



# Hydrometric Station Mercury Assessment

Pembina River Below Crystal Creek – Station # 05OB023  
Rural Municipality of Argyle, Manitoba

Prepared for:

**Winnipeg Environmental  
Remediations Inc.**

4040 Main Street  
West St. Paul, MB R4A 1A7

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Pinchin File: 292865



**Hydrometric Station Mercury Assessment**

Pembina River Below Crystal Creek – Station # 05OB023, Rural Municipality of Argyle,  
Manitoba

Winnipeg Environmental Remediations Inc.

December 3, 2021

Pinchin File: 292865

**Issued To:** Winnipeg Environmental Remediations Inc.  
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**Issuing Office:** Winnipeg, MB  
**Primary Contact:** Valeriy Tyshchuk, B.E.Sc., P.Eng.QP<sub>ESA</sub>  
Senior Project Manager  
204.891.9171  
[vtyshchuk@pinchin.com](mailto:vtyshchuk@pinchin.com)

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Author: 

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Mario Muan, B.Sc.  
Environmental Scientist  
204.250.2316  
[mmuan@pinchin.com](mailto:mmuan@pinchin.com)

Reviewer: 

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Grant Eftoda, B.Sc. (Eng.)  
Senior Technical Manager  
204.770.8919  
[geftoda@pinchin.com](mailto:geftoda@pinchin.com)



## **EXECUTIVE SUMMARY**

Pinchin Ltd. (Pinchin) was retained through an Authorization to Proceed, Limitation of Liability and Terms of Engagement signed by Winnipeg Environmental Remediations Inc. (Client) to conduct a Hydrometric Station Mercury Assessment (HSMA) of the property located at Pembina River Below Crystal Creek – Station # 05OB023 in Rural Municipality of Argyle, Manitoba (hereafter referred to as the Site).

It is Pinchin's understanding that the HSMA was required to support the decommissioning of the existing hydrometric station at the Site.

The shelter infrastructure required decommissioning as the hydrometric station was discontinued. The shelter housed instrumentation that contained mercury. Mercury is regulated under the Canadian Environmental Protection Act (CEPA).

The HSMA was completed at the Site by Pinchin on September 8, 2021 and consisted of an initial mercury vapour survey, advancement of fourteen test pits and completion of confirmatory soil sampling. Pinchin also observed the dismantling and removal of the hydrometric shelter and soil excavation by the Client.

Soil samples collected during the HSMA were submitted for laboratory analysis of mercury.

Based on Site-specific information, the soil quality was assessed based on the Canadian Council of Ministers of the Environment (CCME) "*Environmental Quality Guidelines*", accessed on the CCME web site in October 2021 (hereafter referred to as the "CCME Soil Guidelines").

Reported concentrations in the soil samples submitted for analysis of mercury satisfied the CCME Soil Guidelines.

Backfilling and revegetation activities were conducted by the Client at the Site on October 22, 2021.

Based on the findings of this HSMA, it is Pinchin's opinion that that no further work is required in relation to mercury contamination in soil at the Site.

*This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.*



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## 1.0 INTRODUCTION

Pinchin Ltd. (Pinchin) was retained through an Authorization to Proceed, Limitation of Liability and Terms of Engagement signed by Winnipeg Environmental Remediations Inc. (Client) to conduct a Hydrometric Station Mercury Assessment (HSMA) of the Pembina River below Crystal Creek Hydrometric Station (05OB023) located at the Rural Municipality of Argyle, Manitoba (hereafter referred to as the Site). The Site location is shown on Figure 1 (all Figures are provided in Appendix I).

It is Pinchin's understanding that the HSMA was required to support the decommissioning of the existing hydrometric station at the Site.

### 1.1 Background Information

Pinchin reviewed the following documents that were provided to Pinchin for review by Environment and Climate Change Canada (ECCC):

- *“Assessment and Cleanup of Mercury from Hydrometric Stations, Manitoba, 2001 Program, Volume II: Final Detailed Site Reports”*, completed by Environmental Services, Western Region, PWGSC for the Water Survey of Canada, Environment Canada dated March 2002 (2002 PWGSC Detailed Report);
- *“Update to the National Hydrometric Station Mercury Remediation Guidance Document”*, completed by Dillon Consulting for the Public Services and Procurement Canada (PSPC), dated March 2020 (2020 Mercury Guidance Document); and
- *“Statement of Work, 2021 Pembina River below Crystal Creek – 05OB023”*, completed by ECCC (SoW 05OB023).

Based on Pinchin's review of the the above-referenced documents, it is understood that ECCC is seeking to engage the Client to complete decommissioning of existing hydrometric stations located at the Sites. As part of the decommissioning activities, an assessment of the structure and soils below and around the structure are required to be completed by an environmental consultant to confirm results of previous assessments and to assess for presence of mercury in soils prior to decommissioning, in accordance with the 2020 Mercury Guidance Document. It is understood that all the Sites are classified as Rural/Remote Sites for the purpose of assessment per the 2020 Mercury Guidance Document.

