waste soil remaining in this cell can been characterized as a mix of the following Sample IDs from Table 1: Soil Analytical Results (Matcon Environmental Ltd., March 2019) attached;

- SP19-6-7-1,
- SP19-6-7-4,
- SP19-6-7COMP1,
- SP19-6-7-7,
- SP19-6-7-9,
- SP19-6-7-COMP2,
- SP19-6-7-COMP3,
- SP19-6-8-1,
- SP19-6-8-3,
- SP19-6-8-COMP1,
- SP19-6-8-6,
- SP19-6-8-9,
- SP19-6-8-COMP2, and
- SP19-6-8-COMP3.

The soil stockpile identified as exceeding the BC Hazardous Waste Regulation for Lead - Leachate Quality Standards can been characterized by the analytical data for soil sample (Field ID) C6-1 in Table 3 (Hemmera) attached.

Transfer Facility;

The amended hazardous waste soil remaining in this cell can been characterized as a mix of the following Sample IDs from Table 1: Soil Analytical Results (Matcon Environmental Ltd., March 2019) attached;

- SP19-6-6-7, and
- SP19-6-6-9.

The soil stockpile identified as exceeding BC Hazardous Waste Regulation for Lead - Leachate Quality Standards can been characterized as a mix of the following Sample IDs from Table 1: Soil Analytical Results (Matcon Environmental Ltd., March 2019) attached;

- SP19-6-6-6, and
- SP19-6-6-8.

Stockpile X;

The soil remaining in this stockpile can been characterized be the analytical data for soil sample (Field ID) SP19-X in Table 4 (Hemmera) attached.

GLOSSARY: STOCKPILE ANALYTICAL RESULTS
Matcon Environmental Ltd.
Pacific Environment Centre Site
Project #: 14767
March 2019

List of Acronyms

AL	Agricultural Land Use
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CL	Commercial Land Use
CSR	British Columbia Contaminated Sites Regulation
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
$EPHs_{10-19}$	Extractable Petroleum Hydrocarbons (carbon range 10 to 19)
$EPHs_{19-32}$	Extractable Petroleum Hydrocarbons (carbon range 19 to 32)
HEPHs	Heavy Extractable Petroleum Hydrocarbons (corrected for PAH)
HMW-PAHs	Heavy Molecular Weight Polycyclic Aromatic Hydrocarbons
HWR	British Columbia Hazardous Waste Regulation
IL	Industrial Land Use
LEPHs	Light Extractable Petroleum Hydrocarbons (corrected for PAH)
LMW-PAHs	Light Molecular Weight Polycyclic Aromatic Hydrocarbons
MS	Maximum Spread
MTBE	Methyl tert-Butyl Ether
n/s	No Standard
PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCDD	Polychlorinated Dibenzodioxins
PCDF	Polychlorinated Dibenzofurans
PL	Urban Park Land Use
RDL	Reported Detection Limit
RL_{HD}	Residential (High Density) Land Use
RL_{LD}	Residential (Low Density) Land Use
RPD	Relative Percent Difference
TEQ	Toxicity Equivalence Quotient
VHs_{6-10}	Volatile Petroleum Hydrocarbons (carbon range 6 to 10)
VOC	Volatile Organic Compounds
VPHs	Volatile Petroleum Hydrocarbons (corrected for BTEX)
WL_N	Wildlands (Natural) Land Use
WL_R	Wildlands (Reverted) Land Use

List of Symbols

--	Sample was not analyzed for the specified constituent
*	Laboratory reported detection limit is greater than applicable standard/guideline
<	Concentration is less than the laboratory reported detection limit
a	BC CSR Matrix Numerical Soil Standards (BC CSR Schedule 3.1, Part 1) site specific fac
	1 Intake of contaminated soil
	3 Toxicity to soil invertebrates and plants
b	CSR standard is pH dependent
c	CSR standard for hexavalent chromium (Cr VI) used for conservativeness
d	Regional background soil quality for metals analyses from BC MOE Protocol 4
e	CSR standard for VPHs/LEPHs/HEPHs used for comparison

List of Units

mbg	Metres below grade
µg/g	Micrograms per gram
pg/g	Picograms per gram

Soil Exceedances

125	Exceeds BC HWR Standards

QA/QC Exceedances

45%	RPD exceeds 35%
5>3	MS exceeds RDL

Formulas

MS
MS = (Max. Concentration - Min. Concentration); reported as MS </=/> RDL
Note: MS used in place of RPD when concentration of sample and/or duplicate is less than 5x RDL.

PAH TEQ
TEQ = 0.1*(Benzo[a]anthracene + Benzo[b]fluoranthene + Benzo[k]fluoranthene) + Benzo[a]pyrene + 0.2*(Indeno[1,2,3-cd]pyrene) + 1.1*(Dibenzo[a,h]anthracene)
Note: For PAH concentrations below the analytical relative detection limit, a value of one half the detection limit is used in the calculations.

PCDD & PCDF TEQ
TEQ = 2,3,7,8-TCDD + 1,2,3,7,8-PCDD + 0.3*(2,3,4,7,8-PCDF) + 0.1*(1,2,3,4,7,8-HCDD + 1,2,3,7,8,9-HCDD + 1,2,3,6,7,8-HCDD + 2,3,7,8-TCDF + 1,2,3,4,7,8-HCDF + 1,2,3,7,8,9-HCDF + 1,2,3,6,7,8-HCDF + 2,3,4,6,7,8-HCDF) + 0.03*(1,2,3,7,8-PCDF)+ 0.01*(1,2,3,4,6,7,8-HCDD + 1,2,3,4,6,7,8-HCDF + 1,2,3,4,7,8,9-HCDF) + 0.0003*(OCDD + OCDF)
Note: For PCDD/PCDF concentrations below the analytical relative detection limit, the value of the detection limit is used in the calculations.

RPD
RPD = ((Max. Concentration - Min. Concentration)/((Max. Concentration + Min. Concentration)/2))*100

TABLE 1: SOIL ANALYTICAL RESULTS
INORGANICS
Matcon Environmental Ltd.
Pacific Environment Centre Site
Project #: 14767
March 2019

HWR Leachate Quality Standards	SAMPLE ID / DATE SAMPLED / LAB CERTIFICATE / LAB SAMPLE ID / SAMPLE DEPTH (mbg) / SOIL DESCRIPTION	Units	SP19-2-1-3 04-Mar-19 B915586 VH7381 0.15	SP19-2-1-5 04-Mar-19 B915586 VH7383 0.15	SP19-2-1-COMP1 04-Mar-19 B915586 VH7384 0.15	SP19-2-1-6 04-Mar-19 B915586 VH7385 0.15	SP19-B 04-Mar-19 B915586 VH7386 Duplicate of SP19-2-1-6	RPD or MS for SP19-2-1-6 and SP19-B	SP19-2-1-7 04-Mar-19 B915586 VH7387 0.15	SP19-2-1-COMP2 04-Mar-19 B915586 VH7391 0.15	SP19-2-1-12 04-Mar-19 B915586 VH7393 0.15	SP19-2-1-13 04-Mar-19 B915586 VH7394 0.15
	TCLP Leachate Metals											
n/s	antimony	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
2500	arsenic	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
100000	barium	µg/L	1540	930	1380	1010	1050	4%	1080	1100	1050	890
n/s	beryllium	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
500000	boron	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
500	cadmium	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
5000	chromium (total)	µg/L	160	130	150	140	140	0%	140	140	<100	120
n/s	cobalt	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
100000	copper	µg/L	120	150	130	190	180	5%	120	130	<100	130
n/s	iron	µg/L	<500	<500	<500	<500	<500	--	<500	<500	<500	<500
5000	lead	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
100	mercury	µg/L	<2	<2	<2	<2	<2	--	<2	<2	<2	<2
500	molybdenum	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
n/s	nickel	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
1000	selenium	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
n/s	silver	µg/L	<10	<10	<10	<10	<10	--	<10	<10	<10	<10
n/s	thallium	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
10000	uranium	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
n/s	vanadium	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
500000	zinc	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100
n/s	zirconium	µg/L	<100	<100	<100	<100	<100	--	<100	<100	<100	<100

Soil Exceedances

125	Exceeds HWR leachate quality standards

QA/QC Exceedances

45%	RPD exceeds 35%

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	TCLP Leachate Metals											
n/s	antimony	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
2500	arsenic	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
100000	barium	µg/L	850	810	790	970	820	860	5%	1200	950	750
n/s	beryllium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
500000	boron	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
500	cadmium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
5000	chromium (total)	µg/L	110	130	<100	140	140	140	0%	150	140	120
n/s	cobalt	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
100000	copper	µg/L	140	230	200	230	200	220	10%	180	240	330
n/s	iron	µg/L	<500	<500	<500	<500	<500	<500	--	<500	<500	<500
5000	lead	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
100	mercury	µg/L	<2	<2	<2	<2	<2	<2	--	<2	<2	<2
500	molybdenum	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
n/s	nickel	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
1000	selenium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
n/s	silver	µg/L	<10	<10	<10	<10	<10	<10	--	<10	<10	<10
n/s	thallium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
10000	uranium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
n/s	vanadium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
500000	zinc	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
n/s	zirconium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100

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	TCLP Leachate Metals											
n/s	antimony	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
2500	arsenic	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
100000	barium	µg/L	820	870	1270	870	1030	1020	1%	610	700	620
n/s	beryllium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
500000	boron	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
500	cadmium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
5000	chromium (total)	µg/L	130	130	140	120	140	140	0%	<100	<100	<100
n/s	cobalt	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
100000	copper	µg/L	350	380	290	480	360	370	3%	16600	230	11200
n/s	iron	µg/L	<500	<500	<500	<500	<500	<500	--	<500	<500	<500
5000	lead	µg/L	<100	<100	<100	<100	<100	<100	--	12900	<100	5980
100	mercury	µg/L	<2	<2	<2	<2	<2	<2	--	2	<2	<2
500	molybdenum	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
n/s	nickel	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
1000	selenium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
n/s	silver	µg/L	<10	<10	<10	<10	<10	<10	--	<10	<10	<10
n/s	thallium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
10000	uranium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
n/s	vanadium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100
500000	zinc	µg/L	<100	<100	<100	<100	<100	<100	--	2700	<100	2280
n/s	zirconium	µg/L	<100	<100	<100	<100	<100	<100	--	<100	<100	<100

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	TCLP Leachate Metals											
n/s	antimony	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
2500	arsenic	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
100000	barium	µg/L	810	960	900	1070	1070	720	690	4%	670	590
n/s	beryllium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
500000	boron	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
500	cadmium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
5000	chromium (total)	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
n/s	cobalt	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
100000	copper	µg/L	260	3050	270	550	4330	130	110	17%	130	130
n/s	iron	µg/L	<500	<500	<500	<500	<500	<500	<500	--	<500	<500
5000	lead	µg/L	<100	1420	<100	960	2920	<100	<100	--	<100	<100
100	mercury	µg/L	<2	<2	<2	<2	<2	<2	<2	--	<2	<2
500	molybdenum	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
n/s	nickel	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
1000	selenium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
n/s	silver	µg/L	<10	<10	<10	<10	<10	<10	<10	--	<10	<10
n/s	thallium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
10000	uranium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
n/s	vanadium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100
500000	zinc	µg/L	<100	2230	<100	930	2290	<100	<100	--	<100	<100
n/s	zirconium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100	<100

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	TCLP Leachate Metals											
n/s	antimony	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
2500	arsenic	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
100000	barium	µg/L	880	920	4%	670	760	810	740	760	740	720
n/s	beryllium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
500000	boron	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
500	cadmium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
5000	chromium (total)	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
n/s	cobalt	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
100000	copper	µg/L	11500	4380	90%	130	130	200	140	140	150	140
n/s	iron	µg/L	<500	<500	--	<500	<500	<500	<500	<500	<500	<500
5000	lead	µg/L	9790	2350	123%	<100	<100	<100	<100	<100	<100	<100
100	mercury	µg/L	<2	2.8	33%	<2	<2	<2	<2	<2	<2	<2
500	molybdenum	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
n/s	nickel	µg/L	170	150	13%	<100	<100	<100	<100	<100	<100	<100
1000	selenium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
n/s	silver	µg/L	<10	<10	--	<10	<10	<10	<10	<10	<10	<10
n/s	thallium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
10000	uranium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
n/s	vanadium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
500000	zinc	µg/L	3420	2770	21%	<100	<100	<100	<100	<100	<100	<100
n/s	zirconium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100

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	TCLP Leachate Metals										
n/s	antimony	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
2500	arsenic	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
100000	barium	µg/L	750	810	730	10%	670	710	780	740	750
n/s	beryllium	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
500000	boron	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
500	cadmium	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
5000	chromium (total)	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
n/s	cobalt	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
100000	copper	µg/L	150	140	150	7%	150	150	140	130	130
n/s	iron	µg/L	<500	<500	<500	--	<500	<500	<500	<500	<500
5000	lead	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
100	mercury	µg/L	<2	<2	<2	--	<2	<2	<2	<2	<2
500	molybdenum	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
n/s	nickel	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
1000	selenium	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
n/s	silver	µg/L	<10	<10	<10	--	<10	<10	<10	<10	<10
n/s	thallium	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
10000	uranium	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
n/s	vanadium	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
500000	zinc	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100
n/s	zirconium	µg/L	<100	<100	<100	--	<100	<100	<100	<100	<100

Soil Exceedances

125 Exceeds HWR leachate quality standards

QA/QC Exceedances

45% RPD exceeds 35%

TABLE 1: SOIL ANALYTICAL RESULTS
INORGANICS
Matcon Environmental Ltd.
Pacific Environment Centre Site
Project #: 14767
March 2019

HWR Leachate Quality Standards	SAMPLE ID / DATE SAMPLED / LAB CERTIFICATE / LAB SAMPLE ID / SAMPLE DEPTH (mbg) / SOIL DESCRIPTION	Units	SP19-6-5-3 18-Mar-19 B919482 VJ6186 0.15	SP19-K 18-Mar-19 B919482 VJ6187 Duplicate of SP19-6-5-3	RPD or MS for SP19-6-5-3 and SP19-K	SP19-6-5-5 18-Mar-19 B919482 VJ6189 0.15	SP19-6-5-COMP1 18-Mar-19 B919482 VJ6190 0.15	SP19-6-5-8 18-Mar-19 B919482 VJ6193 0.15	SP19-6-5-9 18-Mar-19 B919482 VJ6194 0.15	SP19-6-5-COMP2 18-Mar-19 B919482 VJ6195 0.15	SP19-6-6-2 18-Mar-19 B919482 VJ6197 0.15	SP19-6-6-4 18-Mar-19 B919482 VJ6199 0.15
	TCLP Leachate Metals											
n/s	antimony	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
2500	arsenic	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
100000	barium	µg/L	990	970	2%	720	890	930	910	790	950	890
n/s	beryllium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
500000	boron	µg/L	110	220	67%	<100	110	<100	<100	<100	<100	<100
500	cadmium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
5000	chromium (total)	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
n/s	cobalt	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
100000	copper	µg/L	1640	2060	23%	290	820	580	790	310	6420	860
n/s	iron	µg/L	<500	<500	--	<500	<500	<500	<500	<500	<500	<500
5000	lead	µg/L	150	190		<100	<100	<100	<100	<100	3380	220
100	mercury	µg/L	<2	<2	--	<2	<2	<2	<2	<2	<2	<2
500	molybdenum	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
n/s	nickel	µg/L	100	110	10%	<100	120	<100	<100	<100	120	<100
1000	selenium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
n/s	silver	µg/L	<10	<10	--	<10	<10	<10	<10	<10	<10	<10
n/s	thallium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
10000	uranium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
n/s	vanadium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
500000	zinc	µg/L	1890	2110	11%	<100	990	630	940	<100	3350	1200
n/s	zirconium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100

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HWR Leachate Quality Standards	SAMPLE ID / DATE SAMPLED / LAB CERTIFICATE / LAB SAMPLE ID / SAMPLE DEPTH (mbg) / SOIL DESCRIPTION	Units	SP19-6-6-COMP1 18-Mar-19 B919482 VJ6201 0.15	SP19-6-6-6 18-Mar-19 B919482 VJ6202 0.15	SP19-6-6-7 18-Mar-19 B919482 VJ6203 0.15	SP19-6-6-8 18-Mar-19 B919482 VJ6204 0.15	SP19-6-6-9 18-Mar-19 B919482 VJ6205 0.15	SP19-6-6-10 18-Mar-19 B919482 VJ6206 0.15	SP19-M 18-Mar-19 B919482 VJ6207 Duplicate of SP19-6-6-10	RPD or MS for SP19-6-6-10 and SP19-M	SP19-6-6-COMP2 18-Mar-19 B919482 VJ6208 0.15
	TCLP Leachate Metals										
n/s	antimony	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100
2500	arsenic	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100
100000	barium	µg/L	940	950	850	920	970	930	960	3%	910
n/s	beryllium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100
500000	boron	µg/L	<100	<100	<100	<100	<100	250	130	63%	<100
500	cadmium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100
5000	chromium (total)	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100
n/s	cobalt	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100
100000	copper	µg/L	3240	13200	10200	14100	4220	3950	5470	32%	17400
n/s	iron	µg/L	<500	<500	<500	<500	<500	<500	<500	--	<500
5000	lead	µg/L	860	9370	2300	37100	1080	1340	1700	24%	2970
100	mercury	µg/L	<2	2.4	2.3	<2	2.7	2.2	<2	10%	<2
500	molybdenum	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100
n/s	nickel	µg/L	110	130	120	130	110	120	140	15%	160
1000	selenium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100
n/s	silver	µg/L	<10	<10	<10	<10	<10	<10	<10	--	<10
n/s	thallium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100
10000	uranium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100
n/s	vanadium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100
500000	zinc	µg/L	2680	4020	3850	3930	3340	3040	3430	12%	4550
n/s	zirconium	µg/L	<100	<100	<100	<100	<100	<100	<100	--	<100

Soil Exceedances

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INORGANICS
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March 2019

HWR Leachate Quality Standards	SAMPLE ID / DATE SAMPLED / LAB CERTIFICATE / LAB SAMPLE ID / SAMPLE DEPTH (mbg) / SOIL DESCRIPTION	Units	SP19-6-7-1 19-Mar-19 B919851 VJ8036 0.15	SP19-N 19-Mar-19 B919851 VJ8037 Duplicate of SP19-6-7-1	RPD or MS for SP19-6-7-1 and SP19-N	SP19-6-7-4 19-Mar-19 B919851 VJ8040 0.15	SP19-6-7-COMP1 19-Mar-19 B919851 VJ8042 0.15	SP19-6-7-7 19-Mar-19 B919851 VJ8044 0.15	SP19-6-7-9 19-Mar-19 B919851 VJ8048 0.15	SP19-6-7-COMP2 19-Mar-19 B919851 VJ8051 0.15	SP19-6-7-COMP3 19-Mar-19 B919851 VJ8054 0.15	SP19-6-8-1 22-Mar-19 B920962 VK3618 0.15
	TCLP Leachate Metals											
n/s	antimony	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
2500	arsenic	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
100000	barium	µg/L	960	870	10%	870	980	670	770	780	780	730
n/s	beryllium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
500000	boron	µg/L	<100	<100	--	<100	100	<100	<100	<100	130	<100
500	cadmium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
5000	chromium (total)	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
n/s	cobalt	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
100000	copper	µg/L	2310	2110	9%	550	1060	350	300	360	350	270
n/s	iron	µg/L	<500	<500	--	<500	<500	<500	<500	<500	<500	<500
5000	lead	µg/L	670	950	35%	<100	310	<100	<100	<100	<100	<100
100	mercury	µg/L	2.6	2.6	0%	<2	2.3	<2	<2	<2	<2	<2
500	molybdenum	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
n/s	nickel	µg/L	120	110	9%	<100	110	<100	<100	<100	<100	<100
1000	selenium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
n/s	silver	µg/L	<10	<10	--	<10	<10	<10	<10	<10	<10	<10
n/s	thallium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
10000	uranium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
n/s	vanadium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100
500000	zinc	µg/L	2910	2670	9%	480	1950	<100	<100	<100	<100	<100
n/s	zirconium	µg/L	<100	<100	--	<100	<100	<100	<100	<100	<100	<100

Soil Exceedances

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March 2019

HWR Leachate Quality Standards	SAMPLE ID / DATE SAMPLED / LAB CERTIFICATE / LAB SAMPLE ID / SAMPLE DEPTH (mbg) / SOIL DESCRIPTION	Units	SP19-6-8-3 22-Mar-19 B920962 VK3621 0.15	SP19-6-8-COMP1 22-Mar-19 B920962 VK3624 0.15	SP19-6-8-6 22-Mar-19 B920962 VK3625 0.15	SP19-R 22-Mar-19 B920962 VK3626 Duplicate of SP19-6-8-6	RPD or MS for SP19-6-8-6 and SP19-R	SP19-6-8-9 22-Mar-19 B920962 VK3629 0.15	SP19-6-8-COMP2 22-Mar-19 B920962 VK3631 0.15	SP19-6-8-COMP3 22-Mar-19 B920962 VK3634 0.15	SP19-5-1-1 22-Mar-19 B920962 VK3635 0.15	SP19-S 22-Mar-19 B920962 VK3636 Duplicate of SP19-5-1-1	RPD or MS for SP19-5-1-1 and SP19-S
	TCLP Leachate Metals												
n/s	antimony	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
2500	arsenic	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
100000	barium	µg/L	870	830	640	660	3%	850	870	650	620	600	3%
n/s	beryllium	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
500000	boron	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
500	cadmium	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
5000	chromium (total)	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
n/s	cobalt	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
100000	copper	µg/L	300	310	220	230	4%	270	270	420	430	410	5%
n/s	iron	µg/L	<500	<500	<500	<500	--	<500	<500	<500	<500	<500	--
5000	lead	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
100	mercury	µg/L	<2	<2	<2	<2	--	<2	<2	<2	<2	<2	--
500	molybdenum	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
n/s	nickel	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
1000	selenium	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
n/s	silver	µg/L	<10	<10	<10	<10	--	<10	<10	<10	<10	<10	--
n/s	thallium	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
10000	uranium	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
n/s	vanadium	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
500000	zinc	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--
n/s	zirconium	µg/L	<100	<100	<100	<100	--	<100	<100	<100	<100	<100	--

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HWR Leachate Quality Standards	SAMPLE ID / DATE SAMPLED / LAB CERTIFICATE / LAB SAMPLE ID / SAMPLE DEPTH (mbg) / SOIL DESCRIPTION	Units	SP19-5-1-5 22-Mar-19 B920962 VK3640 0.15	SP19-5-1-COMP1 22-Mar-19 B920962 VK3641 0.15	SP19-5-1-7 22-Mar-19 B920962 VK3643 0.15	SP19-5-1-10 22-Mar-19 B920962 VK3646 0.15	SP19-5-1-COMP2 22-Mar-19 B920962 VK3648 0.15	SP19-5-1-12 22-Mar-19 B920962 VK3650 0.15	SP19-5-1-14 22-Mar-19 B920962 VK3652 0.15	SP19-5-1-COMP3 22-Mar-19 B920962 VK3653 0.15	SP19-5-2-1 25-Mar-19 B921352 VK5209 0.15	SP19-W 25-Mar-19 B921352 VK5210 Duplicate of SP19-5-2-1	RPD or MS for SP19-5-2-1 and SP19-W
	TCLP Leachate Metals												
n/s	antimony	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
2500	arsenic	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
100000	barium	µg/L	1010	650	750	840	680	940	680	810	920	910	1%
n/s	beryllium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
500000	boron	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
500	cadmium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
5000	chromium (total)	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
n/s	cobalt	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
100000	copper	µg/L	340	570	350	350	370	340	390	400	320	320	0%
n/s	iron	µg/L	<500	1040	<500	<500	<500	<500	<500	<500	<500	<500	--
5000	lead	µg/L	<100	180	<100	<100	<100	<100	<100	<100	<100	<100	--
100	mercury	µg/L	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	--
500	molybdenum	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
n/s	nickel	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
1000	selenium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
n/s	silver	µg/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	--
n/s	thallium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
10000	uranium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
n/s	vanadium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
500000	zinc	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
n/s	zirconium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	--

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HWR Leachate Quality Standards	SAMPLE ID / DATE SAMPLED / LAB CERTIFICATE / LAB SAMPLE ID / SAMPLE DEPTH (mbg) / SOIL DESCRIPTION	Units	SP19-5-2-3 25-Mar-19 B921352 VK5212 0.15	SP19-5-2-COMP1 25-Mar-19 B921352 VK5215 0.15	SP19-5-2-8 25-Mar-19 B921352 VK5219 0.15	SP19-5-2-10 25-Mar-19 B921352 VK5221 0.15	SP19-5-2-COMP2 25-Mar-19 B921352 VK5222 0.15	SP19-5-2-COMP3 25-Mar-19 B921352 VK5225 0.15	SP19-5-3-2 25-Mar-19 B921352 VK5227 0.15	SP19-5-3-5 25-Mar-19 B921352 VK5229 0.15	SP19-U 25-Mar-19 B921352 VK5230 Duplicate of SP19-5-3-5	RPD or MS for SP19-5-3-5 and SP19-U
	TCLP Leachate Metals											
n/s	antimony	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
2500	arsenic	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
100000	barium	µg/L	940	920	870	970	870	940	920	1090	1150	5%
n/s	beryllium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
500000	boron	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
500	cadmium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
5000	chromium (total)	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
n/s	cobalt	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
100000	copper	µg/L	260	260	220	270	240	270	260	260	270	4%
n/s	iron	µg/L	<500	<500	<500	<500	<500	<500	<500	<500	<500	--
5000	lead	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
100	mercury	µg/L	<2	<2	<2	<2	<2	<2	<2	<2	<2	--
500	molybdenum	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
n/s	nickel	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
1000	selenium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
n/s	silver	µg/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	--
n/s	thallium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
10000	uranium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
n/s	vanadium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
500000	zinc	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--
n/s	zirconium	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	--

