Project Title: St. Clair River, Ontario

Southeast Bend Cutoff Channel and Stokes Point

Maintenance Dredging 2013

Project Number: R.042805.001

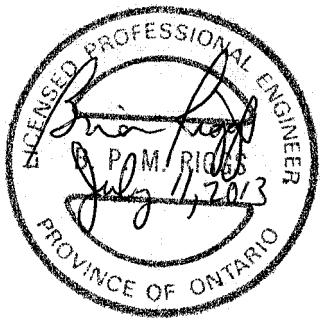
Project Date: 2013-07-11

END

END

DESIGN ENGINEERS:

Brian Riggs, P. Eng.
Riggs Engineering Ltd.



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PART 1 - GENERAL

1.1 CONTRACT METHOD

.1 Construct Work under a combined price contract. All costs for work not specifically identified as a unit price item shall be included in the lump sum arrangement.

.2 Items measured for payment are in metric (SI) units.

.3 Submit requests for payment in metric units corresponding with items on the Unit Price Table.

.4 Submit supporting documents in metric units. Perform all necessary conversions required.

.5 Within 48 hours of bid acceptance submit a list of subcontractors and a detailed breakdown of costs associated with the lump sum arrangement.

1.2 SITE

.1 The site of the work is in the St. Clair River.

1.3 EXAMINATION

.1 Before submitting bid, examine existing site conditions and determine conditions affecting work, including potential inclement weather and sea conditions.

.2 Obtain all information which may be necessary for proper execution of Contract.

1.4 EXISTING UTILITIES

.1 Establish location, protect and maintain existing buried, submerged or above ground utility lines.

1.5 CONSTRUCTION AND STORAGE AREA

.1 The limits of the Construction and Storage Area will be designated by the Departmental Representative prior to commencement of work unless otherwise shown on the Drawings.

.2 Confine work including temporary structures, plant, equipment, and materials to established limits.

1.6 MINIMUM STANDARDS

.1 Execute work to meet or exceed:
.1 Federal Fire Commissioner, No. 301, Standard for Construction Operations, and No. 302, Standard for Welding and Cutting, June 1982 and Fire Protection Standard for Correctional Institutions - Treasury Board Personnel Management Manual, Occupational Safety and Health, Chapter 3-6, Feb. 1992.
.2 Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, O. Reg. 213/91 as amended by O. Reg. 631/94, R.R.O. 1990, Reg. 834.
.3 Environmental Protection Act, O. Reg. 102/94 and O. Reg. 103/94.

1.7 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

1.8 FEES, PERMITS AND CERTIFICATES

.1 Provide authorities having jurisdiction with information requested.

.2 Pay fees and obtain certificates and permits required.

.3 Furnish certificates and permits when requested.

1.9 COMMENCEMENT OF WORK

.1 Commence mobilization of plant and equipment to site immediately upon notification of award.

.2 Commence dredging not later than three weeks after date of award.

1.10 WORKS SCHEDULE

.1 Drawing 1510, Work Schedule, is bound together with these specifications.

.2 Submit with bid a copy of Drawing 1510 depicting the anticipated progress stages within framework of Departmental schedule.

.3 Submit detailed schedule of dredging and disposal operations for Departmental Representative's approval within five days after contract award.

1.10 WORKS SCHEDULE (Cont'd)

.4 When schedule has been approved by Departmental Representative, take necessary measures to complete work within scheduled time. Do not change schedule without Departmental Representative's written approval.

1.11 CO-OPERATION AND PROTECTION

.1 Execute work with minimum disturbance to public, ferry operations at Harsen's Island and normal use of site. Make arrangements with Departmental Representative to facilitate execution of work.

.2 Provide necessary barriers, warning lights and signs. Protect work from damage.

.3 Repair and clean existing structures, roads, beaches or other facilities damaged or fouled by the work or material lost through pipeline leaks. Complete repairs and clean up at no additional expense to Departmental Representative. Repairs made to damaged existing work to equal or better original.

1.12 PROJECT MEETINGS

.1 Departmental Representative will arrange project meetings, set times, record and distribute minutes. Attend these meetings.

1.13 OVERLOADING

.1 No part of Work shall be loaded with load which will endanger its safety or will cause permanent deformation.

.2 Repair to original condition any part of work damaged due to overloading at no cost to Departmental Representative.

.3 Obtain from Departmental Representative the allowable loading permitted on the wharf, adjacent to the dredging site.

1.14 DATUM

.1 Chart datum for St. Clair River at Stokes Point is 174.7 metres I.G.L.D.(1985). This applies to Dredge Area 1.

1.14 DATUM (Cont'd)

.2 Chart datum for Lake St. Clair is 174.4 metres I.G.L.D.(1985). This applies to Dredge Areas 2 through 6.

.3 Dredge Area 1 is to be referenced to the water level gauge maintained by the Canadian Hydrographic Service at Port Lambton, Ontario.

.4 Dredge Areas 2 through 8 are to be referenced to the water level gauge maintained by the National Oceanic and Atmospheric Administration (USA) at St. Clair Shores, Michigan.

.5 Drawing 1502, Water Level Chart, for Lake St. Clair is bound together with these specifications.

.6 Elevations and soundings shown on drawings are expressed in metres relative to chart datum.

1.15 DOCUMENTS REQUIRED

.1 Keep at job site, one copy of each of following:
- .1 Contract drawings.
- .2 Specifications.
- .3 Amendments.
- .4 Change orders.
- .5 Other modifications to Contract.

.2 Maintain documents in clean, dry, legible condition.

.3 Make documents available at all times for inspection by Departmental Representative.

1.16 ADDITIONAL DRAWINGS

.1 Additional drawings may be issued by Departmental Representative to clarify work.

.2 Such drawings become part of Contract Documents.

1.17 EQUIPMENT DEMOBILIZATION

.1 Complete demobilization of equipment no later than two weeks after receiving Departmental Representative's written release from the work. Do not leave any equipment on site.

1.18 FLOATING PLANT REQUIREMENTS

.1 Submit with bid, the appropriate pages of the Appendix to the Bid Form entitled 'Dredges and Other Floating Plant'. Complete this form in its entirety. Plant other than listed cannot be used without prior approval of the Departmental Representative.

.2 Dredges or other floating plants to be employed on this work, to be of Canadian registry, make or manufacture, or, must receive certificate of qualification from Industry, Science and Technology Canada.

1.19 U.S. CUSTOMS AND IMMIGRATION

.1 Contact the following Department of Homeland Security offices prior to submitting your bid to determine regulatory requirements for the work:
.1 Mr. Kotowsko (313) 226-3136, Marine Officer, Bureau of Customs and Border Protection, Department of Homeland Security.

.2 Obtain all necessary information affecting work in addition to that listed herein.

.3 Obtain all necessary approvals and pay all fees required to permit entry of equipment and personnel into the U.S. for the duration of the contract.

.4 Obtain and adhere to the Bureau of Customs and Border Protection (BCBP) procedural requirements. The BCBP will impose the following requirements
.1 For each trip to Dickinson Island submit the following forms daily to the BCBP office in Detroit
.1 CF-1300 Form (one for tug, one for scow).
.2 CF-1302 Cargo Statement plus US$110 fee (up to a maximum of US$1,500 per scow per year).
.3 CF-1304 Form (one for tug)
.4 CF-3171 Form (one for tug)
.5 Clearance Statements from Canada Customs and Revenue Agency.

.5 Obtain and adhere to the Animal and Plant Health Inspection Service (APHIS), US Department of Agriculture, fees and regulations.

.6 Contact the Bureau of Citizenship and Immigration Services regarding requirements for

1.19 U.S. CUSTOMS AND IMMIGRATION (Cont'd)

.6 (Cont'd) employees crossing the border for work on the project.

1.20 CANADA CUSTOMS AND REVENUE AGENCY

.1 Contact Cheryl Larmour at Canada Customs and Revenue Agency (519) 967-4140 to determine all necessary approval, permits, fees etc. required by CCRA.

1.21 EMPLOYMENT OF WALPOLE ISLAND FIRST NATION MEMBERS

.1 The Contractor and his Sub-Contractors are to employ members of the Walpole Island First Nation to the fullest extent reasonably possible subject to the regulations of Canada in relation thereto and any union agreement in force or effect with the Contractor or his Sub-Contractors.

.2 Notwithstanding Clause 1.21.1 above, Contractor must employ at least one Walpole Island First Nation member per work shift or a minimum of 10% of site work force, whichever is the greater.

.3 A list of Band members by construction trades is available from the Band Office. It is the responsibility of the Contractor to establish workers' qualifications.

.4 Upon request, the Contractor will provide to the Departmental Representative a complete record of employment for each band member employed.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 Province of Ontario:
.1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
.2 O. Reg. 490/09, Designated Substances.
.3 Workplace Safety and Insurance Act, 1997.
.4 Municipal statutes and authorities.

1.2 SUBMITTALS

.1 Make submittals in accordance with Section 01 11 03.

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
.1 Results of site specific safety hazard assessment.
.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
.3 Measures and controls to be implemented to address identified safety hazards and risks.
.4 Provide a Fire Safety Plan, specific to the work location.
.5 Contractor's and Sub-contractors' Safety Communication Plan.
.6 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations.

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

.4 Departmental Representative's review of Contractor's final Site Specific Health and Safety Plan should not be construed as as approval and does not reduce the Contractor's overall responsibility for construction site health and safety.

1.2 SUBMITTALS (Cont'd)

.5 Submit records of Contractor's Safety Meetings when requested.

.6 Submit copies of reports or directions issued by safety inspectors of authority having jurisdiction.

.7 Submit copies of incident and accident reports.

.8 Submit Material Safety Data Sheets (MSDS)to. Departmental Representative.

.9 Submit names of personnel and alternates responsible for site safety and health.

.10 Submit WSIB - Workplace Safety and Insurance Board, Experience Rating Report for Province of Ontario.

1.3 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to commencement of Work.

1.4 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

.1 Pre-construction meeting: schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of work.

1.6 REGULATORY REQUIREMENTS

.1 Comply with Acts and regulations of the Province of Ontario.

.2 Comply with specified standards and regulations to ensure safe operations at site.

.3 In event of conflict between any provisions of specified standards and regulations, the most stringent provision governs.

1.7 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with sediment with bulk chemistry as shown in Appendix A.

.2 Work at Dickinson Island Confined Disposal Facility involves potential contact with ticks.

.3 Work on and around water (drowning hazard).

.4 Remote location (no direct access to emergency responders).

1.8 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to commencing any site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Relief from or substitution for any portion or provision of minimum Health and Safety Guidelines specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing. Departmental Representative will respond in writing, where deficiencies are noted and request resubmission with correction of deficiencies either accepting or requesting improvements.

1.9 RESPONSIBILITY

.1 Be responsible for safety of persons and property on site and for protection of persons off site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 Where applicable the Contractor shall be designated "Constructor", as defined by Ontario Act.

1.10 UNFORESEEN HAZARDS

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

.2 Follow procedures in place for Employees Right to Refuse Work as specified in the Act for the Province of Ontario.

1.11 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative:
.1 Contractor's Safety Policy.
.2 Constructor's Name
.3 Notice of Project.
.4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
.5 Ministry of Labour Orders and reports.
.6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
.7 Address and phone number of nearest Ministry of Labour office.
.8 Material Safety Data Sheets.
.9 Written Emergency Response Plan.
.10 Site Specific Safety Plan.
.11 Valid certificate of first aider on duty.
.12 WSIB "In Case of Injury At Work" poster.
.13 Location of toilet and cleanup facilities.

.2 Comply with Provincial general posting requirements.

1.12 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by Departmental Representative and regulatory agency having jurisdiction in the Province.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

1.12 CORRECTION OF NON-COMPLIANCE (Cont'd)

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.13 BLASTING

.1 Blasting or other use of explosives is not permitted.

1.14 WORK STOPPAGE

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

.2 Assign responsibility and obligation to Competent Supervisor to stop or start Work when, at Competent Supervisor's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END

PART 1 - GENERAL

1.1 GENERAL

.1 The material to be dredged is classified as marginally polluted according to the Ministry of the Environment Provincial Sediment Quality Guidelines.

.2 Comply to and complete the Environmental Mitigation Measures form attached at the end of the specifications in Appendix D - Environmental Mitigation Measures.

1.2 DISPOSAL OF MATERIALS

.1 Dispose of dredged material in the designated containment facility as indicated.

.2 The Contractor may be required to temporarily suspend dredging operations if the turbidity plume from dredging activities adversely affects the quality of water. Make no claim for delays resulting from the above.

1.3 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site unless approved by Departmental Representative.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

.3 All waste materials including containers and waste fluids associated with vehicle maintenance should be disposed of in a legal manner at a site approved by Local Authorities.

1.4 FIRES

.1 Fires and burning of rubbish on site not permitted.

1.5 DRAINAGE

.1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.2 Do not pump water containing suspended materials (or other harmful substances) into waterways, sewer or drainage systems.

1.5 DRAINAGE (Cont'd)

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

1.6 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this contract.

.2 Control emissions from equipment and plant to local authorities emission requirements.

.3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.4 Do not allow any debris, fill, deleterious material or other foreign material to enter the waterway.

.5 Prevent spillage of gasoline, diesel fuel and other oil products into the waterways and on land. Clean up spills promptly at own cost in accordance with Provincial regulatory requirements. Report any fuel spills immediately to Departmental Representative and to the Ontario Ministry of Environment and Energy Spills Action Centre (1-800-268-6060).

.6 Fuelling of machinery must take place at a safe distance from the waterway as designated by the Departmental Representative.

.7 Do not cause excessive turbidity when performing in-water work.

.8 Abide by local noise by-laws.

1.7 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties.

.2 Minimize stripping of topsoil and vegetation.

1.8 CLEANING

.1 Maintain project free of accumulated water and rubbish.

1.9 SPECIAL PROTECTION AND PRECAUTIONS

.1 Comply with the requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials and regarding labelling and the provision of material safety data sheets acceptable to Labour Canada.

1.10 WATER QUALIY PERFORMANCE CRITERIA

.1 Resuspension of particulate matter will be measured for compliance 100 m from the in-water work. The total susspended solids (TSS) will be measured during the first three days of production in Area 2 and the first three days of production for any of areas 3 through 6. A site specific correlation between turbidity and TSS will be established specifically for Area 2 and a separate relationship for any of Areas 3 through 6. The Departmental Representaative may enforce either the TSS criteria or turbidty based on the site specific relationship.

.2 The maximum increase in TSS over background is 25 mg per litre.

.3 The maximum increase in turbidty over background before a site specifc relationship is developed is 25 NTU.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END

PART 1 - GENERAL

1.1 ACCESS

.1 Provide and maintain adequate access to and exit from project site.

.2 Provide snow removal for temporary access throughout the period of work.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractor's use of roads.

.4 Make good damage to any existing land, roads, vegetation or structures resulting from Contractor's equipment and operations. Restore to original condition at no additional cost to Departmental Representative.

1.2 ACCESS TO DICKINSON ISLAND CDF

.1 The Dickinson Island CDF is under the jurisdiction of the U.S. Army Corps of Engineers (COE), Detroit District. Adhere to U.S. COE rules and regulations for use of site.

.2 Make necessary arrangements with the Departmental Representative for access to Dickinson Island for duration of Contract. Adhere to USACE security requirements.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractor's use of roads.

1.3 DEPARTMENTAL REPRESENTATIVE'S OFFICE

.1 Supply one suitable weatherproof offices for use by Departmental Representative. Furnish office with table, chairs, and adequate lighting, well ventilated with screened window openings and adequate air conditioning equipment. Maintain at minimum temperature of 20°C and to a maximum of 28°C during hours of work. Departmental Representative to approve location and suitability office. Office to be located on dredge.

1.3 DEPARTMENTAL REPRESENTATIVE'S OFFICE (Cont'd)

.2 Office on dredge to be a separate room dedicated to Departmental Representative's use. Machinery and crew lunch rooms are unacceptable.

.3 Provide one facsimile machine for use on site for the duration of the contract. Maintain machine in good operating condition with sufficient paper supply. Make machine available for Departmental Representative's use. No separate payment to be made for facsimile machine. Include costs in the lump sum arrangement.

1.4 SANITARY FACILITIES

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

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

.3 Provide sufficient supply of fresh drinking water daily for work force including PWGSC personnel.

1.5 REMOVAL OF TEMPORARY FACILITIES

.1 Remove temporary facilities from site upon completion of work unless otherwise directed by Departmental Representative.

.2 When project is closed down at end of construction season keep facilities operational until close down is approved by Departmental Representative.

1.6 MEASUREMENT PROCEDURES

.1 Departmental Representative's office: Include costs in Lump Sum Arrangement.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END

PART 1 - GENERAL

1.1 DEFINITIONS

.1 The following defines the terminology used in this specification.

.2 Dredging: excavating, transporting and disposing of underwater materials.

.3 Class A material: solid rock requiring drilling and blasting to loosen, and boulders or rock fragments of individual volumes of 1.5 cubic metres or more.

.4 Class B material: loose or shale rock, silt, sand, quick sand, mud, shingle, gravel, clay and sand, gumbo, boulders, till, debris or and material not specified under Class A.

.5 Obstructions: class of material greater than 1.5 cubic metres that is not included in this specification.

.6 Debris: pieces of wood, wood fibre, logs, wire rope, tires, scrap steel, pieces of concrete and other waste materials.

.7 Grade: plane above which all material is to be dredged.

.8 Side slope: inclined surface from grade depth at side limit of dredging area to intersect original ground line outside of dredging area and to be expressed as a ratio of horizontal to vertical.

.9 Estimated quantity:
.1 Volume of material calculated to be above grade and inside specified grade side slopes unless otherwise specified.
.2 Area in square metres of material calculated horizontally to exist above grade and within dredge limits, unless otherwise specified.

.10 Definitions:
.1 CMPM: cubic metres place measurement at dredging site.
.2 CMSM: cubic metres scow measurement.
.3 SQM: area in square metres projected on horizontal plane.

1.1 DEFINITIONS (Cont'd)

.11 Box cut: dredging channel area with vertical side slopes and allowing side slope of excavation collapse to a natural equilibrium slope.

.12 Cleared areas: areas of dredging accepted as complying with plans and specifications.

.13 Mechanical sweep: clearing all the dredged areas to the grade depth using a mechanical device suspended from a barge.

.14 Chart datum: permanently established plane from which soundings or tide heights are referenced.

.15 Coordinates:
.1 U.T.M.: universal transverse mercator projection.
.2 U.T.M. Coordinates: plane rectangular coordinates used in grid system in which grid network is applied to U.T.M. projection.

.16 Mechanical dredging plant: equipment that is comprised of the following - clamshell, dragline, dipper or backhoe dredge with dump scows.

.17 Hydraulic dredging plant: equipment that uses the movement of water to excavate and transport underwater materials such as: cutter suction dredger, suction dredger or trailing suction hopper dredger.

.18 CUBE surface: pre and post dredge surveys will be undertaken by a multibeam echo sounder. The surface used for computation of dredge volumes is the Combined Uncertainty and Bathymetric Estimator (CUBE) surface. As soundings are propagated to nodes, based on distance and uncertainty, a hypothesis is developed. Soundings with a low vertical uncertainty are given more influence than soundings with high vertical uncertainty. Soundings with a low horizontal uncertainty are given more influence than soundings with a high horizontal uncertainty. Soundings close to the node are given a greater weight than soundings further away from the node.

1.2 LOCATION

.1 Work comprises dredging of following areas and as specified herein.
- .1 Area A1 of 8,325 square metres.
- .2 Area A2 of 27,777 square metres.
- .3 Area A3 of 74,400 square metres.
- .4 Area A4 of 22,707 square metres.
- .5 Area A5 of 21,660 square metres.
- .6 Area A6 of 20,167 square metres.

.2 Area measurements exclude side slopes.

1.3 INTERFERENCE TO NAVIGATION

.1 Do not impede navigation during progress of work in accordance with the Collision Regulation with Canadian Modifications 1983.

.2 Ascertain schedule of vessel movements in area affected by dredging and transportation of dredged material operations. The site is subject to heavy navigational traffic both commercial and recreational.

.3 Plan and execute work in manner that will not interfere with fishing operations, marina operations, construction activities at wharf sites, or access to wharves by land or water.

.4 Make no claim for delays resulting from the above.

.5 Departmental Representative will not be responsible for loss of time, equipment, material or any other cost related to interference with moored vessels in harbour or due to other Contractor's operations.

.6 Keep Regional Operations Centre, Watchkeeper at 1-800-265-0237, Canadian Coast Guard,(CCG), Prescott, Ontario informed of dredging operations in order that necessary Notices to Shipping and Notices to Mariners will be issued. Advise nearest Coast Guard Base of any requirements to relocate channel markers/buoys within dredging area.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

.1 Mark floating equipment with lights in accordance with the Collision Regulations with Canadian Modifications, 1983, and maintain a VHF marine radio watch on board.

.2 The Contractor is required to obtain permission from the United States Army Corp of Engineers(USACE) authorizing use of the Dickinson Island Confined Disposal Facility. The contractor will be required to pay to the USACE a lump sum facility inspection fee and a disposal fee per cubic metre. This permit will be signed prior to contract award. The terms of the agreement are as follows:

.1 The Corps of Engineers reserves the right to halt disposal operations at any time.

.2 Prior to placement of material into the disposal facility, the contractor shall submit for approval to the Detroit Area Office, Area Engineer, (313) 226-1320, a suitable disposal plan. The plan shall include, but not be limited to, the specific location within the facility where material will be placed, special material handling, or other items necessary for the protection of the environment in the area of the CDF.

.3 Weekly reports on the volume of material placed into the disposal facility will be sent to the Corps' Detroit Area Office by the Departmental Representative. The method for the determination of final volume of material will be one of the two methods identified in the USACE permit. The Departmental Representative will choose the method.

.4 Give the Detroit Area Office a minimum of 72 hours (exclusive of Saturdays, Sundays and U.S. Holidays) advance notice of proposed start or resumption of placement of dredged material within the CDF.

.5 Repair any damages or reimburse the US government for repair costs, to the disposal facilities resulting from the contractor's operation.

.6 Hold and save the United States free from damages due to the contractor's use of the facility and its appurtenances.

.7 Disposal fees are to be paid in advance of the placement of dredged material into the CDF. The disposal fee at the Dickinson Island Confined Disposal Facility is US $9.01 per cubic metre place measure. A cash payment of US $100,000 to cover the initial disposal fee must be received by the Corps, prior to the onset of

1.4 REQUIREMENTS OF REGULATORY AGENCIES (Cont'd)

.2 (Cont'd)

.7 (Cont'd)

disposal operations. Additional payments of US $100,000 must be made as the work progresses so that disposal fees are paid prior to the placement of dredged material in the CDF.

.8 Pay a lump sum inspection fee of US $1,500 in advance of the placement of dredged material into the CDF.

.9 Payments to the USACE to be made by a cashier's check, payable to Finance and Accounting Officer, "FAO, USAED, Detroit", at P.O. Box 1027, Detroit, Michigan 48231-1027. Include with the cash payments a reference to Agreement Number 120106.

.10 A cost adjustment will be made after the completion of disposal operations and the final volume determination.

1.5 SITE INFORMATION

.1 Material to be dredged consists of Class 'B' material.

.2 Sediment Sample Locations are indicated on drawings. Sediment bulk chemistry is attached to the end of the specifications in Appendix A.

.3 Sediment Sample Grain Size Analysis is attached to the end of the specifications in Appendix B. Grain size analysis is limited to the depth of core samples as specified and may not be indicative of the overall soil conditions.

.4 Area 1 has been previously dredged to 9.0 metres below chart datum. Areas 2 though 8 have been previously dredged to 8.5 m below chart datum.

.5 Results of most recent soundings are shown on drawings. This data is made available for bidding purposes. This data may differ from present site conditions. A predredge survey will be undertaken prior to the commencement of dredging and will supersede the soundings shown on the drawings.

1.6 DREDGING SEQUENCE

.1 Sequence of dredging will be in the following order:

.1 Dredge in the direction from upstream to downstream commencing at cut nearest to centreline of channel and completion at channel limit including side slope material.

.2 Supply Departmental Representative with plan of dredging sequence and\or stages.

.3 Departmental Representative may direct Contractor to alter sequence of dredging areas.

1.7 MEASUREMENT PROCEDURES

.1 Include all costs associated with mobilization and demobilization of dredging equipment as well as preparation and restoration of the disposal area in the Lump Sum arrangement. Include in this arrangement all fees imposed by the U.S. Department of Homeland Security, the U.S. Department of Agriculture APHIS, Canada Customs and Revenue Agency, USACE Dickinson Island CDF inspection fee and the costs of providing a duty boat for Departmental Representative's and Inspector's transportation. See Clause 1.7.3 for payment of Disposal Fees.

.2 Dredging: Class "B" to be measured in cubic metres, in-place measurement (CMPM), for classes indicated on Unit Price Table, determined from soundings taken by Departmental Representative before and after dredging. Only material excavated above grade plane and within specified side slopes will be measured.

.3 Include in the dredging payment item, all costs for disposal of dredged material at disposal area; maintenance of disposal site; and mechanical sweeping of dredged areas.

.4 Dickinson Island Disposal Fees will be measured for payment based on the total volume dredged, in-place measurement (CMPM), including material below grade as determined from before and after dredging surveys conducted by the Departmental Representative. Disposal Fees will be reimbursed on the progress claims based on the cubic metres placed in the CDF at the effective date of the progress claim.

1.7 MEASUREMENT PROCEDURES (Cont'd)

.5 Obstructions:

.1 Removal of obstructions, authorized by Departmental Representative, will be measured in hours actually used in removal. Dredging equipment used for removal of obstructions will be paid for at rate computed from average hourly earnings of equipment for preceding two weeks and negotiated in advance and authorized in writing by Departmental Representative.

.6 All operations in connection with field positioning of dredging equipment, Contractor's survey vessel, equipment and crew or diving services will not be measured separately for payment but shall be considered included in the dredging item.

.7 There will be no additional payment for delays caused by vessel traffic, downtime or periods when no dredging is permitted.

.8 Removal of infilling material will not be measured for payment but shall be considered included in the dredging item.

1.8 DREDGING PLANT

.1 Dredging plant used in the work to be mechanical or hydraulic type of sufficient capacity and in good operating condition to satisfactorily complete the work, within the time schedule and in accordance with the specifications.