The Site station name is “Pembina River below Crystal Creek” with station number 05OB023. The Site is located approximately 11 kilometres (km) west of Pilot Mound, Manitoba on PR 253, then approximately 35 metres (m) north into the pasture. The Site has GPS coordinates of 49°13'19.3" N, 99°02'04.7" W. Further details pertaining to the Site are provided in Section 1.3.



The 2002 PWGSC Detailed Report indicated that the hydrometric shelter and surrounding soil conditions were assessed and met the clean up criteria, wherein no further action was required. Furthermore, the SoW 05OB023 indicated that the shelter infrastructure was no longer in use and deemed for decommissioning in the summer of 2021.

## **1.2 Scope of Work**

The scope of work completed by Pinchin, as outlined in the Pinchin proposal entitled “*REVISED Proposal for Hydrometric Station Mercury Assessments, Seven Sites, Manitoba, Canada*” submitted to the Client on August 6, 2021, included the following:

- Preparation of an Environmental Management Plan as per ECCC requirements;
- Preparation a Remedial Plan to be submitted to Manitoba Conservation and Climate for review and approval;
- Following receipt of approval of Remedial Plans and any other required permits (to be obtained by the Client) to complete the work, notification of the owners of each property at least 48 hours prior to the scheduled fieldwork day in order to arrange access to the Sites;
- Mobilization to the Sites and conduct a mercury vapour survey using a Jerome 505 instrument to confirm vapour concentrations of mercury within the shelters and exterior are below applicable guidelines and consistent with findings of the initial Shelter Assessments;
- Advancement of up to fifteen (15) test pits at each Site with shovel or hand-auger to a maximum depth of 0.3 metres around and underneath each shelter to assess soil quality for presence of mercury and to provide information on Site-specific geological characteristics, in accordance with requirements set out in the 2020 Mercury Guidance Document;
- Completion of confirmatory soil sampling activities following soil excavation by the Client;
- Field sample screening using the Lumex RA-915 Light Zeeman Mercury Spectrometer (Lumex RA-915) instrument on samples collected from each test pit and soil sampling location;
- Provide on-Site supervision of soil remediation activities during the shelter decommissioning to be completed by the Client;



- Submission of soil samples from each test pit and confirmatory samples, including duplicates, as well as one sample of backfill material for each Site excavation for chemical analyses of mercury using cold vapour atomic adsorption spectrophotometry (EPA Method 7471) to Bureau Veritas, a laboratory accredited by the Standards Council of Canada and the Canadian Association for Laboratory Accreditation. The soil samples were submitted on 3 day rush turnaround time;
- Evaluation of the soil analytical results by comparison to the applicable criteria;
- Preparation of Field Forms for each Site documenting the findings of the assessment, in accordance with reporting requirements outlined in the 2020 Mercury Guidance Document and the ECCC Scope of Work documents. The Field Forms will be included in the Final Report to be prepared following completion of the decommissioning activities; and
- Preparation of a factual report detailing the findings of the HSMA and recommendations.

The scope of work described in the Pinchin proposal included the advancement of up to fifteen (15) test pits at the Site. However, due to presence of a former concrete anchor underlying the hydrometric shelter, only fourteen (14) test pits were advanced at the Site.

Additionally, the scope of work described in the Pinchin proposal included collection of soil samples from imported backfill material. However, backfilling and revegetation activities at the Site were conducted by the Client on a separate date. Therefore, no samples from backfill material were collected in relation to the Site. Based on information provided by the Client, areas included in the soil sampling activities were re-graded with imported topsoil backfill and seeded with grass.

Lastly, the scope of work described in the Pinchin proposal included preparation of a factual report in a template to be provided by the ECCC. However, no report template was provided and therefore, this HSMA report was written as outlined in the SoW 05OB023 document provided to Pinchin.

### **1.3 Areas of Potential Environmental Concern and Potential Contaminants of Concern**

The following tables summarises the Site's general information and the APECs and potential contaminants of concern (PCOCs) that were investigated during the HSMA.



The associated investigative test pit and/or soil sampling locations for each APEC are also listed.

<b>General Information</b>	
Hydrometric Station Number	05OB023
Hydrometric Station Name	Pembina River below Crystal Creek
Environment Canada Sub-Office	No data provided
Latitude/Longitude	49°13'19.3" N, 99°02'04.7" W
Map Number	No data provided
Date Established	1962
Previous Shelter Locations	No data provided
Urban/Remote Land Use	Rural
<b>General Information</b>	
Limit of Acceptable Mercury Concentrations in Soil	6.6 mg/kg
Applicable Regulatory Guideline	Canadian Council of Ministers of the Environment's (CCME) " <i>Environmental Quality Guidelines</i> "
Previous Mercury Assessment/Remediation Date	2002 PWGSC Detailed Report
Recommendation from Previous Report	Decommissioning (SoW 05OB023)
<b>Site Access Details</b>	
Environment Canada Access Clearance Date	August-September 2021
Access Notification Date	August 2021
Station Access Date	September 8, 2021
Staff Accessing Station	Pinchin, WERI