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	DATE SAMPLED		25-Mar-19	25-Mar-19	25-Mar-19	25-Mar-19	25-Mar-19
	LAB CERTIFICATE		B921352	B921352	B921352	B921352	B921352
	LAB SAMPLE ID		VK5231	VK5234	VK5236	VK5237	VK5250
	SAMPLE DEPTH (mbg)		0.15	0.15	0.15	0.15	0.15
	SOIL DESCRIPTION						
	TCLP Leachate Metals						
n/s	antimony	µg/L	<100	<100	<100	<100	<100
2500	arsenic	µg/L	<100	<100	<100	<100	<100
100000	barium	µg/L	880	910	850	940	760
n/s	beryllium	µg/L	<100	<100	<100	<100	<100
500000	boron	µg/L	<100	<100	<100	<100	<100
500	cadmium	µg/L	<100	<100	<100	<100	<100
5000	chromium (total)	µg/L	<100	<100	<100	<100	<100
n/s	cobalt	µg/L	<100	<100	<100	<100	<100
100000	copper	µg/L	290	230	250	260	240
n/s	iron	µg/L	<500	<500	<500	<500	<500
5000	lead	µg/L	<100	<100	<100	<100	<100
100	mercury	µg/L	<2	<2	<2	<2	<2
500	molybdenum	µg/L	<100	<100	<100	<100	<100
n/s	nickel	µg/L	<100	<100	<100	<100	<100
1000	selenium	µg/L	<100	<100	<100	<100	<100
n/s	silver	µg/L	<10	<10	<10	<10	<10
n/s	thallium	µg/L	<100	<100	<100	<100	<100
10000	uranium	µg/L	<100	<100	<100	<100	<100
n/s	vanadium	µg/L	<100	<100	<100	<100	<100
500000	zinc	µg/L	<100	<100	<100	<100	<100
n/s	zirconium	µg/L	<100	<100	<100	<100	<100

Soil Exceedances

125 Exceeds HWR leachate quality standards

QA/QC Exceedances

45% RPD exceeds 35%

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Table #2a: Storage Cell #5 Soil Analytical Results - Metals

		Field ID	C5-01	C5-02	C5-03	C5-04	C5-05	C5-06	C5-07	C5-08	C5-800	C5-09	C5-10
		Location ID	C5-1	C5-2	C5-3	C5-4	C5-5	C5-6	C5-7	C5-8	C5-800	C5-9	C5-10
		Sample Date	21/01/2019	21/01/2019	21/01/2019	21/01/2019	19/01/2019	18/01/2019	18/01/2019	21/01/2019	25/01/2019	21/01/2019	21/01/2019
		BC CSR CL											
Inorganics													
pH (Lab)	pH_Units	-	7.34	7.26	6.25	5.71	5.19	4.79	5.09	7.35	7.92	7.2	6.2
Phosphorus	mg/kg	-	446	350	445	428	458	432	439	508	418	367	429
Metals													
Aluminium	mg/kg	250,000	10,200	10,500	10,300	10,200	9120	10,100	9620	11,700	11,700	9380	11,600
Antimony	mg/kg	40	3.53	2.42	14.1	17.3	14.3	19.7	22.9	6.6	1.18	2.52	5.47
Arsenic	mg/kg	10	26.3	18.2	118	149	135	180	192	45.1	5.63	19.2	36.2
Barium	mg/kg	1500	34.4	50	50.1	38.9	37.4	39.6	38.5	40.9	43.3	33.6	40.2
Beryllium	mg/kg	Varies - see Regs	<0.2	<0.2	<0.2	<2	<2	<2	<2	<0.2	<0.2	<0.2	<0.2
Bismuth	mg/kg	-	2.84	1.7	18.5	18.7	14.6	19.2	18.4	5.89	0.37	1.65	3.78
Boron	mg/kg	50,000	1.9	1.4	1.4	<10	<10	<10	<10	2.3	2.8	1.3	1.6
Cadmium	mg/kg	Varies - see Regs	2.15	2.23	7.57	11.4	7.98	8.87	14	4.97	1.81	1.36	1.88
Calcium	mg/kg	-	5860	4530	4930	5080	5320	4870	4440	8170	10,000	4710	4590
Chromium	mg/kg	60	17.1	13.8	17	17	15	18	17	22.4	16.1	16.4	18.3
Cobalt	mg/kg	25	5.79	6.96	11	13.8	10.9	14.2	14.4	9.06	8.77	6.02	6.46
Copper	mg/kg	Varies - see Regs	5340	11,400	20,400	29,900	22,100	31,300	33,500	12,100	1740	6430	6640
Iron	mg/kg	150,000	26,400	20,900	41,700	50,000	44,500	56,300	51,400	36,800	21,100	23,500	28,300
Lead	mg/kg	Varies - see Regs	1130	558	5240	10,100	8650	8850	8120	1590	257	957	1690
Lithium	mg/kg	450	10.3	11.8	8.5	<50	<50	<50	<50	12	11.7	10.2	12.4
Magnesium	mg/kg	-	3770	3620	3850	3550	3190	3260	3420	4120	4120	3680	4100
Manganese	mg/kg	2000	198	196	216	181	160	169	178	218	247	190	211
Mercury	mg/kg	75	0.402	0.243	0.481	1.17	1.05	1.23	1.22	0.958	0.058	0.131	0.316
Molybdenum	mg/kg	150	39.3	24.8	134	159	166	202	204	71.9	6.02	22.7	45.7
Nickel	mg/kg	Varies - see Regs	26	56.8	49	42.1	50.5	44	70.4	33.9	63.6	38	27.1
Potassium	mg/kg	-	1010	1040	1050	1040	1160	1140	1140	1160	970	976	1050
Selenium	mg/kg	1	3.8	2.14	11.5	15	13	20.7	19.1	7.95	0.52	2.18	4.25
Silver	mg/kg	40	3.35	1.99	12.2	15.8	13.1	18.1	17.7	6.59	0.796	2.11	4.38
Sodium ion	mg/kg	-	470	474	449	<1000	<1000	<1000	<1000	531	516	409	489
Strontium	mg/kg	150,000	38.9	35	37.7	37.6	41.6	38.6	34.7	53.2	61.8	30.9	36.2
Thallium	mg/kg	25	0.101	0.079	0.187	<0.5	<0.5	<0.5	<0.5	0.16	0.063	0.066	0.1
Tin	mg/kg	300	0.88	0.45	1.68	2.4	2.2	3.8	2.9	1.37	0.63	0.53	0.87
Titanium	mg/kg	-	567	647	653	590	590	593	578	631	693	531	626
Tungsten	mg/kg	200	<0.5	<0.5	0.76	<5	<5	<5	<5	<0.5	<0.5	<0.5	<0.5
Uranium	mg/kg	150	0.86	0.864	0.771	0.83	0.87	0.75	0.91	1.23	1.25	0.932	0.843
Vanadium	mg/kg	300	60.3	57.3	71.4	62	57	61	55	74.8	62.8	65.1	61.1
Zinc	mg/kg	Varies - see Regs	572	774	1790	3000	2120	2350	3400	1480	435	429	574
Zirconium	mg/kg	-	0.7	0.74	1.29	<5	<5	<5	<5	0.69	0.81	0.83	0.81

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Table #2a: Storage Cell #5 Soil Analytical Results - Metals

		Field ID	C5-11	C5-12	C5-13	C5-14	C5-15	C5-16	C5-17	C5-18	C5-19	C5-20	C5-21	C5-22	C5-23	C5-24	C5-25
		Location ID	C5-11	C5-12	C5-13	C5-14	C5-15	C5-16	C5-17	C5-18	C5-19	C5-20	C5-21	C5-22	C5-23	C5-24	C5-25
		Sample Date	21/01/2019	19/01/2019	19/01/2019	18/01/2019	21/01/2019	21/01/2019	21/01/2019	21/01/2019	19/01/2019	19/01/2019	18/01/2019	18/01/2019	19/01/2019	19/01/2019	21/01/2019
		BC CSR CL															
Inorganics																	
pH (Lab)	pH_Units	-	6.01	5.18	4.75	5.08	7.43	6.24	5.85	6.25	6.5	4.79	5.23	4.71	5.16	4.32	6.96
Phosphorus	mg/kg	-	471	505	443	440	458	517	555	532	489	373	358	496	411	411	474
Metals																	
Aluminium	mg/kg	250,000	12,000	8810	9140	11,500	10,700	10,800	12,000	12,000	12,500	9850	9070	9340	11,400	10,500	12,300
Antimony	mg/kg	40	17.4	19.4	22.2	12.6	4.43	8.22	6.08	4.83	10.7	15	18.3	16.1	11.5	10.8	5.41
Arsenic	mg/kg	10	131	169	176	118	27.1	84.9	72.4	48.7	128	130	181	148	103	81	40.1
Barium	mg/kg	1500	53.8	45.1	40.1	32.9	41	38.1	41.6	39.1	41.8	33.8	31.5	41.1	36.4	33.2	37.8
Beryllium	mg/kg	Varies - see Regs	<0.2	<2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2
Bismuth	mg/kg	-	17.5	19.4	17.1	12.1	2.78	9.43	5.62	3.73	8.4	11.3	15.5	10.9	9.55	5.93	3.08
Boron	mg/kg	50,000	1.4	<10	<10	1.2	1.9	2.4	2.6	1.6	1.8	1.2	<10	1.2	1.2	1.1	2
Cadmium	mg/kg	Varies - see Regs	5.63	5.66	6.47	7.45	1.86	4.07	1.58	1.71	2.96	4.08	9	3.11	4.93	1.81	2.61
Calcium	mg/kg	-	5230	4550	4020	5300	6950	5890	5870	6230	9790	4540	5420	5480	4710	5110	5770
Chromium	mg/kg	60	21.7	17	25	19.5	18.9	19.2	18.8	23	21.9	18	20	21.9	17.8	23.2	21.3
Cobalt	mg/kg	25	13.6	10.4	11.3	10.8	6.58	8.58	6.86	7.26	8.72	9.53	10.6	8.64	8.22	7.8	13
Copper	mg/kg	Varies - see Regs	22,900	23,200	29,300	21,400	7020	11,500	6510	8270	16,300	18,300	24,000	19,000	14,300	13,600	9730
Iron	mg/kg	150,000	48,200	52,100	59,000	40,200	27,700	36,300	29,400	32,200	38,900	41,900	50,200	51,600	39,200	44,700	31,200
Lead	mg/kg	Varies - see Regs	9170	10,800	6070	6130	1650	3480	2520	1660	4060	3110	8400	5260	4450	2060	1060
Lithium	mg/kg	450	10.8	<50	<50	10.8	12.2	13.3	15.4	13.5	15	9.9	<50	9.6	13.8	10.1	19.7
Magnesium	mg/kg	-	4330	3400	3310	3470	3920	3840	4200	4230	4330	3320	2760	3560	3890	3520	4410
Manganese	mg/kg	2000	230	163	147	176	218	212	236	231	209	158	144	173	188	174	292
Mercury	mg/kg	75	0.643	0.86	1.67	0.482	0.205	0.363	0.317	0.205	0.392	0.772	0.65	0.691	0.487	0.442	0.265
Molybdenum	mg/kg	150	146	195	231	121	35.4	63.2	43.8	33.3	83.2	140	170	148	101	109	43.3
Nickel	mg/kg	Varies - see Regs	44	31.2	32.4	88.4	22.2	43.2	35.6	26.1	30.5	26.7	63.9	17.7	31.5	10.9	32.1
Potassium	mg/kg	-	1350	1300	1240	1010	1020	1030	1230	1080	1280	1070	<1000	1160	1140	1070	1200
Selenium	mg/kg	1	12.5	18.4	29.8	10.9	3.2	6.9	3.81	3.94	6.5	12.1	14.2	11.8	9.23	8.16	4.01
Silver	mg/kg	40	13.9	17.3	20.2	10.2	3.41	7.23	5.04	3.76	8.13	12.1	15.1	12.4	9.1	7.46	3.85
Sodium ion	mg/kg	-	611	<1000	<1000	511	482	493	620	589	649	532	<1000	521	484	561	545
Strontium	mg/kg	150,000	46.6	43.4	41.1	41	43.8	39.5	47.3	43	50	35	33.8	41.7	37.2	38.8	42.1
Thallium	mg/kg	25	0.195	<0.5	<0.5	0.184	0.095	0.149	0.134	0.108	0.159	0.226	<0.5	0.195	0.157	0.131	0.098
Tin	mg/kg	300	2.09	3	3.6	1.8	0.92	1.58	1.32	1.03	2.19	2.2	2.7	2.28	1.53	1.6	0.92
Titanium	mg/kg	-	732	658	575	621	618	605	667	727	794	565	552	644	662	685	699
Tungsten	mg/kg	200	0.75	<5	<5	0.72	<0.5	0.6	0.94	<0.5	0.89	0.8	<5	0.87	0.65	<0.5	<0.5
Uranium	mg/kg	150	0.814	0.79	0.63	0.905	0.96	1.54	1.95	1.22	1.37	0.622	0.75	0.656	0.901	0.467	1.17
Vanadium	mg/kg	300	72	62	58	72.4	67.7	77.2	69.6	84.4	80.1	57.6	73	82.5	70.1	90.8	82.3
Zinc	mg/kg	Varies - see Regs	1500	1560	1780	1820	490	1110	425	494	892	1200	2000	946	1120	521	753
Zirconium	mg/kg	-	1.09	<5	<5	0.74	0.82	0.64	0.59	0.63	0.72	0.68	<5	0.81	0.65	0.89	0.59

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Table #2a: Storage Cell #5 Soil Analytical Results - Metals

		Field ID	C5-26	C5-27	C5-28	C5-29	C5-30	C5-31	C5-32	C5-33	C5-34	C5-35	C5-36	C5-37	C5-38	C5-53
		Location ID	C5-26	C5-27	C5-28	C5-29	C5-30	C5-31	C5-32	C5-33	C5-34	C5-35	C5-36	C5-37	C5-38	C5-53
		Sample Date	21/01/2019	18/01/2019	18/01/2019	19/01/2019	19/01/2019	19/01/2019	19/01/2019	19/01/2019	19/01/2019	19/01/2019	21/01/2019	21/01/2019	19/01/2019	21/01/2019
		BC CSR CL														
Inorganics																
pH (Lab)	pH_Units	-	5.15	4.01	5.11	4.9	6.41	7.49	7.22	7.61	7.39	7.07	6.76	7.72	7.45	7.49
Phosphorus	mg/kg	-	370	412	382	446	404	404	356	397	379	351	403	413	416	360
Metals																
Aluminium	mg/kg	250,000	10,100	8710	11,500	11,600	11,700	10,100	10,900	10,600	10,800	10,600	12,600	11,400	11,000	10,400
Antimony	mg/kg	40	5.54	20.3	10.9	10.8	1.89	1.23	1.29	0.56	0.63	1.33	2.95	1.58	1.68	2.49
Arsenic	mg/kg	10	47.4	161	89.9	93.1	16.4	12.3	11.1	4.72	6.53	8.12	25.8	12.3	12.8	19.1
Barium	mg/kg	1500	29.1	42.8	35.6	36.4	29.7	32.3	39.5	30.6	29.6	29.5	40.8	40.1	37.1	33.8
Beryllium	mg/kg	Varies - see Regs	<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
Bismuth	mg/kg	-	3.32	12.5	6.64	7.24	1.16	0.8	0.78	0.27	0.41	0.57	2.01	1	1.01	1.54
Boron	mg/kg	50,000	1.2	1.2	1.2	1.3	1.8	3.1	1.5	1.8	1.6	1.7	1.8	1.3	1.2	1.1
Cadmium	mg/kg	Varies - see Regs	1.39	1.92	2.29	2.02	1.19	2.01	1.41	1.63	1.28	1.14	1.5	1.13	0.937	1.25
Calcium	mg/kg	-	4260	5040	5710	5410	5330	6640	5720	6020	5650	4990	6130	6790	5880	7360
Chromium	mg/kg	60	18.3	17.6	21.4	17.6	21.9	24.7	18.4	23.8	18.8	21.1	15.8	19.9	19.7	16.5
Cobalt	mg/kg	25	8.01	6.12	7.5	7.33	8.85	7.81	7.74	7.67	7.28	6.46	6.46	8.38	7.7	7.31
Copper	mg/kg	Varies - see Regs	7840	19,700	17,500	13,600	7020	9400	5720	6910	6790	6510	6820	4880	4720	6650
Iron	mg/kg	150,000	30,200	54,000	41,200	39,700	27,400	26,600	22,900	26,300	21,700	24,300	23,600	26,600	24,300	22,100
Lead	mg/kg	Varies - see Regs	1070	5200	2550	2800	459	306	264	117	171	201	972	518	548	803
Lithium	mg/kg	450	10.6	8.4	11.5	11.7	14.4	12.4	15.2	12.7	12.8	12.8	12.8	12.3	11.2	11.6
Magnesium	mg/kg	-	3450	3190	3530	3700	3770	3700	3840	3850	3910	3570	4070	4160	3940	3940
Manganese	mg/kg	2000	189	159	167	175	193	204	209	215	219	192	219	254	218	218
Mercury	mg/kg	75	0.236	0.973	0.673	0.554	0.09	0.064	0.054	<0.05	<0.05	<0.05	0.196	0.099	0.084	0.093
Molybdenum	mg/kg	150	49.6	217	125	116	16.8	10.2	10.3	4.48	5.76	10.5	28.1	16.3	15.3	21.6
Nickel	mg/kg	Varies - see Regs	15.8	14.2	21	16.7	31.6	26.3	19.5	26.4	28.9	23	40	17.5	15.1	18.4
Potassium	mg/kg	-	902	1250	1070	1170	931	975	998	913	900	908	1030	975	925	960
Selenium	mg/kg	1	4.2	15.5	10.5	8.47	1.62	0.96	0.95	<0.5	<0.5	0.64	2.5	1.32	1.22	1.84
Silver	mg/kg	40	4.37	16.1	8.71	8.29	1.52	0.938	0.815	0.357	0.462	0.659	2.36	1.32	1.33	1.78
Sodium ion	mg/kg	-	434	601	526	621	476	462	501	492	540	477	517	451	476	491
Strontium	mg/kg	150,000	29.8	43.7	39.5	42	34	41.1	39	40.6	38.4	34.9	42.6	40.9	40.5	51.4
Thallium	mg/kg	25	0.09	0.233	0.162	0.151	0.055	0.054	<0.05	<0.05	<0.05	<0.05	0.088	0.064	0.055	0.059
Tin	mg/kg	300	0.94	3.17	1.56	1.71	0.5	0.52	0.38	0.3	0.44	0.29	0.71	0.59	0.66	0.5
Titanium	mg/kg	-	525	615	654	678	602	597	682	717	670	603	692	694	665	640
Tungsten	mg/kg	200	<0.5	1.01	0.54	0.61	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.57	<0.5	<0.5
Uranium	mg/kg	150	0.603	0.496	0.653	0.72	0.822	0.992	0.957	0.977	0.833	0.979	0.931	0.59	0.461	0.533
Vanadium	mg/kg	300	67.2	58.3	74.4	67	93.7	99.3	78.6	103	71.4	87	61.4	85.7	77.4	67.7
Zinc	mg/kg	Varies - see Regs	417	653	717	654	398	599	455	507	456	408	532	305	263	343
Zirconium	mg/kg	-	0.59	0.97	0.94	0.77	<0.5	<0.5	0.55	0.61	0.71	0.6	1.09	1.15	1.19	0.92

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Table #7b: Storage Cell #5 Soil TCLP Analytical Results

		Location ID	C5-2	C5-3	C5-4	C5-5	C5-6	C5-7	C5-11	C5-12	C5-13
		Field ID	C5-02	C5-03	C5-04	C5-05	C5-06	C5-07	C5-11	C5-12	C5-13
		Sample Date	21/01/2019	21/01/2019	21/01/2019	19/01/2019	18/01/2019	18/01/2019	21/01/2019	19/01/2019	19/01/2019
		BC HW Reg Sch 4									
Metals											
Antimony	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Arsenic	µg/L	2500	<100	<100	<100	<100	<100	<100	<100	<100	<100
Barium	µg/L	100000	200	170	150	110	120	130	140	140	110
Beryllium	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Boron	µg/L	500000	<100	<100	<100	<100	<100	<100	120	<100	<100
Cadmium	µg/L	500	<100	<100	<100	<100	<100	<100	<100	<100	<100
Chromium	µg/L	5000	<100	<100	<100	<100	<100	<100	<100	<100	<100
Cobalt	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Copper	µg/L	100000	168,000	44,400	36,800	26,400	37,100	65,200	39,700	26,900	28,800
Iron	mg/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Lead	µg/L	5000	1560	90,300	70,600	64,900	84,200	44,300	44,900	35,000	20,900
Mercury	µg/L	100	<2	<2	<2	<2	<2	<2	<2	<2	<2
Molybdenum	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Nickel	µg/L		120	160	230	280	130	350	<100	<100	<100
Selenium	µg/L	1000	<100	<100	<100	<100	<100	<100	<100	<100	<100
Silver	µg/L	5000	<10	<10	<10	<10	<10	<10	<10	<10	<10
Thallium	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Uranium	µg/L	10000	<100	<100	<100	<100	<100	<100	<100	<100	<100
Vanadium	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Zinc	µg/L	500000	4060	2600	2700	5190	1760	4800	2120	2130	1270
Zirconium	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100

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Table #7b: Storage Cell #5 Soil TCLP Analytical Results

		Location ID	C5-14	C5-15	C5-16	C5-17	C5-18	C5-19	C5-21	C5-22	C5-25
		Field ID	C5-14	C5-15	C5-16	C5-17	C5-18	C5-19	C5-21	C5-22	C5-25
		Sample Date	18/01/2019	21/01/2019	21/01/2019	21/01/2019	21/01/2019	19/01/2019	18/01/2019	18/01/2019	21/01/2019
		BC HW Reg Sch 4									
Metals											
Antimony	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Arsenic	µg/L	2500	<100	<100	<100	<100	<100	<100	<100	<100	<100
Barium	µg/L	100000	120	260	200	160	230	110	120	140	140
Beryllium	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Boron	µg/L	500000	<100	<100	<100	<100	<100	<100	<100	<100	<100
Cadmium	µg/L	500	<100	<100	<100	<100	<100	<100	<100	<100	<100
Chromium	µg/L	5000	<100	<100	<100	<100	<100	<100	<100	<100	<100
Cobalt	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Copper	µg/L	100000	48,400	55,100	55,200	53,000	88,400	84,100	34,200	43,600	63,600
Iron	mg/L		<0.5	<0.5	3.23	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Lead	µg/L	5000	26,600	17,300	26,000	17,900	5700	72,300	51,600	15,600	3800
Mercury	µg/L	100	<2	<2	<2	<2	<2	<2	<2	<2	<2
Molybdenum	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Nickel	µg/L		220	<100	150	120	<100	280	410	<100	<100
Selenium	µg/L	1000	<100	<100	<100	<100	<100	<100	<100	<100	<100
Silver	µg/L	5000	<10	<10	<10	<10	<10	<10	<10	<10	<10
Thallium	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Uranium	µg/L	10000	<100	<100	<100	<100	<100	<100	<100	<100	<100
Vanadium	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Zinc	µg/L	500000	2570	3290	2910	4040	3070	8850	2800	2600	3530
Zirconium	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100

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Table #7b: Storage Cell #5 Soil TCLP Analytical Results

		Location ID	C5-26	C5-27	C5-30	C5-31	C5-32	C5-33	C5-34	C5-35	C5-36
		Field ID	C5-26	C5-27	C5-30	C5-31	C5-32	C5-33	C5-34	C5-35	C5-36
		Sample Date	21/01/2019	18/01/2019	19/01/2019	19/01/2019	19/01/2019	19/01/2019	19/01/2019	19/01/2019	21/01/2019
		BC HW Reg Sch 4									
Metals											
Antimony	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Arsenic	µg/L	2500	<100	<100	<100	<100	<100	<100	<100	<100	<100
Barium	µg/L	100000	120	<100	210	220	210	170	200	170	200
Beryllium	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Boron	µg/L	500000	<100	<100	<100	<100	<100	<100	180	<100	130
Cadmium	µg/L	500	<100	<100	<100	<100	<100	<100	<100	<100	<100
Chromium	µg/L	5000	<100	<100	<100	<100	<100	<100	<100	<100	<100
Cobalt	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Copper	µg/L	100000	59,800	66,100	191,000	152,000	125,000	126,000	205,000	159,000	95,200
Iron	mg/L		<0.5	<0.5	0.58	0.75	<0.5	<0.5	0.66	<0.5	<0.5
Lead	µg/L	5000	8520	5410	480	1180	470	200	560	180	4860
Mercury	µg/L	100	<2	<2	<2	<2	<2	<2	<2	<2	<2
Molybdenum	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Nickel	µg/L		<100	<100	110	110	120	110	140	120	140
Selenium	µg/L	1000	<100	<100	<100	<100	<100	<100	<100	<100	<100
Silver	µg/L	5000	<10	<10	<10	<10	<10	<10	<10	<10	<10
Thallium	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Uranium	µg/L	10000	<100	<100	<100	<100	<100	<100	<100	<100	<100
Vanadium	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100
Zinc	µg/L	500000	2620	3700	6200	6120	7610	6390	7890	8520	4340
Zirconium	µg/L		<100	<100	<100	<100	<100	<100	<100	<100	<100

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Teble #3: Storage Cell #6 Soil Analytical Results - Metals