.2 Hydraulic dredging is not permitted in Area 1.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 LAYOUT OF WORK

.1 Immediately upon entering site for purpose of beginning work on this project, locate all reference points and take proper action necessary to prevent their disturbance.

.2 Departmental Representative will meet with the Contractor and his survey staff to identify the established horizontal control consisting of a coordinate system with reference control monuments and vertical control consisting of water level gauges, to define the work and disposal areas.

.3 Maintain the established horizontal and vertical control and lay out the work from these established references. Be responsible for the accuracy of work relative to established references. Provide and maintain electronic position fixing and distance measuring equipment as required for accurate dredging control. Provide, at own expense, survey vessel, equipment and crew to set up and maintain control for location of dredge limits.

.4 Contractor's electronic positioning system must be made accessible to the Departmental Representative or his representative upon request. It must provide a continuous automatic update of position in all weather conditions. Minimum accuracy of positioning to be ±1 metre. An on-line graphics display of position and hard copy capability is required. Positioning system is subject to Departmental Representative's approval.

.5 Install and maintain a water level gauges in vicinity of worksite in order that proper depth of dredging can be determined. Locate gauges so as to be clearly visible.

3.2 DREDGING DETAILS

.1 Dredge area A1 to a grade depth of 8.7 m below chart datum. Dredge Areas A2 to A6 inclusive to a grade depth of 8.5 m below chart datum.

.2 Dredge side slopes to four horizontal to one vertical.

3.2 DREDGING DETAILS (Cont'd)

.3 Remove all materials above specified grade depths, within limits indicated. Do not over excavate. Average overdredging not to exceed 0.2 metres.

.4 Remove spillage or shoaling which occurs as a result of work. This quantity will not be measured for payment.

.5 Do not cast-over material unless authorized in writing by Departmental Representative. Remove material cast-over on to surrounding area and dispose of it as dredged material.

.6 Remove infilling in dredge areas which occurs prior to acceptance by Departmental Representative.

.7 Make provision for removal of debris in bid. Make no claims for delays attributed to debris.

.8 Immediately notify Departmental Representative upon encountering an obstruction. By-pass the obstruction after clearly marking its location, move to another area and continue work. No related claim will be entertained if the foregoing procedure is not followed.

3.3 SOUNDING SURVEYS

.1 Contract drawings are based on current soundings taken by the Canadian Hydrographic Service in May and June 2013. Contract quantity shown on the Unit Price Table are based on this survey with nominal allowances for infilling.

.2 A pre-dredging and post dredging sounding survey will be taken by the Departmental Representative.

.3 No area will be dredged prior to Departmental Representative's and Contractor's mutual acceptance of pre-dredge survey for that area.

.4 The Departmental Representative will conduct one post dredging survey of the dredging site at no cost to the Contractor. Any subsequent surveys as a result of finding high spots or incomplete dredging will be done at the Contractor's cost at a charge of $3000/day of survey field work and $2000/day for standby.

3.3 SOUNDING SURVEYS (Cont'd)

.5 Results of the pre and post dredging surveys will be distributed to the Contractor, by the Departmental Representative, prior to and upon completion of the work, respectively.

.6 Contractor will be notified of the post dredging survey results within four working days of survey completion and given subsequent release if he has successfully fulfilled the requirements of the work.

.7 The final pay quantity will be calculated on the basis of the pre and post dredging surveys carried out by the Departmental Representative.

3.4 DISPOSAL OF DREDGED MATERIAL

.1 Dispose of dredged material by depositing in containment facility identified. Limits of disposal to be verified on site prior to start of work. Restrict disposal activities to those areas indicated.

.2 Fill disposal area to maximum elevation of 3.7 m above chart datum I.G.L.D. (1985). Do not overtop the perimeter dykes.

.3 Ensure dump scows are sealed and do not leak dredged material during transportation between dredging site and transfer area of the containment facility. If spillage or leakage of dredged material occurs, stop work until remedial measures are taken.

.4 Dredged disposal material may be transferred from scow to the disposal cell location by hydraulic conveyance only. Trucking of dredged material is not permitted.

.5 Provide discharge pipeline and booster pumps as required to transport the dredged material from scows to Cell. Maintain pipeline during the work and repair all leaks. Provide Departmental Representative with all details for review and approval. Location for pipeline access is in the middle channel nominally to the south of the existing berthing facility. The USACE has recently dredged this area to 3.5 m below chart datum.

.6 Do not permit any dredged material to spill or flow into waterways during the disposal of dredged material activities.

3.4 DISPOSAL OF DREDGED MATERIAL (Cont'd)

.7 Grade disposal site as designated. Grade site and overflow trench to provide positive surface drainage towards open water areas of the CDF.

.8 Maintain the dyke roadways and transfer area in a clean manner throughout the duration of the contract. Repair any damages caused by Contractor's operation at no additional cost to Departmental Representative. Restore surfaces to the original condition upon the completion of work.

3.5 DISPOSAL OF DEBRIS

.1 Do not dispose of debris in open lake.

.2 Dispose of debris in containment facility identified or at approved land disposal site.

3.6 SWEEPING AND ACCEPTANCE OF WORK

.1 On completion of dredging, the Contractor will conduct in the presence of the Departmental Representative, a mechanical sweep of the dredged areas to confirm that grade depth has been achieved. Provide details of sweep system including horizontal and vertical control methods within 15 days after contract award.

.2 Sweeping equipment to consist of heavy steel beam suspended from a barge at required depth. Beam to be capable of adjustment and calibration.

.3 Upon successful completion of the mechanical sweep as determined by the Departmental Representative, provided that no high spots were encountered, the Departmental Representative will conduct a post dredging survey.

.4 Provide a minimum of 48 hours notice to Departmental Representative for commencement of the mechanical sweeping of the site.

.5 The post dredging sounding survey takes precedence over the mechanical sweep for pay quantity purposes.

3.7 RE-DREDGING

.1 Re-dredge unsatisfactory work and verify depths with additional sounding or mechanical sweeping to approval of Departmental Representative.

3.8 CO-OPERATION AND ASSISTANCE TO ENGINEER

.1 Cooperate with Departmental Representative on inspection of work and provide assistance requested.

.2 Furnish use of such boats, equipment, labour and materials forming ordinary and usual part of dredging plant as may be reasonably necessary to inspect and supervise work.

.3 Provide approved duty boat to transport Departmental Representative and PWGSC Inspectors to and from the Dredge Site and to and from the CDF under the following conditions:
.1 At the beginning and end of each inspection shift which occurs between sunset and sunrise.
.2 Whenever the PWGSC vessel is deemed to be inoperable for whatever reason.
.3 During poor weather and any emergency situations affecting health and safety of personnel.

3.9 MONITORING OF WORK

.1 Contractor is responsible to monitor effectiveness and productivity of his own work on an ongoing basis.

END

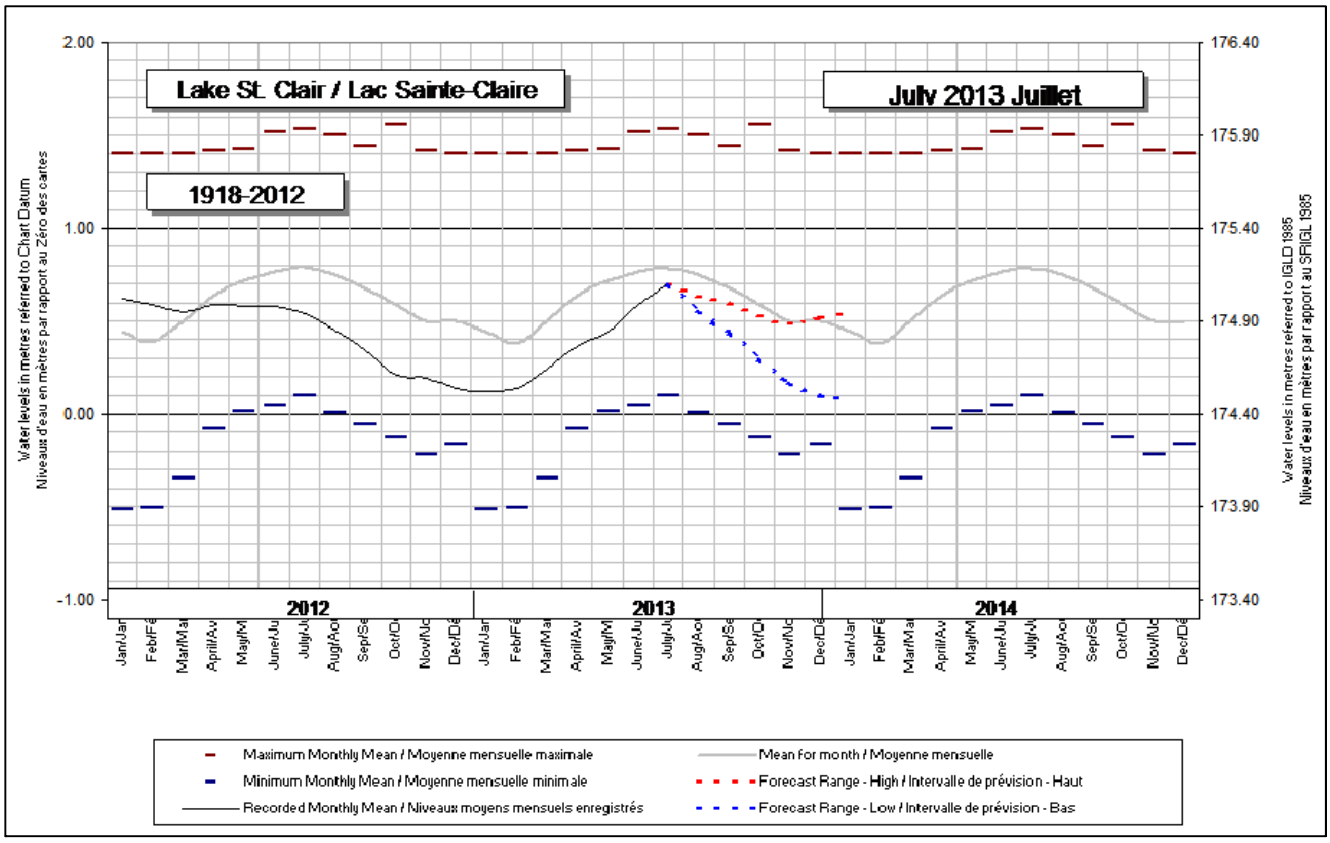
Public Works and Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics et Services gouvernmentaux Canada
Services d'architecture et de génie
Région de l'Ontario

WATER LEVEL CHART

DRAWING No. 1502

PROJ. No. R.042805.001



INFORMATION OBTAINED FROM
MONTHLY WATER LEVEL BULLETIN
GREAT LAKES AND MONTREAL HARBOUR
CANADIAN HYDROGRAPHIC SERVICE.

INFORMATION ALSO AVAILABLE AT THE
FOLLOWING WEB SITE:

http://www.waterlevels.gc.ca/C&A/bulletin_e.html

Public Works and Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics et Services gouvernmentaux Canada
Services d'architecture et de génie
Région de l'Ontario

WORK SCHEDULE

DRAWING No. 1510

PROJ. No. R.042805.001

ST. CLAIR RIVER, ONTARIO
SOUTHEAST BEND CUTOFF CHANNEL AND STOKES POINT
MAINTENANCE DREDGING 2013
PROJECT No. R.042805.001

DATE OF CONTRACT AWARD

NAME OF CONTRACTOR

OPERATION	TIME IN WEEKS									
	1	2	3	4	5	6	7	8	9	10
1) MOBILIZATION OF DREDGE EQUIPMENT										
2) CLASS "B" DREDGING										
3) DEMOBILIZATION OF DREDGE EQUIPMENT										

CONTRACTOR TO SCHEDULE WORK IN SEQUENCE SPECIFIED AND WITHIN DEPARTMENTAL SCHEDULE. SUBMIT A COPY OF COMPLETED SCHEDULE WITH YOUR BID.

Appendix A
Sediment Bulk Chemistry

Appendix A
Sediment Bulk Chemistry

2012 Samples

Notes:

1. 'All concentrations in ug/g (ppm) unless otherwise specified.
2. '-' means no value available
3. 'PSQG = Provincial Sediment Quality Guidelines, defined in Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario: An Integrated Approach, May 2008.
4. LEL=Lowest Effect Level
5. Table 1 Full Depth Background Site Conditions
6. CSQG='Canadian Sediment Quality Guidelines for the Protection of Aquatic Wildlife, CCME 2002
7. ISQG= Interim Sediment Quality Guidlines
8. PEL=Probable Effect Level

Table A-1: 2012 Southeast Bend Cut-off Channel Metals and Nutrients Samples 1 through 13

Parameter	Back-ground	PSQG LEL	PSQG SEL	CSQG ISQG	CSQG PEL	Result												
						1	2	3	4	5	6	7	8	9	10	11	12	13
METALS																		
Arsenic	4.2	6	33	5.9	17	4	4	5	2	5	2	4	2	3	2	4	2	2
Cadmium	1	0.6	10	0.6	3.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	31	26	110	37.3	90	7	8	8	3	9	4	7	4	5	4	7	6	3
Cobalt	-	50***	-	-	-	3.6	3.8	3.7	1.7	4.0	2.1	3.4	2.2	2.5	1.9	3.2	2.6	1.4
Copper	25	16	110	35.7	197	8	9	11	3	10	3	7	4	5	2	7	6	1
Lead	23	31	250	35	91.3	7	6	8	3	9	4	7	4	5	3	6	4	2
Manganese	400	460	1100	-	-	225	232	245	112	275	144	215	144	187	116	205	159	76
Mercury	0.1	0.2	2	0.17	0.486	0.23	0.21	0.17	0.18	0.17	0.17	0.17	0.19	0.15	0.19	0.11	0.16	0.03
Nickel	31	16	75			9	7	9	1	10	2	8	2	6	1	8	3	3
Silver	-	0.5***	-			<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
Zinc	65	120	820	123	315	41	33	36	17	37	17	37	24	23	17	29	23	8
NUTRIENTS																		
TOC (%)		1	10	-	-	1.20	0.20	0.35	<0.15	1.02	0.91	1.07	0.29	0.42	0.79	1.42	<0.15	<0.15
TKN		0.055	0.48	-	-	0.08	0.07	0.08	<0.05	0.09	<0.05	0.06	<0.05	<0.05	<0.05	0.07	<0.05	<0.05
TP		600	2000	-	-	221	254	227	135	267	135	212	149	160	134	217	208	90

Table A-2: 2012 Southeast Bend Cut-off Channel Metals and Nutrients Samples 14 through 28

Parameter	Back-ground	PSQG LEL	PSQG SEL	CSQG ISQG	CSQG PEL	Result													
						14	15	16	17	18	19	20	21	22	23	24	25	27	28
Arsenic	4.2	6	33	5.9	17	1	3	2	2	1	2	<1	2	3	2	1	2	2	1
Cadmium	1	0.6	10	0.6	3.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	31	26	110	37.3	90	3	4	5	5	4	5	3	4	6	5	3	4	3	4
Cobalt	-	50***	-	-	-	1.3	2.3	2.4	1.8	1.6	1.7	1.5	1.7	3.3	1.9	1.5	1.7	1.5	1.8
Copper	25	16	110	35.7	197	1	3	4	2	2	2	2	2	8	3	2	2	2	4
Lead	23	31	250	35	91.3	2	5	4	4	3	4	2	4	5	4	3	4	3	4
Manganese	400	460	1100	-	-	67.4	144	152	131	107	120	92.5	122	205	135	97	119	104	123
Mercury	0.1	0.2	2	0.17	0.486	0.04	0.13	0.15	0.15	0.13	0.14	0.12	0.14	0.23	0.17	0.19	0.13	0.12	0.13
Nickel	31	16	75			<1	5	2	4	<1	3	<1	4	5	4	<1	3	3	1
Silver	-	0.5***	-			<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
Zinc	65	120	820	123	315	8	18	18	12	13	9	20	16	34	19	18	20		14
TOC (%)		1	10	-	-	<0.15	<0.15	0.16	<0.15	0.45	<0.15	0.24	<0.15	1.27	<0.15	<0.15	0.48	<0.15	<0.15
TKN		0.055	0.48	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05
TP		600	2000	-	-	65	102	173	168	168	135	136	156	228	149	132	163	106	155

Table A-3: 2012 Southeast Bend Cut-off Channel Polycyclic Aromatic Hydrocarbons Samples 1 through 14

Parameter	PSQG LEL	CSQG ISQG	CSQG PEL	Result													
				1	2	3	4	5	6	7	8	9	10	11	12	13	14
Acenaphthene	-	0.007	0.089	<0.05	0.008	<0.05	<0.005	<0.05	<0.005	<0.05	0.017	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005
Acenaphthylene	-	-	0.128	<0.05	0.008	<0.05	<0.005	<0.05	<0.005	<0.05	0.014	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005
Anthracene	0.22	-	0.245	<0.05	0.023	<0.05	0.007	<0.05	0.007	<0.05	0.021	<0.05	0.006	<0.05	<0.004	<0.05	<0.004
Benzo[a]anthracene	0.32	0.032	0.385	<0.05	0.05	0.09	<0.03	0.08	<0.03	<0.05	0.06	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03
Benzo[b]fluoranthene	-	-	-	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[k]fluoranthene	0.24	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[a]pyrene	0.37	0.032	0.782	<0.05	<0.03	<0.05	<0.03	0.05	<0.03	<0.05	0.05	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03
Benzo[g,h,i]perylene	0.17	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	0.34	0.057	0.862	<0.05	<0.05	0.10	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenzo[a,h]anthracene	0.06	0.006	0.135	<0.05	0.015	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005
Fluoranthene	0.75	0.111	2.355	<0.05	0.15	0.12	<0.03	0.11	0.04	<0.05	0.10	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03
Fluorene	0.19	0.021	0.144	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02
Indeno[1,2,3-cd]pyrene	0.2	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	-	0.035	0.391	<0.05	0.013	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005
Phenanthrene	0.56	0.042	0.515	<0.05	0.12	0.13	0.04	0.06	0.04	<0.05	0.10	0.05	0.04	<0.05	<0.02	<0.05	<0.02
Pyrene	0.49	0.053	0.875	<0.05	0.09	0.13	<0.03	0.14	<0.03	<0.05	0.07	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03

Table A-4: 2012 Southeast Bend Cut-off Channel Polycyclic Aromatic Hydrocarbons Samples 15 through 28

Parameter	PSQG	CSQG	CSQG	Result												
	LEL	ISQG	PEL	15	16	17	18	19	20	21	22	23	24	25	27	28
Acenaphthene	-	0.007	0.089	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.05	<0.005
Acenaphthylene	-	-	0.128	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.05	<0.005
Anthracene	0.22	-	0.245	<0.05	<0.004	<0.05	0.006	<0.05	<0.004	<0.05	0.008	<0.05	0.008	<0.05	<0.05	<0.004
Benzo[a]anthracene	0.32	0.032	0.385	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.05	<0.03
Benzo[b]fluoranthene	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[k]fluoranthene	0.24	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[a]pyrene	0.37	0.032	0.782	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.05	<0.03
Benzo[g,h,i]perylene	0.17	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	0.34	0.057	0.862	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenzo[a,h]anthracene	0.06	0.006	0.135	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.05	<0.005
Fluoranthene	0.75	0.111	2.355	<0.05	<0.03	0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.05	<0.03
Fluorene	0.19	0.021	0.144	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
Indeno[1,2,3-cd]pyrene	0.2	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	-	0.035	0.391	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	0.006	<0.05	0.006	<0.05	<0.05	<0.005
Phenanthrene	0.56	0.042	0.515	<0.05	0.03	0.07	0.04	<0.05	<0.02	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.02
Pyrene	0.49	0.053	0.875	<0.05	<0.03	0.06	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.05	<0.03

Table A-5: 2012 Southeast Bend Cut-off Channel Organochlorine Pesticides Samples 1 through 13

Parameter	PSQG LEL	CCME ISQG	CCME PEL	Result												
				1	2	3	4	5	6	7	8	9	10	11	12	13
Aldrin	0.002	-	-	<0.005	<0.002	<0.050	<0.002	<0.050	<0.002	<0.050	<0.002	<0.050	<0.002	<0.050	<0.002	<0.005
Chlordane	0.007	0.005	0.009	<0.070	<0.007	<0.070	<0.007	<0.070	<0.007	<0.070	<0.007	<0.070	<0.007	<0.070	<0.007	<0.007
pp-DDD	0.008	-	-	<0.007	<0.005	<0.007	<0.005	<0.007	<0.005	<0.007	<0.005	<0.007	<0.005	<0.007	<0.005	<0.007
pp-DDE	-	0.001	0.007	<0.070	<0.005	<0.070	<0.005	<0.070	<0.005	<0.070	<0.005	<0.070	<0.005	<0.070	<0.005	<0.007
Total DDT	0.007	0.001	0.005	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Dieldrin	0.002	0.003	0.007	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005
Endrin	0.003	0.003	0.062	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005
Total Endosulfan	-	-	-	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.005
Heptachlor	-	-	-	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.005
Heptachlor Epoxide	0.005	0.001	0.003	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.005
Hexachlorobenzene	0.02	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
γ- BHC (Lindane)	-	0.001	0.001	<0.005	<0.003	<0.005	<0.003	<0.005	<0.003	<0.005	<0.003	<0.005	<0.003	<0.005	<0.003	<0.005
Methoxychlor	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Mirex	0.007	-	-	-	<0.007	-	<0.007	-	<0.007	-	<0.007	-	<0.007	-	<0.007	-
Total PCB	0.07	0.034	0.277	<0.30	<0.05	<0.30	<0.05	<0.30	<0.05	<0.30	<0.05	<0.30	<0.05	<0.30	<0.05	<0.10

Table A-6: 2012 Southeast Bend Cut-off Channel Organochlorine Pesticides Samples 14 through 28

Parameter	PSQG LEL	CCME ISQG	CCME PEL	Result													
				14	15	16	17	18	19	20	21	22	23	24	25	27	28
Aldrin	0.002	-	-	<0.002	<0.050	<0.002	<0.050	<0.002	<0.050	<0.002	<0.050	<0.002	<0.005	<0.002	<0.050	<0.005	<0.002
Chlordane (Total)	0.01	0.005	0.009	<0.007	<0.070	<0.007	<0.070	<0.007	<0.070	<0.007	<0.070	<0.007	<0.007	<0.007	<0.070	<0.007	<0.007
pp-DDD	0.01	-	-	<0.005	<0.007	<0.005	<0.007	<0.005	<0.007	<0.005	<0.007	<0.005	<0.007	<0.005	<0.007	<0.007	<0.005
pp-DDE	-	0.001	0.007	<0.005	<0.070	<0.005	<0.070	<0.005	<0.070	<0.005	<0.070	<0.005	<0.007	<0.005	<0.070	<0.007	<0.005
Total DDT	0.01	0.001	0.005	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Dieldrin	0.002	0.003	0.007	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.005	<0.002
Endrin	0.003	0.003	0.062	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.002	<0.005	<0.005	<0.002
Total Endosulfan	-	-	-	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.005	<0.005	<0.050	<0.005	<0.005
Heptachlor	-	-	-	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.005	<0.005	<0.050	<0.005	<0.005
Heptachlor Epoxide	0.005	0.001	0.003	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.005	<0.005	<0.050	<0.005	<0.005
Hexachlorobenzene	0.02	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
γ- BHC (Lindane)	-	0.001	0.001	<0.003	<0.005	<0.003	<0.005	<0.003	<0.005	<0.003	<0.005	<0.003	<0.005	<0.003	<0.005	<0.005	<0.003
Methoxychlor	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Mirex	0.01	-	-	<0.007	-	<0.007	-	<0.007	-	<0.007	-	<0.007	-	<0.007	-	-	<0.007
Total PCB	0.07	0.034	0.28	<0.05	<0.30	<0.05	<0.30	<0.05	<0.30	<0.05	<0.30	<0.05	<0.10	<0.05	<0.30	<0.10	<0.05

Table A-7: 2012 Southeast Bend Cut-off Channel Priority Six Contaminants Samples 1 though 13

Parameter	PSQG LEL	SGSS Table 1	Result												
			SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	SS9	SS10	SS11	SS12	SS13
Hexachlorobenzene	0.02	0.02	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachloroethane	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	-	0.01	<0.01	<0.010	<0.01	<0.010	<0.01	0.011	<0.01	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01
Tetrachloroethylene	-	0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-
Pentachlorobenzene	-	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
Octachlorostyrene	-	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-
Methyl Ethyl Ketone	-	0.5	-	<0.50	-	<0.50	-	<0.50	-	<0.50	-	<0.50	-	<0.50	-

Table A-8: 2012 SEBCC Priority Six Contaminants Samples 14 though 28

Parameter	PSQG LEL	SG&SS Table 1	Result													
			SS14	SS15	SS16	SS17	SS18	SS19	SS20	SS21	SS22	SS23	SS24	SS25	SS27	SS28
Hexachlorobenzene	0.02	0.02	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachloroethane	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	-	0.01	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01	<0.01	<0.010
Tetrachloroethylene	-	0.05	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	<0.05
Pentachlorobenzene	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1
Octachlorostyrene	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	<0.05
Methyl Ethyl Ketone	-	0.5	<0.50	-	<0.50	-	<0.50	-	<0.50	-	<0.50	-	<0.50	-	-	<0.50

Table A-9: 2012 Upstream Southeast Bend Cut-off Channel Metals and Nutrients Samples

Parameter	Back-ground	PSQG LEL	PSQG SEL	CSQG ISQG	CSQG PEL	Result		
						U1	U2	U3
Arsenic	4.2	6	33	5.9	17	1	1	1
Cadmium	1	0.6	10	0.6	3.5	<0.5	<0.5	<0.5
Chromium	31	26	110	37.3	90	3	3	3
Cobalt	-	50***	-	-	-	1.1	1.5	1.2
Copper	25	16	110	35.7	197	1	2	1
Lead	23	31	250	35	91.3	2	2	2
Manganese	400	460	1100	-	-			
Mercury	0.1	0.2	2	0.17	0.486	0.05	0.02	0.02
Nickel	31	16	75	-	-	<1	<1	<1
Silver	-	0.5***	-	-	-	<0.2	<0.2	<0.2
Zinc	65	120	820	123	315	7	10	8
TOC (%)	-	1	10	-	-	0.16	<0.15	<0.15
TKN (%)	-	0.055	0.48	-	-	<0.05	<0.05	<0.05
TP	-	600	2000	-	-	52	107	89