<b>Environmental Observations</b>	
Topography	Sloping down towards Pembina River
Stratigraphy	Brown silt, some sand, trace gravel
Nearest Surface Water Body	Pembina River
Drainage	Stormwater run off most likely to drain towards Pembina River
Vegetation/Wildlife	Grass, shrubs, trees
Environmentally Sensitive Areas	Pembina River, approximately 10 m west of hydrometric shelter
Public Access and Land Use	30 m north of PR 253; Agricultural
Other Station Structures	None observed

Table 1. General project information.

<b>APEC #</b>	<b>Description of APEC List of PCOCs</b>	<b>Associated Investigative Test Pits</b>
1	Description: Mercury in the soil surrounding and underneath the metal shelter and within the shelter and its wooden foundation PCOC: Mercury	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14

Table 2. Initial Investigation Results Summary – Potential contaminant exceedances in APECs and PCOCs associated with the Site.

## 2.0 REGULATORY FRAMEWORK

All work performed as part of this HSMA was conducted in accordance with regulations and practices established by Manitoba Conservation and Climate under the Contaminated Site Remediation Act (C.C.S.M. c. C205).

A Remedial Action Plan (RAP) was developed and submitted to Manitoba Conservation and Climate on July 13, 2021 for approval. The RAP outlined the scope of work related to the decommissioning of the hydrometric shelter, which consists of assessment activities and soil remediation activities. The RAP was approved on August 19, 2021. The RAP and RAP approval document is presented in Appendix VI.

Following approval of the RAP, Pinchin developed an Environmental Management Plan (EMP) for the Client, dated August 30, 2021, and submitted it to Environment and Climate Change Canada to demonstrate general understanding of the environmental component of the hydrometric shelter decommissioning activities. The EMP is presented in Appendix VII.



Manitoba Conservation and Climate has adopted Canadian Council of Ministers of the Environment (CCME) guidelines as the regulatory criteria applicable to soil conditions in Manitoba. Analytical results of soil samples are compared to criteria set forth in the CCME “*Environmental Quality Guidelines*” that are accessed at the CCME web site. These guidelines are hereby referred to as the “CCME Soil Guidelines”.

The above guidelines have been developed using a risk-based approach. The application of the appropriate criteria is dependent upon several site-specific conditions including:

- The existing/proposed land use;
- The existing/potential groundwater use;
- Soil depth; and
- Soil texture.

Guidelines are further subdivided into the following types of protection:

- Human health guidelines; and
- Environmental health guidelines.

Within each of these categories, several pathways are listed that describe how the chemical or compound in question would come in contact with the receptor. If a pathway is not applicable to a site, or a specific area of a site, then the corresponding guideline value is not applicable. For example, if the site is covered with asphalt or concrete, access to the soil is limited and the human health guideline for soil ingestion is not applicable because there is no pathway for humans to come into contact with the soil if the cover is maintained. If future use of a site is modified, pathways that were not applicable can become applicable and need to be reassessed.

Site-specific details for the evaluation of applicable pathways are as noted below.

- As outlined in the 2020 Mercury Guidance document, agricultural land use criteria are applied to rural/remote sites, even if the land use designation or intended land use is not agricultural.
- Pinchin conducted a groundwater well search on the GW Drill database and there are no groundwater wells within 250 m radius of the Site. As such, groundwater is not a potable source on-Site or in the vicinity of the Site.
- Groundwater is not used for livestock watering at the Site and, therefore, the livestock watering pathway is not applicable to the Site.
- The Site is located within 30 metres of Pembina River and, therefore, the freshwater aquatic life pathway is applicable to the Site.



- Native soils at the Site are prominently comprised of fine-grained soils (silt) and fine-grained guidelines are applicable to the Site.
- The human health vapour inhalation pathway is applicable within 30 centimetres of a building foundation (or proposed building foundation). For the purpose of this HSMA, the human health vapour inhalation pathway has been considered applicable to the Site.
- The environmental health soil contact, human health ingestion, and human health dermal contact pathways are applicable in areas where access to the soil is possible (i.e., not under asphalt, concrete or a building foundation). The areas of the Site included in this HSMA were bare and, therefore, the environmental health soil contact, human health ingestion and human health dermal contact pathways are considered to be applicable to the Site.
- The off-Site migration check, management limit, and nutrient and energy cycling checks are applicable to all areas of the Site.

Based on the above evaluation, all soil analytical results have been compared to the CCME Soil Guidelines for agricultural land use and fine-grained soils.

The above evaluation is based on Pinchin's observation of Site conditions at the time of the HSMA. If Site conditions or use of the Site changes in the future, the applicable pathways should be re-evaluated.