		Location ID	C6-1
		Field ID	C6-01
		Sample Date	24/01/2019
		BC CSR CL	
Inorganics			
pH (Lab)	pH_Units		7.52
Phosphorus	mg/kg		420
Metals			
Aluminium	mg/kg	250,000	11,600
Antimony	mg/kg	40	2.1
Arsenic	mg/kg	10	11.9
Barium	mg/kg	1500	42.2
Beryllium	mg/kg	Varies - see Regs	<0.2
Bismuth	mg/kg	-	1.74
Boron	mg/kg	50,000	4.5
Cadmium	mg/kg	Varies - see Regs	1.24
Calcium	mg/kg	-	6060
Chromium	mg/kg	60	21.8
Cobalt	mg/kg	25	7.77
Copper	mg/kg	Varies - see Regs	5850
Iron	mg/kg	150,000	23,000
Lead	mg/kg	Varies - see Regs	602
Lithium	mg/kg	450	11
Magnesium	mg/kg	-	4920
Manganese	mg/kg	2000	255
Mercury	mg/kg	75	0.18
Molybdenum	mg/kg	150	18.1
Nickel	mg/kg	Varies - see Regs	50.1
Potassium	mg/kg	-	832
Selenium	mg/kg	1	1.76
Silver	mg/kg	40	2.02
Sodium ion	mg/kg	-	422
Strontium	mg/kg	150,000	42.4
Thallium	mg/kg	25	0.07
Tin	mg/kg	300	0.78
Titanium	mg/kg	-	735
Tungsten	mg/kg	200	<0.5
Uranium	mg/kg	150	0.862
Vanadium	mg/kg	300	64.5
Zinc	mg/kg	Varies - see Regs	300
Zirconium	mg/kg	-	1.47

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Table 4: Stockpile X Soil Analytical Results - TCLP Metals

	Units	BC Hazardous Waste Reg Sch 4	
Metals			
Antimony	µg/L		<100
Arsenic	µg/L	2500	<100
Barium	µg/L	100000	300
Beryllium	µg/L		<100
Boron	µg/L	500000	<100
Cadmium	µg/L	500	<100
Chromium	µg/L	5000	<100
Cobalt	µg/L		<100
Copper	µg/L	100000	8740
Iron	mg/L		<0.5
Lead	µg/L	5000	3550
Mercury	µg/L	100	<2
Molybdenum	µg/L		<100
Nickel	µg/L		<100
Selenium	µg/L	1000	<100
Silver	µg/L	5000	<10
Thallium	µg/L		<100
Uranium	µg/L	10000	<100
Vanadium	µg/L		<100
Zinc	µg/L	500000	790
Zirconium	µg/L		<100

Appendix B

Borehole Logs

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW-20A

Client: Environment Canada Project: PEC Additional Wells

Project No.: 457-003.03 Location: PEC Site Supervised by: M. Choi

Drilling Co.: Beck Drilling and Environmental Services Ltd. Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan Date Completed: 21 Feb 02

SAMPLE				Depth Scale		Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well TOP Elevation (mNVD): 3.12
Sample Interval	Analysis (Not analysed /analysed)	Sample I.D. (% recovery in split spoons)	Water Conductivity (uS/cm)	(ft)	(m)		Surface Elevation (mNVD): 3.19		Road box
							- No logging (blind bit) - Same as MW-20B		Cement (0-0.34 m) Bentonite chips (0.34-2.74 m) depth to water 2.470 m (13-Mar-02) Fine sand (2.74-3.048 m) 10/20 Filter Sand (3.048-5.18 m) 0.025 cm slot, 5 cm diameter PVC well screen (3.51-5.03 m)
				5 10 15	1 2 3 4 5			-2.0 5.2	

SAMPLE TYPE: SS Split Spoon; WC Wash Cuttings; ST Shelby Tube

PEC WELL LOG2 4570303.GPJ 37405

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW-20B

Client: Environment Canada | Project: PEC Additional Wells

Project No.: 457-003.03 | Location: PEC Site | Supervised by: R. Arellano

Drilling Co.: Beck Drilling and Environmental Services Ltd. | Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan | Date Completed: 20 Feb 02

SAMPLE				Depth Scale		Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well TOP Elevation (mNVD): 3.07
Sample Interval	Analysis (Not analysed /analysed)	Sample I.D. (% recovery in split spoons)	Water Conductivity (uS/cm)	(ft)	(m)		Surface Elevation (mNVD): 3.15		Road box
							SAND and GRAVEL - fine to coarse grained, well graded, compact, brown, damp to moist		Cement (0-0.34 m)
					1				Bentonite chips (0.34-0.91 m)
				5				1.6	
	Metals	20B-1 (75%)					SAND - medium to coarse grained, trace shells, brown, loose, shells have pink/purple precipitate, trace wood, wet at 2.1 m	1.5	
					2				
	Metals **grain size**	20B-2 (100%)					- 15.2 cm of fine sand, some silt, trace clay at 2.3 m		depth to water 2.429 m (13-Mar-02)
	Cond.	Water grab	1330				- fine sand and silt at 2.4 m		
				10	3		- fine to coarse grained sand at 2.7 m to 3.4 m, with trace of gravel		
							- cobble at 3.4 m	-0.2	
							SAND and GRAVEL - some cobbles, fine to coarse grained, dense, brown, wet	3.4	
					4				
	Metals	20B-3 (75%)					- precipitate on sand at 4.0 m to 4.6 m		
							- no exceedances of CCME SQG (CL)	-1.4	
	Microbio.	MW-20@ 15-16.5'		15			GRAVEL and COBBLE - some sand, very dense, brown orange, wet	4.6	Bentonite grout (0.91-7.01 m)
					5				
				20	6				
	Grain size	20B-4	646						
					7		- grey light brown at 6.7 m, with some silt		Fine sand (7.01-7.32 m)
				25					10/20 Fliter Sand (7.32-9.14 m)
					8				
	Metals	20B-5					**- no exceedances of CCME SQG (CL)**		0.025 cm slot, 5 cm diameter PVC well screen (7.62-9.14 m)
	Cond.	Water grab	267	30	9				

SAMPLE TYPE: SS Split Spoon; WC Wash Cuttings; ST Shelby Tube

PEC WELL LOG2 4570303.GPJ 37406

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW-20B

Client: Environment Canada Project: PEC Additional Wells

Project No.: 457-003.03 Location: PEC Site Supervised by: R. Arellano

Drilling Co.: Beck Drilling and Environmental Services Ltd. Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan Date Completed: 20 Feb 02

SAMPLE				Depth Scale		Graphic Log	Stratigraphic Description	Elev. Depth (m)	
Sample Interval	Analysis (Not analysed /analysed)	Sample I.D. (% recovery in split spoons)	Water Conductivity (uS/cm)	(ft)	(m)		Continued from previous page		
					10			-7.2	
	Grain size	20B-6		35			SILT - clayey, some sand, grey and dark brown, trace wood debris, soft	10.4 -7.5	
					11		SAND - gravelly, some silt and clay, fine to medium grained, grey, loose	10.7	Slough (9.14-13.72 m)
	Grain size	20B-7							
				40	12			-9.0	
							SAND - medium to coarse grained, some gravel, brown	12.2	
					13				
	Cond.	Water grab	152	45				-10.6	
								13.7	

PEC WELL LOG2 4570303.GPJ 37406

SAMPLE TYPE: SS Split Spoon; WC Wash Cuttings; ST Shelby Tube

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW-21A

Client: Environment Canada | Project: PEC Additional Wells

Project No.: 457-003.03 | Location: PEC Site | Supervised by: M. Choi

Drilling Co.: Beck Drilling and Environmental Services Ltd. | Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan | Date Completed: 21 Feb 02

SAMPLE				Depth Scale		Graphic Log	Stratigraphic Description	Elev. Depth	Well TOP Elevation (mNVD): 3.07
Sample Interval	Analysis (Not analysed /analysed)	Sample I.D. (% recovery in split spoons)	Water Conductivity (uS/cm)	(ft)	(m)		Surface Elevation (mNVD): 3.12	(m)	Road box
							- No logging (blind bit) - Same as MW-21B		Cement (0-0.34 m) Bentonite chips (0.34-0.49 m) depth to water 2.443 m (13-Mar-02) 20/40 Fine sand (2.97-3.05 m) 10/20 Filter Sand (3.05-5.03 m) 0.025 cm slot, 5 cm diameter PVC well screen (3.51-5.03 m)
	Microbio.	MW21@6-8'							
				5	1			-1.9	
				10	2				
				15	3			5.0	
					4				
					5				

SAMPLE TYPE: SS Split Spoon; WC Wash Cuttings; ST Shelby Tube

PEC WELL LOG2 4570303.GPJ 37405

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well **MW-21B**

Client: Environment Canada | Project: PEC Additional Wells

Project No.: 457-003.03 | Location: PEC Site | Supervised by: M. Choi

Drilling Co.: Beck Drilling and Environmental Services Ltd. | Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan | Date Completed: 21 Feb 02

SAMPLE: Sample Interval	Analysis (Not analysed /analysed)	Sample I.D. (% recovery in split spoons)	Water Conductivity (uS/cm)	Depth Scale (ft)	Depth Scale (m)	Graphic Log	Stratigraphic Description	Elev. / Depth (m)
							Surface Elevation (mNVD): 3.11	
							SAND - some gravel, trace cobbles and boulders, grey brown, trace to some silt in chunks, compact, moist	1.6
	Metals grain size	21B-5'-7' (50%)		5	1		SILT - clayey, some sand, brown, compact to dense, black at top **- arsenic: 17 mg/kg**	1.5
	Metals	21B-7'-9' (50%)			2			0.7
	Metals	21B-9'-11' (5%)		10	3		SAND - some gravel, trace cobbles and silt, dense, moist to wet	2.4
								-0.2
					4		SAND and GRAVEL - trace to some cobbles, trace silt and boulders, grey brown, dense, wet	3.4
	Metals **cond.**	Water grab	1091	15	5			-2.1
	Metals **cond.**	Water grab	1232				SAND and GRAVEL - trace cobbles and boulders, trace silt, grey brown, dense, wet	5.2
	Metals grain size	21B-19'-21' (30%) Water grab	988	20	6			
	Metals		758		7			
	Metals		265					
	Metals		263	25	8			
	Metals grain size	21B-27'-29' (40%)	263				**- no exceedances of CCME SQG (CL)**	
				30	9		- trace black silt at 8.84-8.99'	

Well TOP Elevation (mNVD): 3.05

Road box

Cement (0-0.34 m)

10/20 Filter Sand (0.34-1.52 m)

depth to water 2.464 m (13-Mar-02)

Bentonite grout (1.52-6.71 m)

Fine sand (6.71-7.52 m)

10/20 Filter Sand (7.52-9.14 m)

0.025 cm slot, 5 cm diameter PVC well screen (7.52-9.14 m)

SAMPLE TYPE:
SS Split Spoon
WC Wash Cuttings
ST Shelby Tube

PEC WELL LOG2 4570303.GPJ 37405

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW-21B

Client: Environment Canada Project: PEC Additional Wells

Project No.: 457-003.03 Location: PEC Site Supervised by: M. Choi

Drilling Co.: Beck Drilling and Environmental Services Ltd. Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan Date Completed: 21 Feb 02

SAMPLE				Depth Scale		Graphic Log	Stratigraphic Description	Elev. / Depth (m)
Sample Interval	Analysis (Not analysed /analysed)	Sample I.D. (% recovery in split spoons)	Water Conductivity (uS/cm)	(ft)	(m)		Continued from previous page	-6.0 9.1

SAMPLE TYPE:

SS Split Spoon

WC Wash Cuttings

ST Shelby Tube

Log of Monitoring Well: MW08-39A

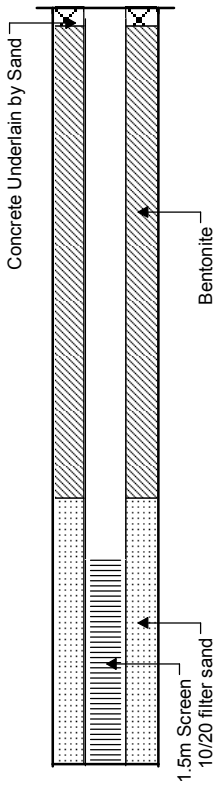
Project Name/No: Assessment Support / 457-002.31
Client: Environment Canada
Date Drilled: Oct 9 2008
Site Location: PEC Site

Drilling Company: Sonic Drilling, ltd.
Drilling Method: Sonic Vibracore
Logged by: Tilman Roschinski

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE						
Depth (ft / m)	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
		Ground Surface							
0 / 0		**NO SAMPLING** Drilled without sampling, for stratigraphy see borehole log of MW08-39D.	0.00						
20 / 6		End of Log	6.10						
30 / 9									



Well location: PEC Site, West Vancouver
Depth to water level (TOC): 2.779 mbtoc
Date of water level: Jan 23, 2009
Borehole diameter: 0.15 m

Well casing diameter: 0.05 m
Well casing material: PVC
Well screen slot size: 0.025cm
Well screen interval (bgs): 4.1 to 5.6 m

Depth of well (TOC): 5.682 mbtoc
Well Elevation (TOC): 3.480 mNVD
Ground Elevation: 3.57 mNVD

Log of Monitoring Well: MW08-39B

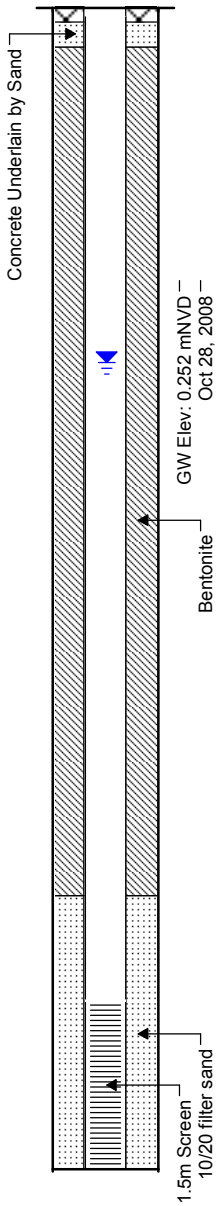
Project Name/No: Assessment Support / 457-002.31
Client: Environment Canada
Date Drilled: Oct 15 2008
Site Location: PEC Site

Drilling Company: Sonic Drilling, ltd.
Drilling Method: Sonic Vibracore
Logged by: Tilman Roschinski

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE						
Depth (ft / m)	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface							
		NO SAMPLING Drilled without sampling, for stratigraphy see borehole log of MW08-39D.	0.00						
34 / 10		End of Log	10.36						



Well location: PEC Site
Depth to water level (TOC): 3.165 mbtoc
Date of water level: Oct 28, 2008
Borehole diameter: 0.15 m

Well casing diameter: 0.05 cm
Well casing material: PVC
Well screen slot size: 0.025cm
Well screen interval (bgs): 8.8 to 10.3 m

Depth of well (TOC): 10.268 mbtoc
Well Elevation (TOC): 3.417 mNVD
Ground Elevation: 3.57 mNVD

Log of Monitoring Well: MW08-39C

Project Name/No: Assessment Support / 457-002.31

Client: Environment Canada

Date Drilled: Oct 15 2008

Site Location: PEC Site, West Vancouver

Drilling Company: Sonic Drilling, ltd.

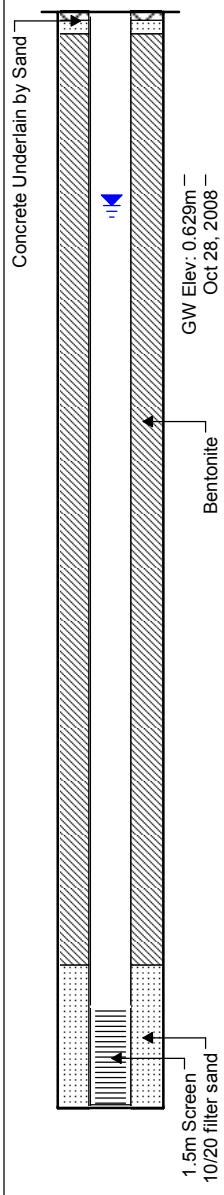
Drilling Method: Sonic Vibracore

Logged by: Tilman Roschinski

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE						
Depth (ft / m)	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface							
		NO SAMPLING Drilled without sampling, for stratigraphy see borehole log of MW08-39D.	0.00						
17 / 5		End of Log	16.76						



Well location: PEC Site

Depth to water level (TOC): 2.906 mbtoc

Date of water level: Oct 28, 2008

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025cm

Well screen interval (bgs): 14.8 to 16.3 m

Depth of well (TOC): 16.283 m

Well Elevation (TOC): 3.535 mNVD

Ground Elevation: 3.57 mNVD

Log of Monitoring Well: MW08-39D

Project Name/No: Assessment Support / 457-002.31

Client: Environment Canada

Date Drilled: Oct 10 and 14 2008

Site Location: PEC Site

Drilling Company: Sonic Drilling, ltd.

Drilling Method: Sonic Vibracore

Logged by: Tilman Roschinski

HEMMERA

Sheet: 1 of 2

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Description	Depth/Elev (m)
		Ground Surface	
0	0	**SAND** Medium grained sand, trace shells, trace gravel. Moist, medium dense, grey.	0.00
5	1.52	**SAND, GRAVEL AND COBBLES** Cobbles and gravel with some silty fine sand. Damp to moist, moderately dense, grey.	1.52
8	2.44	**SILT** 2.4m to 2.6m: Silt (50%) and Organics (50%). Moist, fibrous, dense, dark brown. H2S odour present.	2.44
10	3	2.6m to 3m: Decreasing organics content (~15%)	3.18
11		**SAND** 3m to 3.1m: Fine to medium sand with trace silt. Moist to wet, loose, red/orange.	3.96
13	4	3.1m to 3.4m: Fine to medium sand with some silt. Wet, moderately dense, grey.	4.27
15		3.4m to 4.0m: Medium to coarse sand, some shell fragments and gravel, and trace silt. Wet, loose, grey.	4.57
16	5	**GRAVEL** Gravel within a matrix of sand (20%) with minor shell fragments. Wet, loose, grey.	
20	6	**SILTY SAND** Silty sand, trace organics and trace gravel. Wet, moderately dense, dark grey/brown. Red and orange iron oxide stains throughout. H2S odour.	6.40
23	7	**SAND, GRAVEL AND COBBLES** Gravel and cobbles in a matrix of very coarse sand with trace silt. Wet, grey-brown.	7.62
25		**NO RECOVERY**	
26	8	**GRAVEL** Gravel (rounded to sub-angular) with trace coarse sand. Wet, loose, brown.	8.23
27		**SAND** 7.6m to 7.8m: Coarse sand. Wet, loose, grey.	8.53
28		7.8m to 8.2m: Fine sand with some cobbles and trace gravel. Wet, moderately dense, orange/dark-brown.	9.45
31	9	**COBBLES AND GRAVEL** Cobbles and gravel in a matrix of very coarse sand. Wet, brown.	10.06
33	10	**NO RECOVERY**	10.97
36	11	**SAND AND GRAVEL** Coarse sand and gravel. Wet, loose, grey-brown.	12.50
39	12		
41			

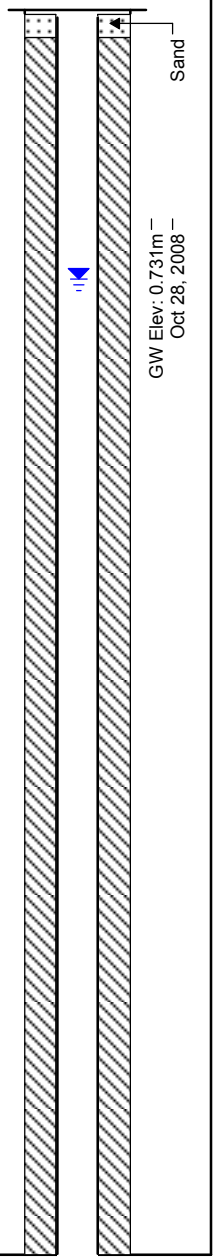
SAMPLE

Sample ID	Analysed Y,N	Sample Type
1	Y	
2	Y	
3	Y	
4	Y	

Vapour ppm: 0 250 500

LEL %: 0 50 100

Backfill details



Well location: PEC Site

Depth to water level (TOC): 2.809 mbtoc

Date of water level: Oct 28, 2008

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025cm

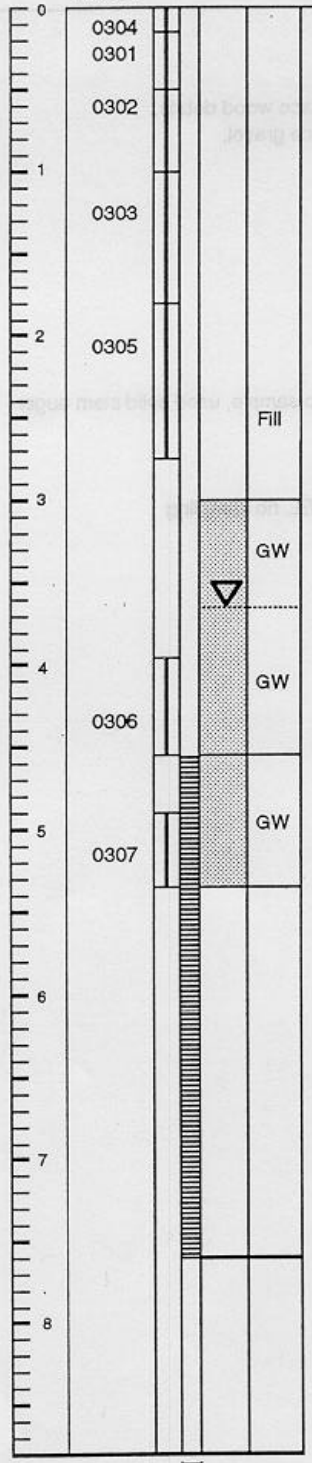
Well screen interval (bgs): 22.4 to 23.9 m

Depth of well (TOC): 23.672 mbtoc

Well Elevation (TOC): 3.540 mNVD

Ground Elevation: 3.57 mNVD

Geological Boring Log
PWGSC - North Vancouver
Borehole OW3



0 - 0.15 m orange brown fine SAND, some gravel
0.15 - 0.5 m grey SAND, trace gravel

0.50 - 2.0 m grey SAND, trace gravel, trace wood debris

2.0 - 3.0 m brown silty SAND, trace gravel

3.00 - 3.7 m COBBLES, SAND

3.7 - 4.6 m grey coarse SAND and GRAVEL; wet at 3.1 m

4.6 - 5.3 m greyish brown coarse SAND and GRAVEL; wet

5.3 - 7.6 m no recovery, used solid stem due to difficult drilling

E.O.H. at 7.62 m

- Screen
- Sand
- Bentonite
- Blank
- Undisturbed Split Spoon
- Disturbed Soil Sample
- Beginning of wet conditions or water

Client Name: PWGSC
Site Location: North Vancouver
Drilling Contractor: Uniwide
Project No. : 20749-011-310
Sampling Method: Hollow stem with split spoon sampler; solid stem

Date: September 13, 1995
Field Geologist: J. Smith

Norecol, Dames & Moore

PROJECT: 61821

WTI-5A

LOCATION: PEC

BORING DATE: 03/18/97 DATUM: GROUND SURFACE DIP: 90° LOGGED: EP

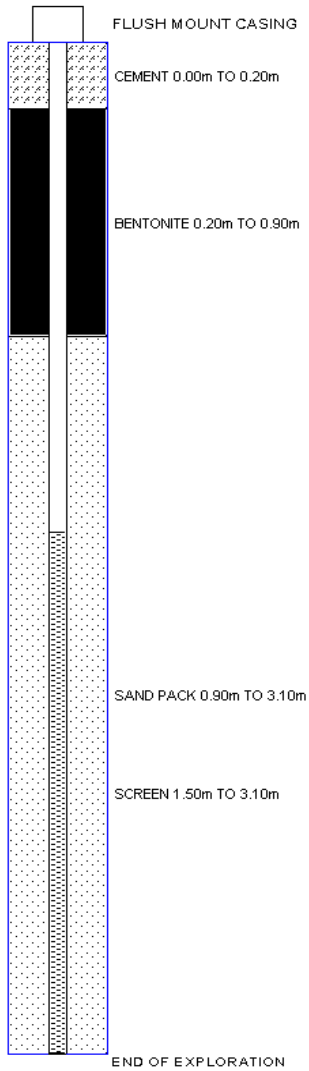
DEPTH SCALE METRES	DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	DEPTH B.G.S. (m)
			GROUND SURFACE		
			SAND, grey, some cobbles, minor shells, fine.		0.0
			ORGANICS, brown, wood debris, minor silt		0.4
			GRAVEL, olive green, coarse, minor sand		0.6
		SONIC	SAND, grey, fine, minor shells, green stains		2.0
			END OF EXPLORATION @ 3.10m		3.10