Table A-10: 2012 Upstream Southeast Bend Cut-off Polycyclic Aromatic Hydrocarbons

Parameter	PSQG LEL	CSQG ISQG	CSQG PEL	Result		
				U1	U2	U3
Acenaphthene	-	0.007	0.089	<0.005	<0.005	<0.005
Acenaphthylene	-	-	0.128	<0.005	<0.005	<0.005
Anthracene	0.22	-	0.245	<0.004	<0.004	<0.004
Benzo[a]anthracene	0.32	0.032	0.385	<0.03	<0.03	<0.03
Benzo[b]fluoranthene	-	-	-	<0.05	<0.05	<0.05
Benzo[k]fluoranthene	0.24	-	-	<0.05	<0.05	<0.05
Benzo[a]pyrene	0.37	0.032	0.782	<0.03	<0.03	<0.03
Benzo[g,h,i]perylene	0.17	-	-	<0.05	<0.05	<0.05
Chrysene	0.34	0.057	0.862	<0.05	<0.05	<0.05
Dibenzo[a,h]anthracene	0.06	0.006	0.135	<0.005	<0.005	<0.005
Fluoranthene	0.75	0.111	2.355	<0.03	<0.03	<0.03
Fluorene	0.19	0.021	0.144	<0.02	<0.02	<0.02
Indeno[1,2,3-cd]pyrene	0.2	-	-	<0.05	<0.05	<0.05
Naphthalene	-	0.035	0.391	<0.005	<0.005	<0.005
Phenanthrene	0.56	0.042	0.515	<0.02	<0.02	<0.02
Pyrene	0.49	0.053	0.875	<0.03	<0.03	<0.03

Table A-11: 2012 Upstream Southeast Bend Cut-off OC Pesticides

Parameter	PSQG LEL	CSQG ISQG	CSQG PEL	Result		
				U1	U2	U3
Aldrin	0.002	-	-	<0.002	<0.002	<0.002
Chlordane	0.007	0.005	0.009	<0.007	<0.007	<0.007
pp-DDD	0.008	-	-	<0.007	<0.007	<0.007
pp-DDE	0.005	0.001	0.007	<0.005	<0.005	<0.005
DDT (Total)	0.007	0.001	0.005	<0.007	<0.007	<0.007
Dieldrin	0.002	0.003	0.007	<0.002	<0.002	<0.002
Endrin	0.003	0.003	0.062	<0.003	<0.003	<0.003
Total Endosulfan	-	-	-	<0.005	<0.005	<0.005
Heptachlor	-	-	-	<0.005	<0.005	<0.005
Heptachlor Epoxide	0.005	0.001	0.003	<0.005	<0.005	<0.005
Hexachlorobenzene	-	-	-	0.007	<0.005	<0.005
γ-BHC (Lindane)	-	0.001	0.001	<0.003	<0.003	<0.003
Hexachloroethane	-	-	-	<0.01	<0.01	<0.01
Methoxychlor	-	-	-	<0.005	<0.005	<0.005
Total PCB	0.07	0.034	0.277	<0.07	<0.07	<0.07

Table A-12: 2012 Upstream Southeast Bend Cut-off Priority Contaminants March 2012

Parameter	PSQG LEL	SG&SS Table 1	Result		
			U1	U2	U3
Hexachlorobenzene	0.02	0.02	0.007	<0.005	<0.005
Hexachloroethane	-	0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	-	0.01	0.014	<0.010	<0.010
Tetrachloroethylene	-	0.05	<0.05	<0.05	<0.05
Pentachlorobenzene	-	-	<0.1	<0.1	<0.1
Octachlorostyrene	-	-	<0.05	<0.05	<0.05
Methyl Ethyl Ketone	-	0.5	<0.50	<0.50	<0.50

Table A-13: 2012 Upstream Southeast Bend Cut-off Priority Six Contaminants July 2012

Parameter	PSQG LEL	SG&SS Table 1	Result								
			USA1	USA2	USA3	USA4	USA-5	USA6	USA7	USA8	USA9
Hexachlorobenzene	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachloroethane	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	-	0.01	<0.01	0.02	0.04	0.02	0.02	<0.01	0.01	0.02	<0.01
Tetrachloroethylene	-	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
Pentachlorobenzene	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Octachlorostyrene	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methyl Ethyl Ketone	-	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50

Table A-14: 2012 Stokes Point Shoal Area Metals Samples SP1 to SP6 July 2012

Parameter	Back-	PSQG	PSQG	CSQG	CSQG	Result					
Metal	ground	LEL	SEL	ISQG	PEL	SP1-1	SP3-1	SP3-2	SP5-1	SP5-2	SP6-2
Arsenic	4.2	6.0	33.0	5.9	17.0	12.0	13.0	14.0	22.0	15.0	7.0
Cadmium	1.0	0.6	10.0	0.6	3.5	0.7	0.7	0.6	1.0	0.7	0.6
Chromium	31.0	26.0	110.0	37.3	90.0	20.0	8.0	8.0	11.0	15.0	6.0
Copper	25.0	16.0	110.0	35.7	197.0	24.0	20.0	15.0	23.0	25.0	12.0
Iron	31200	20000	40000	-	-	32500	16600	11400	22200	21600	7550
Lead	23.0	31.0	250.0	35.0	91.3	10.0	9.0	8.0	10.0	8.0	5.0
Manganese	400.0	460.0	1100	-	-	485.0	403.0	323.0	509.0	376.0	223.0
Mercury	0.1	0.2	2.0	0.17	0.49	<0.10	0.11	0.13	<0.10	<0.10	<0.10
Nickel	31.0	16.0	75.0	-	-	43.0	26.0	19.0	28.0	33.0	12.0
Zinc	65.0	120.0	820.0	123.0	315.0	87.0	71.0	60.0	92.0	77.0	46.0

Table A-15: 2012 Stokes Point Shoal Area Metals Samples SP7 to SP14 July 2012

Parameter	Back-	PSQG	PSQG	CSQG	CSQG	Result				
Metal	ground	LEL	SEL	ISQG	PEL	SP7-1	SP7-2	SP8-1	SP8-2	SP14-2
Arsenic	4.2	6.0	33.0	5.9	17.0	17.0	11.0	13.0	12.0	17.0
Cadmium	1.0	0.6	10.0	0.6	3.5	0.8	0.7	0.6	0.9	0.7
Chromium	31.0	26.0	110.0	37.3	90.0	11.0	9.0	11.0	20.0	16.0
Copper	25.0	16.0	110.0	35.7	197.0	23.0	15.0	22.0	25.0	23.0
Iron	31200	20000	40000	-	-	20400	10900	14900	28000	24500
Lead	23.0	31.0	250.0	35.0	91.3	15.0	7.0	50.0	9.0	11.0
Manganese	400.0	460.0	1100	-	-	465.0	366.0	422.0	393.0	476.0
Mercury	0.1	0.2	2.0	0.17	0.49	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	31.0	16.0	75.0	-	-	30.0	22.0	25.0	40.0	31.0
Zinc	65.0	120.0	820.0	123.0	315.0	76.0	62.0	66.0	83.0	84.0

Table A-16: 2012 Stokes Point Shoal Area Metals OC Pesticides and PCB Samples SP1 to SP6

Parameter	PSQG	CSQG	CSQG	Result					
Pesticides	LEL	ISQG	PEL	SP1-1	SP3-1	SP3-2	SP5-1	SP5-2	SP6-2
Aldrin	0.002	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chlordane	0.007	0.0045	0.0087	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
beta- BHC	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chlordane	0.007	0.0045	0.0087	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp-DDD	0.008	0.00354	0.00851	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp DDE	0.005	0.00142	0.00675	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Total DDT	0.007	0.001	0.005	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
DDT (o,p' + p,p')	0.008	0.0019	0.0477	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	0.002	0.00285	,00667	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Endrin	0.003	0.00267	0.0624	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
γ-BHC (Lindane)	0.003	0.0094	0.00138	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Heptachlor	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor Epoxide	0.005	0.0006	0.00274	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	0.02	-	-	<0.005	0.005	0.006	<0.005	<0.005	0.006
Hexachlorocyclohexane	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	0.007	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total PCB	0.07	0.0341	0.277	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07

Table A-17: 2012 Stokes Point Shoal Area Metals Metals Samples S7 to S14

Parameter	PSQG	CSQG	CSQG	Result				
Pesticides	LEL	ISQG	PEL	SP7-1	SP7-2	SP8-1	SP8-2	SP14-2
Aldrin	0.002	-	-	<0.002	<0.002	<0.002	<0.002	<0.002
Chlordane	0.007	0.0045	0.0087	<0.005	<0.005	<0.005	<0.005	<0.005
beta- BHC	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005
Chlordane	0.007	0.0045	0.0087	<0.007	<0.007	<0.007	<0.007	<0.007
pp-DDD	0.008	0.00354	0.00851	<0.005	<0.005	<0.005	<0.005	<0.005
pp-DDE	0.005	0.00142	0.00675	<0.004	<0.004	<0.004	<0.004	<0.004
Total DDT	0.007	0.001	0.005	<0.007	<0.007	<0.007	<0.007	<0.007
op+pp-DDT	0.008	0.0019	0.0477	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	0.002	0.00285	,00667	<0.002	<0.002	<0.002	<0.002	<0.002
Endrin	0.003	0.00267	0.0624	<0.003	<0.003	<0.003	<0.003	<0.003
γ-BHC (Lindane)	0.003	0.0094	0.00138	<0.003	<0.003	<0.003	<0.003	<0.003
Heptachlor	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor Epoxide	0.005	0.0006	0.00274	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	0.02	-	-	<0.005	<0.005	0.007	<0.005	<0.005
Hexachlorocyclohexane	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	0.07	-	-	<0.005	<0.005	<0.005	<0.005	<0.005
Total PCB	0.07	0.0341	0.277	<0.07	<0.07	<0.07	<0.07	<0.07

Table A-18: 2012 Stokes Point Shoal Area Metals PAH Species Samples SP1 to SP6

Parameter	PSQG	CSQG	CSQG	Result					
PAH	LEL	ISQG	PEL	SP1-1	SP3-1	SP3-2	SP5-1	SP5-2	SP6-2
Acenaphthene	-	0.00671	0.0889	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	-	0.00587	0.128	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	0.22	0.0469	0.245	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	0.32	0.0317	0.385	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	0.37	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(g,h,i)perylene	0.17	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	0.24	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	0.34	0.057	0.862	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene	0.06	0.00622	0.135	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.75	0.111	2.355	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	0.19	0.0212	0.144	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	0.2	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	-	0.0346	0.391	0.06	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	0.56	0.0419	0.515	0.10	0.09	0.11	0.09	0.09	0.09
Pyrene	0.49	0.053	0.875	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total PAH	4.0	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

Table A-19: 2012 Stokes Point Shoal Area Metals PAH Species Samples SP7 to SP14

Parameter	PSQG	CSQG	CSQG	Result				
PAH	LEL	ISQG	PEL	SP7-1	SP7-2	SP8-1	SP8-2	SP14-2
Acenaphthene	-	0.00671	0.0889	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	-	0.00587	0.128	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	0.22	0.0469	0.245	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	0.32	0.0317	0.385	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	0.37	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(g,h,i)perylene	0.17	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	0.24	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	0.34	0.057	0.862	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene	0.06	0.00622	0.135	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.75	0.111	2.355	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	0.19	0.0212	0.144	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	0.2	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	-	0.0346	0.391	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	0.56	0.0419	0.515	0.07	0.07	0.07	0.08	<0.05
Pyrene	0.49	0.053	0.875	<0.05	<0.05	<0.05	<0.05	<0.05
Total PAH	4.0	-	-	<0.03	<0.03	<0.03	<0.03	<0.03

Appendix A
Sediment Bulk Chemistry

2013 Samples

Notes:

1. 'All concentrations in ug/g (ppm) unless otherwise specified.
2. '-' means no value available
3. 'PSQG = Provincial Sediment Quality Guidelines, defined in Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario: An Integrated Approach, May 2008.
4. LEL=Lowest Effect Level
5. Table 1 Full Depth Background Site Conditions
6. CSQG='Canadian Sediment Quality Guidelines for the Protection of Aquatic Wildlife, CCME 2002
7. ISQG= Interim Sediment Quality Guidlines
8. PEL=Probable Effect Level

Table A-1: 2013 Southeast Bend Cut-off Channel Metals and Nutrients Samples 1 through 13

Parameter	Back-ground	PSQG LEL	PSQG SEL	CSQG ISQG	CSQG PEL	Result (µg/g)												
						1	2	3	4	5	6	7	8	9	10	11	12	13
METALS																		
Arsenic	4.2	6	33	5.9	17	4	4	5	2	5	2	4	2	3	2	4	2	2
Cadmium	1	0.6	10	0.6	3.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	31	26	110	37.3	90	7	8	8	3	9	4	7	4	5	4	7	6	3
Cobalt	-	-	-	-	-	3.6	3.8	3.7	1.7	4.0	2.1	3.4	2.2	2.5	1.9	3.2	2.6	1.4
Copper	25	16	110	35.7	197	8	9	11	3	10	3	7	4	5	2	7	6	1
Lead	23	31	250	35	91.3	7	6	8	3	9	4	7	4	5	3	6	4	2
Manganese	400	460	1100	-	-	225	232	245	112	275	144	215	144	187	116	205	159	76
Mercury	0.1	0.2	2	0.17	0.486	0.23	0.21	0.17	0.18	0.17	0.17	0.17	0.19	0.15	0.19	0.11	0.16	0.03
Nickel	31	16	75			9	7	9	1	10	2	8	2	6	1	8	3	3
Silver	-	0.5***	-			<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
Zinc	65	120	820	123	315	41	33	36	17	37	17	37	24	23	17	29	23	8
NUTRIENTS																		
TOC (%)		1	10	-	-	1.20	0.20	0.35	<0.15	1.02	0.91	1.07	0.29	0.42	0.79	1.42	<0.15	<0.15
TKN		0.055	0.48	-	-	0.08	0.07	0.08	<0.05	0.09	<0.05	0.06	<0.05	<0.05	<0.05	0.07	<0.05	<0.05
TP		600	2000	-	-	221	254	227	135	267	135	212	149	160	134	217	208	90

Table A-2: 2013 Southeast Bend Cut-off Channel Metals and Nutrients Samples 14 through 28

Parameter	Back-ground	PSQG LEL	PSQG SEL	CSQG ISQG	CSQG PEL	Result (µg/g)													
						14	15	16	17	18	19	20	21	22	23	24	25	27	28
Arsenic	4.2	6	33	5.9	17	1	3	2	2	1	2	<1	2	3	2	1	2	2	1
Cadmium	1	0.6	10	0.6	3.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	31	26	110	37.3	90	3	4	5	5	4	5	3	4	6	5	3	4	3	4
Cobalt	-	-	-	-	-	1.3	2.3	2.4	1.8	1.6	1.7	1.5	1.7	3.3	1.9	1.5	1.7	1.5	1.8
Copper	25	16	110	35.7	197	1	3	4	2	2	2	2	2	8	3	2	2	2	4
Lead	23	31	250	35	91.3	2	5	4	4	3	4	2	4	5	4	3	4	3	4
Manganese	400	460	1100	-	-	67.4	144	152	131	107	120	92.5	122	205	135	97	119	104	123
Mercury	0.1	0.2	2	0.17	0.486	0.04	0.13	0.15	0.15	0.13	0.14	0.12	0.14	0.23	0.17	0.19	0.13	0.12	0.13
Nickel	31	16	75			<1	5	2	4	<1	3	<1	4	5	4	<1	3	3	1
Silver	-	0.5***	-			<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
Zinc	65	120	820	123	315	8	18	18	12	13	9	20	16	34	19	18	20		14
TOC (%)		1	10	-	-	<0.15	<0.15	0.16	<0.15	0.45	<0.15	0.24	<0.15	1.27	<0.15	<0.15	0.48	<0.15	<0.15
TKN		0.055	0.48	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05
TP		600	2000	-	-	65	102	173	168	168	135	136	156	228	149	132	163	106	155

Table A-3: 2013 Southeast Bend Cut-off Channel Metals and Nutrients Samples 13-1 through 13-16

Parameter	Back-ground	PSQG LEL	PSQG SEL	CSQG ISQG	CSQG PEL	Result (µg/g)														
						13-1	13-2	13-3	13-4	13-5	13-6	13-7	13-8	13-9	13-10	13-11	13-12	13-13	13-14	13-15	13-16
Arsenic	4.2	6	33	5.9	17	7	4	6	5	3	4	1	2	2	5	2	2	5	9	5	2
Cadmium	1	0.6	10	0.6	3.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	31	26	110	37.3	90	15	9	25	10	7	7	3	4	4	29	5	5	25	31	28	5
Copper	25	16	110	35.7	197	20	11	28	12	7	9	2	5	3	27	3	4	24	34	26	4
Iron	30000	20000	40000			16200	8800	29800	9930	6900	8020	2630	3310	3950	28400	3880	3610	25300	31900	29100	4210
Lead	23	31	250	35	91.3	10	5	12	6	4	5	2	3	3	10	3	3	11	14	10	3
Manganese	400	460	1100	-	-	425	227	605	287	185	222	76	92	109	570	109	105	632	636	587	124
Mercury	0.1	0.2	2	0.17	0.486	0.06	0.04	0.02	0.10	0.10	0.08	0.07	0.13	0.12	0.02	0.16	0.11	0.02	0.02	0.03	0.09
Nickel	31	16	75			19	11	33	12	7	9	3	3	4	34	4	4	30	39	34	4
Zinc	65	120	820	123	315	51	26	66	30	22	21	9	10	10	56	12	9	57	80	58	17
TOC (%)		1	10	-	-	1.60	1.31	1.22	1.00	0.22	2.00	<0.15	0.55	1.59	0.86	0.39	0.16	1.02	1.09	1.16	0.34
TKN		550	4800	-	-	1410	700	555	745	<500	635	<500	<500	<500	510	<500	<500	500	625	535	<500
TP		600	2000	-	-		180	582	207	155	162	86	118	111	474	92	112	506	576	477	106

Table A-4: 2013 Southeast Bend Cut-off Channel Polycyclic Aromatic Hydrocarbons Samples 1 through 14

Parameter	PSQG LEL	CSQG ISQG	CSQG PEL	Result (µg/g)													
				1	2	3	4	5	6	7	8	9	10	11	12	13	14
Acenaphthene	-	0.007	0.089	<0.05	0.008	<0.05	<0.005	<0.05	<0.005	<0.05	0.017	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005
Acenaphthylene	-	-	0.128	<0.05	0.008	<0.05	<0.005	<0.05	<0.005	<0.05	0.014	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005
Anthracene	0.22	-	0.245	<0.05	0.023	<0.05	0.007	<0.05	0.007	<0.05	0.021	<0.05	0.006	<0.05	<0.004	<0.05	<0.004
Benzo[a]anthracene	0.32	0.032	0.385	<0.05	0.05	0.09	<0.03	0.08	<0.03	<0.05	0.06	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03
Benzo[b]fluoranthene	-	-	-	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[k]fluoranthene	0.24	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[a]pyrene	0.37	0.032	0.782	<0.05	<0.03	<0.05	<0.03	0.05	<0.03	<0.05	0.05	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03
Benzo[g,h,i]perylene	0.17	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	0.34	0.057	0.862	<0.05	<0.05	0.10	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenzo[a,h]anthracene	0.06	0.006	0.135	<0.05	0.015	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005
Fluoranthene	0.75	0.111	2.355	<0.05	0.15	0.12	<0.03	0.11	0.04	<0.05	0.10	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03
Fluorene	0.19	0.021	0.144	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5 2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno[1,2,3-cd]pyrene	0.2	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	-	0.035	0.391	<0.05	0.013	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005
Phenanthrene	0.56	0.042	0.515	<0.05	0.12	0.13	0.04	0.06	0.04	<0.05	0.10	0.05	0.04	<0.05	<0.02	<0.05	<0.02
Pyrene	0.49	0.053	0.875	<0.05	0.09	0.13	<0.03	0.14	<0.03	<0.05	0.07	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03

Table A-5: 2013 Southeast Bend Cut-off Channel Polycyclic Aromatic Hydrocarbons Samples 15 through 28

Parameter	PSQG	CSQG	CSQG	Result (µg/g)												
	LEL	ISQG	PEL	15	16	17	18	19	20	21	22	23	24	25	27	28
Acenaphthene	-	0.007	0.089	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.05	<0.005
Acenaphthylene	-	-	0.128	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.05	<0.005
Anthracene	0.22	-	0.245	<0.05	<0.004	<0.05	0.006	<0.05	<0.004	<0.05	0.008	<0.05	0.008	<0.05	<0.05	<0.004
Benzo[a]anthracene	0.32	0.032	0.385	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.05	<0.03
Benzo[b]fluoranthene	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[k]fluoranthene	0.24	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[a]pyrene	0.37	0.032	0.782	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.05	<0.03
Benzo[g,h,i]perylene	0.17	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	0.34	0.057	0.862	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenzo[a,h]anthracene	0.06	0.006	0.135	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	<0.05	<0.005
Fluoranthene	0.75	0.111	2.355	<0.05	<0.03	0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.05	<0.03
Fluorene	0.19	0.021	0.144	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno[1,2,3-cd]pyrene	0.2	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	-	0.035	0.391	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05	0.006	<0.05	0.006	<0.05	<0.05	<0.005
Phenanthrene	0.56	0.042	0.515	<0.05	0.03	0.07	0.04	<0.05	<0.02	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.02
Pyrene	0.49	0.053	0.875	<0.05	<0.03	0.06	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.03	<0.05	<0.05	<0.03

Table A-6: 2013 Southeast Bend Cut-off Channel Polycyclic Aromatic Hydrocarbons Samples 13-1 through 13-16

Parameter	PSQG LEL	CSQG ISQG	CSQG PEL	Result (µg/g)														
				13-1	13-2	13-3	13-4	13-5	13-6	13-7	13-8	13-9	13-10	13-11	13-12	13-13	13-14	13-15	13-16
Anthracene	0.22	-	0.245	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[a]anthracene	0.32	0.032	0.385	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[k]fluoranthene	0.24	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[a]pyrene	0.37	0.032	0.782	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[g,h,i]perylene	0.17	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	0.34	0.057	0.862	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenzo[a,h]anthracene	0.06	0.006	0.135	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.75	0.111	2.355	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	0.19	0.021	0.144	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno[1,2,3-cd]pyrene	0.2	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	0.56	0.042	0.515	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	0.49	0.053	0.875	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Table A-7: 2013 Southeast Bend Cut-off Channel Organochlorine Pesticides Samples 1 through 13

Parameter	PSQG LEL	CCME ISQG	CCME PEL	Result (µg/g)												
				1	2	3	4	5	6	7	8	9	10	11	12	13
Aldrin	0.002	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chlordane	0.007	0.005	0.009	<0.070	<0.007	<0.070	<0.007	<0.070	<0.007	<0.070	<0.007	<0.070	<0.007	<0.070	<0.007	<0.007
pp-DDD	0.008	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp-DDE	-	0.001	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total DDT	0.007	0.001	0.005	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Dieldrin	0.002	0.003	0.007	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Endrin	0.003	0.003	0.062	<0.002	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Total Endosulfan	-	-	-	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.005
Heptachlor	-	-	-	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.005
Heptachlor Epoxide	0.005	0.001	0.003	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.005
Hexachlorobenzene	0.02	-	-	<0.005	<0.005	<0.052	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
γ- BHC (Lindane)	0.003	0.001	0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Methoxychlor	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Mirex	0.007	-	-	-	<0.007	-	<0.007	-	<0.007	-	<0.007	-	<0.007	-	<0.007	-
Total PCB	0.07	0.034	0.277	<0.30	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Table A-8: 2013 Southeast Bend Cut-off Channel Organochlorine Pesticides Samples 14 through 28

Parameter	PSQG LEL	CCME ISQG	CCME PEL	Result (µg/g)													
				14	15	16	17	18	19	20	21	22	23	24	25	27	28
Aldrin	0.002	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chlordane (Total)	0.01	0.005	0.009	<0.007	<0.070	<0.007	<0.070	<0.007	<0.070	<0.007	<0.070	<0.007	<0.007	<0.007	<0.070	<0.007	<0.007
pp-DDD	0.01	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp-DDE	-	0.001	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total DDT	0.01	0.001	0.005	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Dieldrin	0.002	0.003	0.007	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Endrin	0.003	0.003	0.062	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Total Endosulfan	-	-	-	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.005	<0.005	<0.050	<0.005	<0.005
Heptachlor	-	-	-	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.005	<0.005	<0.050	<0.005	<0.005
Heptachlor Epoxide	0.005	0.001	0.003	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.050	<0.005	<0.005	<0.005	<0.050	<0.005	<0.005
Hexachlorobenzene	0.02	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
γ- BHC (Lindane)	0.003	0.001	0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Methoxychlor	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Mirex	0.01	-	-	<0.007	-	<0.007	-	<0.007	-	<0.007	-	<0.007	-	<0.007	-	-	<0.007
Total PCB	0.07	0.034	0.28	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Table A-9: 2013 Southeast Bend Cut-off Channel Organochlorine Pesticides Samples 13-1 through 13-16

Parameter	PSQG LEL	Result (µg/g)															
		13-1	13-2	13-3	13-4	13-5	13-6	13-7	13-8	13-9	13-10	13-11	13-12	13-13	13-14	13-15	13-16
Aldrin	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
BHC	0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
alpha - BHC	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
beta-BHC (beta-HCH)	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC (Lindane)	0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Chlordane (Total)	0.002	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
DDT (Total)	0.003	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
op'-DDT + pp'-DDT	-	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
pp'-DDD	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp'-DDE	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Endrin	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Hexachlorobenzene	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Heptachlor	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor Epoxide	0.07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Mirex		<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
PCB (Total)		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Table A-10: 2013 Southeast Bend Cut-off Channel Priority Six Contaminants Samples 1 though 13

Parameter	PSQG LEL	SGSS Table 1	Result (µg/g)												
			SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	SS9	SS10	SS11	SS12	SS13
Hexachlorobenzene	0.02	0.02	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachloroethane	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tetrachloroethylene	-	0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-
Pentachlorobenzene	-	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
Octachlorostyrene	-	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-
Methyl Ethyl Ketone	-	0.5	-	<0.50	-	<0.50	-	<0.50	-	<0.50	-	<0.50	-	<0.50	-