### **3.0 METHODOLOGY**

The investigation methodology was conducted in general accordance with standard environmental consulting practices and the following documents:

- Dillon Consulting publication entitled "*Update to the National Hydrometric Station Mercury Remediation Guidance Document*", dated March 2020; and
- Manitoba Conservation and Climate guidelines entitled:
  - "*Environmental Site Assessments in Manitoba*", dated June 2016.
- Manitoba Conservation and Climate information bulletins entitled:
- "*Contaminated Sites Remediation Regulation Reporting Requirements and Standards*", dated October 2015; and
- Canadian Standards Association publication entitled "*Phase II Environmental Site Assessment, CSA Standard Z769-00 (R 2018)*".



### **3.1 Initial Mercury Vapour Survey**

Pinchin conducted an initial mercury vapour survey at the Site on September 8, 2021 prior to the hydrometric shelter decommissioning activities. Using a Lumex RA-915 Light Zeeman Mercury Spectrometer (Lumex RA-915), mercury vapour readings at the Site were obtained from the background (outdoors, upwind), and inside the hydrometric shelter: mid-level, left front door, right front door, left back door, and right back door. The mercury vapour readings were collected three times for each location.

Mercury vapour readings exceeding 0.025 milligrams per cubic metre (mg/m<sup>3</sup>) are considered exceedances to the criteria outlined in the 2020 Mercury Guidance Document and will prompt a hydrometric shelter clean-up to be conducted by the Client. If mercury vapours satisfy the criteria, decommissioning of the hydrometric shelter may proceed.

The Lumex RA-915 operated in this HSMA generated vapour readings in microgram per cubic metre (µg/m<sup>3</sup>), which provided more conservative screening data.

The mercury vapour readings obtained during the initial mercury vapour survey are presented in the field logs/ forms in Appendix II.

### **3.2 Hydrometric Shelter Decommissioning Activities**

The Client completed the hydrometric shelter decommissioning activities at the Site on September 8, 2021 following satisfactory results from the initial mercury vapour survey. The Client used power tools to dismantle anchor bolts attaching the hydrometric shelter to the ground. Using a track-mounted excavator equipped with a bucket and thumb, the hydrometric shelter was removed from its location.

The landowner requested from the Client that the hydrometric shelter structure to be donated to the landowner for private use. Verbal authorization from ECCC was provided to the Client regarding this event.

Photographs depicting different events of the hydrometric shelter decommissioning activities are presented in Appendix III.

### **3.3 Soil Sampling**

Pinchin advanced fourteen (14) test pits at the Site, to a maximum depth of 0.3 metres below ground surface (mbgs) using hand tools (shovel, trowel) following the sampling plan outlined in the 2020 Mercury Guidance Document. For each test pit, composite soil samples were collected from the test pit walls and floor, avoiding the upper detritus zone. Each composite soil sample was homogenized in a sample bag and consisted of 1/3 floor sample and 2/3 wall sample material. Soil samples were containerized in laboratory-supplied glass sampling jars.



Following removal of the hydrometric shelter and soil excavation by the Client, confirmatory soil samples were collected within the excavated area using hand tools (shovel, trowel). Up to nine (9) soil samples were collected at a depth of approximately 0.3 mbgs. Soil samples were containerized in laboratory-supplied glass sampling jars.

Soil samples were labelled using the following nomenclature: Site Name (shortened) –Test Pit Number/Confirmatory Sampling Location. For example, “Crystal-02”, was the sample collected at the Pembina River below Crystal Creek Hydrometric Station in test pit 2 and “Crystal-16” was the sample collected at the Pembina River below Crystal Creek Hydrometric Station in confirmatory sampling location 16.

Subsurface soil conditions were logged on-Site by Pinchin personnel at the time of the HSMA. A portion of each sample was analyzed in the field for mercury vapour concentrations in soil headspace using the Lumex RA-915. Mercury vapour readings exceeding 0.025 mg/m<sup>3</sup> will prompt a soil remediation to be conducted by the Client, which consists of additional soil excavation. The mercury vapour readings obtained during the soil sampling activities are presented in the field logs/ forms in Appendix II.

The locations of the test pits are shown on Figure 2 and a description of the subsurface stratigraphy encountered during the soil sampling activities is documented in the field logs/ forms included in Appendix IV.

### **3.4 Sampling and Laboratory Analysis**

#### *3.4.1 Soil*

One composite soil sample recovered from each test pit was submitted for laboratory analysis of mercury.

The test pit locations are shown on Figure 2.

One discrete soil sample collected from each confirmatory sampling location was submitted for laboratory analysis of mercury.

The confirmatory sampling locations are shown on Figure 3.

#### *3.4.2 Analytical Laboratory*

Soil samples were delivered to Bureau Veritas Laboratories (BV Labs) in Winnipeg, Manitoba for analysis. BV Labs is an independent laboratory accredited by the Standards Council of Canada and the Canadian Association for Laboratory Accreditation. Formal chain of custody records of the sample submissions were maintained between Pinchin and the staff at BV Labs.