Samples: ID, Type, Recovery (%), "N" Value

Concentration: LEL, Moisture Content, Gas Concentration

0 20 40 60 80 100

WTI 5A



DRAWN: IC

WTI

CHECKED: RMC

PROJECT: 61821

WTI-5B

LOCATION: PEC

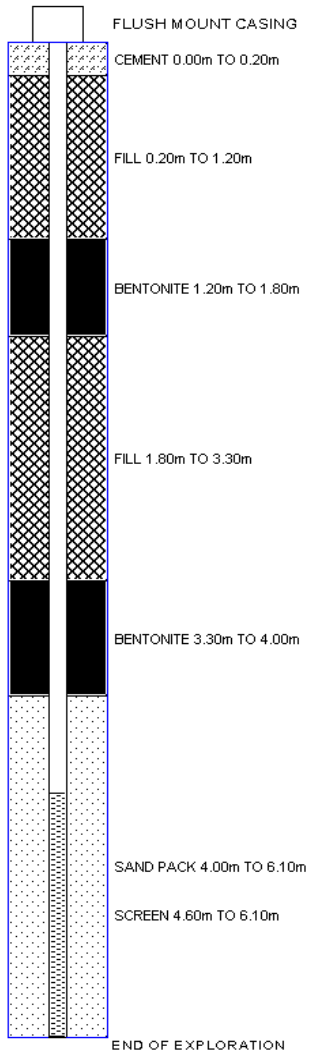
BORING DATE: 03/18/97 DATUM: GROUND SURFACE DIP: LOGGED: EP

DEPTH SCALE METRES	DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	DEPTH B.G.S. (m)
			GROUND SURFACE		
0	0		SAND, grey, fine, some cobbles, some shells		0.0
	2		ORGANICS, brown, wood debris for 3 cm, silty		0.4
					0.6
1	4		GRAVEL, grey, coarse, some sand		
	6				
2					2.0
	8				
3	10		SAND, grey, fine, some shells, green stains for first 60 cm		
	12				
4					
	14				
	16				
5		SONIC			5.0
	18		GRAVEL, grey, some cobbles		
6					
	20		END OF EXPLORATION @ 6.10m		6.10
	22				
7					
	24				
8	26				
	28				
9					
	30				
	32				
10					

Samples: ID | Type | Recovery (%) | "N" Value

Concentration: LEL ◆ Moisture Content ● Gas Concentration ■ (0 20 40 60 80 100)

WTI-5B



DRAWN: IC

WTI

CHECKED: RMC

PROJECT: 61821

WTI-5C

LOCATION: PEC

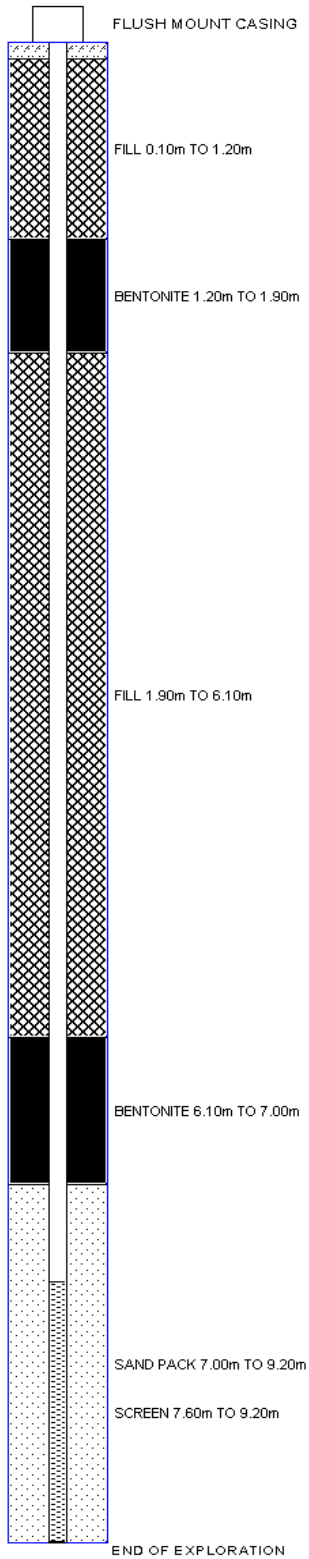
BORING DATE: 03/18/97 DATUM: GROUND SURFACE DIP: LOGGED: EP

DEPTH SCALE METRES	DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	DEPTH B.G.S. (m)
			GROUND SURFACE		
0	0	SONIC	SAND, grey, fine, minor cobbles, minor shells		0.0
	2		ORGANICS, brown, wood debris, silty sand		0.4
1	4		GRAVEL, grey, coarse, minor sand		0.6
2	6				
	8		SAND, grey, fine, minor shells, green stains for first 60cm		2.0
3	10				
	12				
4	14				
	16				
5	18		GRAVEL, grey, some cobbles		5.0
6	20				
	22				
7	24				
	26		SAND, brown, some cobbles		7.5
8	28				
	30		END OF EXPLORATION @ 9.20m		9.20
9	32				
10					

Samples: ID | Type | Recovery (%) | "N" Value

Concentration: LEL ◆ Moisture Content ● Gas Concentration ■ (0 20 40 60 80 100)

WTI-5C



DRAWN: IC

WTI

CHECKED: RMC

PROJECT: 61821

WTI-5D

LOCATION: PEC

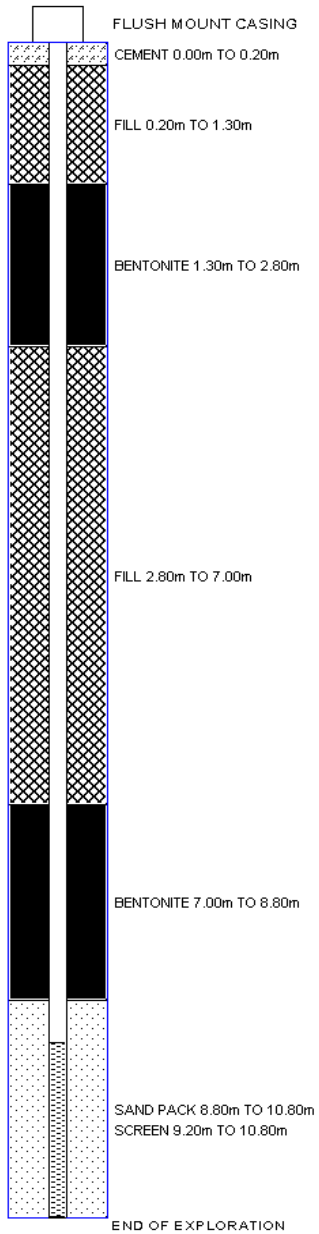
BORING DATE: 03/18/97 DATUM: GROUND SURFACE DIP: 90° LOGGED: EP

DEPTH SCALE METRES	DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	DEPTH B.G.S. (m)
			GROUND SURFACE		
0	0		SAND, grey, fine, cobbles, minor shells		0.0
	2		ORGANICS, brown, wood debris 3cm, silty sand		0.4
1	4		GRAVEL, grey, coarse, minor sand		0.6
2	6				
	8				2.0
3	10		SAND, grey, fine, minor shells, green stains for first 60 cm		
	12				
4	14				
	16				
5	18				5.0
	20		GRAVEL, grey, cobbles		
6	22				
	24				
7	26	SONIC			7.5
	28		SAND, brown, some cobbles		
8	30				
	32				
9	34				
	36		END OF EXPLORATION @ 10.80m		10.80
10	38				
	40				
11	42				
	44				
12	46				
	48				
13	50				

Samples: ID | Type | Recovery (%) | "N" Value

Concentration: LEL ◆ Moisture Content ● Gas Concentration ■ (0 20 40 60 80 100)

WTI-5D



DRAWN: IC

WTI

CHECKED: RMC

PROJECT: 61821

WTI-5E

LOCATION: PEC

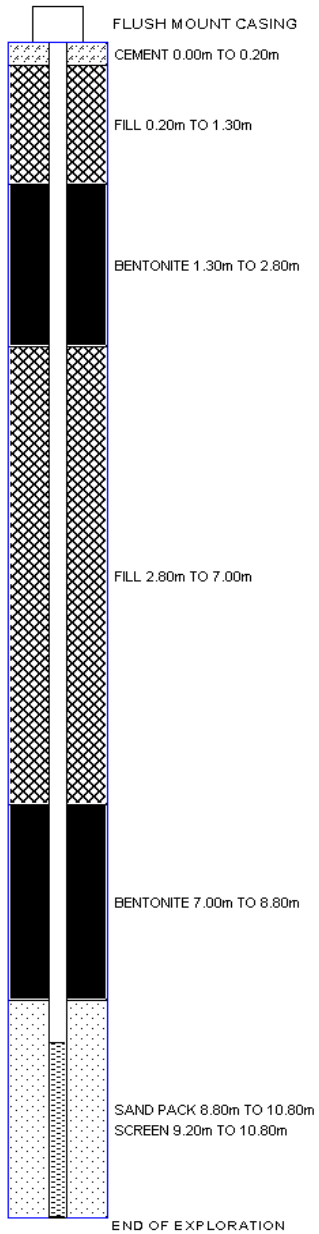
BORING DATE: 03/18/97 DATUM: GROUND SURFACE DIP: 90° LOGGED: EP

DEPTH SCALE METRES	DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	DEPTH B.G.S. (m)
			GROUND SURFACE		
			SAND, grey, fine, cobbles, minor shells		0.0
			ORGANICS,brown, wood debris 3cm, silty sand		0.4
			GRAVEL, grey, coarse, minor sand		0.6
			SAND, grey, fine, minor shells, green stains for first 60 cm		2.0
			GRAVEL, grey, cobbles		5.0
		SONIC	SAND, brown, some cobbles		7.5
			END OF EXPLORATION @ 10.80m		10.80

Samples: ID | Type | Recovery (%) | "N" Value

Concentration: LEL ◆ Moisture Content ● Gas Concentration ■ (0 20 40 60 80 100)

WTI-5D



DRAWN: IC

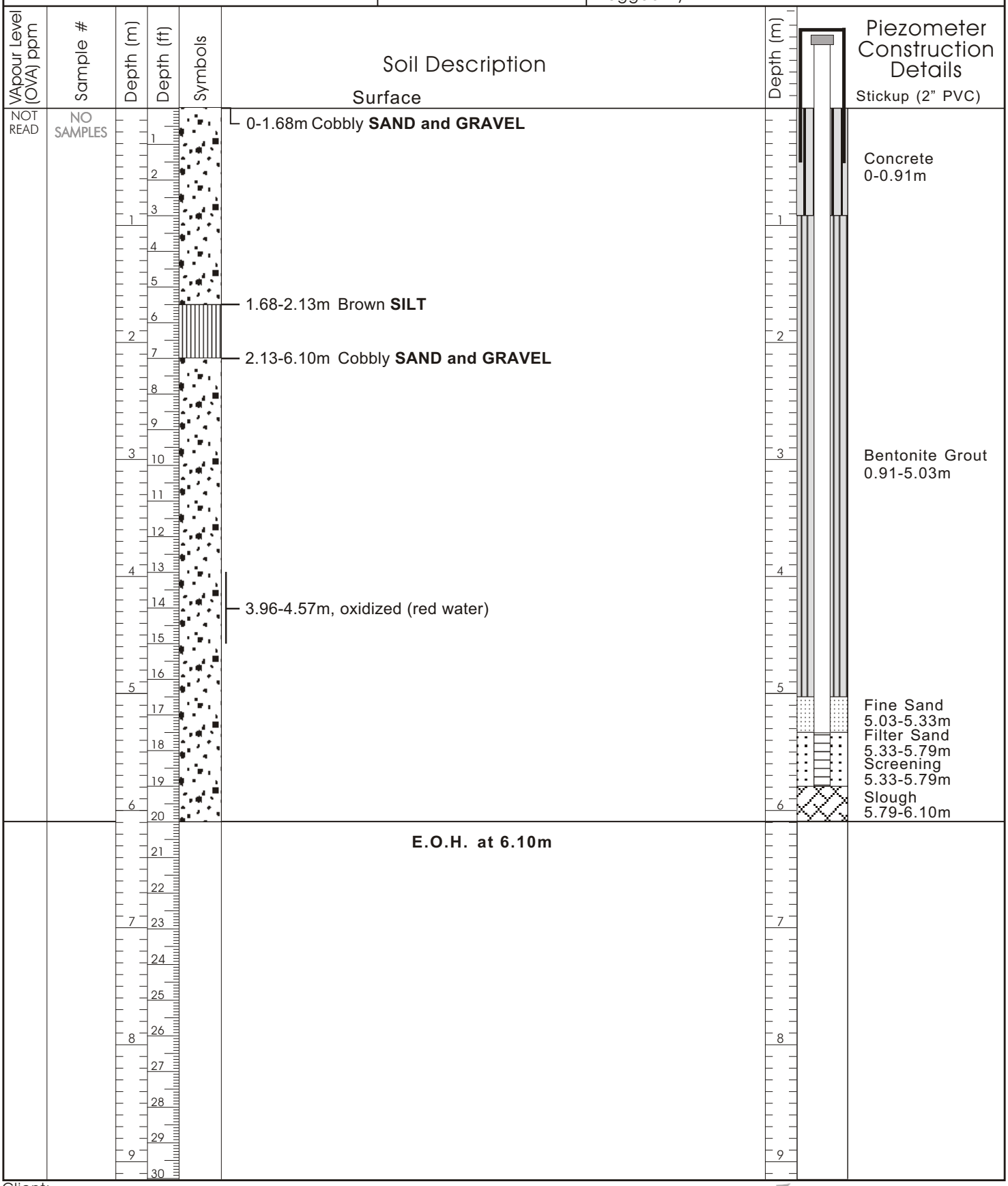
WTI

CHECKED: RMC

Project: Detailed Site Investigation
Project No.: 445-002.01
Date Drilled: November 8, 2000
Elevation: 2.56 m NVD

GROUNDWATER WELL 206A

Location: Pacific Environmental Centre, North Vancouver, BC
Contractor: Foundex
Method: Becker Hammer
Logged By: Ruben Arellano



Client:
PUBLIC WORKS and GOVERNMENT SERVICES CANADA

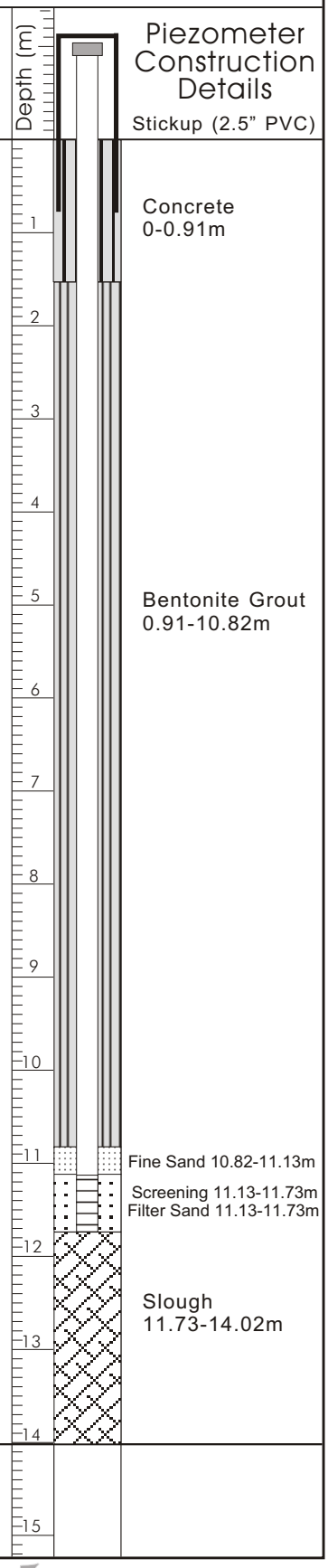
HEMMERA ENVIROCHEM INC.

Project: Detailed Site Investigation
Project No.: 445-002.01
Date Drilled: November 18, 2000
Elevation: 2.31 m NVD

GROUNDWATER WELL 206B

Location: Pacific Environmental Centre, North Vancouver, BC
Contractor: Foundex
Method: Becker Hammer
Logged By: Mike Choi

Blow Count	Sample #	Depth (m)	Depth (ft)	Soil Description
				Surface
		1	1	0-1.52m Brown **SAND,** with some gravel and a trace of silt; medium to coarse grained sand, loose, damp
13	206b-1		5	1.52-2.13m Brown to grey **SILT,** with some sand and organics; moist with hydrogen sulphide odour
21	206b-2	2		2.13-2.44m Grey to brown **SAND and SILT**; fine grained sand, loose, moist, with hydrogen sulphide odour
36	206b-3	3	10	2.44-7.62m **SAND,** with some gravel; fine to coarse grained sand, compact, wet
12R				@3.05m, some cobbles
42R	206b-4	4		
100R			15	@4.27m, gravelly, cobbly
37R		5		
170R	206b-5			
		6	20	
150	206b-6			
75	206b-7	7		
50	206b-8		25	7.62-8.99m Grey to orange-brown **SAND**, with some silt; fine to medium grained, compact
75	206b-9	8		7.92-8.99m, trace silt
78	206b-10	9	30	8.99-9.14m Brown **SAND and SILT**, with traces of gravel and cobbles; fine grained sand, compact, moist
				9.14-14.02m Grey **SAND,** with some gravel and a trace of silt; medium to coarse grained sand, compact, wet
50	206b-11	10		
100R	206b-12		35	
		11		
150R	206b-13			10cm lense of fine to medium grained sand with a trace of silt at 11.13 m
				11.58-14.02m, gravelly, dark brown
210	206b-14	12		
			40	
105	206b-15			
50	206b-16	13		
175	206b-17	14	45	
		15	50	**E.O.H. at 14.02m**



Client:
PUBLIC WORKS and GOVERNMENT SERVICES CANADA

HEMMERA ENVIROCHEM INC.

Log of Monitoring Well: MW-26A

HEMMERA

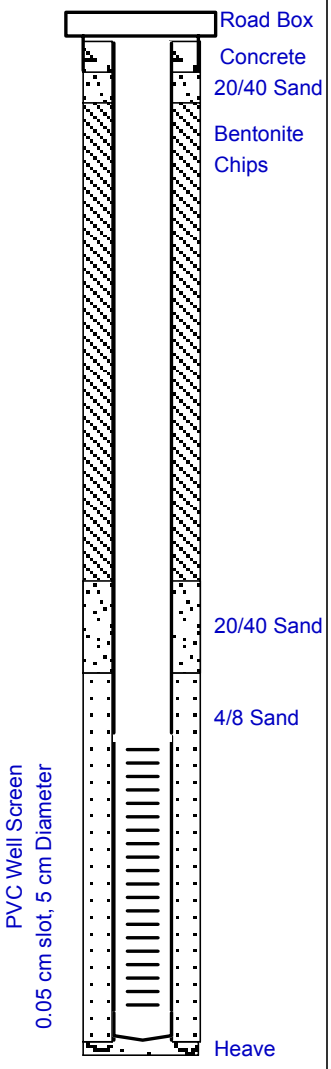
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** A. Morriss

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 14-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.72		Well TOP Elevation (mNVD): 3.63
			ft m		Ground Surface	3.7	
			0 0			0.0	
					Hole Drilled Blind See MW-26D for sediment log and samples.		
			2				
			4				
			6 2				
			8				
			10				
			12 4				
			14				
			16			-1.5	
						5.2	
			18				
			20 6				



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-26B

HEMMERA

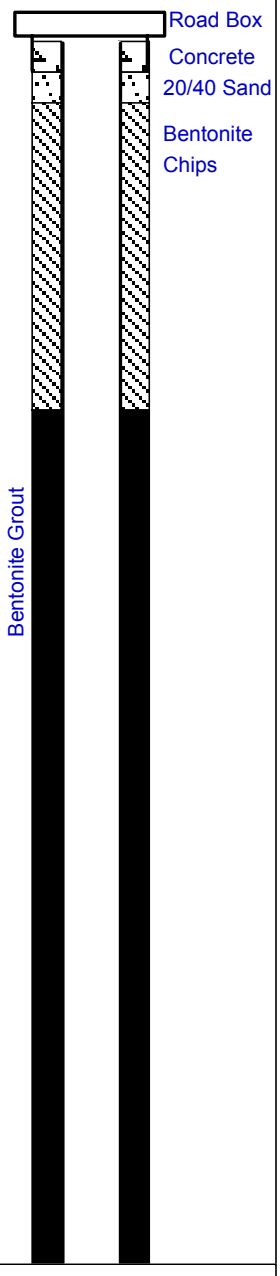
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** A. Morriss

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 08-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.71		Well TOP Elevation (mNVD): 3.60
			ft m		Ground Surface	3.7	
			0 0			0.0	
					Drilled Blind See MW-25D for sediment log and samples.		
			2				
			4				
			6 2				
			8				
			10				
			12 4				
			14				
			16				
			18				
			20 6				



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-26B

HEMMERA

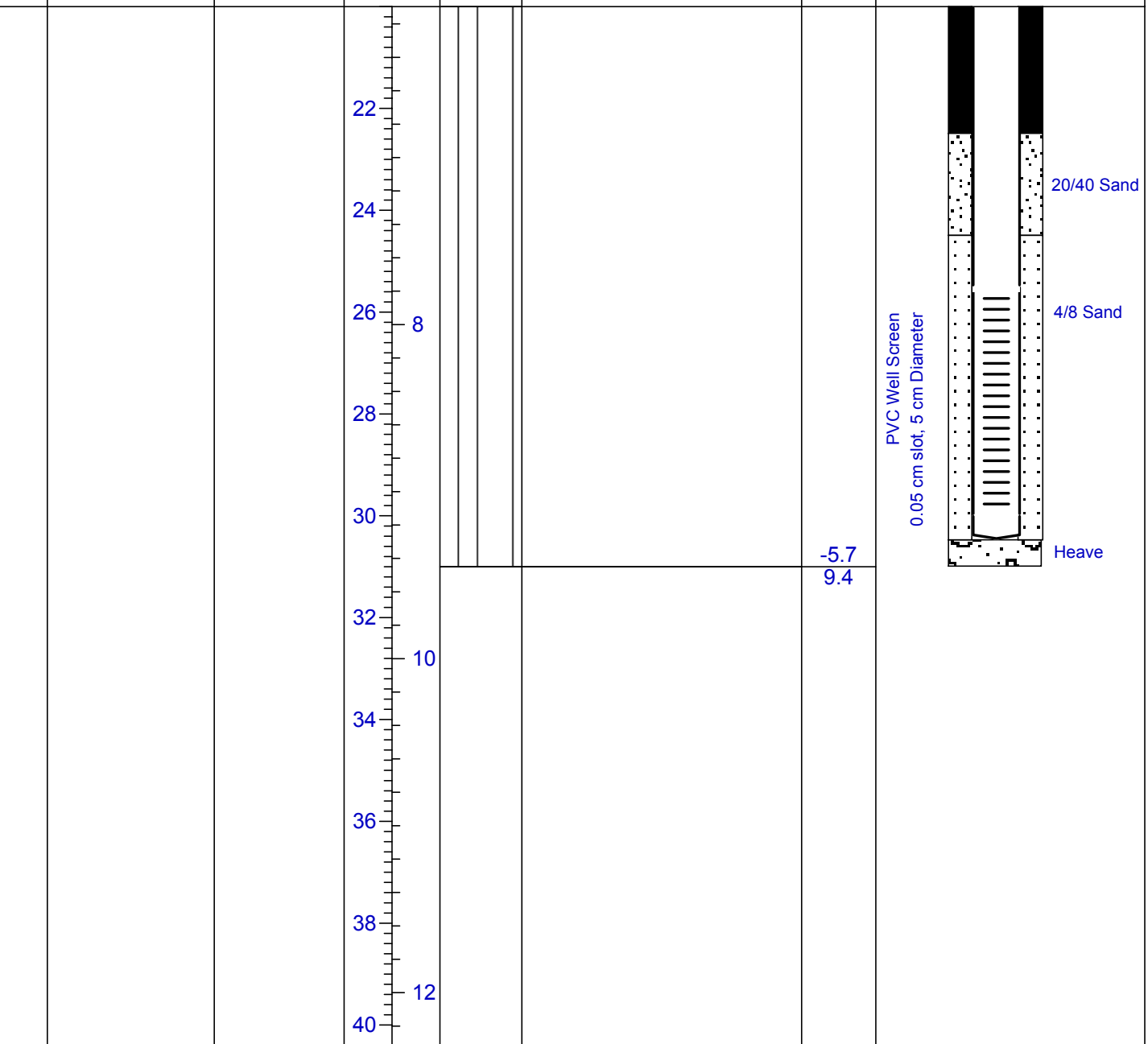
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** A. Morriss

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 08-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.71		Well TOP Elevation (mNVD): 3.60



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-26C

HEMMERA

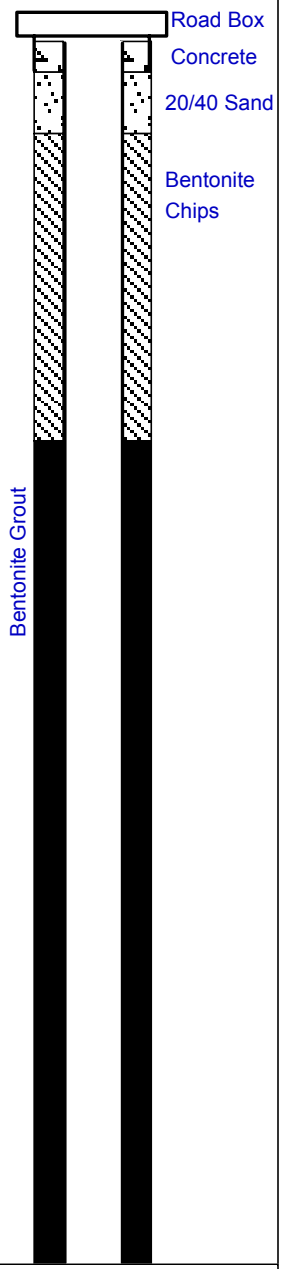
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** A. Morriss

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 15-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.69		Well TOP Elevation (mNVD): 3.61
			ft / m		Ground Surface	3.7	
					Drilled Blind See MW-26D for sediment log and samples.	0.0	