Table A-11: 2013 Southeast Bend Cut-off Channel Priority Six Contaminants Samples 14 though 28

Parameter	PSQG LEL	SG&SS Table 1	Result (µg/g)												
			SS14	SS15	SS16	SS17	SS18	SS19	SS20	SS21	SS22	SS23	SS24	SS25	SS27	SS28
Hexachlorobenzene	0.02	0.02	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachloroethane	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	-	0.01	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01	<0.010	<0.01	<0.01	<0.010
Tetrachloroethylene	-	0.05	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	<0.05
Pentachlorobenzene	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1
Octachlorostyrene	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	<0.05
Methyl Ethyl Ketone	-	0.5	<0.50	-	<0.50	-	<0.50	-	<0.50	-	<0.50	-	<0.50	-	-	<0.50

Table A-12: 2013 Southeast Bend Cut-off Channel Priority Six Contaminants Samples 13-1 though 13-26

Parameter	Result (µg/g)															
	13-1	13-2	13-3	13-4	13-5	13-6	13-7	13-8	13-9	13-10	13-11	13-12	13-13	13-14	13-15	13-16
Hexachlorobenzene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Hexachloroethane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tetrachloroethylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Pentachlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Octachlorostyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methyl Ethyl Ketone	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Table A-13: 2013 Southeast Bend Upstream Shoal Area Metals and Nutrients Samples

Parameter	Back-ground	PSQG LEL	PSQG SEL	CSQG ISQG	CSQG PEL	Result (µg/g)		
						U1	U2	U3
Arsenic	4.2	6	33	5.9	17	1	1	1
Cadmium	1	0.6	10	0.6	3.5	<0.5	<0.5	<0.5
Chromium	31	26	110	37.3	90	3	3	3
Cobalt	-	-	-	-	-	1.1	1.5	1.2
Copper	25	16	110	35.7	197	1	2	1
Lead	23	31	250	35	91.3	2	2	2
Manganese	400	460	1100	-	-			
Mercury	0.1	0.2	2	0.17	0.486	0.05	0.02	0.02
Nickel	31	16	75	-	-	<1	<1	<1
Silver	-	0.5***	-	-	-	<0.2	<0.2	<0.2
Zinc	65	120	820	123	315	7	10	8
TOC (%)	-	1	10	-	-	0.16	<0.15	<0.15
TKN (%)	-	0.055	0.48	-	-	<0.05	<0.05	<0.05
TP	-	600	2000	-	-	52	107	89

Table A-14: 2013 Southeast Bend Upstream Shoal Area Polycyclic Aromatic Hydrocarbons

Parameter	PSQG LEL	CSQG ISQG	CSQG PEL	Result (µg/g)		
				U1	U2	U3
Acenaphthene	-	0.007	0.089	<0.005	<0.005	<0.005
Acenaphthylene	-	-	0.128	<0.005	<0.005	<0.005
Anthracene	0.22	-	0.245	<0.005	<0.005	<0.005
Benzo[a]anthracene	0.32	0.032	0.385	<0.05	<0.05	<0.05
Benzo[b]fluoranthene	-	-	-	<0.05	<0.05	<0.05
Benzo[k]fluoranthene	0.24	-	-	<0.05	<0.05	<0.05
Benzo[a]pyrene	0.37	0.032	0.782	<0.05	<0.05	<0.05
Benzo[g,h,i]perylene	0.17	-	-	<0.05	<0.05	<0.05
Chrysene	0.34	0.057	0.862	<0.05	<0.05	<0.05
Dibenzo[a,h]anthracene	0.06	0.006	0.135	<0.005	<0.005	<0.005
Fluoranthene	0.75	0.111	2.355	<0.05	<0.05	<0.05
Fluorene	0.19	0.021	0.144	<0.05	<0.05	<0.05
Indeno[1,2,3-cd]pyrene	0.2	-	-	<0.05	<0.05	<0.05
Naphthalene	-	0.035	0.391	<0.005	<0.005	<0.005
Phenanthrene	0.56	0.042	0.515	<0.05	<0.05	<0.05
Pyrene	0.49	0.053	0.875	<0.05	<0.05	<0.05

Table A-15: 2013 Southeast Bend Upstream Shoal Area Organochlorine Pesticides

Parameter	PSQG LEL	CSQG ISQG	CSQG PEL	Result (µg/g)		
				U1	U2	U3
Aldrin	0.002	-	-	<0.002	<0.002	<0.002
Chlordane	0.007	0.005	0.009	<0.007	<0.007	<0.007
pp-DDD	0.008	-	-	<0.007	<0.007	<0.007
pp-DDE	0.005	0.001	0.007	<0.005	<0.005	<0.005
DDT (Total)	0.007	0.001	0.005	<0.007	<0.007	<0.007
Dieldrin	0.002	0.003	0.007	<0.002	<0.002	<0.002
Endrin	0.003	0.003	0.062	<0.003	<0.003	<0.003
Total Endosulfan	-	-	-	<0.005	<0.005	<0.005
Heptachlor	-	-	-	<0.005	<0.005	<0.005
Heptachlor Epoxide	0.005	0.001	0.003	<0.005	<0.005	<0.005
Hexachlorobenzene	-	-	-	0.007	<0.005	<0.005
γ-BHC (Lindane)	-	0.001	0.001	<0.003	<0.003	<0.003
Hexachloroethane	-	-	-	<0.01	<0.01	<0.01
Methoxychlor	-	-	-	<0.005	<0.005	<0.005
Total PCB	0.07	0.034	0.277	<0.07	<0.07	<0.07

Table A-16: 2013 Southeast Bend Upstream Shoal Area Priority Contaminants

Parameter	PSQG LEL	SG&SS Table 1	Result (µg/g)		
			U1	U2	U3
Hexachlorobenzene	0.02	0.02	0.007	<0.005	<0.005
Hexachloroethane	-	0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	-	0.01	0.014	<0.010	<0.010
Tetrachloroethylene	-	0.05	<0.05	<0.05	<0.05
Pentachlorobenzene	-	-	<0.1	<0.1	<0.1
Octachlorostyrene	-	-	<0.05	<0.05	<0.05
Methyl Ethyl Ketone	-	0.5	<0.50	<0.50	<0.50

Table A-17: 2013 Southeast Bend Upstream Shoal Priority Six Contaminants

Parameter	PSQG LEL	SG&SS Table 1	Result (µg/g)								
			USA1	USA2	USA3	USA4	USA-5	USA6	USA7	USA8	USA9
Hexachlorobenzene	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachloroethane	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	-	0.01	<0.01	0.02	0.04	0.02	0.02	<0.01	0.01	0.02	<0.01
Tetrachloroethylene	-	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
Pentachlorobenzene	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Octachlorostyrene	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methyl Ethyl Ketone	-	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.00	<0.50

Table A-18: 2013 Stokes Point Shoal Area Metals Samples SP1 to SP6

Parameter	Back-ground	PSQG LEL	PSQG SEL	CSQG ISQG	CSQG PEL	Result (µg/g)					
Metal						SP1-1	SP3-1	SP3-:;:2	SP5-1	SP5-2	SP6-2
Arsenic	4.2	6.0	33.0	5.9	17.0	12.0	13.0	14.0	22.0	15.0	7.0
Cadmium	1.0	0.6	10.0	0.6	3.5	0.7	0.7	0.6	1.0	0.7	0.6
Chromium	31.0	26.0	110.0	37.3	90.0	20.0	8.0	8.0	11.0	15.0	6.0
Copper	25.0	16.0	110.0	35.7	197.0	24.0	20.0	15.0	23.0	25.0	12.0
Iron	31200	20000	40000	-	-	32500	16600	11400	22200	21600	7550
Lead	23.0	31.0	250.0	35.0	91.3	10.0	9.0	8.0	10.0	8.0	5.0
Manganese	400.0	460.0	1100	-	-	485.0	403.0	323.0	509.0	376.0	223.0
Mercury	0.1	0.2	2.0	0.17	0.49	<0.10	0.11	0.13	<0.10	<0.10	<0.10
Nickel	31.0	16.0	75.0	-	-	43.0	26.0	19.0	28.0	33.0	12.0
Zinc	65.0	120.0	820.0	123.0	315.0	87.0	71.0	60.0	92.0	77.0	46.0

Table A-19: 2013 Stokes Point Shoal Area Metals Samples SP7 to SP14

Parameter	Back-	PSQG	PSQG	CSQG	CSQG	Result (µg/g)				
Metal	ground	LEL	SEL	ISQG	PEL	SP7-1	SP7-2	SP8-1	SP8-2	SP14-2
Arsenic	4.2	6.0	33.0	5.9	17.0	17.0	11.0	13.0	12.0	17.0
Cadmium	1.0	0.6	10.0	0.6	3.5	0.8	0.7	0.6	0.9	0.7
Chromium	31.0	26.0	110.0	37.3	90.0	11.0	9.0	11.0	20.0	16.0
Copper	25.0	16.0	110.0	35.7	197.0	23.0	15.0	22.0	25.0	23.0
Iron	31200	20000	40000	-	-	20400	10900	14900	28000	24500
Lead	23.0	31.0	250.0	35.0	91.3	15.0	7.0	50.0	9.0	11.0
Manganese	400.0	460.0	1100	-	-	465.0	366.0	422.0	393.0	476.0
Mercury	0.1	0.2	2.0	0.17	0.49	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	31.0	16.0	75.0	-	-	30.0	22.0	25.0	40.0	31.0
Zinc	65.0	120.0	820.0	123.0	315.0	76.0	62.0	66.0	83.0	84.0

Table A-20: 2013 Stokes Point Shoal Area Organochlorine Pesticides Samples SP1 to SP6

Parameter	PSQG	CSQG	CSQG	Result (µg/g)					
Pesticides	LEL	ISQG	PEL	SP1-1	SP3-1	SP3-2	SP5-1	SP5-2	SP6-2
Aldrin	0.002	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chlordane	0.007	0.0045	0.0087	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
beta- BHC	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chlordane	0.007	0.0045	0.0087	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp-DDD	0.008	0.00354	0.00851	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp DDE	0.005	0.00142	0.00675	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Total DDT	0.007	0.001	0.005	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
DDT (o,p' + p,p')	0.008	0.0019	0.0477	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	0.002	0.00285	,00667	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Endrin	0.003	0.00267	0.0624	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
γ-BHC (Lindane)	0.003	0.0094	0.00138	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Heptachlor	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor Epoxide	0.005	0.0006	0.00274	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	0.02	-	-	<0.005	0.005	0.006	<0.005	<0.005	0.006
Hexachlorocyclohexane	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	0.007	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total PCB	0.07	0.0341	0.277	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07

Table A-21: 2013 Stokes Point Shoal Area Organochlorine Pesticides Samples S7 to S14

Parameter	PSQG	CSQG	CSQG	Result (µg/g)				
Pesticides	LEL	ISQG	PEL	SP7-1	SP7-2	SP8-1	SP8-2	SP14-2
Aldrin	0.002	-	-	<0.002	<0.002	<0.002	<0.002	<0.002
Chlordane	0.007	0.0045	0.0087	<0.005	<0.005	<0.005	<0.005	<0.005
beta- BHC	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005
Chlordane	0.007	0.0045	0.0087	<0.007	<0.007	<0.007	<0.007	<0.007
pp-DDD	0.008	0.00354	0.00851	<0.005	<0.005	<0.005	<0.005	<0.005
pp-DDE	0.005	0.00142	0.00675	<0.004	<0.004	<0.004	<0.004	<0.004
Total DDT	0.007	0.001	0.005	<0.007	<0.007	<0.007	<0.007	<0.007
op+pp-DDT	0.008	0.0019	0.0477	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	0.002	0.00285	,00667	<0.002	<0.002	<0.002	<0.002	<0.002
Endrin	0.003	0.00267	0.0624	<0.003	<0.003	<0.003	<0.003	<0.003
γ-BHC (Lindane)	0.003	0.0094	0.00138	<0.003	<0.003	<0.003	<0.003	<0.003
Heptachlor	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor Epoxide	0.005	0.0006	0.00274	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	0.02	-	-	<0.005	<0.005	0.007	<0.005	<0.005
Hexachlorocyclohexane	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	0.07	-	-	<0.005	<0.005	<0.005	<0.005	<0.005
Total PCB	0.07	0.0341	0.277	<0.07	<0.07	<0.07	<0.07	<0.07

Table A-22: 2013 Stokes Point Shoal Area Polycyclic Aromatic Hydrocarbons Samples SP1 to SP6

Parameter	PSQG	CSQG	CSQG	Result (µg/g)					
PAH	LEL	ISQG	PEL	SP1-1	SP3-1	SP3-2	SP5-1	SP5-2	SP6-2
Acenaphthene	-	0.00671	0.0889	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	-	0.00587	0.128	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	0.22	0.0469	0.245	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	0.32	0.0317	0.385	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	0.37	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(g,h,i)perylene	0.17	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	0.24	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	0.34	0.057	0.862	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene	0.06	0.00622	0.135	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.75	0.111	2.355	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	0.19	0.0212	0.144	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	0.2	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	-	0.0346	0.391	0.06	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	0.56	0.0419	0.515	0.10	0.09	0.11	0.09	0.09	0.09
Pyrene	0.49	0.053	0.875	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total PAH	4.0	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Table A-23: 2013 Stokes Point Shoal Area Polycyclic Aromatic Hydrocarbons Samples SP7 to SP14

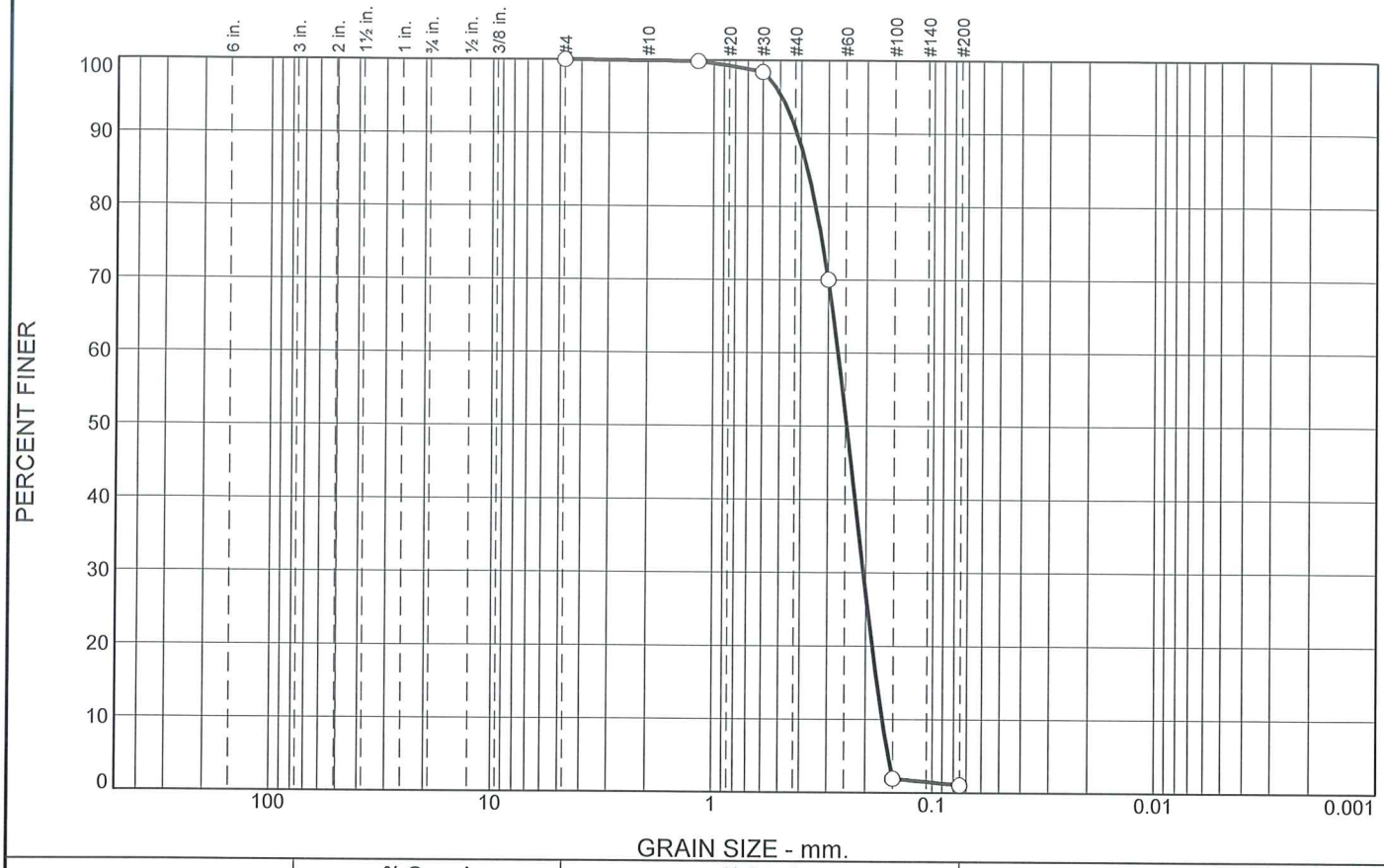
Parameter	PSQG	CSQG	CSQG	Result (µg/g)				
PAH	LEL	ISQG	PEL	SP7-1	SP7-2	SP8-1	SP8-2	SP14-2
Acenaphthene	-	0.00671	0.0889	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	-	0.00587	0.128	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	0.22	0.0469	0.245	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)anthracene	0.32	0.0317	0.385	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	0.37	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(g,h,i)perylene	0.17	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	0.24	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	0.34	0.057	0.862	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene	0.06	0.00622	0.135	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.75	0.111	2.355	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	0.19	0.0212	0.144	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-cd)pyrene	0.2	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	-	0.0346	0.391	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	0.56	0.0419	0.515	0.07	0.07	0.07	0.08	<0.05
Pyrene	0.49	0.053	0.875	<0.05	<0.05	<0.05	<0.05	<0.05
Total PAH	4.0	-	-	<0.05	<0.05	<0.05	<0.05	<0.05

Appendix B
Sediment Sample Grain Size Analysis

Appendix B
Sediment Sample Grain Size Analysis

2012 Samples

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	9.1	89.7	1.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#16	99.9		
#30	98.4		
#50	70.0		
#100	1.9		
#200	1.1		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4159 D_{85}= 0.3729 D_{60}= 0.2699
D_{50}= 0.2457 D_{30}= 0.2052 D_{15}= 0.1772
D_{10}= 0.1676 C_u= 1.61 C_c= 0.93

Classification

USCS= AASHTO=

Remarks

Material: Fine sand, trace of silt
Coefficient of permeability: 10^-2 cm/sec

Location: Sample No. U1
Sample Number: L-105

Date: 11-04-2012

LVM, Inc.

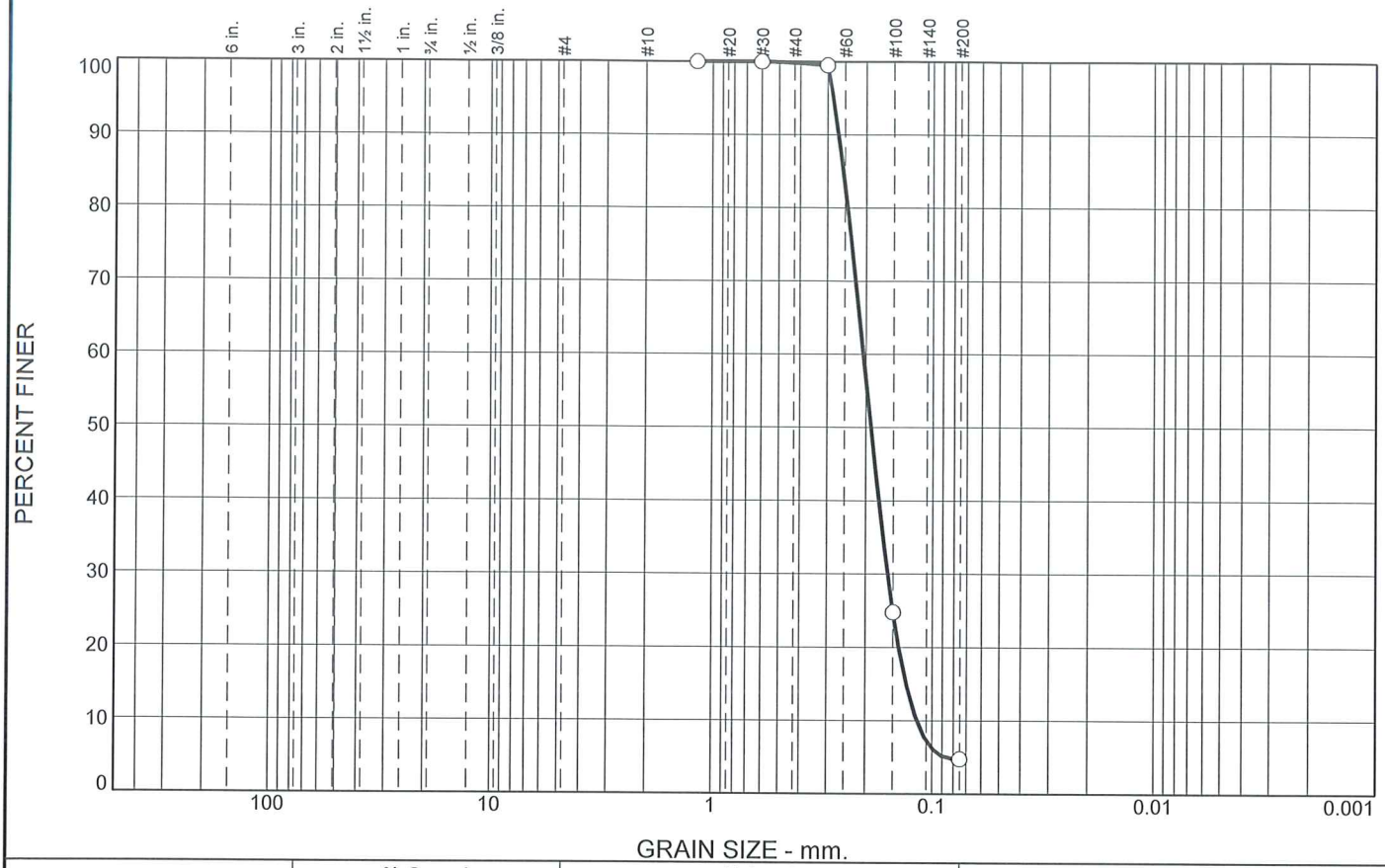
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples
Project No: P-0000209

Figure

Tested By: J.D. **Checked By:** R.H.

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	95.0	4.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#16	100.0		
#30	100.0		
#50	99.5		
#100	24.8		
#200	4.8		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2667 D_{85}= 0.2537 D_{60}= 0.2053
D_{50}= 0.1894 D_{30}= 0.1586 D_{15}= 0.1305
D_{10}= 0.1167 C_u= 1.76 C_c= 1.05

Classification

USCS= AASHTO=

Remarks

Material: Fine sand, trace of silt
Coefficient of permeability: 10^-2 cm/sec

Location: Sample No. U2
Sample Number: L-106

Date:

LVM, Inc.

London, Ontario

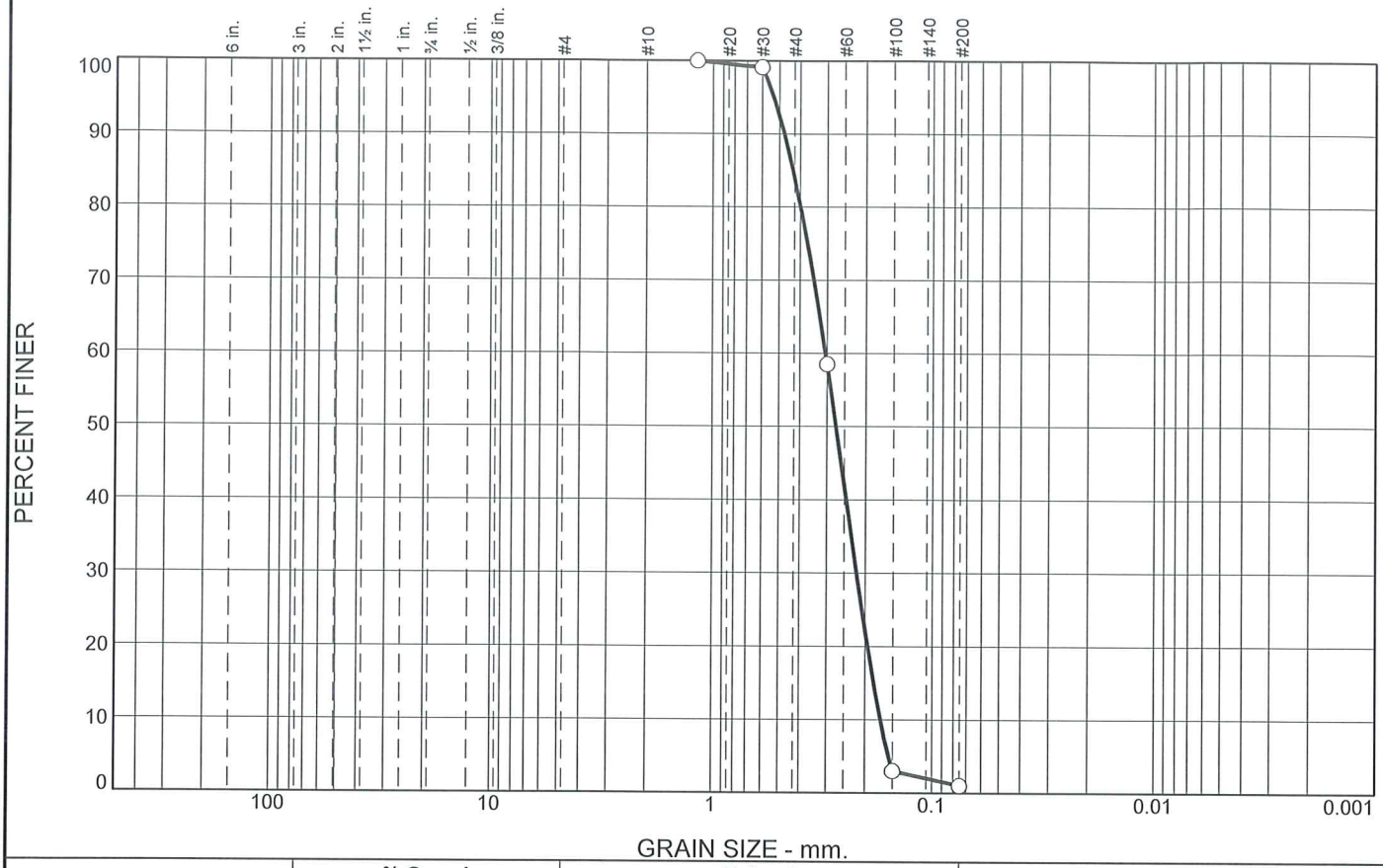
Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209

Figure

Tested By: J.D. **Checked By:** R.H.