### 3.5 QA/QC Protocols

Various quality assurance/quality control (QA/QC) protocols were followed during the HSMA to ensure that representative samples were obtained and that representative analytical data were reported by the laboratory.

Field QA/QC protocols that were employed by Pinchin included the following:

- Soil samples were extracted from areas not in direct contact with the sampling equipment where possible, to minimize the potential for cross-contamination;
- Soil samples were placed in laboratory-supplied glass sample jars;
- Soil samples were placed in coolers on ice immediately upon collection, with appropriate sample temperatures maintained prior to submission to the laboratory;
- Dedicated and disposable nitrile gloves were used for sample handling;
- Non-dedicated monitoring and sampling equipment (e.g., shovel, trowel) was cleaned before initial use and between uses to minimize the potential for cross-contamination by washing with an Alconox™/potable water mixture followed by a deionized water rinse; and
- Sample collection and handling procedures were performed in general accordance with the *Manitoba Conservation and Climate Guidelines* and Pinchin's SOPs for excavations.

BV Labs's internal laboratory QA/QC consisted of the analysis of laboratory duplicate, method blank, matrix spike and spiked blank samples, and an evaluation of relative percent difference (RPD) calculations for laboratory duplicate samples.

#### 3.5.1 Field Duplicate Samples

In addition to the above QA/QC measures, Pinchin also collected a total of two field duplicate soil samples during the HSMA for analysis to assess the suitability of field sampling methods and laboratory performance. The field duplicate samples were collected immediately following collection of the regular samples. The frequency of field duplicate soil sample analysis complied with the requirement that one field duplicate soil sample is analyzed for every ten regular soil samples submitted for analysis. The field duplicate pairings and corresponding analytical parameters are summarized as follows:

- Soil sample Crystal-01 and its corresponding field duplicate Crystal-Dup1 were submitted for laboratory analysis of mercury;
- Soil sample Crystal-14 and its corresponding field duplicate Crystal-Dup2 were submitted for laboratory analysis of mercury; and



- Soil sample Crystal-17 and its corresponding field duplicate Crystal-Dup3 were submitted for laboratory analysis of mercury.

The quality of the analytical results was evaluated by calculating the RPD for the original and field duplicate samples. The RPDs were calculated using the following equation:

$$\text{RPD} = \frac{(\text{Original Concentration} - \text{Duplicate Concentration}) \times 100}{(\text{Original Concentration} + \text{Duplicate Concentration})/2}$$

RPDs were not calculated unless the parameter concentration in both the original and duplicate sample had detectable concentrations above the corresponding practical quantitation limit (PQL) for the parameter, which is equal to five times the lowest laboratory RDL.

The calculated RPDs for the original and field duplicate soil samples have been compared to performance standard of 50%, which are considered acceptable by Pinchin. If calculated RPD values are greater than the performance standards, further assessment is required of the apparent lack of precision of the analytical results and the effect, if any, on the interpretation of the analytical results. This assessment may include a review of analytical laboratory quality control, reporting errors and field sampling methods.

## **4.0 RESULTS**

### **4.1 Site Geology**

Based on the soil samples recovered during the soil sampling activities, the soil stratigraphy at the test pit locations below the grass generally consists of brown silt, some sand, trace gravel to a depth of approximately 0.3 mbgs.

A detailed description of the subsurface stratigraphy encountered during borehole advancement is documented in the field logs located in Appendix II.

Pembina River is located approximately 10 m west of the Site. Groundwater flow at the Site is inferred to be towards the west based on the location of Pembina River.

### **4.2 Soil Headspace Vapour Concentrations**

Mercury vapour concentrations measured in the headspace of soil samples collected during the soil sampling activities are presented on the field logs/forms in Appendix II and measured at 0 µg/m<sup>3</sup> throughout all the soil samples.



#### **4.3 Field Observations**

No staining or evidence of mercury spills were observed in the soil samples collected during the soil sampling activities.

#### **4.4 Hydrometric Shelter Decommissioning**

Following removal of the hydrometric shelter structure from its location, the landowner requested from the Client that the hydrometric shelter structure to be donated to the landowner for private use. As a result, no debris resulting from the hydrometric shelter decommissioning were transported for off-Site disposal by the Client.

#### **4.5 Confirmatory Soil Sampling**

Following the hydrometric shelter decommissioning, soil below the hydrometric shelter was excavated by the Client. The underlying soil material was excavated to a depth of approximately 0.3 mbgs. The excavation dimensions along with the confirmatory soil sample locations are shown in Figure 3.

The excavated soil material was hauled and transported by the Client to an approved facility and disposed as hazardous material. Details pertaining to the excavated soil material and the disposal facility location were not provided to Pinchin.