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-26C

HEMMERA

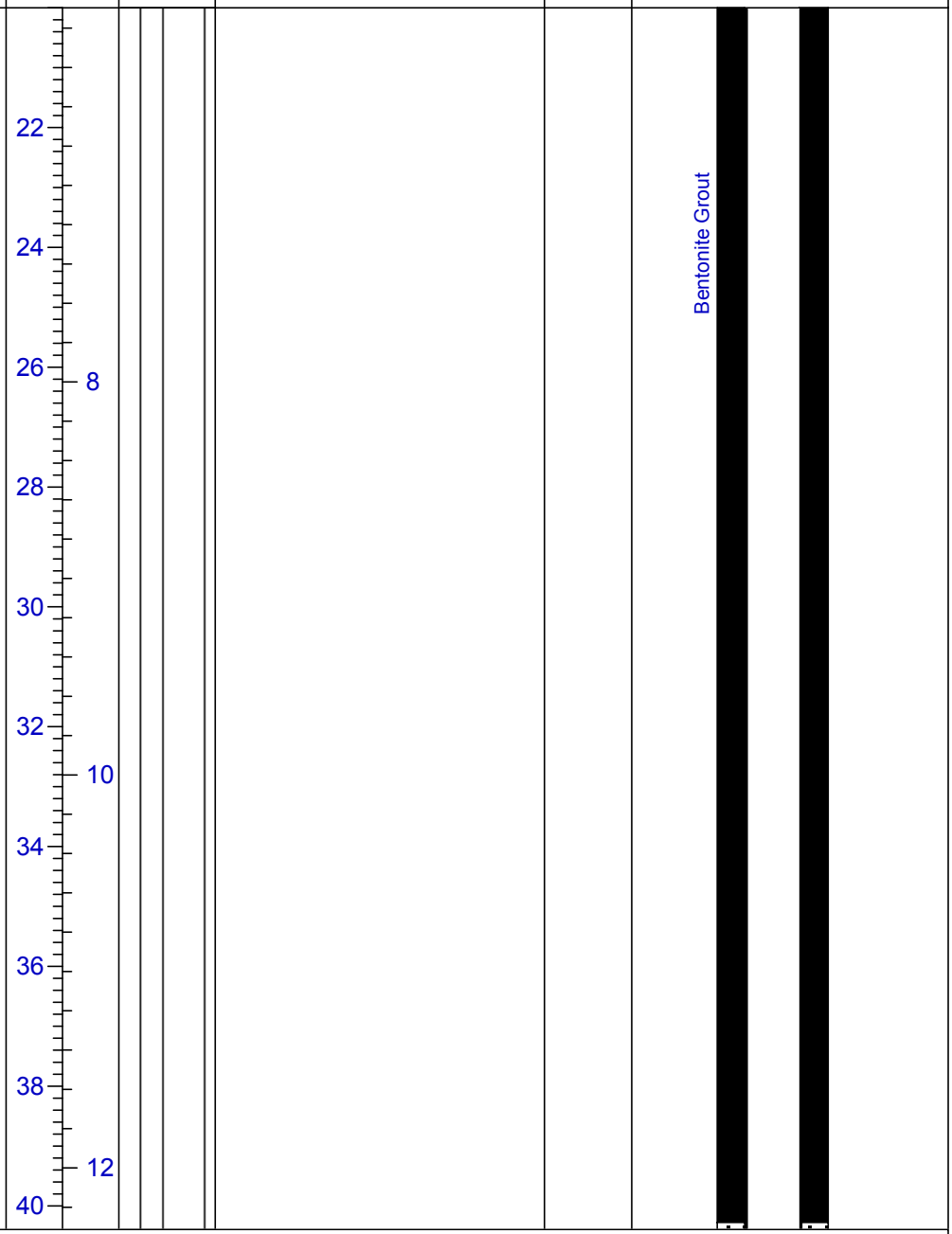
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** A. Morriss

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 15-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.69		Well TOP Elevation (mNVD): 3.61



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-26C

HEMMERA

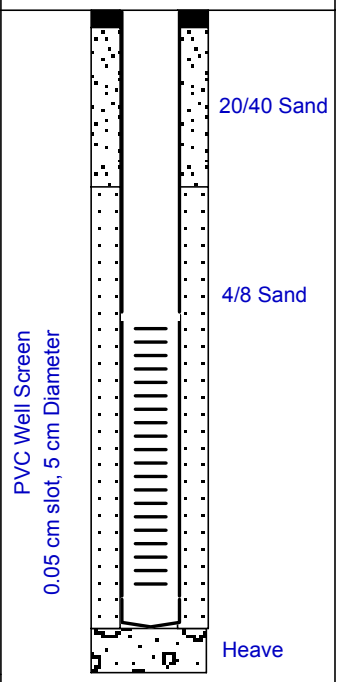
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** A. Morriss

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 15-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.69		Well TOP Elevation (mNVD): 3.61



42
44
46 — 14
48
50
52 — 16
54
56
58 — 18
60

-11.7
15.4

SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-26D

HEMMERA

Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.09 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 14-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.69		Well TOP Elevation (mNVD): 3.61
			ft / m		Ground Surface	3.7	
OH	(Metals)	4	0 / 0		***ASPHALT***	0.0	Road Box
					SAND silty, cobbly, dense, brown		Concrete
OH	(Metals)	3	2				20/40 Sand
					Cu = 3322 ppm; Ni = 141 ppm	2.8	Bentonite Chips
OH	METALS	2				0.9	
			4		*Cu = 2049 ppm; Ni = 157 ppm*		
OH	METALS	1					
			6 / 2		***SAND and GRAVEL*** medium to coarse, some cobbles, grey, some green staining.	1.9 / 1.8	
			8		***SAND*** fine to medium, grey, abundant shells. -wood debris 2.4 - 2.7 m		
SS	(Metals)	5				0.6	
			10		***SILT*** soft, grey brown, organic.	0.2 / 3.4	
SS	(Metals)	6					
			12 / 4		***SAND*** fine to medium, grey, abundant shells.		
			14		***GRAVEL*** sandy, trace fines, dense, brown and light grey.		
CC	METALS & GS	7 and Dup 1	16		*Cu = 915.9 ppm; Ni = 72 ppm*		Bentonite Grout
			18				
			20 / 6				

SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-26D

HEMMERA

Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.09 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 14-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.69		Well TOP Elevation (mNVD): 3.61
			22			-3.3	Bentonite Grout
CC	(Metals)	8	24		***SAND*** fine to coarse, trace gravel, trace cobbles, compact, light brown.	7.0	
			26	8		-4.5	
CC	(Metals)	10	28		***SAND and GRAVEL*** fine to coarse, some cobbles, trace silt, compact, light brown.	8.2	
			30		-Very dense 8.8 - 11.3 m		
					-some silt 10.1 - 11.3 m		
			32		-dense 11.3 - 11. 8 m		
				10	-very dense 11.8 - 13.4 m		
			34		-light brown 13.4 - 14.6 m		
CC	METALS	9 / DUP 2	36		*No exceedances*		
			38				
				12			
			40				

SAMPLE TYPE:
SS - Split Spoon CC - Cyclone Cuttings
OH - Open Hole Hand Sample GS - Grain Size Analysis

Log of Monitoring Well: MW-26D

HEMMERA

Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.09 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 14-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.69		Well TOP Elevation (mNVD): 3.61
			42				Bentonite Grout
			44				
			46	14			
			48			-10.9	
CC	METALS & GS	11 and Dup 3	50		***GRAVEL and SAND*** *No exceedances* medium to coarse, trace fines, dense, light grey brown. -grey 15.2 - 17.4 m	14.6	
			52	16			
			54				
			56			-13.7	
CC	(Metals)	12	58			17.4	20/40 Sand
			60	18			

SAMPLE TYPE:
SS - Split Spoon CC - Cyclone Cuttings
OH - Open Hole Hand Sample GS - Grain Size Analysis

Log of Monitoring Well: MW-26D

HEMMERA

Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.09 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 14-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.69		Well TOP Elevation (mNVD): 3.61
			62		***SAND*** fine to medium, some gravel, trace silt, dense, grey. -trace gravel, brown 18.3 - 19.5 m -heaving 18.6 - 19.5 m		20/40 Sand
			64				4/8 Sand
CC	METALS & GS	13 and Dup 4	66 — 20		*No exceedances*	-16.4 / 20.1	PVC Well Screen 0.05 cm slot, 5 cm Diameter
			68		***SAND*** fine to medium, trace gravel, trace fines, compact, light brown, heaving.		4/8 Sand to Prevent Heave
			70			-17.6 / 21.3	
			72 — 22				
			74				
			76				
			78 — 24				
			80				

SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-27A

HEMMERA

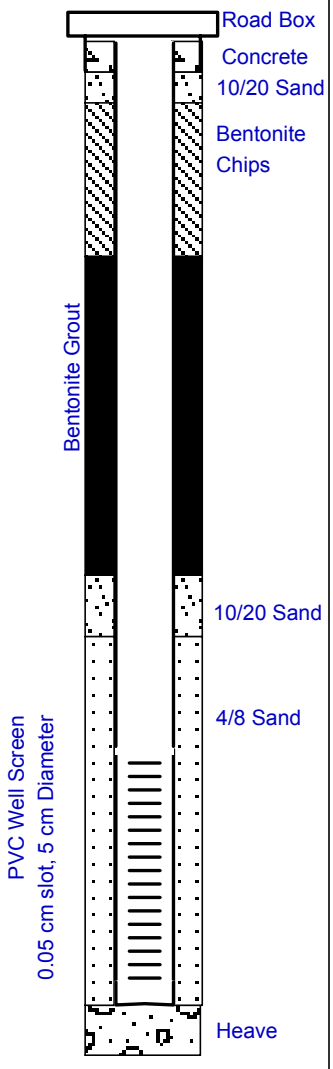
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** A. Morriss

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 13-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.37		Well TOP Elevation (mNVD): 3.30
			ft / m		Ground Surface	3.4	
			0 / 0		***Drilled Blind*** See MW-27D for sediment log and samples.	0.0	
			2 /				
			4 /				
			6 / 2				
			8 /				
			10 /				
			12 / 4				
			14 /				
			16 /			-1.8	
			18 /			5.2	
			20 / 6				



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-27B

HEMMERA

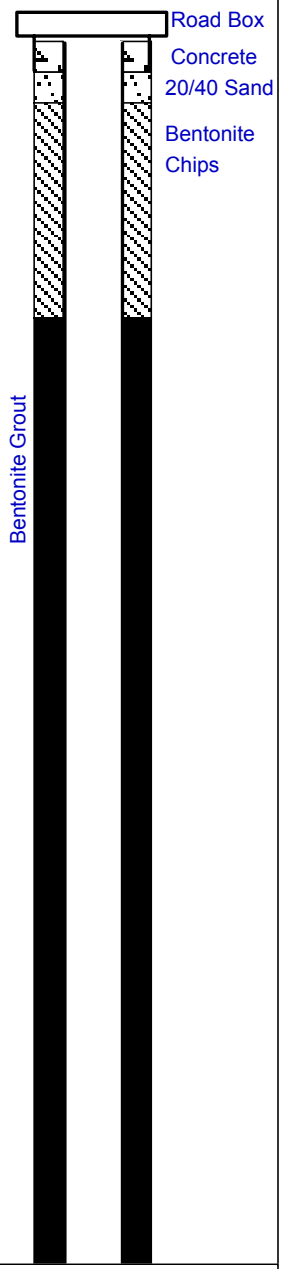
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** A. Morriss

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 13-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.31		Well TOP Elevation (mNVD): 3.22
			ft m		Ground Surface	3.3	
			0 0		***Drilled Blind***	0.0	
					See MW-27D for sediment log and samples.		
			2				
			4				
			6 2				
			8				
			10				
			12 4				
			14				
			16				
			18				
			20 6				



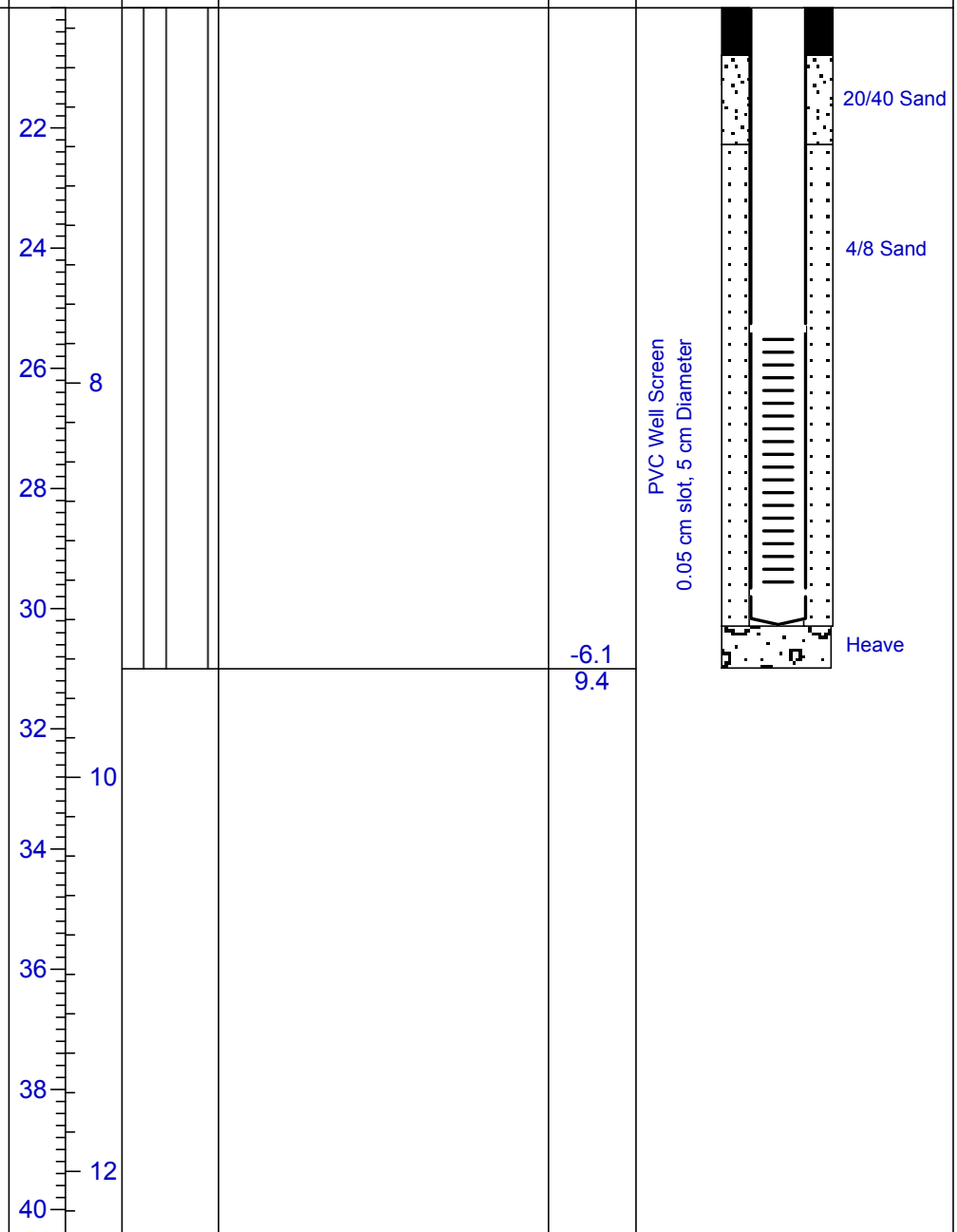
SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-27B

HEMMERA

Client: Environment Canada
Project: Site Wells BCRM Sublease
Project No.: 457-003.08
Location: VWLP Leasehold
Logged By: A. Morriss
Drilling Company: Beck Drilling and Environmental Services
Drilling Method: Becker Hammer
Monitoring Well Location: See Site Plan
Date Drilled: 13-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.31		Well TOP Elevation (mNVD): 3.22



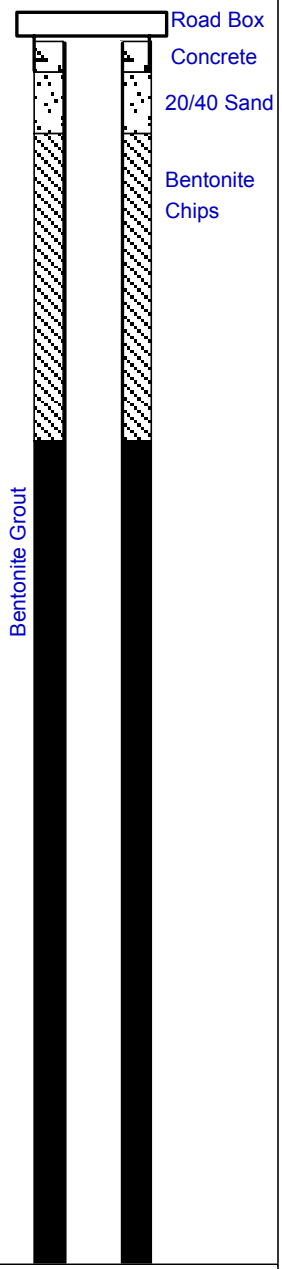
SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-27C

HEMMERA

Client: Environment Canada
Project: Site Wells BCRM Sublease
Project No.: 457-003.08
Location: VWLP Leasehold
Logged By: R. Arellano
Drilling Company: Beck Drilling and Environmental Services
Drilling Method: Becker Hammer
Monitoring Well Location: See Site Plan
Date Drilled: 12-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.39		Well TOP Elevation (mNVD): 3.31
			ft / m		Ground Surface	3.4	
					Hole Drilled Open See MW-27D for soil log. Hole first drilled as MW-27D, due to heaving set as MW-27C.	0.0	



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-27C

HEMMERA

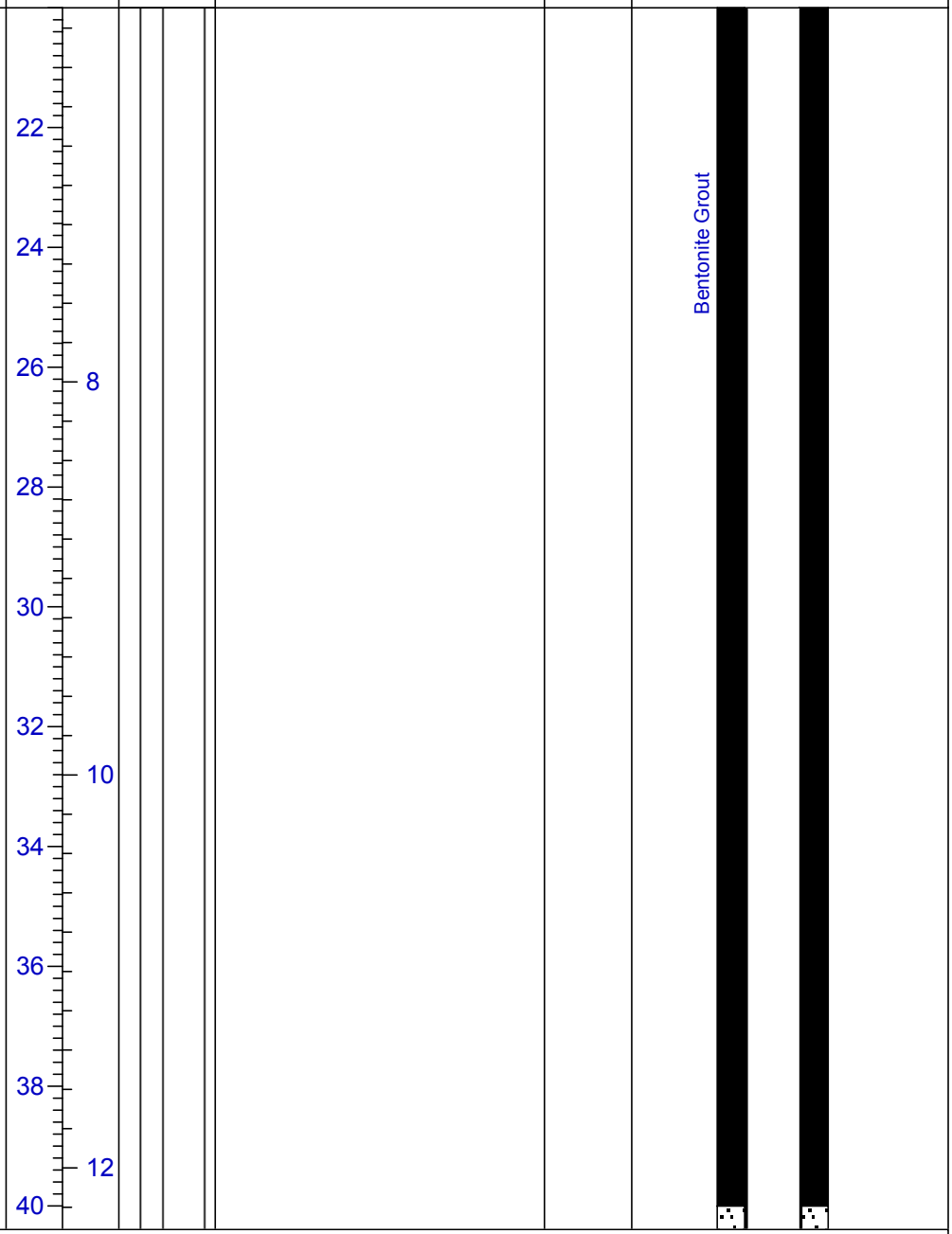
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 12-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.39		Well TOP Elevation (mNVD): 3.31



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-27C

HEMMERA

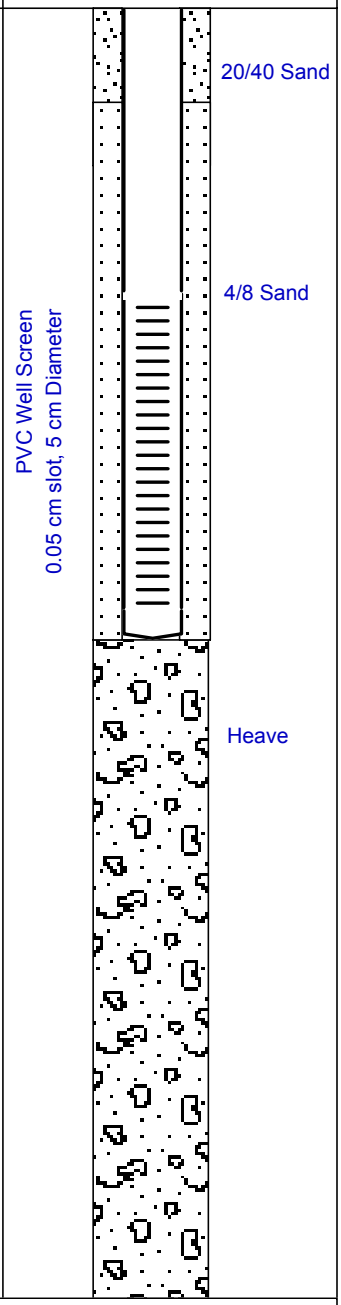
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 12-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.39		Well TOP Elevation (mNVD): 3.31



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-27C

HEMMERA

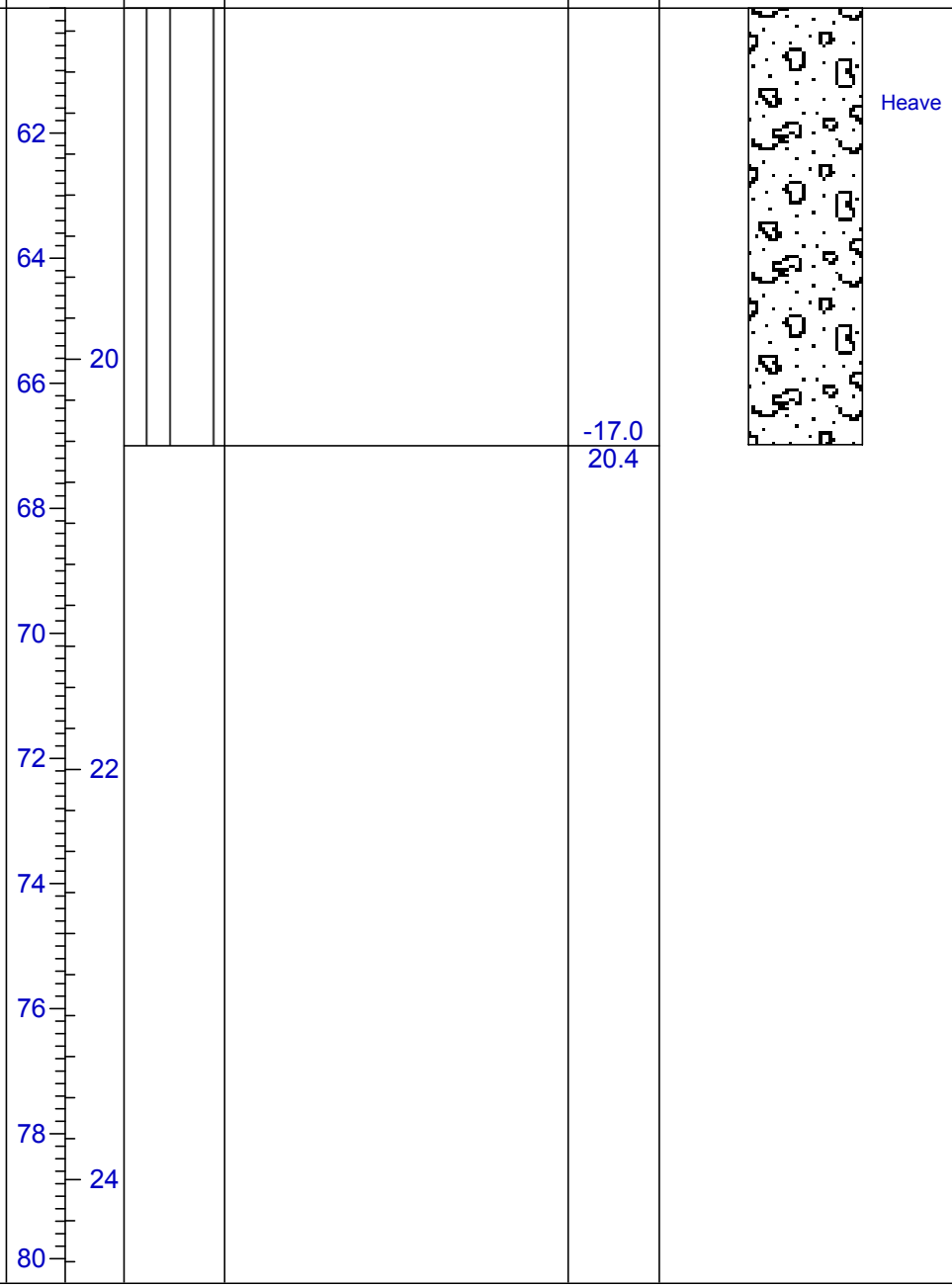
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 12-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.39		Well TOP Elevation (mNVD): 3.31