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	15.8	83.2	1.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#16	100.0		
#30	99.1		
#50	58.5		
#100	3.0		
#200	1.0		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4726 D_{85}= 0.4310 D_{60}= 0.3051
D_{50}= 0.2725 D_{30}= 0.2189 D_{15}= 0.1826
D_{10}= 0.1700 C_u= 1.79 C_c= 0.92

Classification

USCS= AASHTO=

Remarks

Material: Fine sand, trace of silt
Coefficient of permeability: 10^-2 cm/sec

Location: Sample No. U3
Sample Number: L-108

Date: 11-04-2012

LVM, Inc.

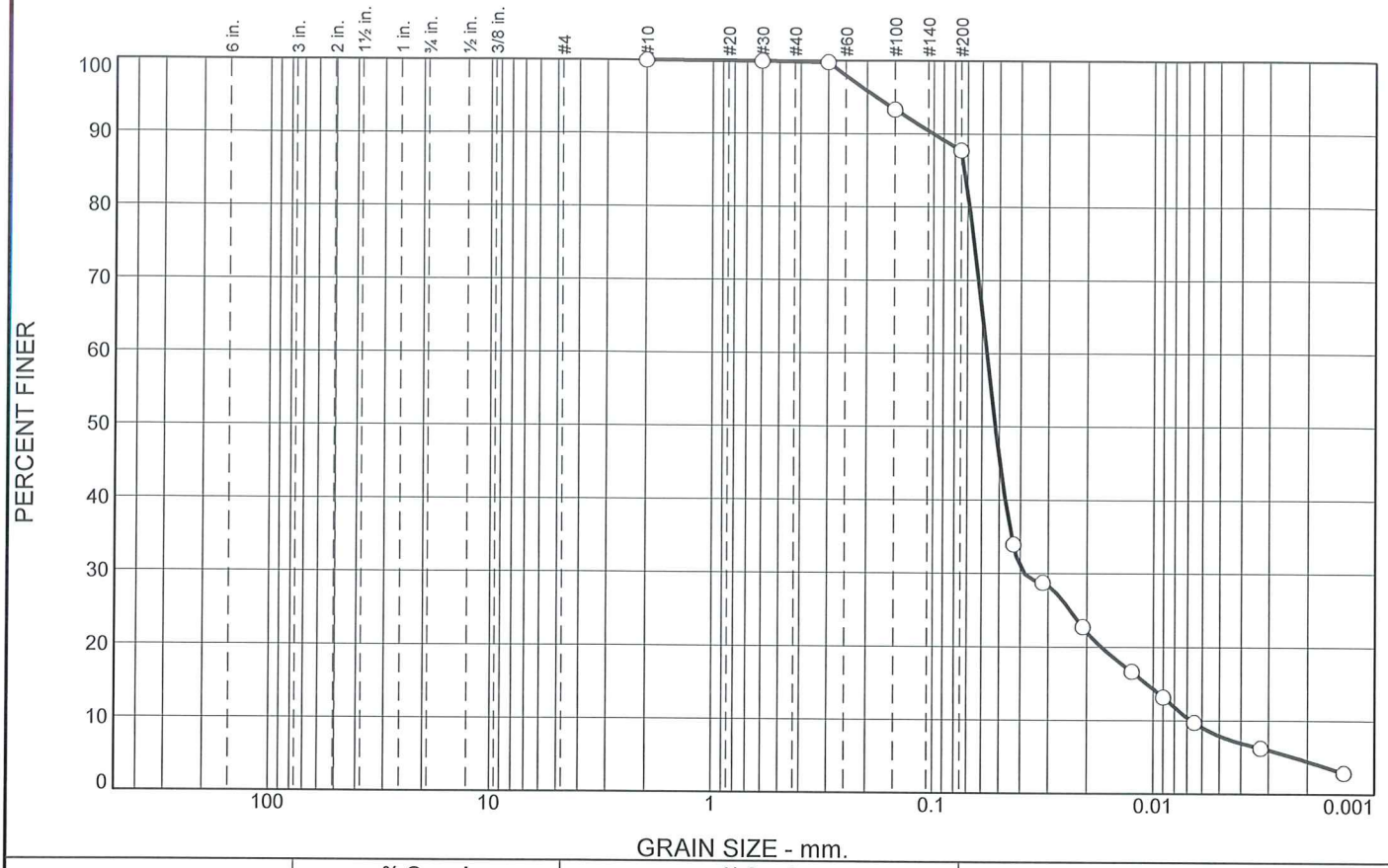
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209 **Figure**

Tested By: J.D. and A.C. **Checked By:** R.H. RH.

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	12.0	83.4	4.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	99.9		
#50	99.8		
#100	93.3		
#200	87.8		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1004 D_{85}= 0.0724 D_{60}= 0.0571
D_{50}= 0.0521 D_{30}= 0.0382 D_{15}= 0.0107
D_{10}= 0.0067 C_u= 8.50 C_c= 3.82

Classification

USCS= AASHTO=

Remarks

Material: Silt, some fine sand
Coefficient of permeability: 10^-5 to 10^-6 cm/sec

Location: Sample No. SS2
Sample Number: L-092

Date: 11-04-2012

LVM, Inc.

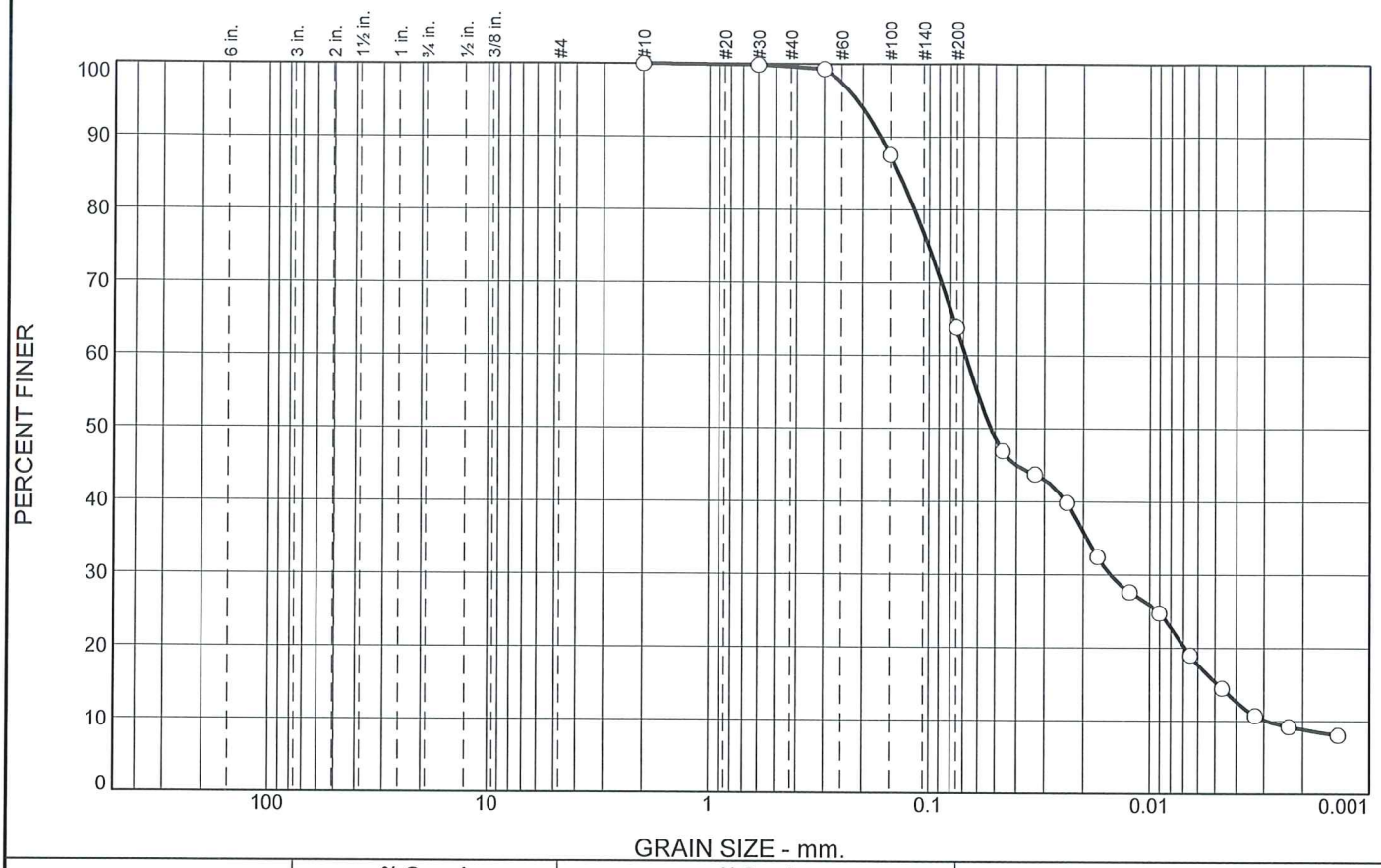
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209 **Figure**

Tested By: J.D. **Checked By:** R.H.

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.4	35.7	55.0	8.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	99.9		
#50	99.3		
#100	87.6		
#200	63.9		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1653 D_{85}= 0.1367 D_{60}= 0.0683
D_{50}= 0.0522 D_{30}= 0.0150 D_{15}= 0.0049
D_{10}= 0.0029 C_u= 23.34 C_c= 1.12

Classification

USCS= AASHTO=

Remarks

Material: Silty sand, trace of clay
Coefficient of permeability: 10^-5 cm/sec

Sample Number: 3

Date: Feb 22/12

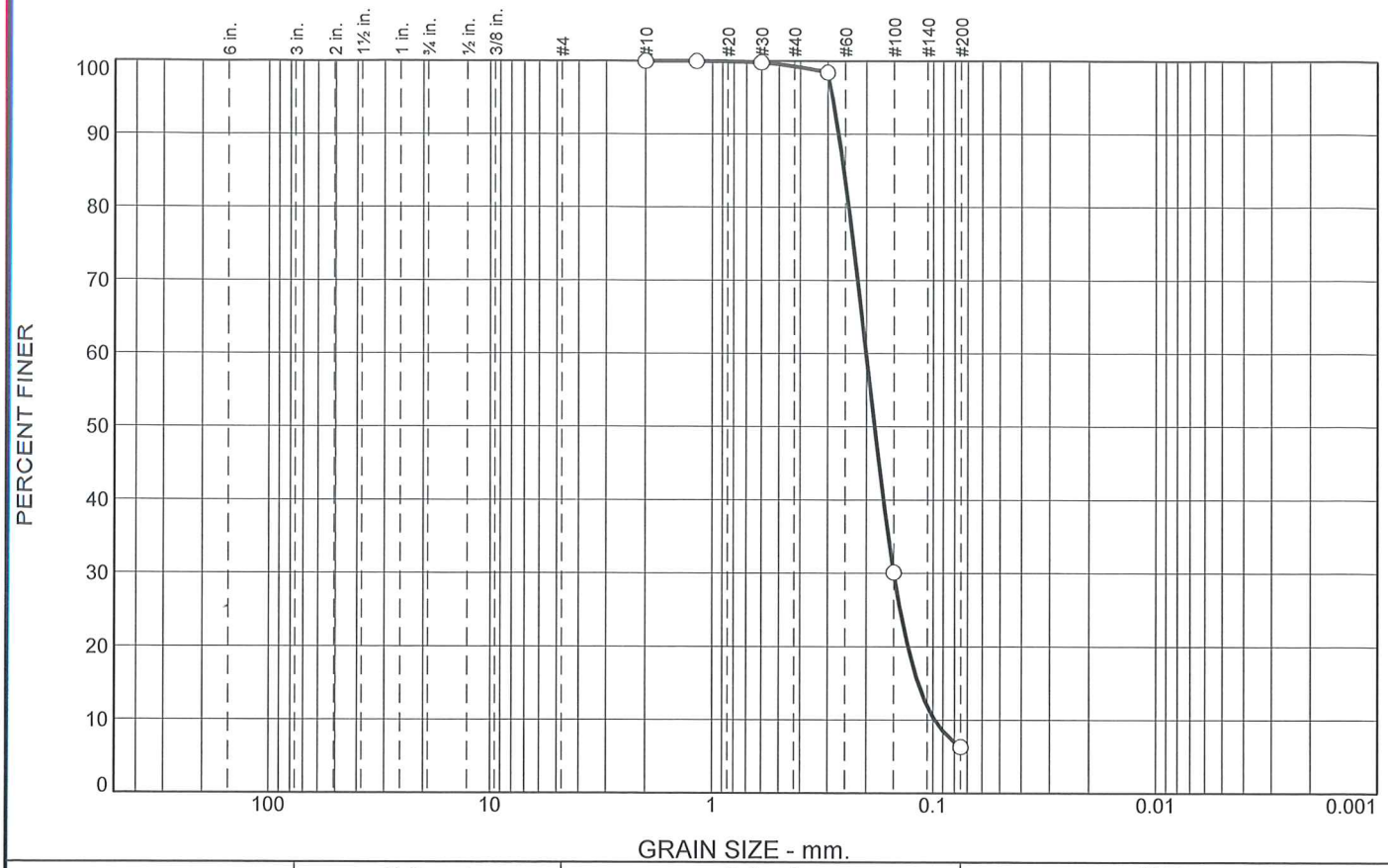
LVM, Inc.

London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River
Project No: P-0000209-0-00-500- **Figure** 001-00

Tested By: AC **Checked By:**

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.7	93.0	6.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#16	100.0		
#30	99.8		
#50	98.4		
#100	30.1		
#200	6.3		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2672 D_{85}= 0.2529 D_{60}= 0.2005
D_{50}= 0.1834 D_{30}= 0.1498 D_{15}= 0.1161
D_{10}= 0.0979 C_u= 2.05 C_c= 1.14

Classification

USCS= AASHTO=

Remarks

Material: Fine sand, trace of silt
Coefficient of permeability: 10^-2 cm/sec.

Location: Sample No. SS4
Sample Number: L-093

Date: 18-04-12

LVM, Inc.

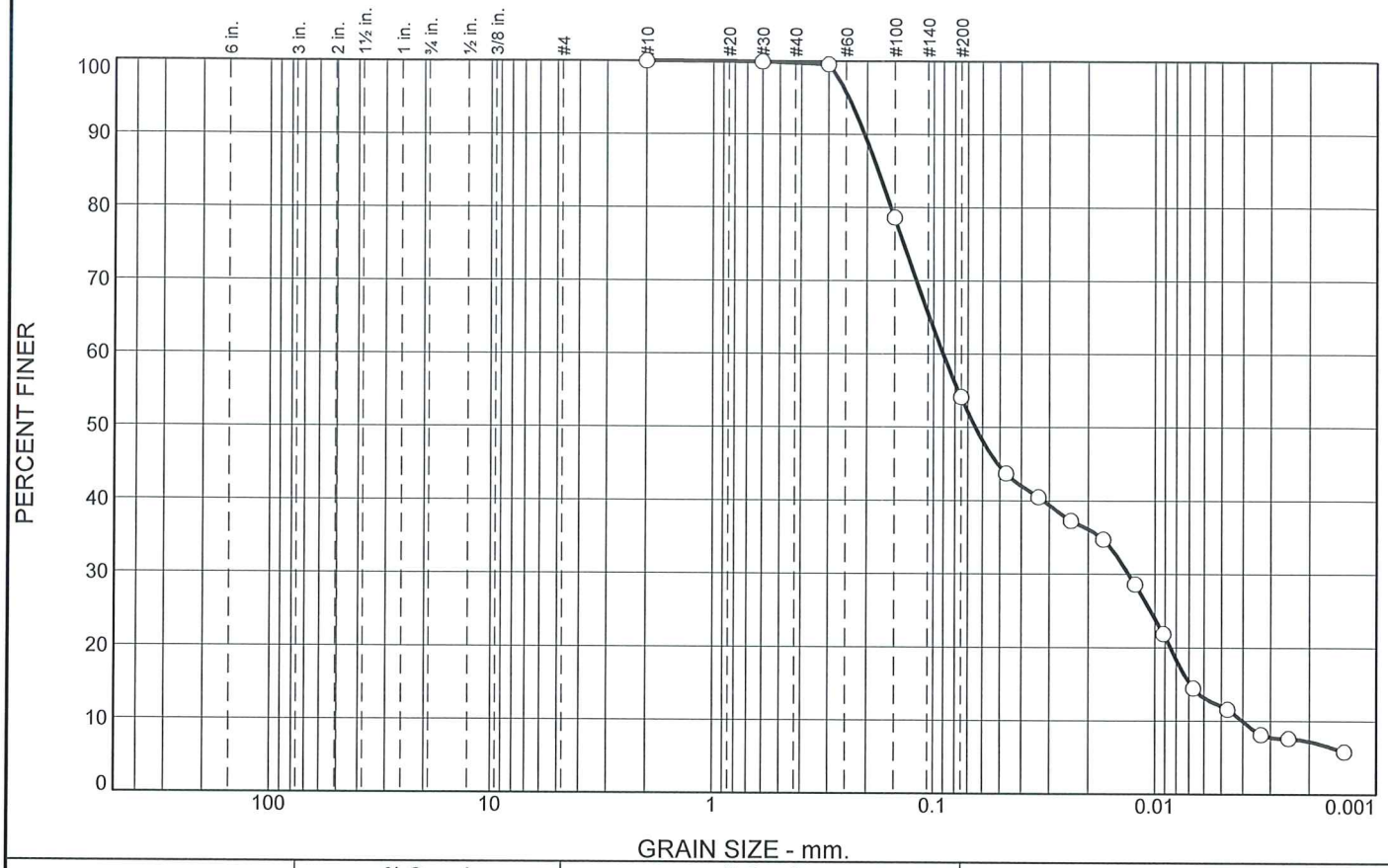
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209 **Figure**

Tested By: J.D. **Checked By:** R.H.

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	45.6	47.0	7.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	99.9		
#50	99.6		
#100	78.7		
#200	54.2		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2048 D_{85}= 0.1776 D_{60}= 0.0902
D_{50}= 0.0644 D_{30}= 0.0131 D_{15}= 0.0069
D_{10}= 0.0040 C_u= 22.48 C_c= 0.47

Classification

USCS= AASHTO=

Remarks

Material: Sandy silt, trace of clay
Coeffiecient of permeability: 10^-5 cm/sec

Sample Number: 5

Date: Feb 22/12

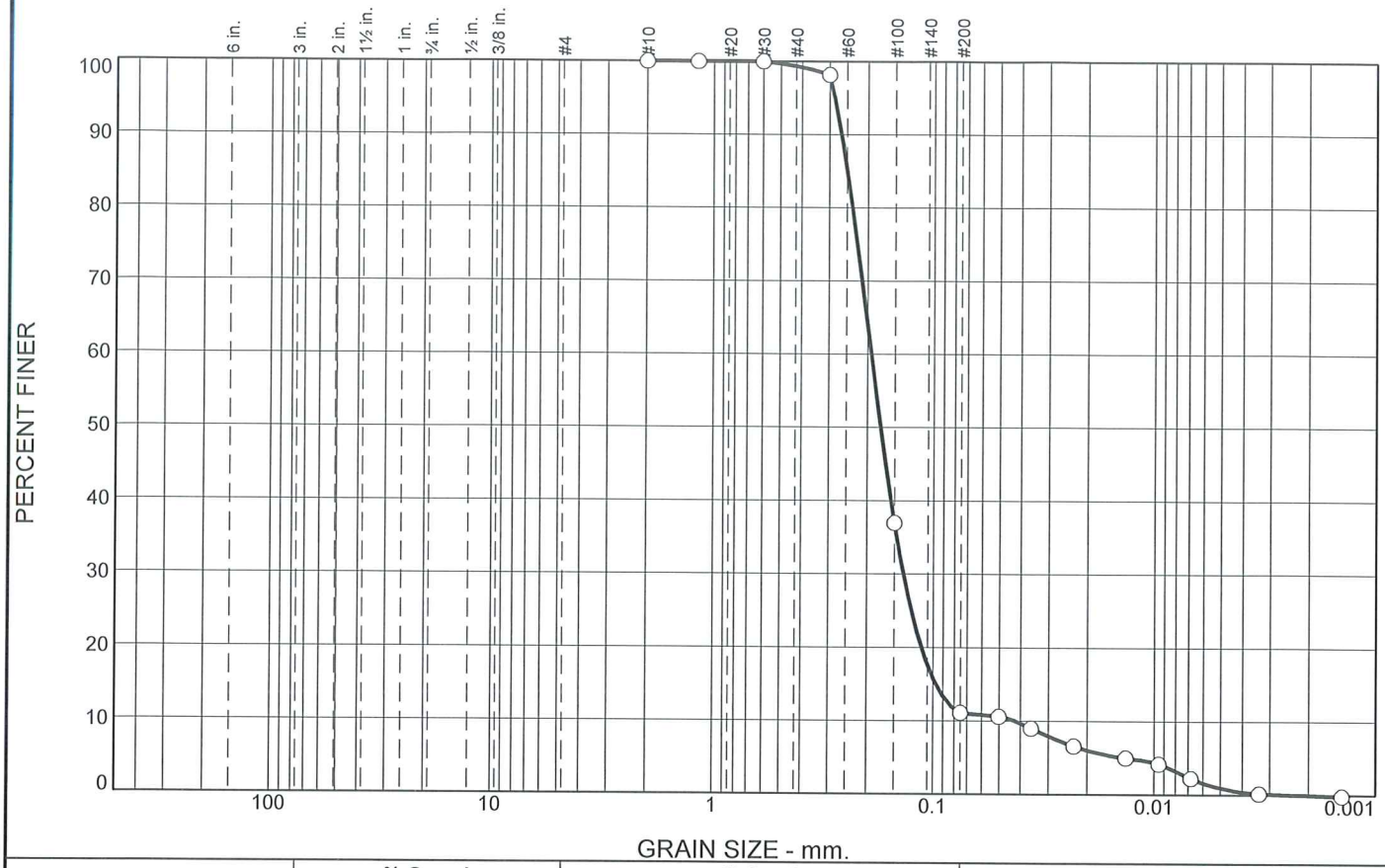
LVM, Inc.

London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River
Project No: P-0000209-0-00-500- **Figure** 002-00

Tested By: AC **Checked By:**

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.7	88.2	11.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#16	100.0		
#30	100.0		
#50	98.2		
#100	37.0		
#200	11.1		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2643 D_{85}= 0.2486 D_{60}= 0.1919
D_{50}= 0.1735 D_{30}= 0.1362 D_{15}= 0.0969
D_{10}= 0.0424 C_u= 4.53 C_c= 2.28

Classification

USCS= AASHTO=

Remarks

Material: Fine sand, some silt
Coefficient of permeability: 10^-3 to 10^-5 cm/sec

Location: Sample No. SS6
Sample Number: L-094

Date: 12-04-12

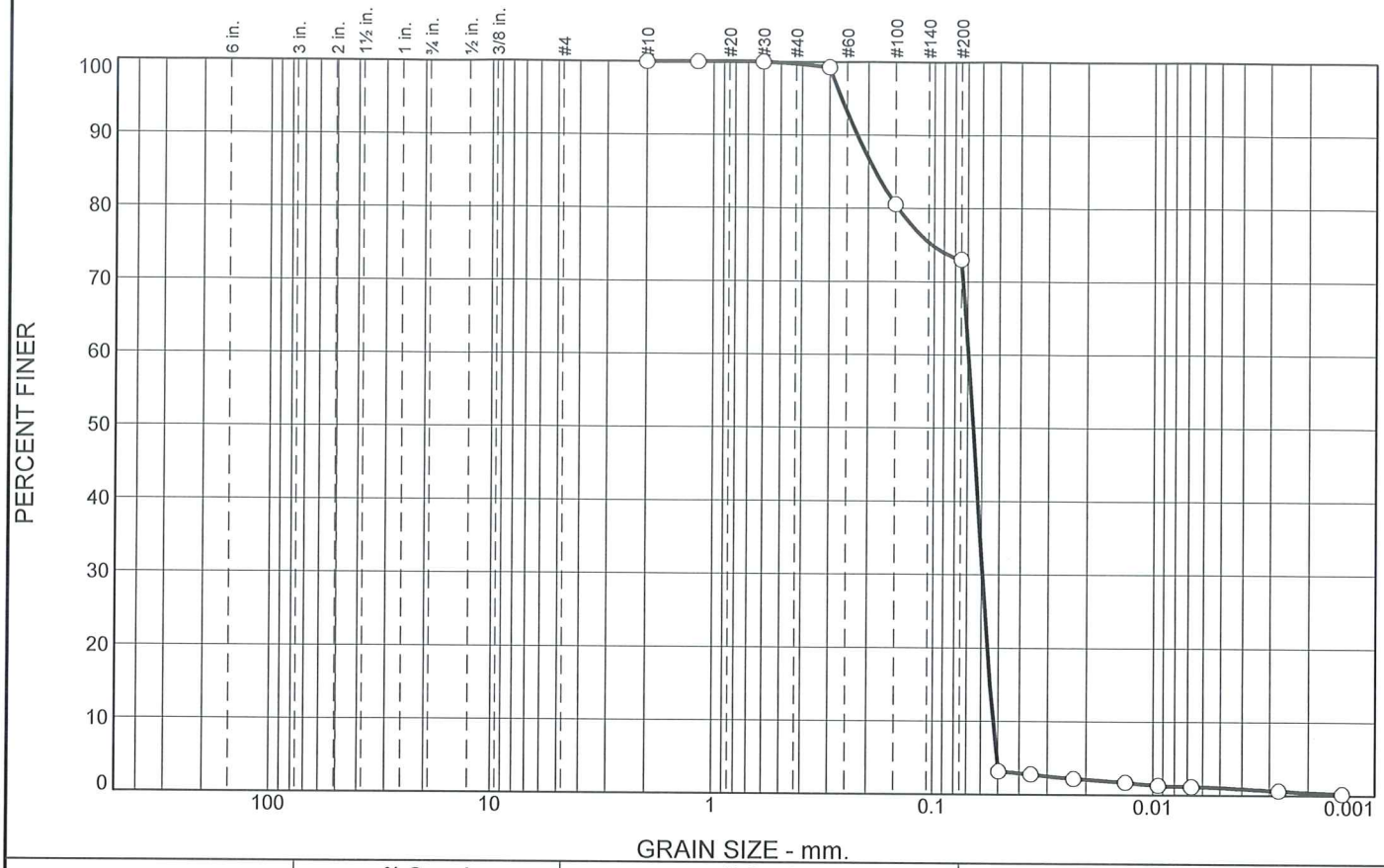
LVM, Inc.