#### **4.6 Backfilling and Revegetation**

The area included in the soil sampling activities was backfilled using topsoil material imported to the Site by the Client on October 22, 2021. Approximately 1.8 tonnes of topsoil material were used for backfilling at the Site. Following placement, the backfill was seeded with grass.

The backfill material and grass seed weigh bill are presented in Appendix IV. Pinchin notes that these weigh bills represent the total volume used for six hydrometric shelter Sites.



#### 4.7 Analytical

##### 4.7.1 Soil

As indicated in Table 3, reported concentrations of mercury in the soil samples submitted for analysis met the CCME Soil Guidelines.

Parameter	CCME Soil Guidelines <sup>a</sup>	Sample Designation					
		Sample Collection Date (dd/mm/yyyy)					
		Sample Depth Range (mbgs)					
		Crystal-01	Crystal-02	Crystal-03	Crystal-04	Crystal-05	Crystal-06
		08/09/2021	08/09/2021	08/09/2021	08/09/2021	08/09/2021	08/09/2021
		0.05-0.30	0.05-0.30	0.05-0.30	0.05-0.30	0.05-0.30	0.05-0.30
Total Mercury	6.6	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Parameter	CCME Soil Guidelines <sup>a</sup>	Sample Designation					
		Sample Collection Date (dd/mm/yyyy)					
		Sample Depth Range (mbgs)					
		Crystal-07	Crystal-08	Crystal-09	Crystal-10	Crystal-11	Crystal-12
		08/09/2021	08/09/2021	08/09/2021	08/09/2021	08/09/2021	08/09/2021
		0.05-0.30	0.05-0.30	0.05-0.30	0.05-0.30	0.05-0.30	0.05-0.30
Total Mercury	6.6	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Parameter	CCME Soil Guidelines <sup>a</sup>	Sample Designation			
		Sample Collection Date (dd/mm/yyyy)			
		Sample Depth Range (mbgs)			
		Crystal-13	Crystal-14	Crystal-Dup1	Crystal-Dup2
		08/09/2021	08/09/2021	08/09/2021	08/09/2021
		0.05-0.30	0.05-0.30	0.05-0.30	0.05-0.30
Total Mercury	6.6	<0.050	<0.050	<0.050	0.062

Notes:

- CCME Canadian Council of Ministers of the Environment
- NG No guideline for corresponding parameter
- BOLD** Exceeds referenced guideline
- Units All units in mg/kg unless otherwise specified
- mbgs Metres below ground surface

<sup>a</sup> Referenced from the CCME Canadian Environmental Quality Guidelines, accessed on-line in October 2021.  
 Data represents the most stringent criterion for agricultural land-use.

Table 3. Mercury Analysis for Soil.



**Hydrometric Station Mercury Assessment**

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Following soil excavation at the Site, reported concentrations of mercury in the soil samples collected during the confirmatory soil sampling activities and submitted for analysis met the CCME Soil Guidelines as indicated in Table 4.

Parameter	CCME Soil Guidelines <sup>a</sup>	Sample Designation					
		Sample Collection Date (dd/mm/yyyy)					
		Sample Depth (mbgs)					
		Crystal-15	Crystal-16	Crystal-17	Crystal-18	Crystal-19	Crystal-20
		08/09/2021	08/09/2021	08/09/2021	08/09/2021	08/09/2021	08/09/2021
		0.3	0.3	0.3	0.3	0.3	0.3
Total Mercury	6.6	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Parameter	CCME Soil Guidelines <sup>a</sup>	Sample Designation			
		Sample Collection Date (dd/mm/yyyy)			
		Sample Depth (mbgs)			
		Crystal-21	Crystal-22	Crystal-23	Crystal-Dup3
		08/09/2021	08/09/2021	08/09/2021	08/09/2021
		0.3	0.3	0.3	0.3
Total Mercury	6.6	<0.050	<0.050	<0.050	<0.050

Notes:

- CCME Canadian Council of Ministers of the Environment
- NG No guideline for corresponding parameter
- BOLD** Exceeds referenced guideline
- Units All units in mg/kg unless otherwise specified
- mbgs Metres below ground surface

<sup>a</sup> Referenced from the CCME Canadian Environmental Quality Guidelines, accessed on-line in October 2021.  
Data represents the most stringent criterion for agricultural land-use.

Table 4. Mercury Analysis for Soil Post Excavation.

The laboratory Certificates of Analysis for the soil samples are provided in Appendix V.



4.7.2 Field Duplicate Soil Samples

The calculated RPDs for the original and field duplicate soil samples are presented in Table 5 and have been compared to the performance standards considered acceptable by Pinchin (i.e., 50%). All sample pairings had both or had one sample with parameter concentrations below detection, therefore, RPDs could not be calculated.