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-27D

HEMMERA

Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.09 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 13-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.28		Well TOP Elevation (mNVD): 3.22
			ft / m		Ground Surface	3.3	
			0 / 0		***ASPHALT*** *As = 143; Cd = 7.8; Cu = 5160; Pb = 6290; Mo = 166; Se = 15; Ag = 78; Zn = 916*	0.0	Road Box
OH	METALS	14					Concrete
							20/40 Sand
OH	(Metals)	13	2				
							Bentonite Chips
OH	(Metals)	12					
CC	(Metals)	1	4		***SAND*** gravelly, medium to coarse, some cobbles, grey with trace green staining. *Cd = 10; Cu = 30246; Pb = 1730; Zn = 2320*		
OH	METALS	11					
			6 / 2				
SS	(Metals)	2					
			8				
CC	(Metals)	3	10			0.2	
					SILT soft, grey.	3.0	
			12 / 4		***GRAVEL and COBBLE*** sandy, medium to coarse, compact to dense, brown. -silty 5.8 - 7.9 m	3.2	
			14				
CC	METALS	4			*Cu = 1630 ppm*		
			16		-compact 6.7 - 7.3 m		
					-dense 7.3 - 8.5 m		
			18				
			20 / 6				Bentonite Grout

SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: MW-27D

HEMMERA

Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.09 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 13-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.28		Well TOP Elevation (mNVD): 3.22
			22				Bentonite Grout
			24				
			26			-4.6	
			8		***SAND and GRAVEL*** medium to coarse sand, some fine sand, trace fines, compact, brown.	7.9	
			28				
CC	METALS & GS	5 and Dup 1			*No exceedances*		
			30		-dark brown with Fe oxide coating 9.1 - 9.8 m		
			32				
			10				
			34				
			36			-8.0	
CC	(Metals)	6				11.3	
			38				
			12				
			40				

SAMPLE TYPE:
SS - Split Spoon CC - Cyclone Cuttings
OH - Open Hole Hand Sample GS - Grain Size Analysis

Log of Monitoring Well: MW-27D

HEMMERA

Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.09 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 13-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.28		Well TOP Elevation (mNVD): 3.22
			42		***SAND*** fine to coarse, gravelly, some cobbles, some silt, dense, brown. -light brown 11.9 - 12.5 m -soft 12.5 - 12.6 m -oxidized brown 12.5 - 13.4 m	-10.1	Bentonite Grout
CC	(Metals)	7	44			13.4	
			46	14	***SAND and GRAVEL*** medium to coarse, some cobbles, dense, brown, some Fe oxidation.		
			48				
CC	METALS	8 and Dup 2			*No exceedances*		
			50				
			52	16		-12.9	
			54		***SAND and GRAVEL*** some cobbles, heaving, very light brown.	16.2	
						-13.5	
CC	(Metals) & GS	9	56		***GRAVEL*** sandy, trace fines, compact, brown.	16.8	
			58				
				18			20/40 Sand
			60				

SAMPLE TYPE:
SS - Split Spoon CC - Cyclone Cuttings
OH - Open Hole Hand Sample GS - Grain Size Analysis

Log of Monitoring Well: MW-27D

HEMMERA

Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.09 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 13-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.28		Well TOP Elevation (mNVD): 3.22
CC	METALS & GS	10 + Dup 10	62, 64, 66, 68, 70, 72, 74, 76, 78, 80 (20, 22, 24)		*No exceedances*	-17.1 20.4	PVC Well Screen 0.05 cm slot, 5 cm Diameter; 4/8 Sand; Heave

SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

DRILLING LOG

SAMPLING SITE No. MW 2

LOCATION: PEC Site, North Vancouver, B.C. CLIENT: PWGSC Realty Services PROJECT #: 760887	Rig Type: Solid-stem auger Date: 21/02/95 Driller: Mud Bay Drilling Sampler: Tim Sackmann

Depth	LITHOLOGY	OBSERVATIONS	COMPLETION	SAMPLE DESCRIPTION		
				Sample ID	Type	Depth
0m	Silty sand and gravel	Dark grey ore concentrate on surface; grey gravelly sand from 3 cm				
1m						
2m						
3m	Silt	Silt and peat at 3.7 m; may be original grade				
4m						
5m						
6m						
7m						
8m						

NOTE Screen 3.7 - 2.1m; sand 3.7- 1m, bentonite 1 - .3m, concrete and road box to surface. Since borehole is adjacent to PEC - 24, no soil samples taken.

Log of Monitoring Well: MW09-45A

Project Name/No: PEC Sublease Area / 457-003.27

Client: Environment Canada

Date Drilled: September 22, 2009

Site Location: PEC Site, West Vancouver

Drilling Company: Sonic Drilling Ltd

Drilling Method: sonic

Logged by: Andrei Novikov

HEMMERA

Sheet: 1 of 1

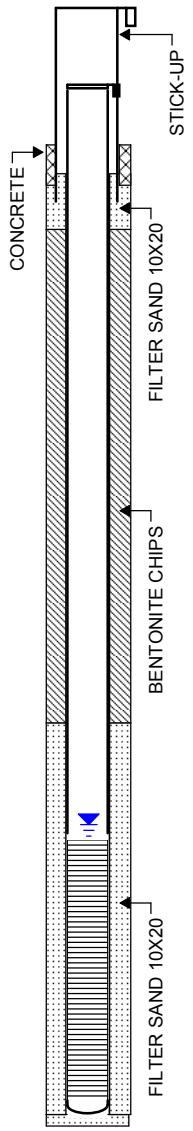
SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
		Ground Surface	
0 / 0		**Sand and Gravel and Cobbles** Crushed gravel at the top 0.15 m. Fine to medium, some coarse grained sand and fine to coarse, subangular to subrounded gravel, and cobbles, trace silt, yellowish-brown, medium dense to loose, poorly graded, moist.	0.00
4 / 1		**Sand and Gravel** Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, trace silt, trace cobbles, grey, loose, homogeneous, poorly graded, moist. Some shell debris with green precipitation. Some orange and dark brown mottling at 3.2 m. A 15 cm layer of fine grained sand, brownish-grey, medium dense, homogeneous, moist, at 3.2 m. Transitioning to grey, with decreasing silt content below 3.4 m.	1.19
13 / 4		**Sand Silty** Brownish-grey, soft, homogeneous, moist. Trace rootlets and fine subangular gravel.	4.11
14 / 4		**Sand and Gravel and Cobbles** Fine to coarse, subrounded to subangular gravel and cobbles, and fine to coarse grained sand, trace silt, brown, loose, poorly graded, wet.	4.42
16 / 5		**Clay and Sand and Gravel and Cobbles** Clay and coarse grained sand, and fine, subangular gravel, and cobbles, olive grey with orange brown and dark brown mottling, soft, wet.	4.94
17 / 5		End of Log	5.18

SAMPLE

Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
0.00					
1.19					
4.11					
4.42					
4.94					
5.18					

Backfill details



Well location: Sublease Area

Depth to water level (TOC): 3.523 m (11.6')

Date of water level: October 8, 2009

Borehole diameter: 0.152 m (6")

Well casing diameter: 0.051 m (2")

Well casing material: PVC

Well screen slot size: 10 slot by 0.25 mm (0.01")

Well screen interval (bgs): 3.597 - 5.120 m (11.8' - 16.8')

Depth of well (TOC): 5.876 m (19.3')

Well Elevation (TOC): 4.026 mNVD

Ground Elevation: 3.28 mNVD

Log of Monitoring Well: MW09-45B

Project Name/No: PEC Sublease Area / 457-003.27

Client: Environment Canada

Date Drilled: September 22, 2009

Site Location: PEC Site, West Vancouver

Drilling Company: Sonic Drilling Ltd

Drilling Method: sonic

Logged by: Andrei Novikov

HEMMERA

Sheet: 1 of 1

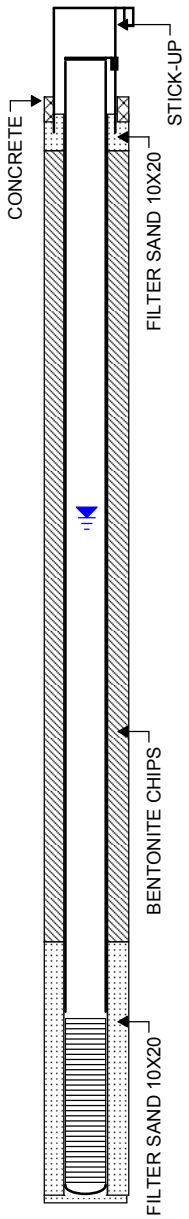
SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
		Ground Surface	
0		**Sand and Gravel and Cobbles** Crushed gravel at the top 0.15 m. Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, and cobbles, trace silt, yellowish-brown, medium dense to loose, poorly graded, moist.	0.00
2		**Sand and Gravel** Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, trace silt, trace cobbles, grey, loose, poorly graded, moist, Increasing fine sand content between 2.4 m - 3 m. Wet below 3 m.	0.61
11		**Sand** Medium grained, grey, loose, homogeneous, wet. Shell debris. A 9 cm layer of sand silty, brownish-grey, soft, homogeneous, moist, trace rootlets and fine, subangular gravel, at 4 m.	3.35 4.27
16		**Sand and Gravel and Cobbles** Medium grained sand and fine to coarse, subangular to subrounded gravel, and cobbles, grey, loose, wet. Orange staining in water. Orange brown sand between 6.2 m - 6.7 m. Increasing sand content below 6.4 m.	
24		**Sandy Silt** Coarse, subangular gravel, grey, soft, wet.	7.32
26		**Sand and Gravel and Cobbles** Medium grained sand and fine to coarse, subangular to subrounded gravel, and cobbles, grey, loose, wet, saturated.	
30		End of Log	9.14

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)

Backfill details



Well location: Sublease Area

Depth to water level (TOC): 3.379 m (11.1')

Date of water level: October 8, 2009

Borehole diameter: 0.152 m (6")

Well casing diameter: 0.051 m (2")

Well casing material: PVC

Well screen slot size: 10 slot by 0.25 mm (0.01")

Well screen interval (bgs): 7.559 - 9.083 m (24.8' - 29.8')

Depth of well (TOC): 9.878 m (32.4')

Well Elevation (TOC): 4.050 mNVD

Ground Elevation: 3.33 mNVD

Log of Monitoring Well: MW09-45C

Project Name/No: PEC Sublease Area / 457-003.27

Client: Environment Canada

Date Drilled: September 21, 2009

Site Location: PEC Site, West Vancouver

Drilling Company: Sonic Drilling Ltd

Drilling Method: sonic

Logged by: Andrei Novikov

HEMMERA

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
		Ground Surface	
0		**Sand and Gravel and Cobbles** Crushed gravel at the top 0.15 m. Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, some cobbles, trace silt, yellowish-brown, medium dense to loose, poorly graded, moist. Wood chips at 0.7 m. Transitioning to grey, dry with increasing fine sand content, below 1.2 m. Copper precipitation on gravel between 0.6 m - 2 m. A 10 cm layer of medium grained sand, loose, homogeneous, moist, trace fine gravel, at 2.8 m. A 5 cm layer of organic-like soil, dark brown, soft, homogeneous, moist, trace rootlets, twigs, at 2.9 m. A 5 cm layer of fine grained sand, dark grey, medium dense, homogeneous, moist, trace rootlets, at 2.95 m.	0.00
10 (3)		**Sand and Gravel and Cobbles** Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, and cobbles, trace silt, orange brown, loose, poorly graded, moist. A 5 cm layer of sand silty, dark brown, at 4.9 m. Wet below 5 m.	3.05
19 (6)		**Sand and Gravel and Cobbles** Medium to coarse grained sand and fine to coarse, subangular to subrounded gravel, and cobbles, grey, loose, poorly graded, wet. Trace silt below 8.2 m. Transitioning to brownish-grey below 9.1 m.	5.79

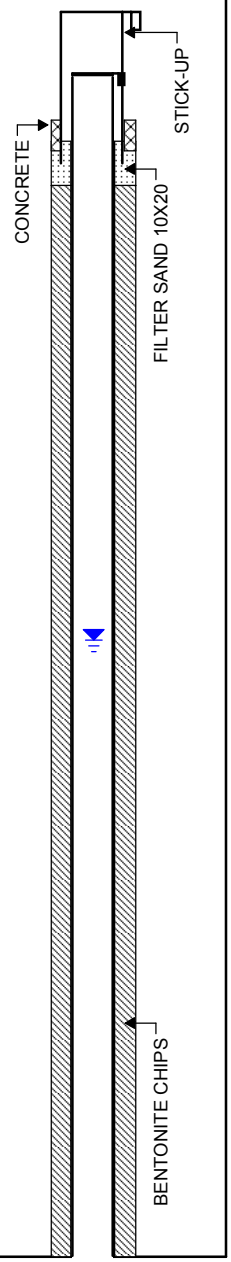
SAMPLE

Sample ID	Analysed Y,N	Sample Type
1	Y	G
2	Y	G
3	Y	G
4	Y	G
5	Y	G

Vapour ppm: 0 250 500

LEL %: 0 50 100

Backfill details



Well location: Sublease Area

Depth to water level (TOC): 3.456 m (11.3')

Date of water level: October 8, 2009

Borehole diameter: 0.152 m (6")

Well casing diameter: 0.051 m (2")

Well casing material: PVC

Well screen slot size: 10 slot by 0.25 mm (0.01")

Well screen interval (bgs): 13.655 - 15.179 m (44.8' - 49.8')

Depth of well (TOC): 15.955 m (52.3')

Well Elevation (TOC): 4.095 mNVD

Ground Elevation: 3.30 mNVD

Log of Monitoring Well: MW09-45C

Project Name/No: PEC Sublease Area / 457-003.27

Client: Environment Canada

Date Drilled: September 21, 2009

Site Location: PEC Site, West Vancouver

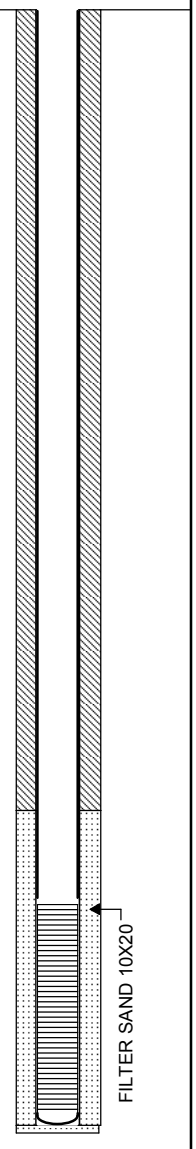
Drilling Company: Sonic Drilling Ltd

Drilling Method: sonic

Logged by: Andrei Novikov

HEMMERA

SUBSURFACE PROFILE			SAMPLE						
Depth	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
26–53				6	Y	G			
				7	N	G			
		Silt Sandy Grey, soft, homogeneous, wet. Shell debris.	10.52						
		Sand and Gravel and Cobbles Fine to coarse, subangular to subrounded gravel and cobbles, and medium to coarse grained sand, trace silt, brownish-grey, loose, poorly graded, wet.	10.82						
		Sand Fine to medium grained, brownish-grey, loose, poorly graded, wet, saturated. Coarse sand appears below 12.5 m.	11.89	8	N	G			
				9	N	G			
		Sand and Gravel Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, brownish-grey, loose, poorly graded, wet, saturated.	13.41						
		Sand and Gravel and Cobbles Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, and cobbles, brownish-grey, loose, poorly graded, wet, saturated.	14.33						
		End of Log	15.24						



Well location: Sublease Area

Depth to water level (TOC): 3.456 m (11.3')

Date of water level: October 8, 2009

Borehole diameter: 0.152 m (6")

Well casing diameter: 0.051 m (2")

Well casing material: PVC

Well screen slot size: 10 slot by 0.25 mm (0.01")

Well screen interval (bgs): 13.655 - 15.179 m (44.8' - 49.8')

Depth of well (TOC): 15.955 m (52.3')

Well Elevation (TOC): 4.095 mNVD

Ground Elevation: 3.30 mNVD

Log of Monitoring Well: MW09-50A

Project Name/No: PEC Sublease Area / 457-003.27

Client: Environment Canada

Date Drilled: October 6, 2009

Site Location: PEC Site, West Vancouver

Drilling Company: Sonic Drilling Ltd

Drilling Method: sonic

Logged by: Andrei Novikov

HEMMERA

Sheet: 1 of 1

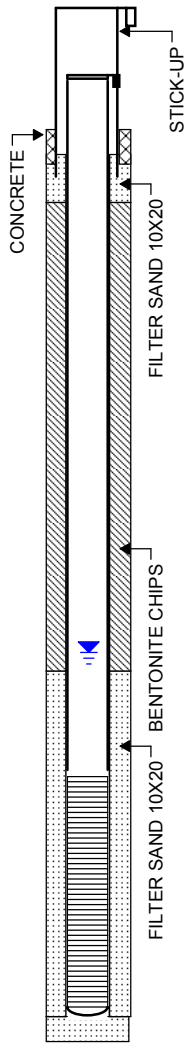
SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
		Ground Surface	
0		**Sand and Gravel** Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, some silt, trace cobbles greyish-brown, dense, poorly graeded, moist. Grey, loose, moist between 0.5 m - 0.8 m. Brown with shell debris and green precipitation between 0.8 m - 1.1 m. Yellowish-brown between 1.1 m - 1.5 m. An 8 cm layer of orange soil at 1.1 m.	0.00
8		**Sand** Fine to coarse grained sand, some gravel, trace cobbles, grey, loose, dry. Wet, saturated below 3 m. Dark staining with strong hydrocarbon odour between 3.5 m - 3.8 m. A 5 cm layer of medium dense, fine to medium grained sand at 3.8 m. Shell debris between 3.8 m - 4 m.	2.44
13		**Sand and Gravel and Cobbles** Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, trace silt, and cobbles, black, loose, poorly graded, wet. Wood debris at 4 m.	3.96
15		**Gravel and Cobbles** Fine to coarse, subangular to subrounded gravel and cobbles, some fine to coarse grained sand, trace silt, orange, loose, poorly graded, wet, saturated.	4.51
16		**Sand and Gravel and Cobbles** Medium to coarse, some fine grained sand and fine to coarse, subangular to subrounded gravel, and cobbles, yellowish-brown, loose, poorly graded, wet.	4.88
18		End of Log	5.49

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)

Backfill details



Well location: Sublease Area

Depth to water level (TOC): 3.078 m (10.1')

Date of water level: October 21, 2009

Borehole diameter: 0.152 m (6")

Well casing diameter: 0.051 m (2")

Well casing material: PVC

Well screen slot size: 10 slot by 0.25 mm (0.01")

Well screen interval (bgs): 3.81 - 5.333 m (12.5'- 17.5')

Depth of well (TOC): 6.123 m (20.1')

Well Elevation (TOC): 4.019 mNVD

Ground Elevation: 3.33 mNVD

Log of Monitoring Well: MW09-50B

Project Name/No: PEC Sublease Area / 457-003.27

Client: Environment Canada

Date Drilled: October 6, 2009

Site Location: PEC Site, West Vancouver

Drilling Company: Sonic Drilling Ltd

Drilling Method: sonic

Logged by: Andrei Novikov

HEMMERA

Sheet: 1 of 1

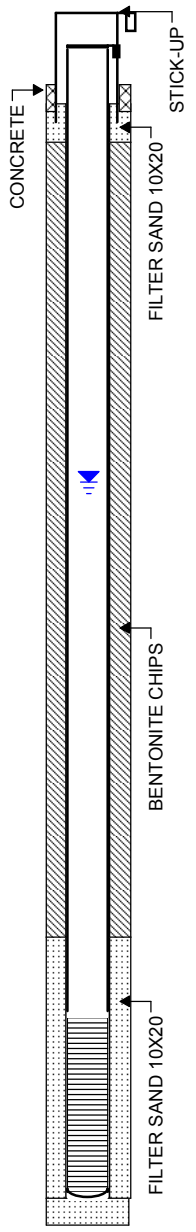
SUBSURFACE PROFILE

Depth (ft / m)	Description	Depth/Elev (m)
	Ground Surface	
0	**Sand and Gravel** Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, trace silt, greyish-brown, dense, poorly graded, moist. Grey, with trace cobbles below 3 m.	0.00
1	**Concrete** Concrete. A 3 cm layer of sandy silt, grey, soft, wet, with crushed rock, at 1.4 m.	0.61
2	**Sand and Gravel and Cobbles** Fine to medium grained ssilty sand and fine to coarse, subangular to subrounded gravel and cobbles, grey, medium dense, poorly graded, wet.	1.83
3	**Sand** Medium grained, some fine to coarse, subangular to subrounded gravel, grey, loose, homogeneous, moist. Shell debris. A 10 cm layer of dark staining with strong hydrocarbon odour at 2.9 m.	2.13
4	**Sand and Gravel and Cobbles** Fine grained sand and fine to coarse, subangular to subrounded gravel and cobbles, dark brown, medium dense, poorly graded, moist.	3.05
5	**Sand** Medium grained, dark grey (stained), loose, homogeneous, wet, saturated, strong hydrocarbon odour. Trace fine, subangular gravel. Shell debris. Pockets of brown, organic soil with rootlets. A 15 cm layer of fine to medium grained sand, dark brown, loose, wet. Hydrocarbon odour at 4.1 m.	3.35
6	**Gravel and Cobbles** Fine to coarse, subangular to subrounded gravel and cobbles, some fine to coarse grained sand, trace silt, greyish-brown, loose, poorly graded, wet.	4.11
7	**Sand and Gravel and Cobbles** Medium to coarse grained sand and fine to coarse, subangular to subrounded gravel, and cobbles, yellowish-brown, loose, poorly graded, wet. Silty clumps on cobbles at 6.2 m. Some fine grained sand and silt, slight orange staining, between 6.4 m - 6.9 m. Trace cobbles below 6.9 m.	4.88
8		
9		
	End of Log	9.14

SAMPLE

Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
0.00					
0.61					
1.83					
2.13					
3.05					
3.35					
4.11					
4.88					
9.14					

Backfill details



Well location: Sublease Area

Depth to water level (TOC): 3.067 m (10.1')

Date of water level: October 21, 2009

Borehole diameter: 0.152 m (6")

Well casing diameter: 0.051 m (2")

Well casing material: PVC

Well screen slot size: 10 slot by 0.25 mm (0.01")

Well screen interval (bgs): 7.407 - 8.937 m (24.3' - 29.3')

Depth of well (TOC): 9.735 m (31.9')

Well Elevation (TOC): 4.007 mNVD

Ground Elevation: 3.28 mNVD

Log of Monitoring Well: MW09-50C

Project Name/No: PEC Sublease Area / 457-003.27

Client: Environment Canada

Date Drilled: October 6, 2009

Site Location: PEC Site, West Vancouver

Drilling Company: Sonic Drilling Ltd

Drilling Method: sonic

Logged by: Andrei Novikov

HEMMERA

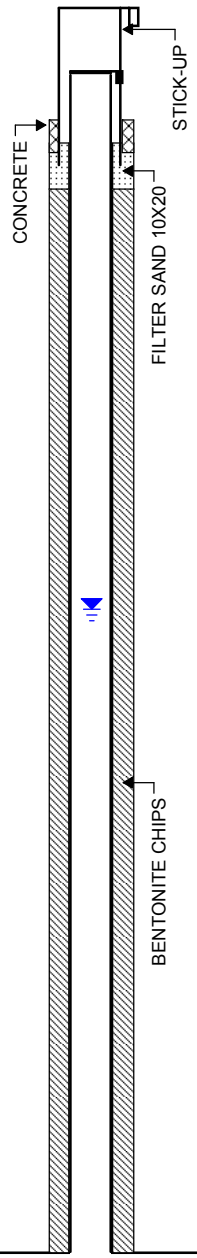
SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
		Ground Surface	
0		**Sand and Gravel** Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, trace silt, trace cobbles, greyish-brown, dense, poorly graded, moist. Trace wood. A 5 cm layer of yellow sand at 0.7 m. Transitioning to grey and loose below 0.8 m.	0.00
10 / 3		**Sand** Fine to medium grained, trace silt, trace gravel, grey, loose, wet. Dark staining with strong hydrocarbon odour between 4 m - 4.6 m.	3.05
16 / 5		**Sand and Gravel** Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, trace silt, trace cobbles, brownish-grey, loose, wet. Orange between 5.3 m - 5.5 m. Yellowish-brown with some coarse grained sand between 5.5 m - 5.8 m. Orange with trace silt between 5.8 m - 7.3 m and at 7.9 m.	4.72
24 / 7			

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)

Backfill details



Well location: Sublease Area

Depth to water level (TOC): 3.096 m (10.2')

Date of water level: October 21, 2009

Borehole diameter: 0.152 m (6")

Well casing diameter: 0.051 m (2")

Well casing material: PVC

Well screen slot size: 10 slot by 0.25 mm (0.01")

Well screen interval (bgs): 13.503 - 15.015 m (44.3' - 49.3')

Depth of well (TOC): 15.813 m (51.9')