London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples
Project No: P-0000209 **Figure**

Tested By: J.D. **Checked By:** R.H.

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.3	26.7	72.6	0.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#16	100.0		
#30	100.0		
#50	99.3		
#100	80.6		
#200	73.0		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2237 D_{85}= 0.1846 D_{60}= 0.0692
D_{50}= 0.0656 D_{30}= 0.0593 D_{15}= 0.0545
D_{10}= 0.0527 C_u= 1.31 C_c= 0.96

Classification

USCS= AASHTO=

Remarks

Material: Sandy silt
Coefficient of permeability: 10^-5 to 10^-6 cm/sec

Location: Sample No. SS8
Sample Number: L-095

Date: 12-04-12

LVM, Inc.

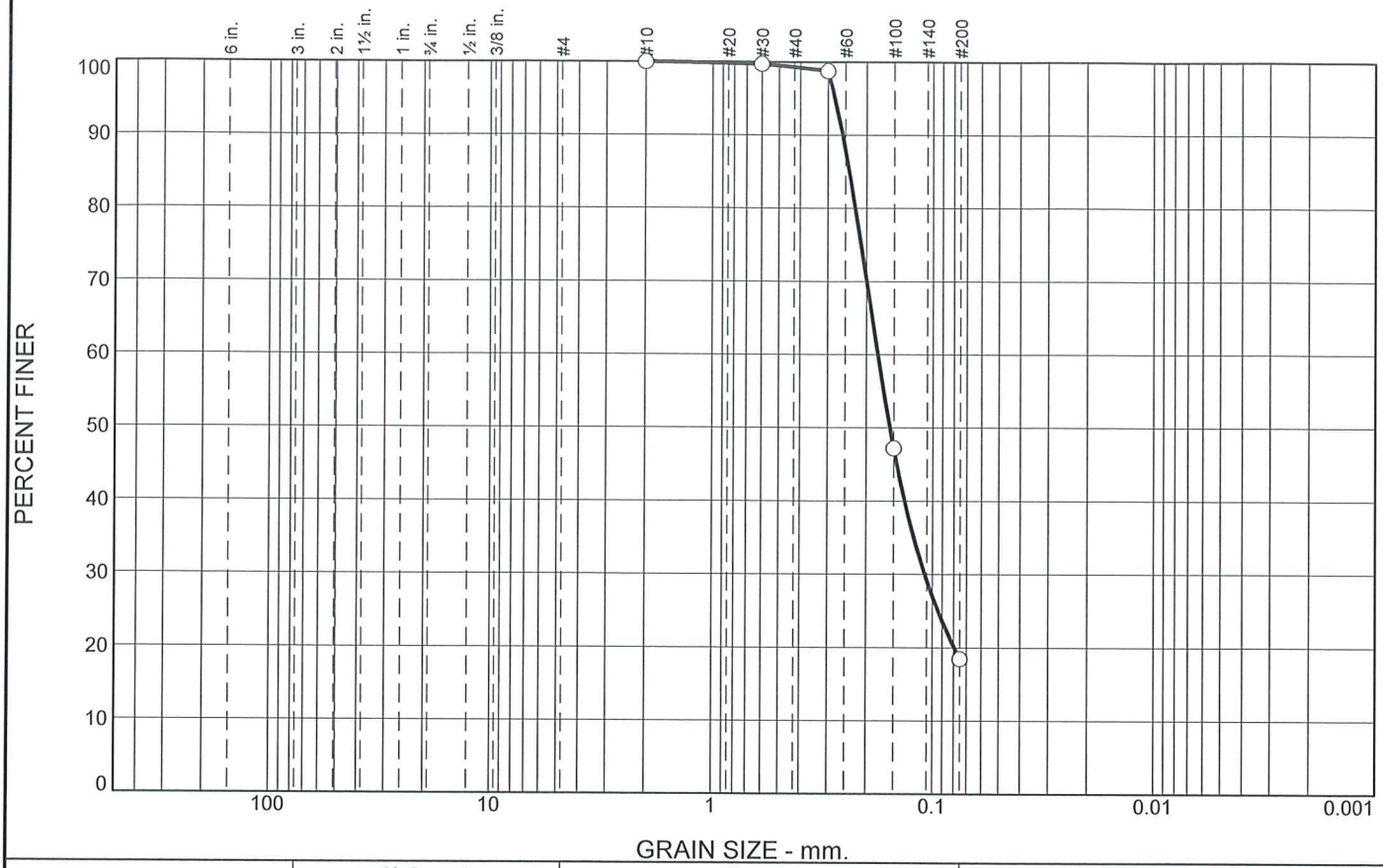
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209 **Figure**

Tested By: J.D. **Checked By:** R.H.

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.7	80.8	18.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	99.7		
#50	98.8		
#100	47.2		
#200	18.5		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2567 D_{85}= 0.2395 D_{60}= 0.1770
D_{50}= 0.1560 D_{30}= 0.1082 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material: Fine SAND, some silt
Coefficient of permeability: 10^-3 to 10^-4 cm/sec

Sample Number: 9

Date: Feb 24/12

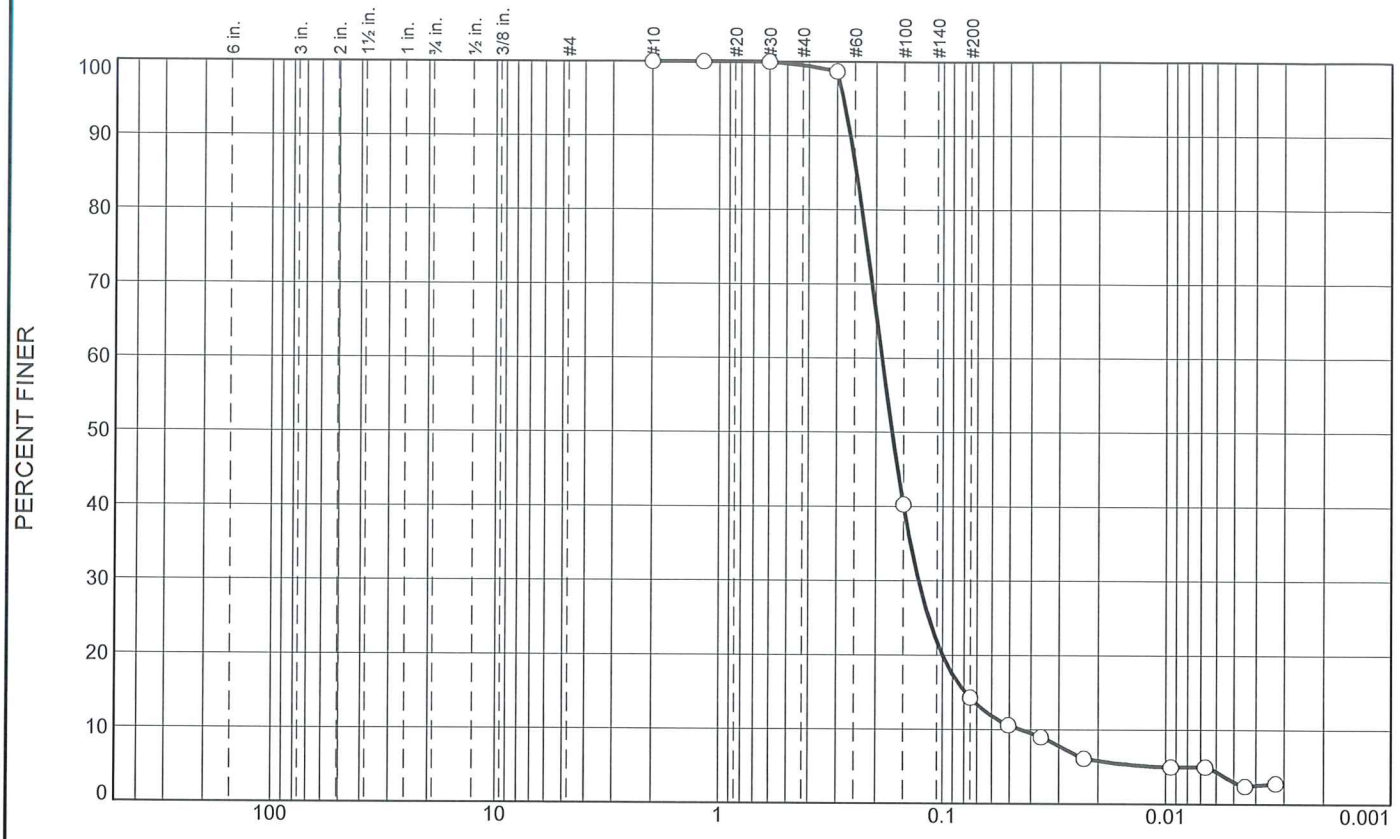
LVM, Inc.

London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River
Project No: P-0000209-0-00-500- **Figure** 004-00

Tested By: AC **Checked By:**

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.5	85.2	14.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#16	100.0		
#30	100.0		
#50	98.7		
#100	40.3		
#200	14.3		

* (no specification provided)

Sample Information

Received: March 26, 2011

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2611 D_{85}= 0.2453 D_{60}= 0.1876
D_{50}= 0.1685 D_{30}= 0.1278 D_{15}= 0.0787
D_{10}= 0.0446 C_u= 4.20 C_c= 1.95

Classification

USCS= AASHTO=

Remarks

Material: Fine sand, some silt
Coefficient of permeability: 10^-3 to 10^-5 cm/sec

Location: Sample No. SS10
Sample Number: L-96

Date: 12-04-12

LVM, Inc.

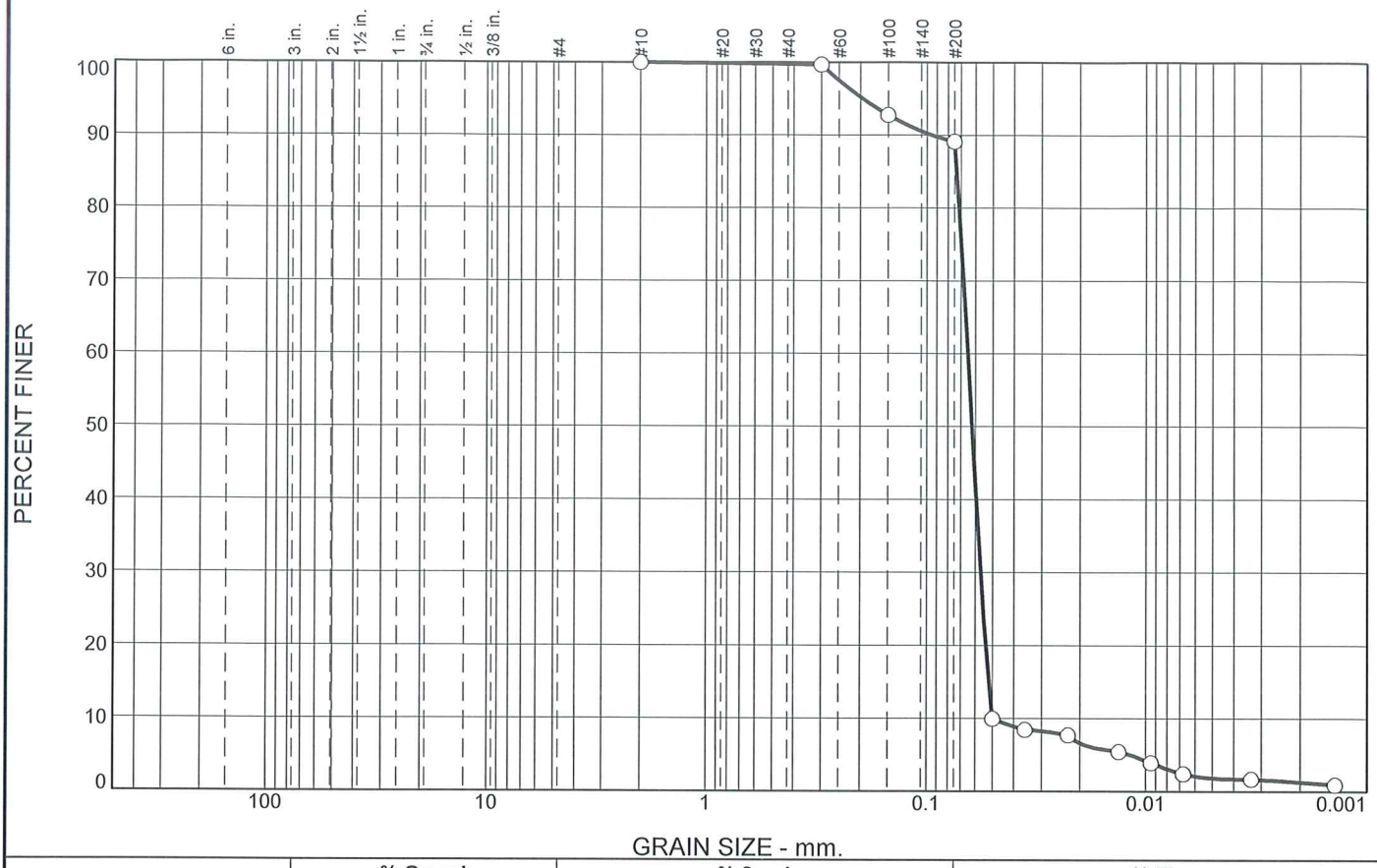
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209 **Figure**

Tested By: J.D. **Checked By:** R.H.

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.3	10.6	87.8	1.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#50	99.7		
#100	92.8		
#200	89.1		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.0950 D_{85}= 0.0732 D_{60}= 0.0648
D_{50}= 0.0620 D_{30}= 0.0566 D_{15}= 0.0519
D_{10}= 0.0499 C_u= 1.30 C_c= 0.99

Classification

USCS= AASHTO=

Remarks

Material: Sandy silt
Coefficient of permeability: 10^-5 to 10^-6 cm/sec

Location: Sample No. SS12
Sample Number: L-97

Date: 11-04-2012

LVM, Inc.

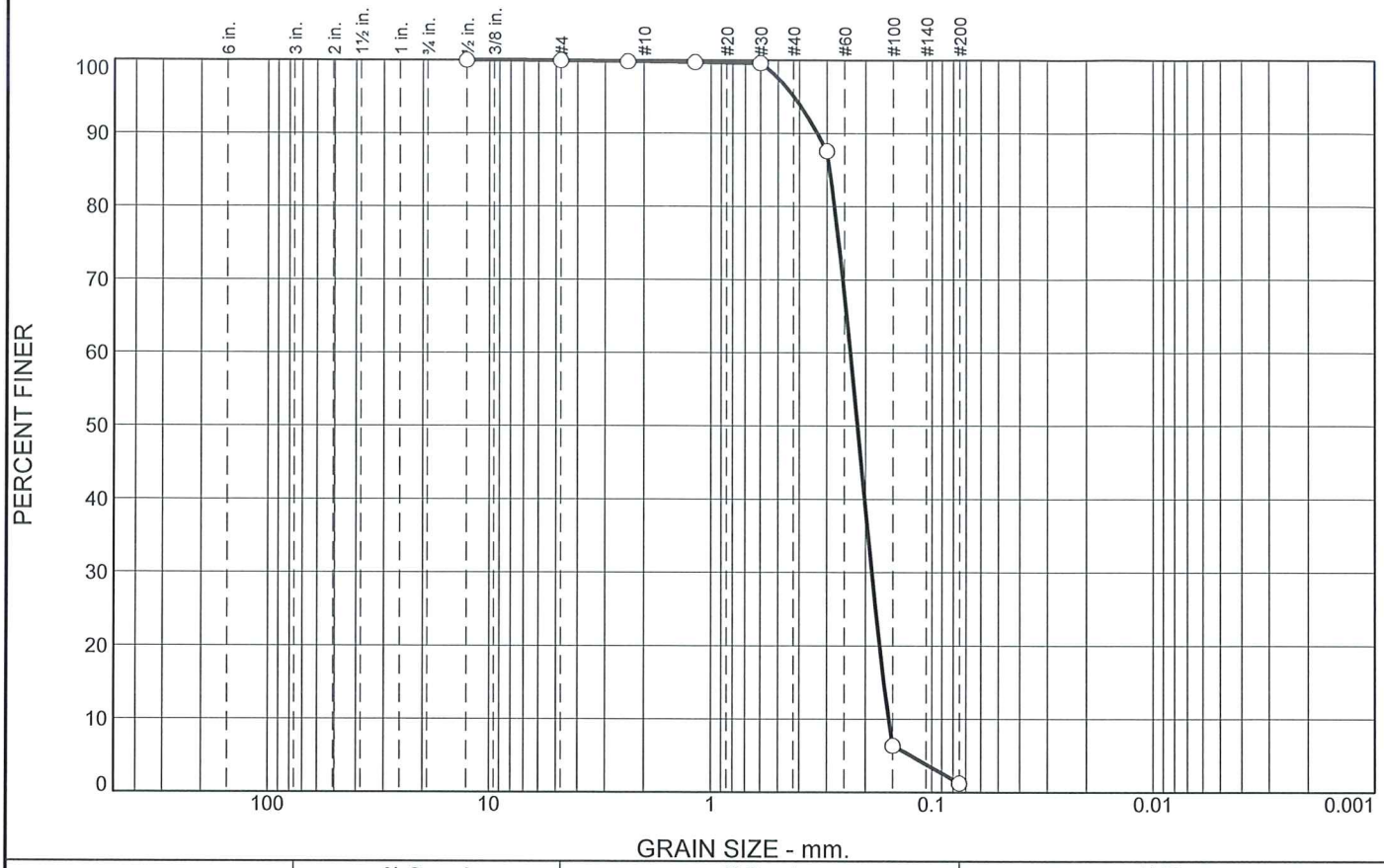
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209 **Figure**

Tested By: J.D. **Checked By:** R.H. RA

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	4.7	93.8	1.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
#4	100.0		
#8	99.8		
#16	99.7		
#30	99.6		
#50	87.6		
#100	6.4		
#200	1.3		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3307 D_{85}= 0.2912 D_{60}= 0.2343
D_{50}= 0.2173 D_{30}= 0.1869 D_{15}= 0.1645
D_{10}= 0.1564 C_u= 1.50 C_c= 0.95

Classification

USCS= AASHTO=

Remarks

Material: Fine SAND, trace of silt
Coefficient of permeability: 2.4 x 10^-2 cm/sec

Sample Number: 13

Date: Feb 24/12

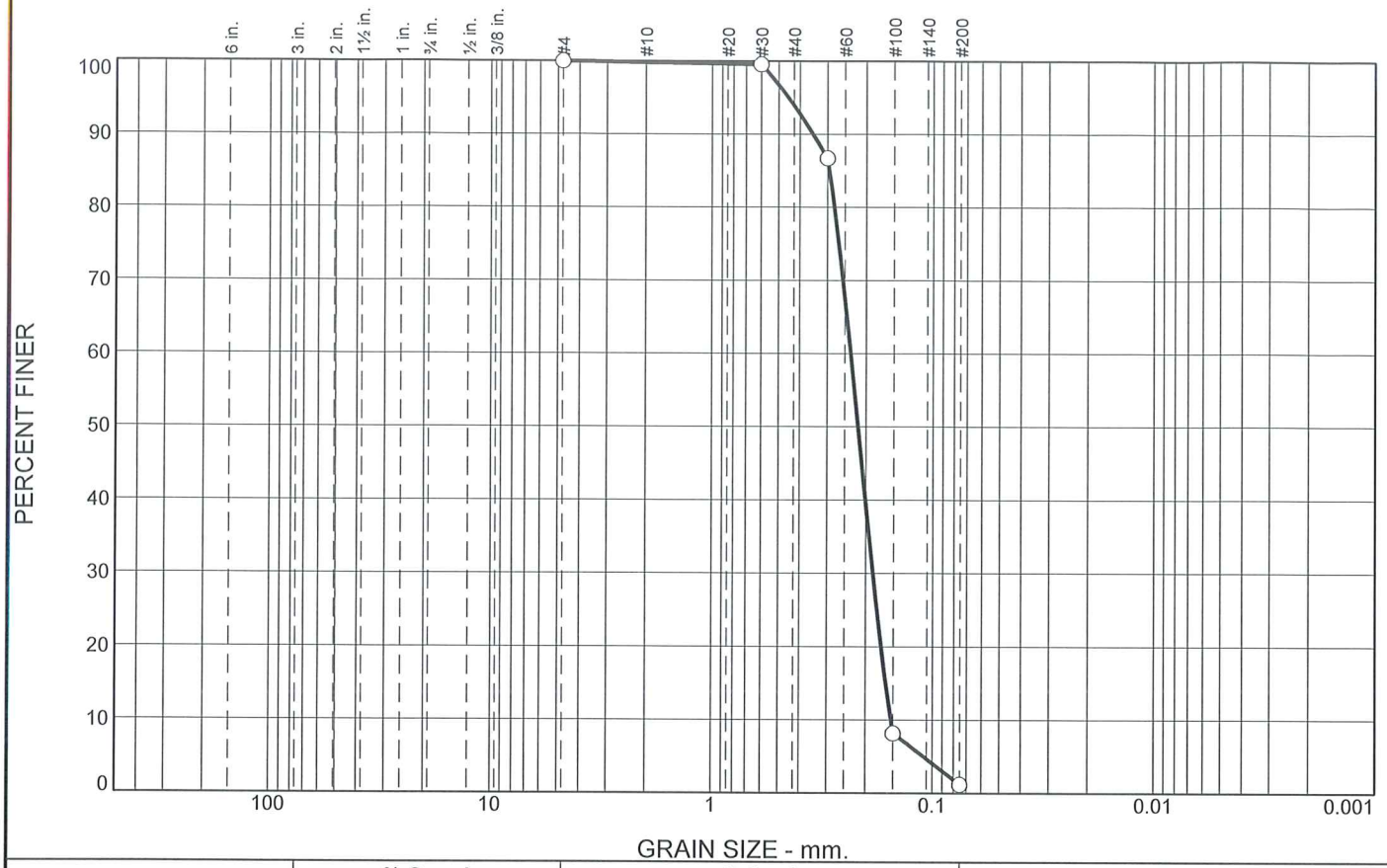
LVM, Inc.

London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River
Project No: P-0000209-0-00-500- **Figure** 005-00

Tested By: AC **Checked By:**

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	5.8	92.8	1.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#30	99.6		
#50	86.7		
#100	8.2		
#200	1.2		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3477 D_{85}= 0.2939 D_{60}= 0.2344
D_{50}= 0.2169 D_{30}= 0.1854 D_{15}= 0.1620
D_{10}= 0.1534 C_u= 1.53 C_c= 0.96

Classification

USCS= AASHTO=

Remarks

Material: Fine sand, trace of silt
Coefficient of permeability: 10^-2 cm/sec

Location: Sample No. SS14
Sample Number: L-98

Date: 11-04-12

LVM, Inc.

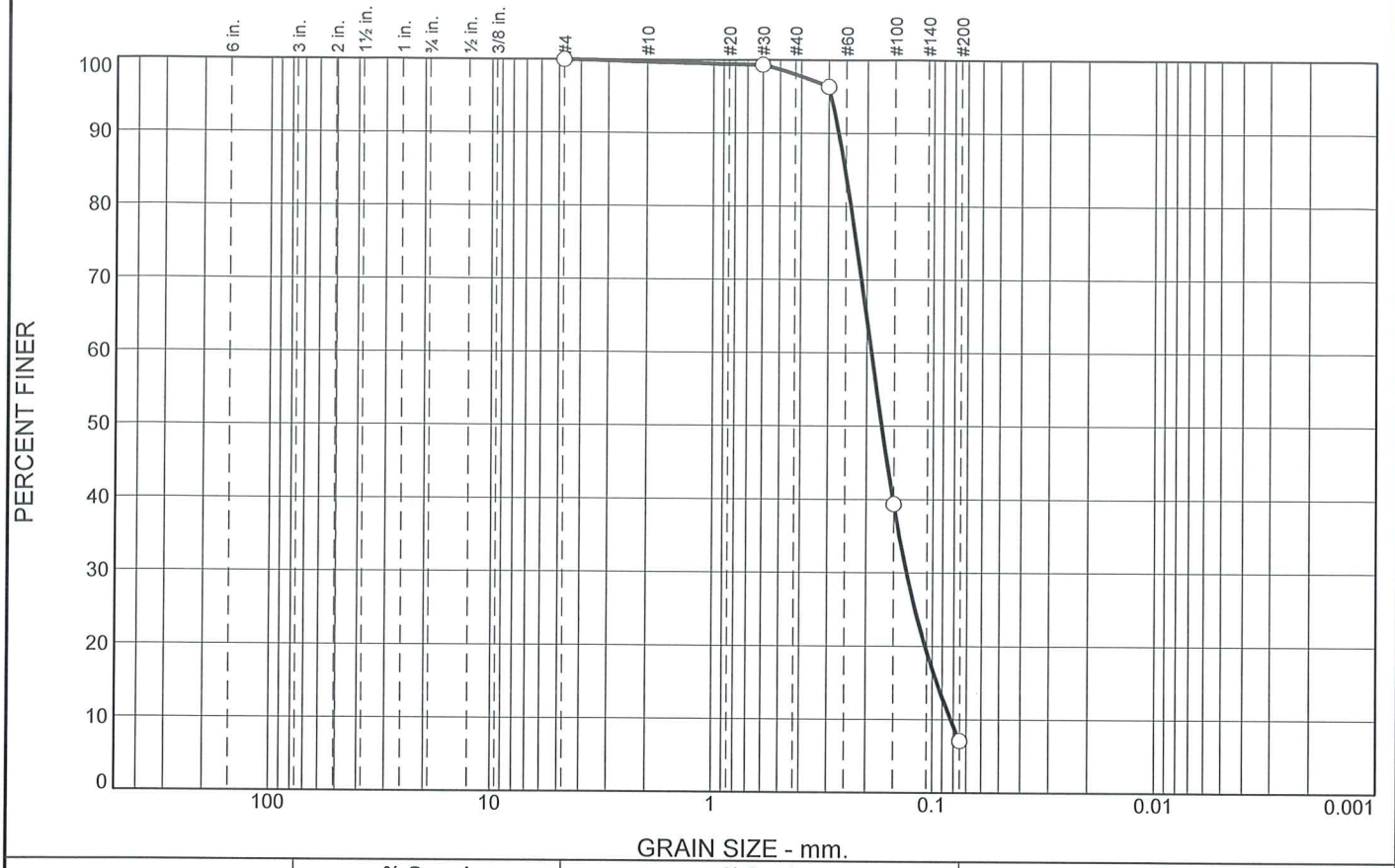
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209 **Figure**

Tested By: J.D. **Checked By:** R.H. RH

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	1.7	90.9	7.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#30	99.3		
#50	96.4		
#100	39.4		
#200	7.1		

* (no specification provided)

Sample Information

Recieved: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2696 D_{85}= 0.2519 D_{60}= 0.1901
D_{50}= 0.1704 D_{30}= 0.1307 D_{15}= 0.0950
D_{10}= 0.0821 C_u= 2.31 C_c= 1.09

Classification

USCS= AASHTO=

Remarks

Material: Fine sand, trace of silt
Coefficient of permeability: 10^-2 cm/sec

Location: Sample No. SS16
Sample Number: L-099

Date: 11-04-12

LVM, Inc.