Parameter		Original Sample	Duplicate Sample	RPD* (%)
	Sample Designation	Crystal-01	Crystal-Dup1	
	Sample Collection Date (dd/mm/yyyy)	08/09/2021	08/09/2021	
	Sample Depth Range (mbgs)	0.05-0.30	0.05-0.30	
Total Mercury		<0.050	<0.050	not calculated
Parameter		Original Sample	Duplicate Sample	RPD* (%)
	Sample Designation	Crystal-14	Crystal-Dup2	
	Sample Collection Date (dd/mm/yyyy)	08/09/2021	08/09/2021	
	Sample Depth Range (mbgs)	0.05-0.30	0.05-0.30	
Total Mercury		<0.050	0.062	not calculated
Parameter		Original Sample	Duplicate Sample	RPD* (%)
	Sample Designation	Crystal-17	Crystal-Dup3	
	Sample Collection Date (dd/mm/yyyy)	08/09/2021	08/09/2021	
	Sample Depth (mbgs)	0.3	0.3	
Total Mercury		<0.050	<0.050	not calculated

Notes:

- BOLD** Exceeds performance standards
- Units All units in mg/kg unless otherwise specified
- mbgs Metres below ground surface

\* The calculated Relative Percent Differences (RPDs) for the original and field duplicate soil samples have been compared to performance standards of 50% for soil samples which is considered acceptable by Pinchin.

Table 5. Relative Percent Difference Calculations for Duplicate Samples.

5.0 DISCUSSION OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Based on the work completed, the following is a summary of the activities and findings of this HSMA:

- Pinchin conducted a HSMA at the Site on September 8, 2021 and consisted of an initial mercury vapour survey and test pit soil sampling. The initial mercury vapour survey was conducted using a Lumex RA-915. Pinchin advanced a total of 14 test pits at the Site, to a maximum depth of 0.3 mbgs using hand tools (shovel, trowel);
- Following the initial mercury vapour survey, the Client dismantled the hydrometric shelter using power tools to dismantle anchor bolts attaching the hydrometric shelter to the ground. Following removal of the hydrometric shelter structure from its location, the landowner requested from the Client that the hydrometric shelter structure to be donated to the landowner for private use. As a result, no debris resulting from the hydrometric shelter decommissioning were transported for off-Site disposal by the Client;



- Following the hydrometric shelter decommissioning activities, soil below the hydrometric shelter was excavated and hauled by the Client for off-Site for disposal as hazardous materials;
- Confirmatory soil sampling was completed within the excavation. Nine soil samples were collected by Pinchin and submitted for analysis of mercury;
- Backfilling and revegetation activities were conducted by the Client at the Site on October 22, 2021. Approximately 1.8 tonnes of topsoil material were used for backfilling at the Site. Following placement, the backfill was seeded with grass;
- The soil stratigraphy at the soil sampling locations generally consists of brown silt, some sand, trace gravel to a depth of approximately 0.3 mbgs;
- Mercury vapour concentrations in headspace of the collected soil samples were below 0.025 mg/m<sup>3</sup>;
- Based on Site-specific information, the soil quality was assessed based on the CCME Soil Guidelines for agricultural land use and fine-grained soils;
- A total of 26 soil samples were submitted for laboratory analysis of mercury; and
- Reported concentrations in the soil samples submitted for analysis of mercury satisfied their respective CCME Soil Guidelines.

Based on the findings of this HSMA , it is Pinchin’s opinion that no further work is required in relation to mercury contamination in soil at the Site.

## **6.0 TERMS AND LIMITATIONS**

This HSMA was performed for Winnipeg Environmental Remediations Inc. (Client) in order to investigate potential environmental impacts at Pembina River Below Crystal Creek – Station # 05OB023 in Rural Municipality of Argyle, Manitoba (Site). This HSMA does not quantify the extent of the current and/or potential environmental impacts or the cost of any remediation.

Conclusions derived are specific to the immediate area of study and cannot be extrapolated extensively away from sample locations. Samples have been analyzed for a limited number of contaminants that are expected to be present at the Site, and the absence of information relating to a specific contaminant does not indicate that it is not present.

No environmental site assessment can wholly eliminate uncertainty regarding the potential for environmental impacts on a property. Performance of this HSMA to the standards established by Pinchin is intended to reduce, but not eliminate, uncertainty regarding the potential for environmental impacts on the Site and recognizes reasonable limits on time and cost.



**Hydrometric Station Mercury Assessment**

Pembina River Below Crystal Creek – Station # 05OB023, Rural Municipality of Argyle,  
Manitoba  
Winnipeg Environmental Remediations Inc.

December 3, 2021  
Pinchin File: 292865

This HSMA was performed in general compliance with currently acceptable practices for environmental site investigations, and specific Client requests, as applicable to this Site.

This report was prepared for the exclusive use of the Client, subject to the terms, conditions and limitations contained within the duly authorized proposal for this project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted.