Well Elevation (TOC): 4.064 mNVD

Ground Elevation: 3.26 mNVD

Log of Monitoring Well: MW09-50C

Project Name/No: PEC Sublease Area / 457-003.27

Client: Environment Canada

Date Drilled: October 6, 2009

Site Location: PEC Site, West Vancouver

Drilling Company: Sonic Drilling Ltd

Drilling Method: sonic

Logged by: Andrei Novikov

HEMMERA

Depth	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
25									
26		**Sand** Fine to coarse grained, grey, loose, homogeneous, wet.	7.92						
27	8								
28		**Sand** Fine to coarse grained, some fine to coarse, subangular to subrounded gravel, trace cobbles, grey, loose, wet. Minor orange staining.	8.38						
29									
30	9	**Sand and Gravel** Medium to coarse grained sand and fine to coarse, subangular to subrounded gravel, trace cobbles, brownish-grey, loose, poorly graded, wet. Orange staining (6cm) at 10.4 m. A 23 cm layer of fine to medium grained sand, grey, loose, homogeneous, poorly graded, wet, saturated at 10.7 m.	9.14						
31									
32									
33	10								
34									
35									
36	11	**Silt** Grey, soft, homogeneous, wet, large amount of shell debris.	10.94						
37									
38		**Gravel and Cobbles** Fine to coarse, subangular to subrounded gravel and cobbles, some fine to coarse grained sand, trace silt, greyish-brown, loose, wet, saturated. Black organic pockets at 11.6 m.	11.58						
39	12		11.89						
40		**Sand and Gravel and Cobbles** Fine to medium grained sand and fine to coarse, subangular to subrounded gravel and cobbles, brownish-grey, loose, wet. Yellowish-grey between 12.8 m - 13.7 m. Orange between 13.7 m - 14.3 m.							
41									
42									
43	13								
44									
45									
46	14								
47		**Sand** Fine to coarse grained, trace gravel, trace cobbles, grey, loose, homogeneous, wet. Clumps of fine grained sand at 15.1 m.	14.33						
48									
49									
50	15	End of Log	15.24						
51									

BENTONITE CHIPS

FILTER SAND 10X20

Well location: Sublease Area

Depth to water level (TOC): 3.096 m (10.2')

Date of water level: October 21, 2009

Borehole diameter: 0.152 m (6")

Well casing diameter: 0.051 m (2")

Well casing material: PVC

Well screen slot size: 10 slot by 0.25 mm (0.01")

Well screen interval (bgs): 13.503 - 15.015 m (44.3' - 49.3')

Depth of well (TOC): 15.813 m (51.9')

Well Elevation (TOC): 4.064 mNVD

Ground Elevation: 3.26 mNVD

Log of Monitoring Well: MW09-50D

Project Name/No: PEC Sublease Area / 457-003.27

Client: Environment Canada

Date Drilled: October 5, 2009

Site Location: PEC Site, West Vancouver

Drilling Company: Sonic Drilling Ltd

Drilling Method: sonic

Logged by: Andrei Novikov

HEMMERA

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
		Ground Surface	
0		**Sand and Gravel** Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, trace silt, trace cobbles, greyish-brown, dense, poorly graded, moist. Trace cobbles and silt.	0.00
10		**Sand** Fine to medium grained, trace fine gravel, grey, loose, homogeneous, moist. Dark staining with strong hydrocarbon odour at 2.7 m.	2.29
10		**Sand and Gravel** Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel, trace silt, greyish-brown, medium dense, poorly graded, moist. Hydrocarbon odour.	2.87
12		**Sand** Medium to coarse grained, dark brown, loose, homogeneous, moist. Some fine to coarse, subangular to subrounded gravel.	3.66
15		**Sand and Gravel and Cobbles** Fine to coarse, sub-angular to sub-rounded gravel and cobbles, fine to coarse grained sand, trace silt, grey, loose, poorly graded, wet. Trace cobbles below 7.6 m. Orange between 4.3 m - 5.3 m. Yellowish-brown below 5.3 m. Saturated between 5.3 m - 6.1 m.	
30		**Gravel and Cobbles** Fine to coarse, subrounded to subangular gravel and cobbles, some fine to coarse grained sand, grey, loose, poorly graded, wet.	9.14
33			10.06

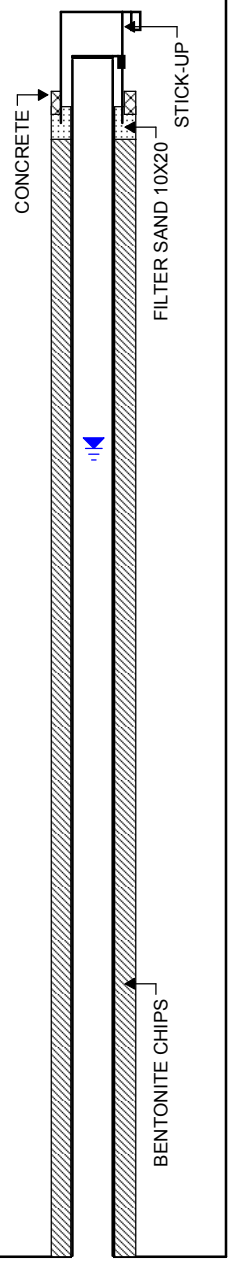
SAMPLE

Sample ID	Analysed Y,N	Sample Type
1	Y	G
2	Y	G
3	Y	G
4	Y	G
5	Y	G
6	Y	G
7	Y	G
8	N	G
9	N	G
10	N	G

Vapour ppm: 0 250 500

LEL %: 0 50 100

Backfill details



Well location: Sublease Area

Depth to water level (TOC): 3.103 m (10.2')

Date of water level: October 21, 2009

Borehole diameter: 0.152 m (6")

Well casing diameter: 0.051 m (2")

Well casing material: PVC

Well screen slot size: 10 slot by 0.25 mm (0.01")

Well screen interval (bgs): 18.532 - 20.067 m (60.8' - 65.8')

Depth of well (TOC): 20.832 m (68.3')

Well Elevation (TOC): 3.28 mNVD

Ground Elevation: 3.28 mNVD

Log of Monitoring Well: MW09-50D

Project Name/No: PEC Sublease Area / 457-003.27

Client: Environment Canada

Date Drilled: October 5, 2009

Site Location: PEC Site, West Vancouver

Drilling Company: Sonic Drilling Ltd

Drilling Method: sonic

Logged by: Andrei Novikov

HEMMERA

SUBSURFACE PROFILE			SAMPLE						
Depth	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
36 / 11		**Sand and Gravel and Cobbles** Fine to coarse, subrounded to sub-angular gravel and cobbles, fine to coarse grained sand, grey, loose, wet		11	N	G			
37		Orange staining between 14.0 m - 14.6 m.							
38		An 8 cm layer of silt, grey, stiff, moist, at 14.8 m.							
39 / 12									
40									
41									
42									
43 / 13				12	N	G			
44									
45									
46 / 14									
47									
48									
49 / 15		**Sand** Fine to medium grained, brown, loose, homogeneous, wet. Coarse grained sand with trace fine gravel below 15.7 m.	14.94	13	N	G			BENTONITE CHIPS
50									
51									
52									
53 / 16									
54									
55									
56									
57 / 17				14	N	G			
58									
59									
60 / 18		**Sand** Fine to coarse grained, homogeneous, greyish-brown, loose, wet, saturated. Increasing coarse grained sand content below 18.7 m. Trace fine gravel between 19.2 m - 19.7 m.	18.29						
61									
62									
63 / 19				15	N	G			
64									
65									
66 / 20									FILTER SAND 10X20
67		**Sand and Gravel and Cobbles** Fine to coarse grained sand and fine to coarse, subangular to subrounded gravel and cobbles, greyish-brown, loose, wet, saturated.	20.42						
68									
69 / 21				16	N	G			
70		End of Log	21.34						
71									
72 / 22									
73									

Well location: Sublease Area

Depth to water level (TOC): 3.103 m (10.2')

Date of water level: October 21, 2009

Borehole diameter: 0.152 m (6")

Well casing diameter: 0.051 m (2")

Well casing material: PVC

Well screen slot size: 10 slot by 0.25 mm (0.01")

Well screen interval (bgs): 18.532 - 20.067 m (60.8' - 65.8')

Depth of well (TOC): 20.832 m (68.3')

Well Elevation (TOC): 3.28 mNVD

Ground Elevation: 3.28 mNVD

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW162

Client: Environment Canada | Project: PEC Full Scale Post-Installation Drilling

Project No.: 457-002.01 | Location: PEC Site | Supervised by: R. Arellano

Drilling Co.: Beck Drilling and Environmental Services Ltd. | Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan | Date Completed: 10 Apr 01

SAMPLE: Sample Interval	SAMPLE: Sample I.D.	Depth Scale (ft) (m)	Graphic Log	Stratigraphic Description	Elev. Depth (m)	Type 1 CMT (Wall D) Well Diagram
	No sample taken	1, 5, 2, 10, 3, 4, 15, 5, 20, 6, 7, 25, 8, 30, 9, 10, 35		Top of Pipe Elevation (mNVD): 3.84 Surface Elevation (mNVD): 3.87 BERM MATERIAL	3.0	Cement Bentonite chips
				TREATMENT MEDIA	0.9	Collapsed native soil Screen A (4.0m) Screen B (5.7m) Screen C (7.3m) Screen D (9.0m) CMT Multilevel well, 76 mm slot Screen E (10.7m)
					-6.8 10.7	

SAMPLE TYPE: WC Wash Cuttings

BRID2 45701.GPJ 37753

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW170

Client: Environment Canada | Project: PEC Full Scale Post-Installation Drilling

Project No.: 457-002.01 | Location: PEC Site | Supervised by: R. Arellano

Drilling Co.: Beck Drilling and Environmental Services Ltd. | Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan | Date Completed: 17 Apr 01

SAMPLE: Sample Interval	SAMPLE: Sample I.D.	Depth Scale (ft)	Depth Scale (m)	Graphic Log	Stratigraphic Description (Top of Pipe Elevation (mNVD): 3.79; Surface Elevation (mNVD): 3.91)	Elev. Depth (m)	Type 2 CMT (Wall C) Well Diagram
					BERM MATERIAL	3.0	Cement Bentonite chips
		5	1		SAND and GRAVEL - grey, some cobbles, compact	0.9	
		10	2				Collapsed native soil
		15	3				
		20	4				Screen A (4.1m)
		25	5				
		30	6				Screen B (5.8m)
		35	7				
		40	8				Screen C (7.4m)
		45	9				
		50	10				Screen D (9.1m)
			11			-7.4	
	MW170-1		12		SILTY SAND - light grey, loose	11.3	Screen E (10.8m)
						-8.0	
			13		SAND and GRAVEL - grey, some cobbles, compact, brown at 13.7m	11.9	
			14				Screen F (13.1m)
			15				CMT Multilevel well, 76 mm slot
					- dense, cobbly with black silt at 14.6m - 15.2m	-11.3	
					SAND - grey, medium to fine grained, trace shell fragments and organics	15.2	Screen G (15.8m)
						-11.9	
						15.8	

SAMPLE TYPE: WC Wash Cuttings

BRID2 45701.GPJ 37753

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW172

Client: Environment Canada Project: PEC Full Scale Post-Installation Drilling

Project No.: 457-002.01 Location: PEC Site Supervised by: R. Arellano

Drilling Co.: Beck Drilling and Environmental Services Ltd. Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan Date Completed: 10 Apr 01

SAMPLE		Depth Scale	Graphic Log	Stratigraphic Description	Elev. Depth	Type 1 CMT (Wall E) Well Diagram
Sample Interval	Sample I.D.	(ft) (m)		Top of Pipe Elevation (mNVD): 3.98 Surface Elevation (mNVD): 4.04	(m)	
	No sample taken			BERM MATERIAL	3.1	Cement Bentonite chips
				TREATMENT MEDIA	0.9	
		5 1				Collapsed native soil
		10 3				Screen A (3.8m)
		15 5				Screen B (5.5m)
		20 6				Screen C (7.1m)
		25 8				Screen D (8.8m)
		30 9				CMT Multilevel well, 76 mm slot
		10			-6.5	
					10.5	Screen E (10.5m)

SAMPLE TYPE: WC Wash Cuttings

BRID2 45701.GPJ 37753

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW174

Page 1 of 1

Client: Environment Canada | Project: PEC Full Scale Post-Installation Drilling

Project No.: 457-002.01 | Location: PEC Site | Supervised by: R. Arellano

Drilling Co.: Beck Drilling and Environmental Services Ltd. | Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan | Date Completed: 12 Apr 01

SAMPLE: Sample Interval	SAMPLE: Sample I.D.	Depth Scale (ft)	Depth Scale (m)	Graphic Log	Stratigraphic Description	Elev. Depth (m)	Type 2 CMT (Wall C) Well Diagram
					Top of Pipe Elevation (mNVD): 3.96 Surface Elevation (mNVD): 3.97		
	No sample taken				BERM MATERIAL	3.1	Cement Bentonite chips
					WALL MEDIA	0.9	
		5	2				Collapsed native soil
		10	3				
			4				Screen A (4.1m)
		15	5				
							Screen B (5.8m)
		20	6				
			7				Screen C (7.4m)
		25	8				
							Screen D (9.1m)
		30	9				
			10				Screen E (10.8m)
		35	11				
							Screen F (13.1m)
		40	12				
			13				CMT Multilevel well, 76 mm slot
		45	14			-10.7	
					SAND and GRAVEL (native) - grey, cobbly, dense	14.6	
		50	15			-11.9	Screen G (15.8m)
						15.8	

SAMPLE TYPE: WC Wash Cuttings

BRID2 45701.GPJ 37753

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW176A

Client: Environment Canada | Project: PEC Full Scale Post-Installation Drilling

Project No.: 457-002.01 | Location: PEC Site | Supervised by: R. Arellano

Drilling Co.: Beck Drilling and Environmental Services Ltd. | Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan | Date Completed: 19 Apr 01

SAMPLE: Sample Interval	SAMPLE: Sample I.D.	Depth Scale (ft) (m)	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Type 3 Well Diagram
	No sample taken	1, 5, 2, 10, 3, 4, 15, 5, 20, 6, 7		Top of Pipe Elevation (mNVD): 3.91 Surface Elevation (mNVD): 4.00 **Blind bit used - no soil log recorded**	-3.3 7.3	Cement Bentonite chips 10/20 silica filter sand pack Coarse silica filter sand pack 0.025 cm slot, 5 cm diameter PVC well screen

SAMPLE TYPE: WC Wash Cuttings

BRID2 45701.GPJ 37753

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW176B

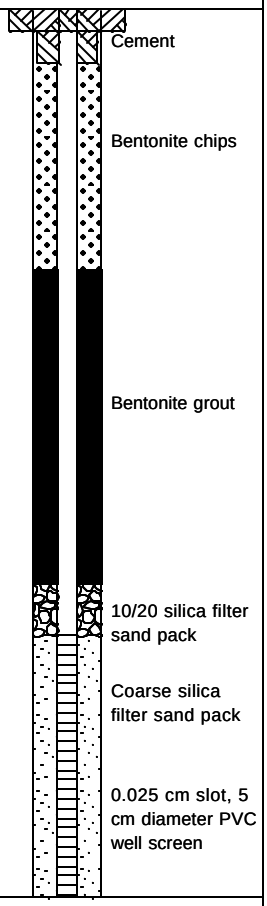
Client: Environment Canada Project: PEC Full Scale Post-Installation Drilling

Project No.: 457-002.01 Location: PEC Site Supervised by: R. Arellano

Drilling Co.: Beck Drilling and Environmental Services Ltd. Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan Date Completed: 19 Apr 01

SAMPLE		Depth Scale	Graphic Log	Stratigraphic Description	Elev. Depth	Type 3 Well Diagram
Sample Interval	Sample I.D.	(ft) (m)		Top of Pipe Elevation (mNVD): 3.93 Surface Elevation (mNVD): 4.01	(m)	
	No sample taken			Blind bit used - no soil log recorded		



-6.4
10.4

BRID2 45701.GPJ 37753

SAMPLE TYPE: WC Wash Cuttings

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW176C

Client: Environment Canada | Project: PEC Full Scale Post-Installation Drilling

Project No.: 457-002.01 | Location: PEC Site | Supervised by: R. Arellano

Drilling Co.: Beck Drilling and Environmental Services Ltd. | Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan | Date Completed: 19 Apr 01

SAMPLE Interval	Sample I.D.	Depth Scale (ft)	Depth Scale (m)	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Type 3 Well Diagram
					Top of Pipe Elevation (mNVD): 3.83 Surface Elevation (mNVD): 3.99		
					BERM MATERIAL - with sand cover		Cement
		5	1				Bentonite chips
						2.2	
			2		WALL MEDIA	1.8	
					SAND and GRAVEL - brown, medium to coarse grained, some fine, some cobbles, compact, moist	1.9 2.1	
		10	3				
			4				
		15					
			5				
					- silty at 5.5m - 5.6m		
	MW176C-1	20	6				Bentonite grout
	Cadmium: <0.5 Copper: 240 Lead: <50 Nickel: 11 Zinc: 95		7				
		25					
			8				
						-4.9	
	MW176C-2	30	9		SAND - trace gravel, some silt	8.8 -5.5	
					SAND and GRAVEL - brown, medium to coarse grained, some fine, some cobbles, compact, moist	9.4	
	Cadmium: <0.5 Copper: 20 Lead: <50 Nickel: 8 Zinc: 32		10				
		35					
			11				
							10/20 Silica filter sand pack
		40	12				Coarse silica filter sand pack
			13				
		45					
	MW176C-3		14				0.025 cm slot, 5 cm diameter PVC well screen
	Cadmium: <0.5 Copper: 17						
		50	15			-11.3	
	Lead: <50 Nickel: <5 Zinc: 29					15.2	

SAMPLE TYPE: WC Wash Cuttings

BRID2 45701.GPJ 37753

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW180

Client: Environment Canada | Project: PEC Full Scale Post-Installation Drilling

Project No.: 457-002.01 | Location: PEC Site | Supervised by: R. Arellano

Drilling Co.: Beck Drilling and Environmental Services Ltd. | Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan | Date Completed: 17 Apr 01

SAMPLE		Depth Scale		Graphic Log	Stratigraphic Description	Elev. Depth	Type 2 CMT (Wall C) Well Diagram
Sample Interval	Sample I.D.	(ft)	(m)		Top of Pipe Elevation (mNVD): 3.78 Surface Elevation (mNVD): 3.96	(m)	
	No sample taken				TREATMENT MEDIA		Cement
						3.0	Bentonite chips
					SAND and GRAVEL - fine to coarse, some cobbles	0.9	
		5	1				Collapsed native soil
		10	2				
			3				
		15	4				Screen A (4.1m)
			5				Screen B (5.8m)
		20	6				
			7				Screen C (7.4m)
		25	8				
		30	9		- more orange brown at 9.1m		Screen D (9.1m)
			10				
		35	11				Screen E (10.8m)
		40	12		- brown, with some silt at 11.6m - dense, cobbly at 12.2m		
			13				Screen F (13.1m)
		45	14		- some shell fragments at 13.1m		CMT Multilevel well, 76 mm slot
		50	15		- orange at 14.6m		Screen G (15.8m)
						-11.9 15.8	

SAMPLE TYPE: WC Wash Cuttings

BRID2 45701.GPJ 37753

HEMMERA ENVIROCHEM

LOG OF MONITORING WELL

Monitoring Well MW194

Client: Environment Canada Project: PEC Full Scale Post-Installation Drilling

Project No.: 457-002.01 Location: PEC Site Supervised by: R. Arellano

Drilling Co.: Beck Drilling and Environmental Services Ltd. Drilling Method: Becker Hammer

Monitoring Well Location: See Site Plan Date Completed: 25 Apr 01

SAMPLE		Depth Scale	Graphic Log	Stratigraphic Description	Elev. Depth	Type 5 Well Diagram
Sample Interval	Sample I.D.	(ft) (m)		Top of Pipe Elevation (mNVD): Surface Elevation (mNVD): 3.63	(m)	
	No sample taken	5 1 10 2 15 3 20 4 5 6		Blind bit used - no soil log recorded	-3.1 6.7	Cement Bentonite chips Coarse silica filter sand pack 0.025 cm slot, 5 cm diameter PVC well screen

SAMPLE TYPE: WC Wash Cuttings

File H:\DWGS\VOS2QS\BH2.DWG

Boring No. BH2

Sheet 1 Of 1

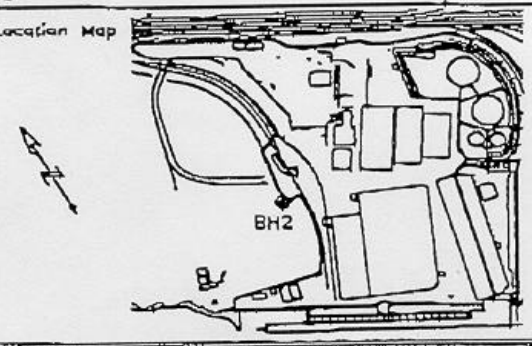
Project No.: VOS 208
Client: VANCOUVER WHARVES

Logged By: SB, HM
Date Drilled: NOV. 12, 1996
Drill Method GEOPROBE

Total Depth From Surface: 8.23m

Northing: +5464669.204m N.
Easting: +491074.613m E
Collar Elev.: 4.838m

Borehole Location Map



Depth (ft/m)	Sample #	Sample Type	Soil Gas Meas. (ppm)	Recovery	Well Completion	Lithologic Symbol	Soil Profile	Depth
0								0.00
	BH2 2	cc	–	100%			tan silty sandy GRAVEL FILL, trace wood fragments, trace copper staining, dry	0.76
							yellow/tan silty GRAVEL FILL dry	0.91
1	BH2 3.5	cc	–				rusty sandy GRAVEL FILL	1.22
	BH2 4.5	cc	–				*stickup well protector, concrete grout to surface*	
5							grey sandy GRAVEL FILL, shell fragments, trace of copper staining, dry	
2							*drill cuttings used as backfill*	2.74
10 3	BH2 10	cc	–	90%			PEAT, slightly decomposed rootlets and grasses, slightly moist	3.35
4							Nov. 15, 1996, 11:25 AM: 3.865m below top of well head after development	
				100%			interbedded sandy GRAVEL and minor PEAT lenses	
15							*bentonite*	4.88
5	BH2 16	cc	–				brown sandy SILT, bedded, with organics (rootlets), slightly moist	5.03
	BH2 17	cc	–					
				100%			rusty sandy coarse GRAVEL, saturated (rusty colour indicates oxidation, possible result of fluctuating groundwater levels)	6.10
20 6	BH2 21	cc	–				*10/20 silica sand*	
7				60%			grey sandy coarse GRAVEL, saturated	7.32
25 8				0%			*well screen* no recovery	8.23
9							EOH	
30							Monitoring well details: Well screened from 6.71 to 8.23. Sand pack from 6.10 to 8.23. Bentonite chips from 2.74 to 6.10 drill cuttings used to backfill from 1.83 to 2.74 Stick up well protector concrete grout at surface	

cc = cuttings from continuous core.
spt - split spoon core
act - cuttings from auger flight.

-U.T.M. GRID COORDINATES

Boring No. BH3

Sheet 1 of 1

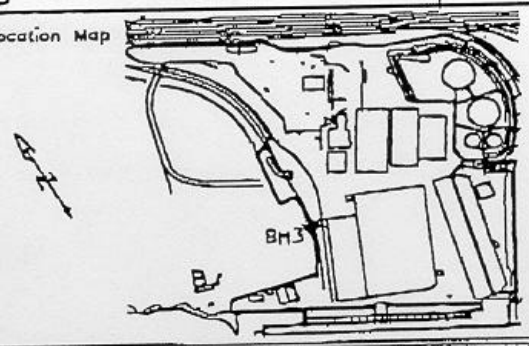
Project No.: V05.208
Client: VANCOUVER WHARVES

Logged By: SB, HM
Date Drilled: NOV. 12, 1996
Drill Method: GEOPROBE

Total Depth from Surface: 6.71m

Northing: *5464626.961m N.
Easting: *491091.212m E.
Collar Elev.: 3.488m

Borehole Location Map



Depth	Sample #	Sample Type	Soil Gas Meas. (ppm)	Recovery %	Well Completion	Lithologic Symbol	Soil Profile	Depth
							flush mount well protector with concrete grout at surface	0.00
	BH3 2	cc	–	100%			tan silty sandy GRAVEL FILL, trace wood fragments, trace copper staining, dry	0.67
							drill cuttings as backfill	
	BH3 6	cc	–				grey sandy GRAVEL FILL, trace copper staining	
							Nov. 18, 1996, 11:55 AM: 2.410m below top of well head after development.	2.74
	BH3 9.5	cc	–	90%			interbedded PEAT, poorly decomposed rootlets and grasses, sandy silt and very fine silty sand, moist	
	BH3 10.5	cc	–				bentonite	3.66
	BH3 12	cc	–				rusty sandy coarse GRAVEL, saturated	4.57
				100%			10/20 silica sand	
	BH3 16	cc	–				grey sandy coarse GRAVEL, saturated	
				100%			well screen	
	BH3 21	cc	–					6.71
							EOH	

ft/m
0 1 2 3 4 5 6 7 8 9
0 5 10 15 20 25 30

Monitoring well details:

Well screened #20 slot from 5.18 to 6.71.
10/20 washed silica filter sand pack from 3.96 to 6.71
Bentonite chips from 3.96 to 2.74
drill cuttings used to backfill from surface to 2.74
flush mount well protector with concrete grout at surface

cc = cuttings from continuous core.
spt = split spoon core
act = cuttings from auger flight.