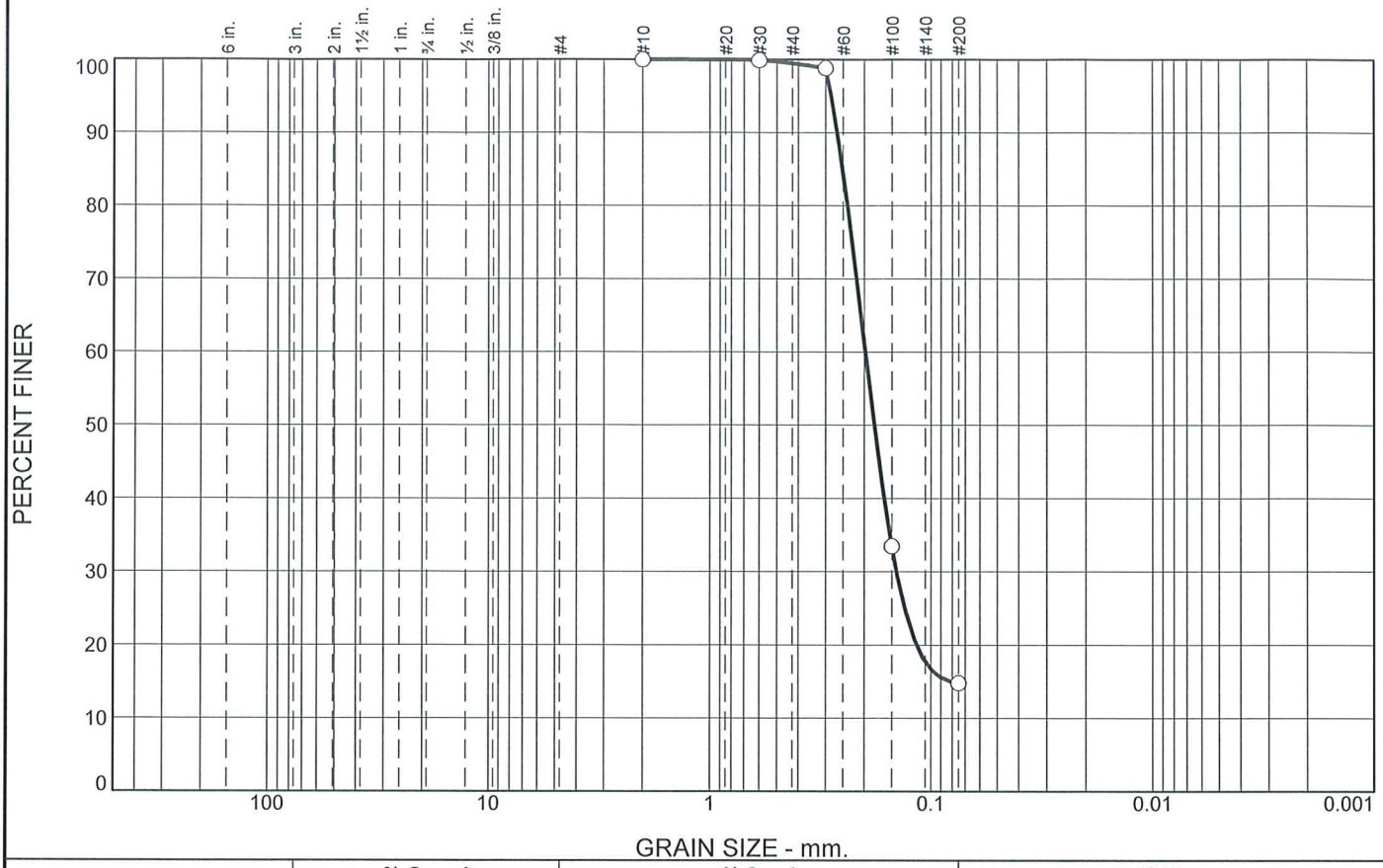
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples
Project No: P-0000209

Figure

Tested By: J.D. **Checked By:** R.H.

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.5	84.7	14.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	99.9		
#50	98.8		
#100	33.5		
#200	14.8		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2654 D_{85}= 0.2510 D_{60}= 0.1975
D_{50}= 0.1797 D_{30}= 0.1428 D_{15}= 0.0802
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material: Fine SAND, some silt
Coefficient of permeability: 10^-3 to 10^-4 cm/sec

Sample Number: 17

Date: Feb 24/12

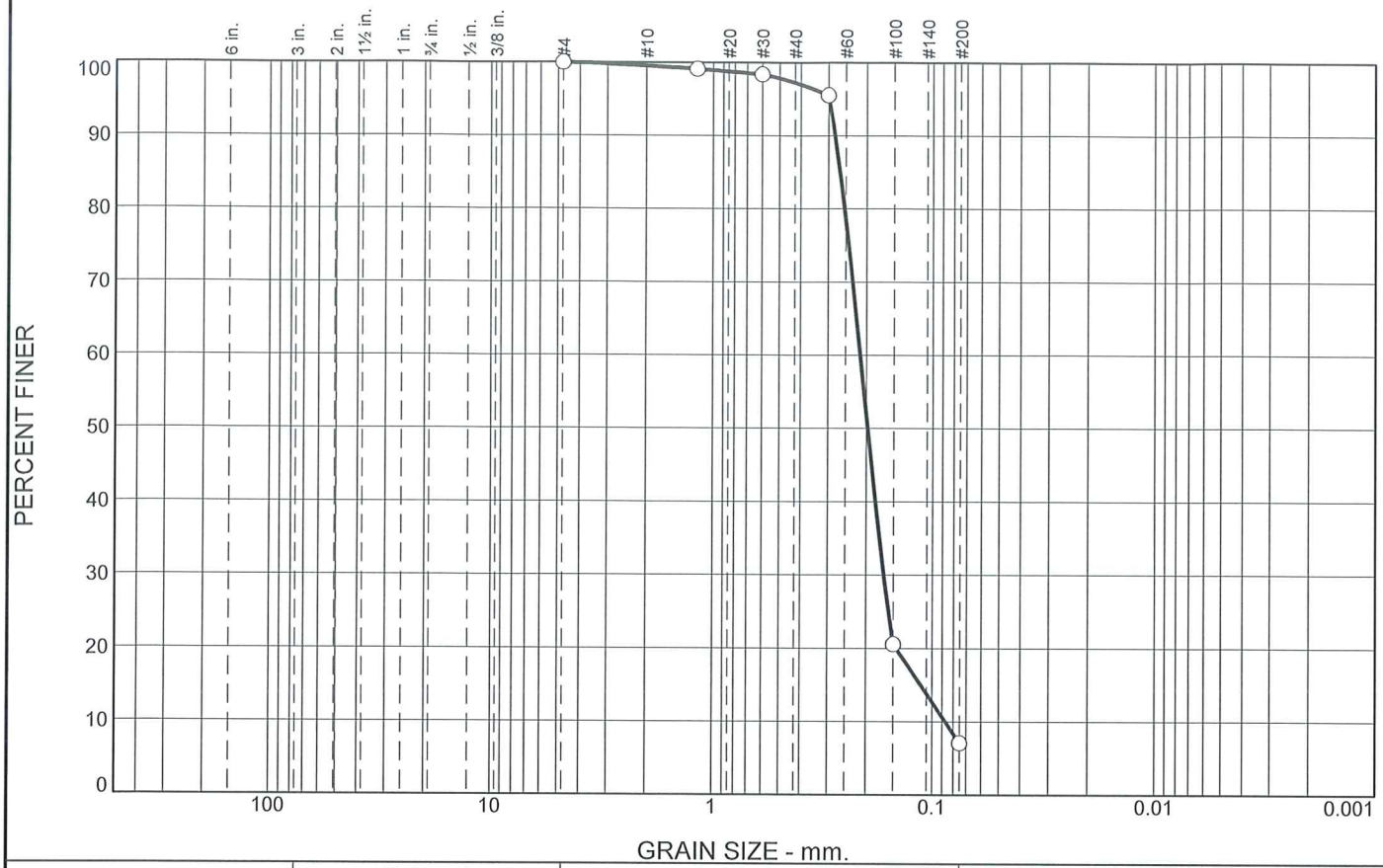
LVM, Inc.

London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River
Project No: P-0000209-0-00-500- **Figure** 006-00

Tested By: AC **Checked By:**

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	2.4	90.1	7.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#16	99.1		
#30	98.4		
#50	95.6		
#100	20.6		
#200	7.1		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2793 D_{85}= 0.2648 D_{60}= 0.2133
D_{50}= 0.1969 D_{30}= 0.1658 D_{15}= 0.1125
D_{10}= 0.0870 C_u= 2.45 C_c= 1.48

Classification

USCS= AASHTO=

Remarks

Material: Fine sand, trace of silt
Coefficient of permeability: 10^-2 cm/sec

Location: Sample No. SS18
Sample Number: L-100

Date: 11-04-2012

LVM, Inc.

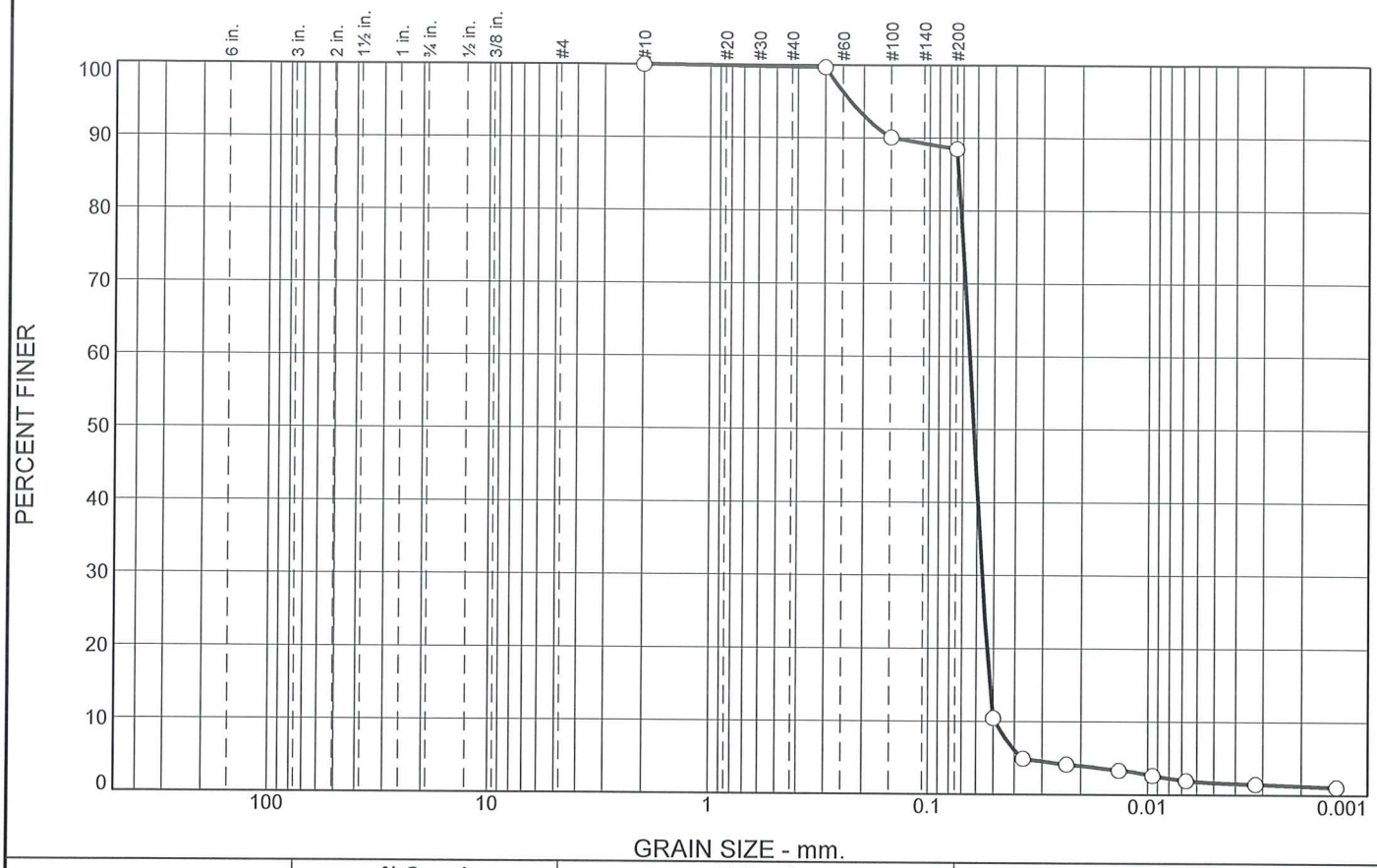
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209 **Figure**

Tested By: J.D. and A.C. **Checked By:** R.H. RH

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	11.3	87.2	1.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#50	99.7		
#100	90.1		
#200	88.5		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= R.H. LL= PI=

Coefficients

D_{90}= 0.1453 D_{85}= 0.0734 D_{60}= 0.0648
D_{50}= 0.0619 D_{30}= 0.0564 D_{15}= 0.0517
D_{10}= 0.0490 C_u= 1.32 C_c= 1.00

Classification

USCS= AASHTO=

Remarks

Material: Silt, some sand
Coefficient of permeability: 10^-5 to 10^-6 cm/sec

Location: Sample No. SS20
Sample Number: L-101

Date: J.D.

LVM, Inc.

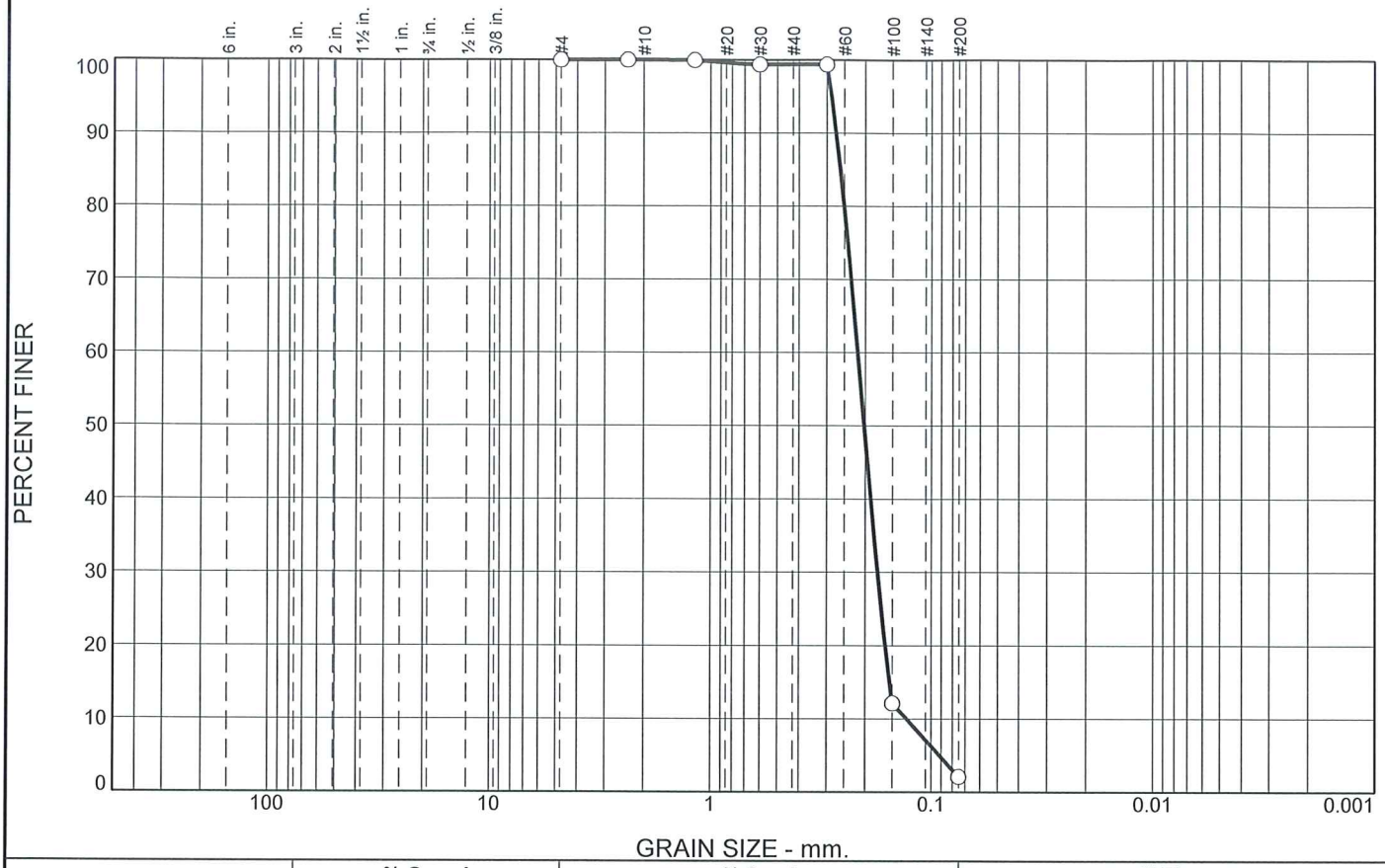
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209 **Figure**

Tested By: J.D. **Checked By:** R.H. RH

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.6	97.3	2.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	100.0		
#16	99.9		
#30	99.4		
#50	99.4		
#100	12.1		
#200	2.1		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2714 D_{85}= 0.2599 D_{60}= 0.2163
D_{50}= 0.2021 D_{30}= 0.1753 D_{15}= 0.1545
D_{10}= 0.1293 C_u= 1.67 C_c= 1.10

Classification

USCS= AASHTO=

Remarks

Material: Fine SAND, trace of silt
Coefficient of permeability: 1.7 x 10^-2 cm/sec

Sample Number: 21

Date: Feb 24/12

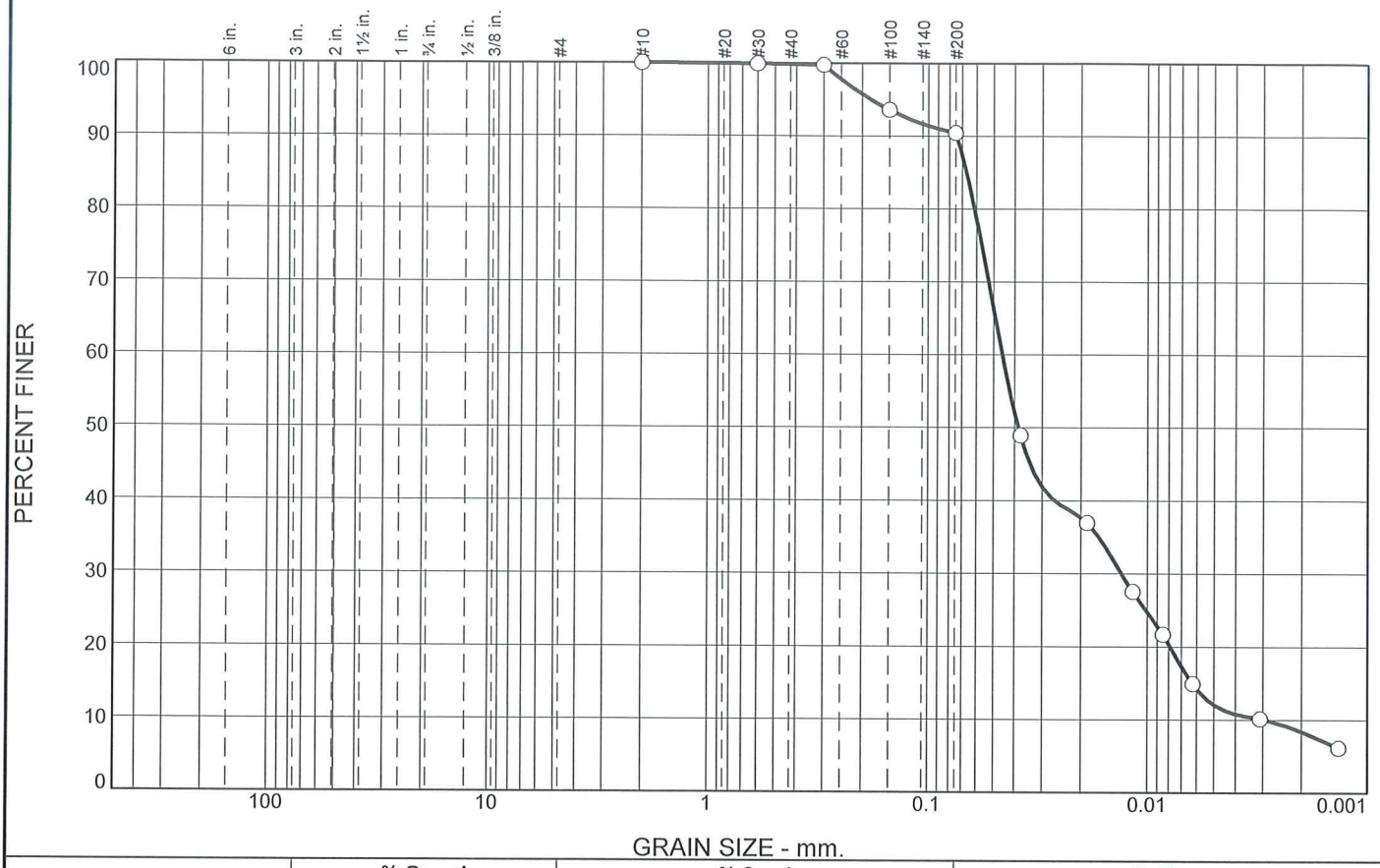
LVM, Inc.

London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River
Project No: P-0000209-0-00-500- **Figure** 007-00

Tested By: AC **Checked By:**

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	9.4	82.1	8.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	99.9		
#50	99.8		
#100	93.6		
#200	90.5		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.0740 D_{85}= 0.0666 D_{60}= 0.0456
D_{50}= 0.0384 D_{30}= 0.0130 D_{15}= 0.0063
D_{10}= 0.0029 C_u= 15.55 C_c= 1.27

Classification

USCS= AASHTO=

Remarks

Material: Silt, trace of clay and sand
Coefficient of permeability: 10^-5 to 10^-6 cm/sec

Location: Sample No. SS22
Sample Number: L-102

Date: 11-04-12

LVM, Inc.

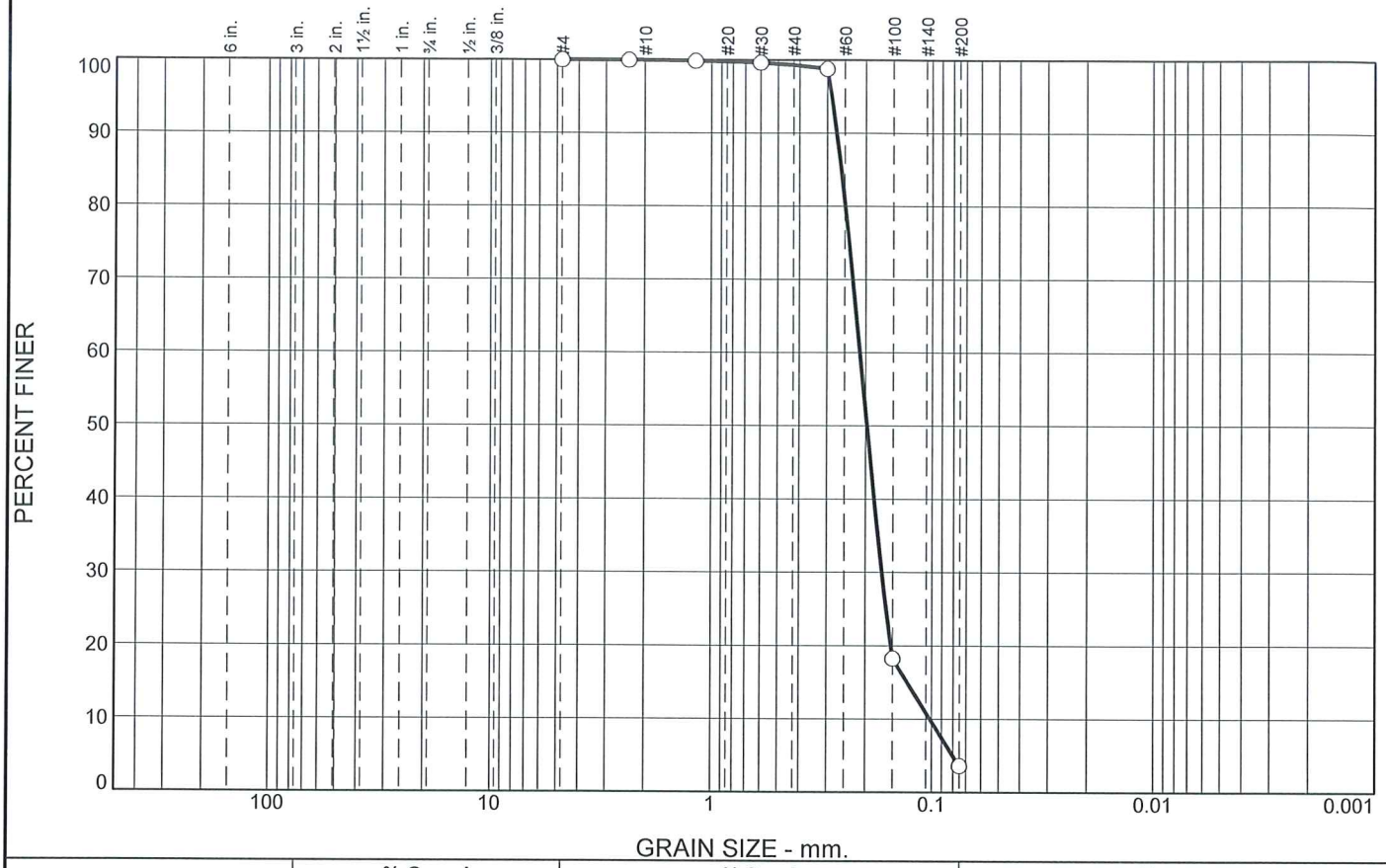
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209 **Figure**

Tested By: J.D. **Checked By:** R.H. RA.

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.7	95.7	3.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	100.0		
#16	99.9		
#30	99.7		
#50	98.8		
#100	18.2		
#200	3.6		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2710 D_{85}= 0.2585 D_{60}= 0.2120
D_{50}= 0.1968 D_{30}= 0.1681 D_{15}= 0.1287
D_{10}= 0.1015 C_u= 2.09 C_c= 1.31

Classification

USCS= AASHTO=

Remarks

Material: Fine SAND, trace of silt
Coefficient of permeability: 1.0 x 10^-2 cm/sec

Sample Number: 23

Date: Feb 24/12

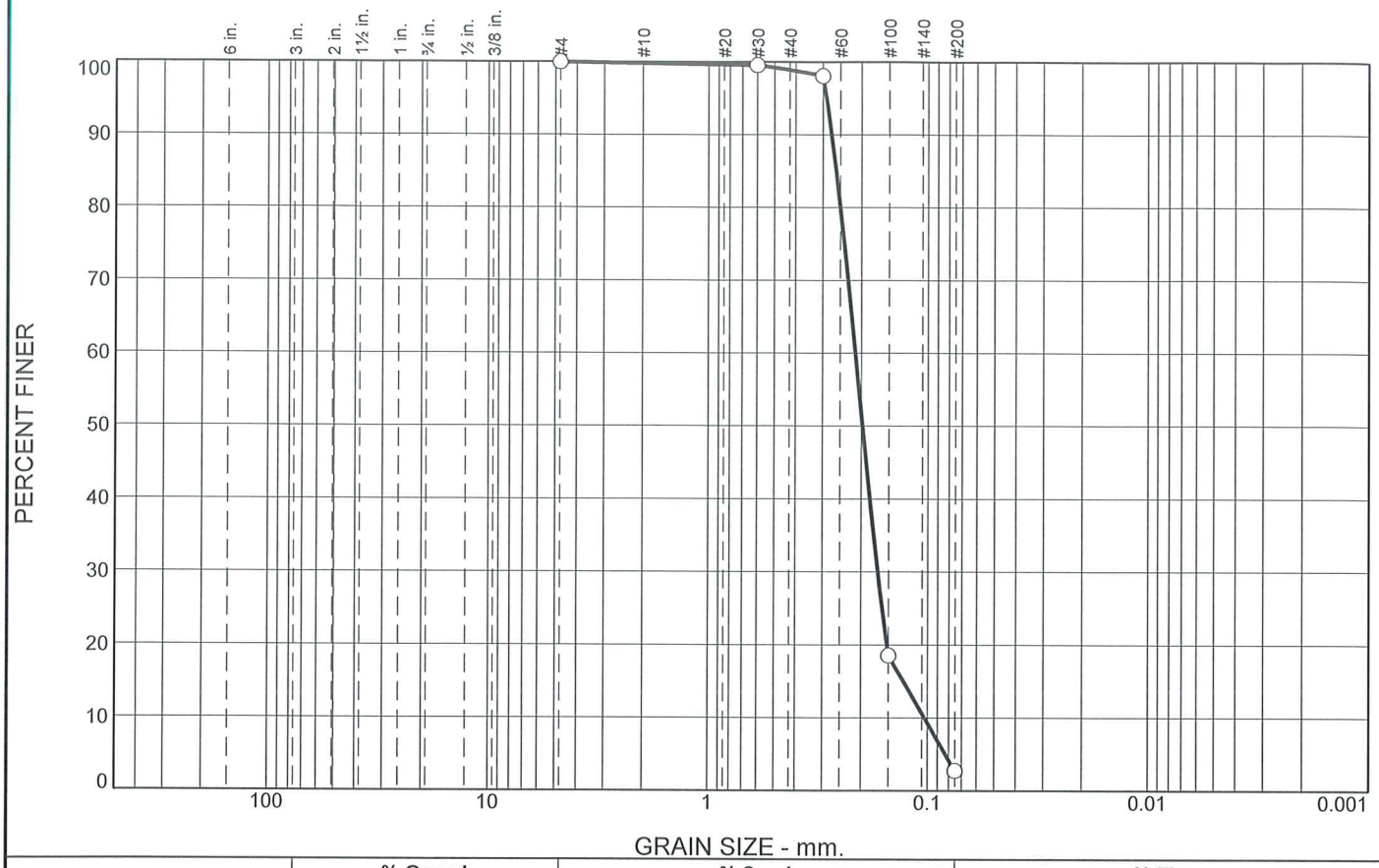
LVM, Inc.

London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River
Project No: P-0000209-0-00-500- **Figure** 008-00

Tested By: AC **Checked By:**

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	0.9	96.1	2.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#30	99.6		
#50	98.1		
#100	18.6		
#200	2.8		

* (no specification provided)

Sample Information

Received: March 26, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2731 D_{85}= 0.2603 D_{60}= 0.2127
D_{50}= 0.1972 D_{30}= 0.1679 D_{15}= 0.1283
D_{10}= 0.1030 C_u= 2.07 C_c= 1.29

Classification

USCS= AASHTO=

Remarks

Material: Fine sand, trace of silt
Coefficient of permeability: 10^-2 cm/sec

Location: Sample No. SS24
Sample Number: L-103

Date: 11-04-12

LVM, Inc.

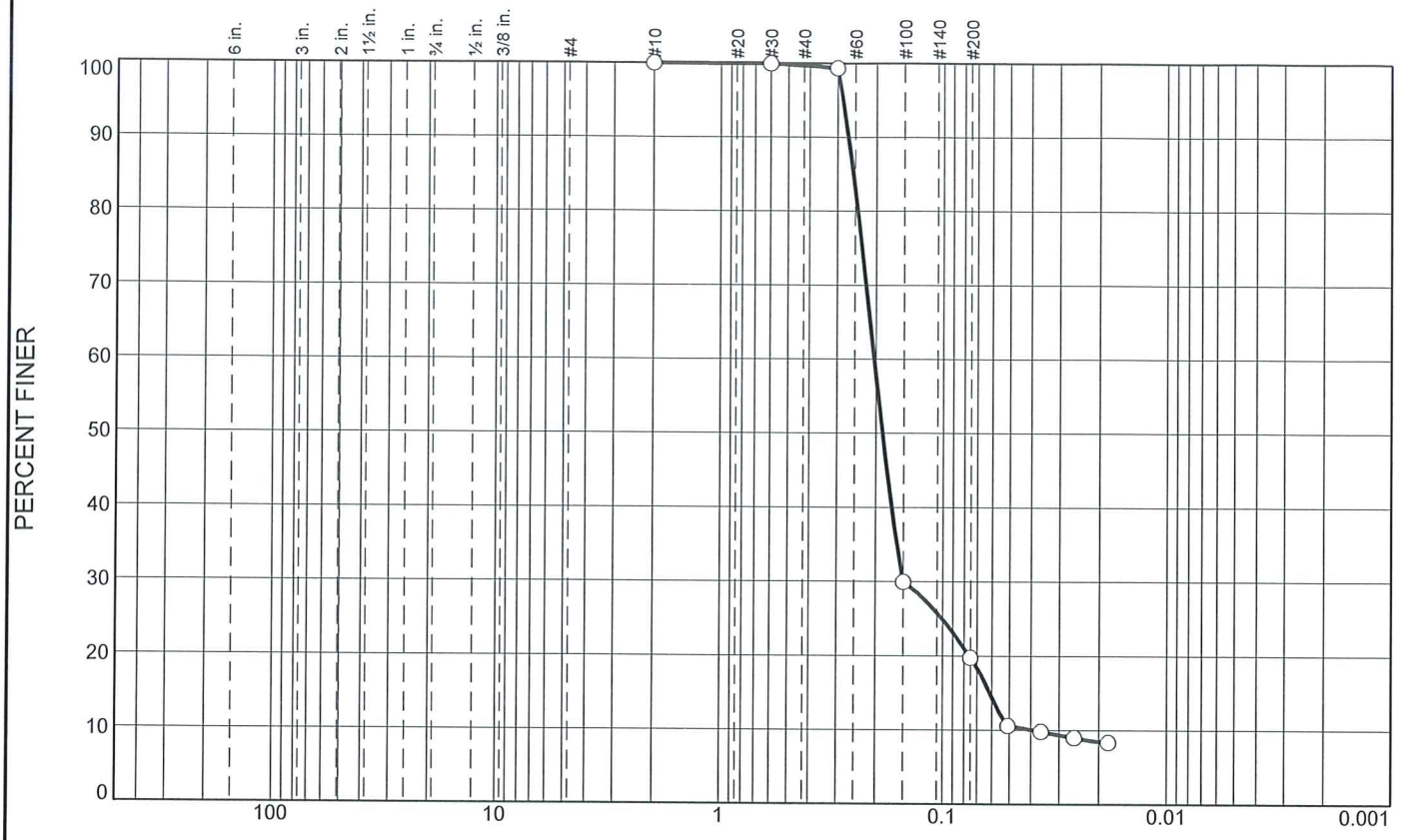
London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209 **Figure**

Checked By: RA.

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.3	80.0	19.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	99.9		
#50	99.3		
#100	30.0		
#200	19.7		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2670 D_{85}= 0.2538 D_{60}= 0.2035
D_{50}= 0.1865 D_{30}= 0.1501 D_{15}= 0.0611
D_{10}= 0.0391 C_u= 5.21 C_c= 2.83

Classification

USCS= AASHTO=

Remarks

Material: Fine SAND, some silt
Coefficient of permeability: 1.5 x 10^-3 cm/sec

Sample Number: 25

Date: Feb 24/12

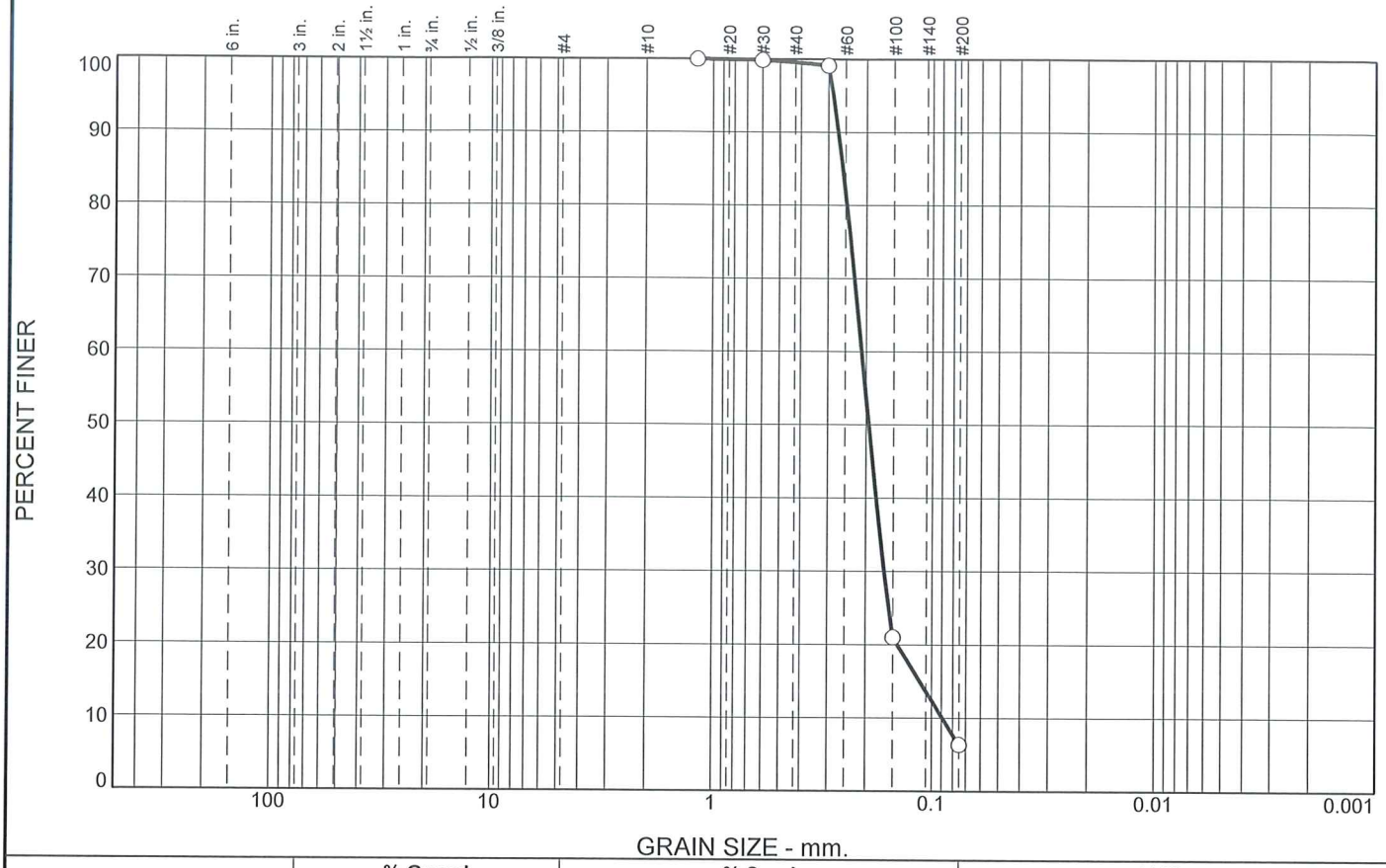
LVM, Inc.

London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River
Project No: P-0000209-0-00-500- **Figure** 009-00

Tested By: AC **Checked By:**

Grain Size Analysis



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.4	93.2	6.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#16	100.0		
#30	99.9		
#50	99.1		
#100	21.0		
#200	6.4		

* (no specification provided)

Sample Information

Received: April 4, 2012

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2694 D_{85}= 0.2568 D_{60}= 0.2096
D_{50}= 0.1941 D_{30}= 0.1645 D_{15}= 0.1129
D_{10}= 0.0890 C_u= 2.35 C_c= 1.45

Classification

USCS= AASHTO=

Remarks

Material: Fine sand, trace of silt
Coefficient of permeability: 10^-2 cm/sec

Location: Sample No. SS28
Sample Number: L-104

Date: 11-04-2012

LVM, Inc.

London, Ontario

Client: Riggs Engineering Ltd.
Project: St. Clair River Sediment Samples

Project No: P-0000209 **Figure**

Tested By: J.D. **Checked By:** R.H. RA

Stokes Point Dredging 2005 – Photos taken show dredged material in scows during 2005 contract. Photos indicate larger typical grain size compared with Southeast Bend Cut-off Channel.

Appendix B
Sediment Sample Grain Size Analysis

2013 Samples

	Sample															
	13-1	13-2	13-3	13-4	13-5	13-6	13-7	13-8	13-9	13-10	13-11	13-12	13-13	13-14	13-15	13-16
Particle Size Distribution (%Sand)	34	78	13	61	70	70	95	95	48		91	94			10	91
Particle Size Distribution (%Silt)	47	13	27	27	18	18			35	27	4	2	32	41	27	4
Particle Size Distribution (%Clay)	19	9	60	12	12	12	4	4	17	72	5	4	67	58	63	5
Soil Texture	Loam	Sandy Loam	Heavy Clay	Sandy Loam	Sandy Loam	Sandy Loam	Sand	Sand	Loam	Heavy Clay	Sand	Sand	Heavy Clay	Silt Clay	Heavy Clay	Sand

Appendix C
Site Inspection 2012

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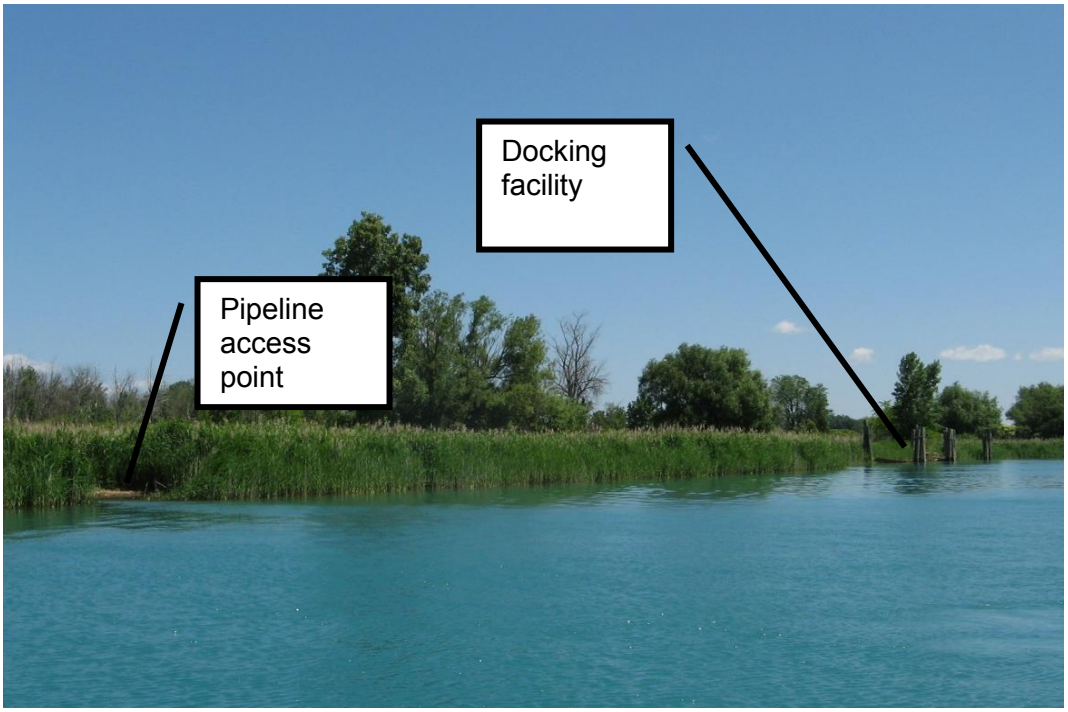

Photo 1: June 2012, View from Middle Channel looking at pipeline access on left and dock for vehicle access on right.

Photo 2: September 2012, View of offloading at pipeline access point.

Photo 3: September 2012, View looking at staging area at docking facility.

Photo4: September 2012, View looking along access road from docking facility to CDF.

Photo 5: June 2012, View looking west into CDF from access road

Photo 6: September 2012, View looking west along temporary haul road within CDF.

Photo 7: September 2012, Dredged material from current USACE contract is being disposed west of Disposal Area 2.

Photo 8: June 2012, View looking west along existing berm from a location west of Disposal Area 2.

Appendix D
Environmental Mitigation Measures

APPENDIX D
ENVIRONMENTAL MITIGATION MEASURES

Responsible Authority: Department of Fisheries and Oceans Canada (DFO) Canadian Coast Guard (CCG)

Southeast Bend Cut-off Channel and Stokes Point, Maintenance Dredging 2013

PWGSC Project No. R.042805.001

The purpose of this record is to monitor the implementation of mitigation measures. It is the responsibility of the PWGSC Project Manager to ensure that this record is completed over the duration of the project. This Environmental Mitigation Measures report form must be completed in full. Specify in the table below whether the mitigation measures have been applied. If a mitigation measure has not been applied, specify the reason(s) why this was not done.

Environmental Mitigation Measure	**Implementation Schedule/Date**	**Person/Title/ Firm Responsible**	**Compliance (Task Complete – Yes or No/Date) If No, provide reason**
Reduce or eliminate idling time of equipment and vehicles, including while loading trucks.			
Vehicles, equipment and boats must be maintained in good condition, equipped with emission controls as applicable, and operate within regulatory requirement, including meeting local authorities emission requirements.			
Fires and burning of rubbish are not permitted.			
Properly shape stockpile to avoid steep faces or sides.			
Cover or wet down materials to prevent blowing dust.			
If necessary, provide windbreaks to reduce dust (wind screen; fences).			
Provide dust control for temporary roads.			
Apply other mitigation measures, as applicable, as per "*Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities".* Prepared by Cheminfo Service Inc. and Construction and Demolition Multi-stakeholder Working Group for Environment Canada Transboundary Issues Branch (2005).			
Repair any damage and restore surfaces, including stabilizing and revegetating any disturbed soils, as soon as possible.			
Contractor to employ an experienced dredge operator capable of minimizing sediment disturbance and resuspension.			
No in-water disposal of dredged material.			
Dredged material must be deposited in CDF.			

Contractor should ensure that dump scows are sealed to avoid leakage of dredged material.			
If spillage or leakage of dredged material occurs, stop work until remedial measures are taken. Do not permit any dredged material to spill or flow into waterways during disposal of the material and do not overtop perimeter dykes at CDF.			
Install sedimentation/erosion control measures prior to commencement of any disturbance of the site, including earthworks. Maintain sedimentation/erosion control measures on a regular basis, particularly prior to and after runoff events, with accumulated materials being cleaned out regularly and prior to removal of sediment and erosion control measures.			
Do not pump water containing suspended materials (or other harmful substances) into waterways, sewer or drainage systems.			
Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.			
All materials and equipment used for the purpose of site preparation and project completion shall be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering the water.			
Fuelling of machinery must take place at a safe distance from the waterway as designated by the Departmental Representative.			
Prevent spillage of gasoline, diesel fuel and other oil products into the waterways.			
Machines and equipment used shall be free of visible grease and oils.			

Do not allow any debris, fill, deleterious material or other foreign material to enter the waterway.			
All workers should be fully aware of the spill prevention and response procedures, including notification of the MOE Spills Action Centre at 1-800-268-6060.			
The Contractor should have emergency spill response equipment available onsite to ensure prompt response to any oil or fuel leaks or spills.			
An emergency spill kit is to be kept onsite in case of fluid leaks of spills from machinery.			
Ensure workers have proper training in spill control and containment, and are required to implement spill control measures.			
Ensure emergency spill control equipment readily available on-site at all times.			
All materials and equipment used for the purpose of site preparation and project completion shall be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering the water.			
Machinery should be operated in a manner that minimizes disturbance to the banks or bed of the water body.			
Machinery to arrive on site in a clean condition and to be maintained free of fluid leaks.			
Machinery to be washed, refuelled, and serviced and fuel and other materials for the machinery is to be stored away from the water to prevent deleterious substances from entering the water.			
Implement mitigation measures as per Surface Water / Drainage, Fish/Fish Habitat and Noise.			
Complete work as quickly as possible.			

Ensure all works are in compliance with the *Migratory Birds Convention Act.*			
Work can not proceed during the OMNR "No in-water work" window March 15 to June 30.			
Contractor to take measures to suppress releases of dust. Monitor public complaints. Inform CCG.			
Submit site-specific Health and Safety Plan within 7 days after date of Notice to Proceed and prior to work commencement, including: - Results of site specific safety hazard assessment. - Results of safety and health risk or hazard analysis of site tasks and operation from work plan. - Measures/controls to be implemented to address identified safety hazards/risks. - A Fire Safety Plan, specific to the work location - Contractor's /Sub-Contractors' Safety Communication Plan. - Contingency and Emergency Response Plan.			
Comply with Acts and regulations of the Province of Ontario and the US, as applicable, including Acts and regulations governing safety and environmental aspects.			
Comply with specified standards and regulations to ensure safe operations at site.			
In event of conflict between and provisions of specified standards and regulations, the most stringent provision governs.			
Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Project Manager verbally and in writing.			
Follow procedures in place for Employees Right to Refuse Work as specified in the Act for the Province of Ontario.			

Implement mitigation for Navigation.			
Abide by the local noise by-laws.			
Maintain equipment, including noise reduction components, in a good state of repair.			
Efforts will be undertaken by the contractor to avoid sensitive timings with respect to noise (i.e. during early morning or evening when duck hunting activities occur).			
Do not dispose of debris in open lake or waterways.			
Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.			
Ensure proper storage of materials and operation of equipment to prevent deleterious substances from entering water.			
Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use handling, storage and disposal of hazardous materials and regarding labelling and the provision of material safety data sheets acceptable to Labour Canada.			
Conduct ongoing inspection and monitoring of the proposed mitigation measures to ensure that they are properly functioning and, if deemed necessary, implement the necessary contingency action if the monitoring finds that the mitigation measures are not functioning as intended. This can include suspending work until repairs can be made.			
Do not impede navigation during progress of work in accordance with the Collision Regulation with Canadian Modifications 1983.			

Ascertain schedule of vessel movements in area affected by dredging operations, recognizing the site is subject to heavy commercial and recreational navigational traffic.			
All vessels must comply with the *Canada Shipping Act*, including any requirements under the collision regulations.			
All vessels and floating equipment should be marked with lights in accordance with the Collision Regulation with Canadian Modifications 1983.			
Any floating material and debris must be contained during the dredging activity and removed upon completion of the operation.			
The Contractor will maintain a VHF marine radio watch on board.			
The Contractor must notify the Regional Operations Centre at Watchkeeper (1-800-265-0237), Canadian Coast Guard, Prescott, Ontario and keep them informed of dredging operations in order that necessary Notices to Shipping and Notices to Mariners will be issued. Notify Watchkeeper at least 24 hours in advance of commencement and upon completion of the dredging.			
Ensure employees wear highly visible, fluorescent orange safety clothing.			
Monitor daily, short term and long term weather forecasts for potential extreme weather conditions affecting the Project.			

NOTES: _____

_____

_____

_____

Completed by:

Name: _____ Title: _____

Firm: _____ Telephone No.: _____

Signature: _____ Date: _____