*U.T.M. GRID COORDINATES

Boring No. BH4

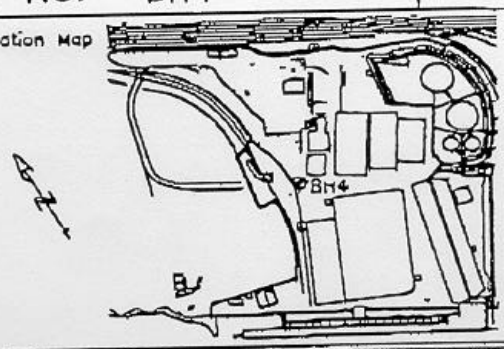
Project No.: VOS.208
Client: VANCOUVER W HARVES

Logged By: SB, HM
Date Drilled: NOV. 12, 1996
Drill Method: GEOPROBE

Total Depth From Surface: 6.71 m

Northing: no survey
Easting: no survey
Collar Elev.: no survey

Borehole Location Map



Depth (ft/m)	Sample #	Sample Type	Soil Gas Meas. (ppm)	Recovery %	Well Completion	Lithologic Symbol	Soil Profile	Depth
							grey sandy GRAVEL FILL	0.23
							dark brown organic SILT FILL	0.46
				100%			*flush mount well protector with concrete grout at surface*	
							grey sandy GRAVEL FILL, dry	
5	BH4 5	cc	–				*drill cuttings used as backfill*	
								1.83
							COBBLE	2.13
	BH4 8	cc	–				grey SAND with shell fragments, moist	
				90%			*bentonite*	3.20
	BH4 11.5	cc	–				inter-bedded PEAT, slightly decomposed rootlets and grasses, sandy SILT, silty very fine SAND, moist	3.88
							grey sandy GRAVEL, wet	4.27
	BH4 14	cc	–	60%			rusty sandy coarse GRAVEL, saturated	4.88
							10/20 silica sand	
							grey sandy coarse GRAVEL, saturated	
				50%				
	BH4 22	cc	–				*well screen*	6.71
							EOH	

Monitoring well details:

Well screened #20 slot from 5.18 to 6.71.
10/20 washed silica filter sand pack from 3.96 to 6.71.
Bentonite chips from 3.96 to 2.74
drill cuttings used to backfill from surface to 2.74
flush mount well protector with concrete grout at surface

water level not determined (well not developed).

cc = cuttings from continuous core.
spt = split spoon core.
oct = cuttings from auger flight.

Log of Monitoring Well: WTI-9B

HEMMERA

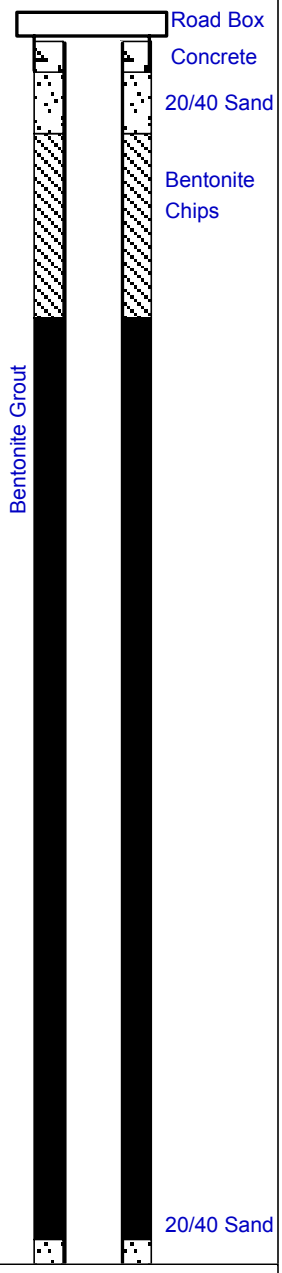
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** A. Morriss

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 11-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.86		Well TOP Elevation (mNVD): 3.75
			ft m		Ground Surface	3.9	
			0 0		***Drilled Blind***	0.0	
					See WTI-9D for sediment log and samples.		
			2				
			4				
			6 2				
			8				
			10				
			12 4				
			14				
			16				
			18				
			20 6				



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: WTI-9B

HEMMERA

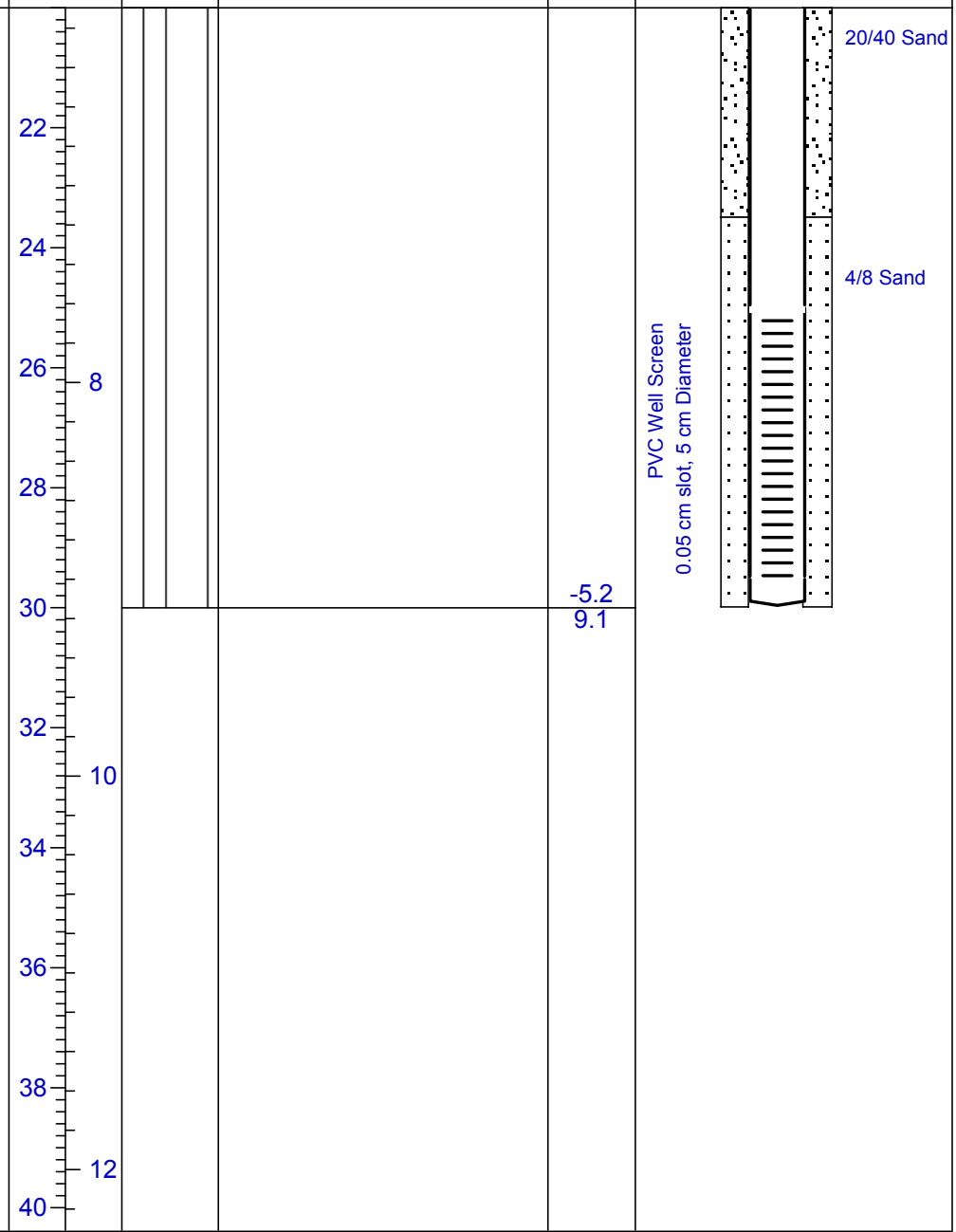
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** A. Morriss

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 11-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.86		Well TOP Elevation (mNVD): 3.75



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: WTI-9C

HEMMERA

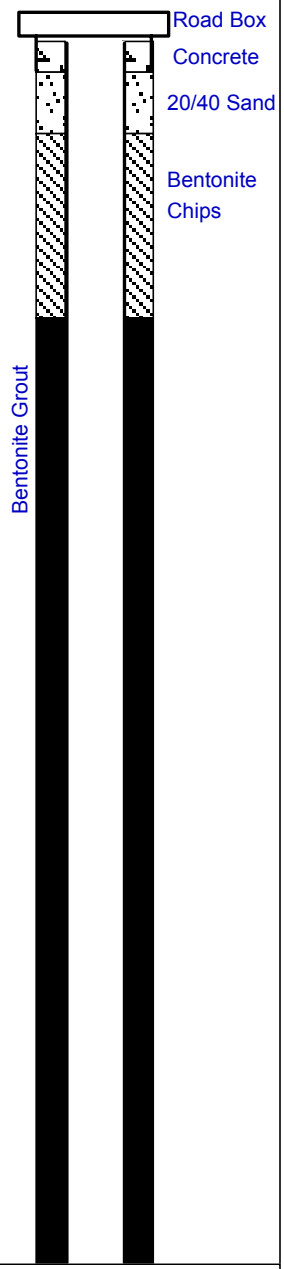
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 11-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.82		Well TOP Elevation (mNVD): 3.74
			ft / m		Ground Surface	3.8	
					Drilled Blind See WTI-9D for sediment log and samples.	0.0	



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: WTI-9C

HEMMERA

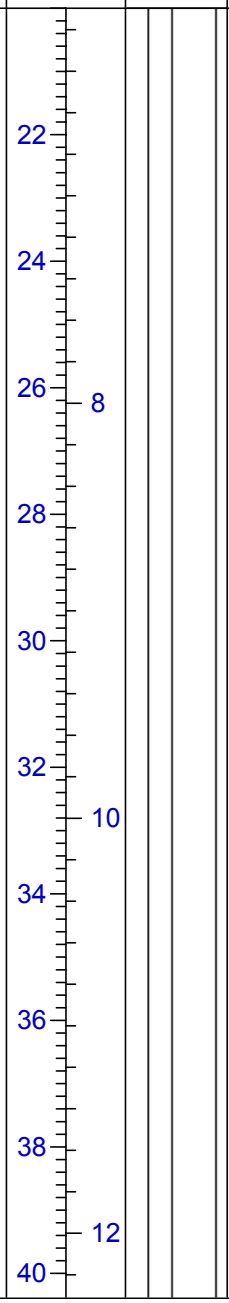
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

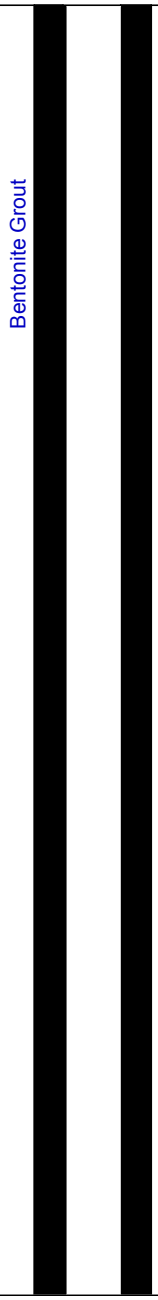
Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 11-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.82		Well TOP Elevation (mNVD): 3.74





SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: WTI-9C

HEMMERA

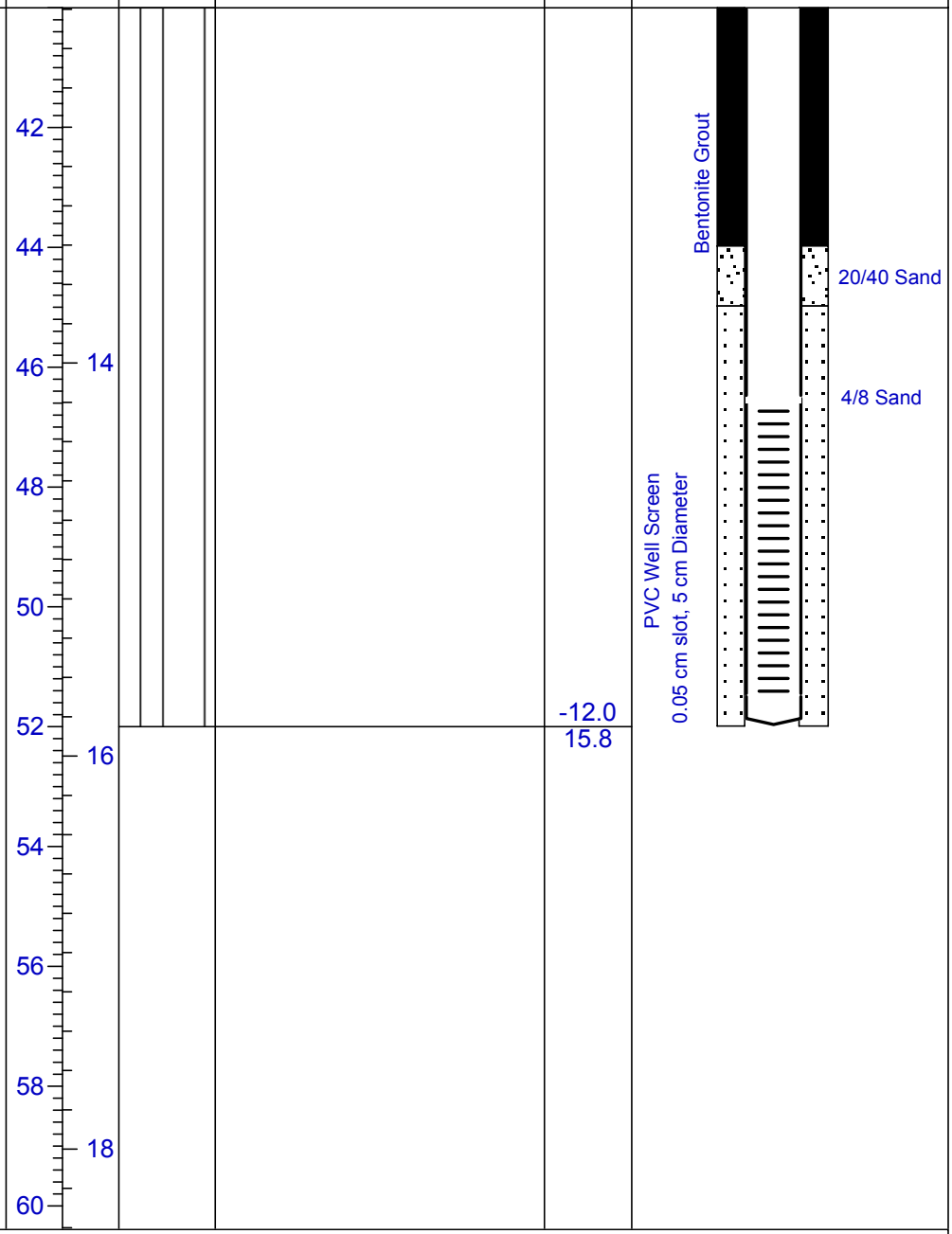
Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.08 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 11-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.82		Well TOP Elevation (mNVD): 3.74



SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: WTI-9D

HEMMERA

Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.09 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 10-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.83		Well TOP Elevation (mNVD): 3.74
			ft / m		Ground Surface	3.8	
			0 / 0		***ASPHALT***	0.0	Road Box
OH	(Metals)	5				3.5	Concrete
					FILL sand and gravel, some silt, some asphalt debris, dense, grey and brown.	0.3	20/40 Sand
OH	(Metals)	4	2				
					As = 15; Cu = 1739		Bentonite Chips
OH	METALS	3			***GRAVEL and COBBLES*** sandy, fine to medium sand, dense, grey.	2.6	
			4			1.2	
OH	(Metals)	2					
OH	(Metals)	1					
			6 / 2		***SAND*** trace gravel, trace fines, light brown		Bentonite Grout
CC	(Metals) & GS	6	8		-shells 2.1 - 2.6 m	1.2	
CC	(Metals) & GS	7				2.6	
CC	METALS	8	10		***SILT*** *No exceedances* sandy, organic, soft, grading grey to brown. -trace clay 2.9 - 3.0 m -0.05 m lense of fine to coarse sand at 3.2 m	0.2	
			12 / 4			3.7	
			14		***GRAVEL and COBBLES*** sandy, trace fines, dense, brown. -silty 6.1 - 7.9 m		
CC	METALS & GS	9 and Dup 1	16		*Cu = 304.6 ppm*		
			18				
			20 / 6				

SAMPLE TYPE:
SS - Split Spoon
OH - Open Hole Hand Sample
CC - Cyclone Cuttings
GS - Grain Size Analysis

Log of Monitoring Well: WTI-9D

HEMMERA

Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.09 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 10-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.83		Well TOP Elevation (mNVD): 3.74
			22				Bentonite Grout
			24				
			26			-4.1	
			8		***SAND and GRAVEL*** cobbley, dense, brown.	7.9	
CC	METALS	10 and Dup 2	28		*No exceedances*		
			30				
			32				
			10			-6.2	
			34		***SILT and SAND*** soft, internal depth approximate	10.1	
			36			-7.1	
			38		***SAND and GRAVEL*** cobbley, dense, brown. -heaving and very dense at 12.8 - 16.1 m	11.0	
			12		-compact 16.2 - 19.2 m		
			40				

SAMPLE TYPE:
SS - Split Spoon CC - Cyclone Cuttings
OH - Open Hole Hand Sample GS - Grain Size Analysis

Log of Monitoring Well: WTI-9D

HEMMERA

Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.09 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 10-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.83		Well TOP Elevation (mNVD): 3.74
CC	(Metals)	11	42, 44				Bentonite Grout
			46	14			
			48				
CC	METALS	12 and Dup 3	50		*No exceedances*		
			52	16			
			54				
			56				
CC	(Metals)	13	58	18			20/40 Sand
			60				

SAMPLE TYPE:
SS - Split Spoon CC - Cyclone Cuttings
OH - Open Hole Hand Sample GS - Grain Size Analysis

Log of Monitoring Well: WTI-9D

HEMMERA

Client: Environment Canada ***Project:*** Site Wells BCRM Sublease

Project No.: 457-003.09 ***Location:*** VWLP Leasehold ***Logged By:*** R. Arellano

Drilling Company: Beck Drilling and Environmental Services ***Drilling Method:*** Becker Hammer

Monitoring Well Location: See Site Plan ***Date Drilled:*** 10-Mar-03

SAMPLE			Depth Scale	Graphic Log	Stratigraphic Description	Elev. / Depth (m)	Well Completion Details
Sample Interval	Analysis (Not Analysed) /ANALYSED	Sample I.D. Not Analysed /ANALYSED			Surface Elevation (mNVD): 3.83		Well TOP Elevation (mNVD): 3.74
			62			-15.4	20/40 Sand
			64		***SAND*** trace gravel, compact to dense, heaving, grey.	19.2	4/8 Sand
			66	20			PVC Well Screen 0.05 cm slot, 5 cm Diameter
CC	METALS & GS	14 and Dup 4	68		*No exceedances*	-17.0	
			70			20.9	
			72	22			
			74				
			76				
			78	24			
			80				

SAMPLE TYPE:
SS - Split Spoon CC - Cyclone Cuttings
OH - Open Hole Hand Sample GS - Grain Size Analysis

PROJECT: 61821

WTI-3

LOCATION: PEC

BORING DATE: 10/23/96 DATUM: GROUND SURFACE DIP: 90° LOGGED: BL

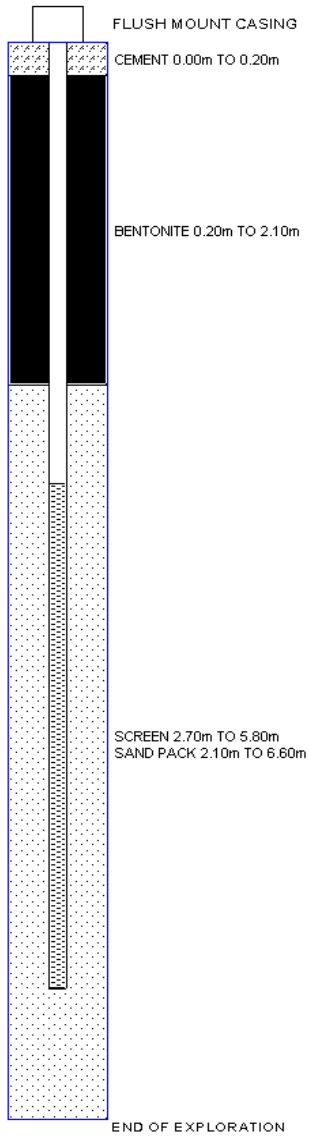
DEPTH SCALE METRES	DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	DEPTH B.G.S. (m)
			GROUND SURFACE		
0	0	SPLIT SPOON	GRAVEL, fill with cobbles		0.0
			SAND, stained green, medium to coarse with fine gravel		0.15
			SAND, stained green, poorly sorted with gravel		1.5
			SAND, poorly sorted with silt and minor gravel, wet at 3.3m.		2.4
			SAND, light with coarse and fine gravel		3.7
			END OF EXPLORATION @ 6.60m		6.60

Samples: ID | Type | Recovery (%) | "N" Value

Concentration: LEL ◆ Moisture Content ● Gas Concentration ■

0 20 40 60 80 100

WTI 3



DRAWN: IC

WTI

CHECKED: RMC

PROJECT: 61821

WTI-4

LOCATION: PEC

BORING DATE: 10/21/96 DATUM: GROUND SURFACE DIP: 90° LOGGED: BL

DEPTH SCALE METRES	DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	DEPTH B.G.S. (m)	Samples ID	Samples Type	Samples Recovery (%)	Samples "N" Value
0	0	SPLIT SPOON	GROUND SURFACE		0.0				
			SAND, olive grey, well graded with gravel			SS-1	SS		
2	8		SILT, dark grey, clayey with minor fine sand, wet at 3.0 m		2.4				
3	10		SILT, dark grey clayey with some well graded sand		3.1	SS-2	SS		
			SAND, light brown, well graded with some silt, gravel, and cobbles		3.5	SS-3	SS		
6	20		END OF EXPLORATION @ 6.00m		6.00				

Concentration

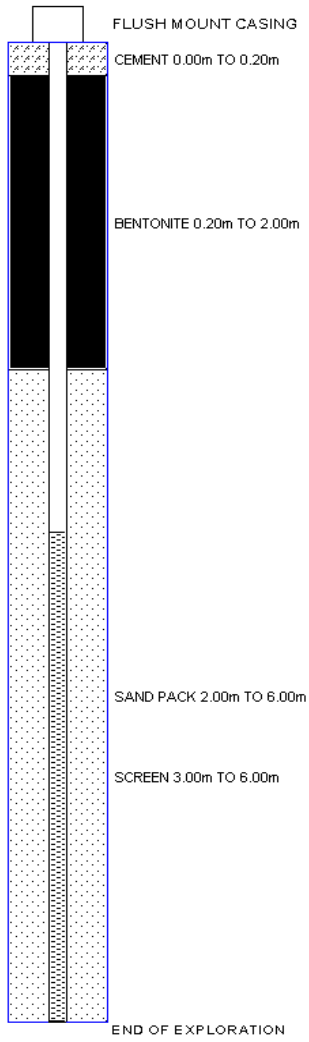
LEL ◆

Moisture Content ●

Gas Concentration ■

0 20 40 60 80 100

WTI4



DRAWN: IC

WTI

CHECKED: RMC

PROJECT: 61821

LOCATION: PEC

WTI-9

BORING DATE: 10\23\96 DATUM: GROUND SURFACE DIP: 90° LOGGED: BL

DEPTH SCALE METRES	DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	DEPTH B.G.S. (m)	Samples ID	Samples Type	Samples Recovery (%)	Samples "N" Value
0	0		GROUND SURFACE						
		SPLIT SPOON	ASPHALT		0.0				
			SAND, olive light grey with gravel		0.1				
			SAND, olive to brown, well graded with minor gravel		1.5				
			PEAT, brown, with minor sand and gravel		1.7	SS-1	SS		
2	6		SAND, dark brown mostly fine with minor fine gravel, trace of silty clay, olive grey/brown, wet at 2.4m		1.9				
			SILT, grey, sands well graded with minor fine gravel		3.1	SS-2	SS		
4	14					SS-3	SS		
5	16		SAND, grey, well graded with some cobbles		4.9				
			END OF EXPLORATION @ 5.00m		5.00				

Concentration

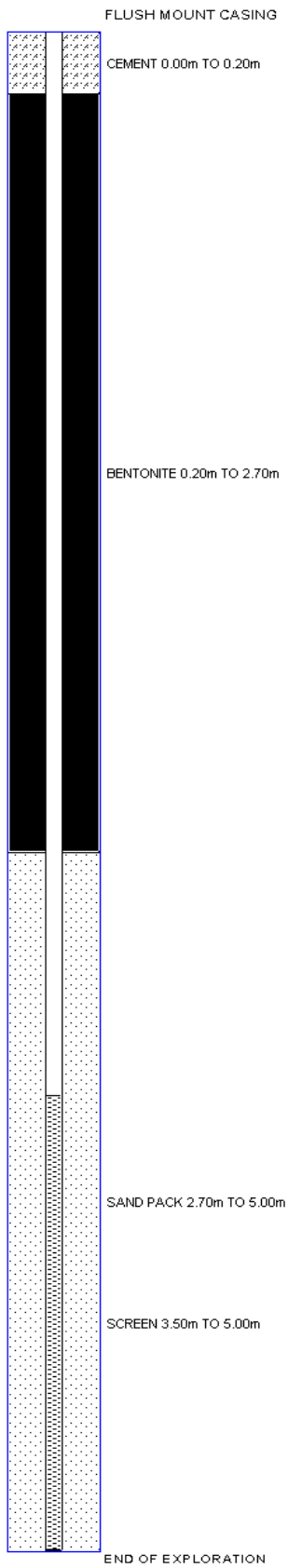
LEL ◆

Moisture Content ●

Gas Concentration ■

0 20 40 60 80 100

WTI-9



DRAWN: IC

WTI

CHECKED: RMC