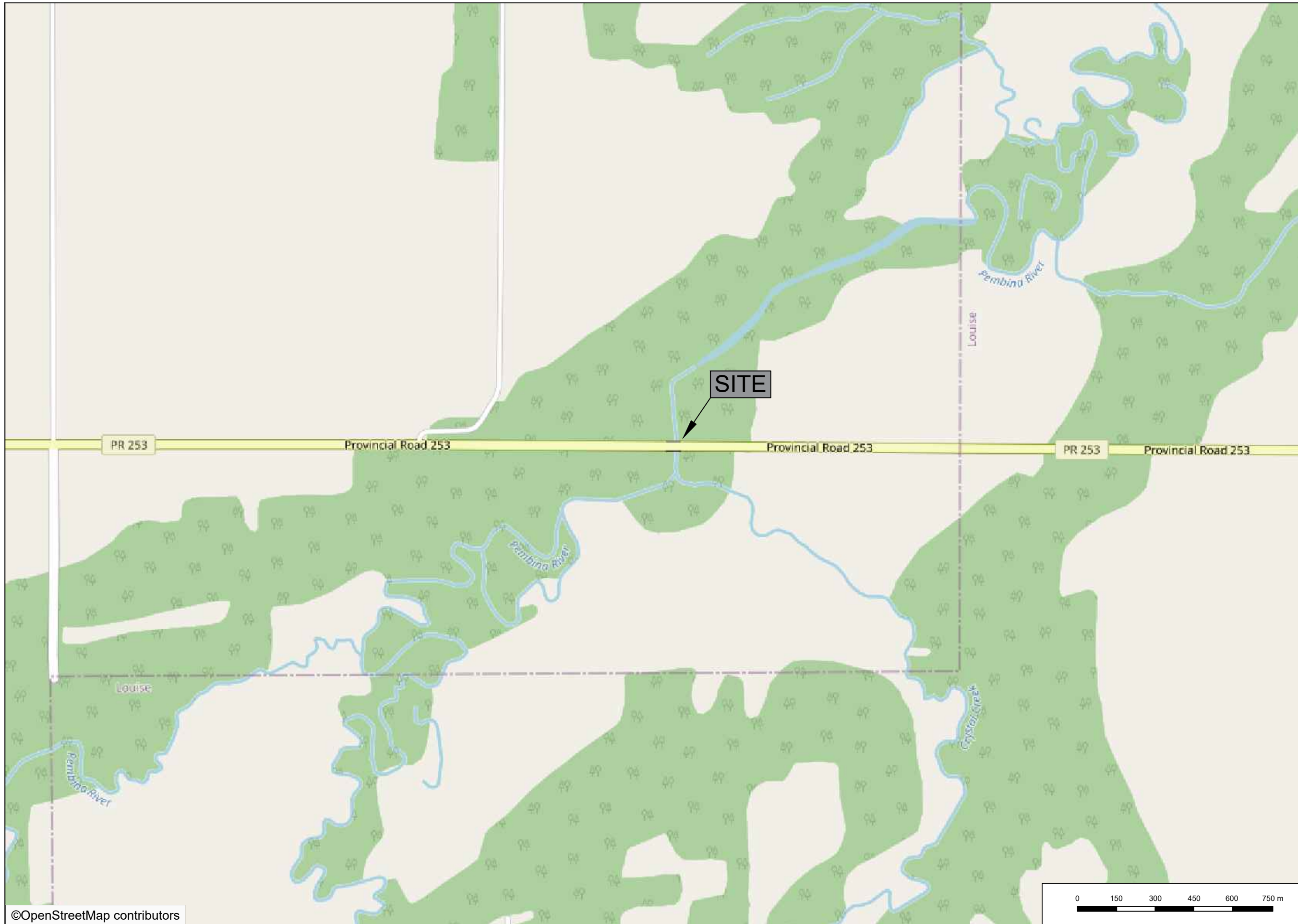
If additional parties require reliance on this report, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed. Furthermore, this report should not be construed as legal advice. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law.

Pinchin makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and these interpretations may change over time.

\\pinchin.com\wpg\Job\292000s\0292865.000 WERI,ClearwaterHydrometric,EDR,MercSoil\Deliverables\05OB023 Pembina River below Crystal Creek\REPORT\292865 Report Hydrometric Stations Mercury Assessment\_Pembina River below Crystal Creek Dec 3, 2021.docx

Template: Master Report for Phase II ESA - Stage 2 PSI, EDR, January 13, 2021

**APPENDIX I**  
**Figures**



LEGEND

LEGEND IS COLOUR DEPENDENT.  
NON-COLOUR COPIES MAY ALTER  
INTERPRETATION.



PROJECT NAME:  
**HYDROMETRIC STATION  
MERCURY ASSESSMENTS**

CLIENT NAME:  
**WINNIPEG ENVIRONMENTAL  
REMEDIATIONS INC.**

PROJECT LOCATION:  
**PEMBINA RIVER BELOW CRYSTAL CREEK  
(STATION # 05OB023)  
RM OF ARGYLE, MB**

FIGURE NAME:  
**KEY MAP**

PROJECT NUMBER:  
**292865**

SCALE:  
**AS SHOWN**

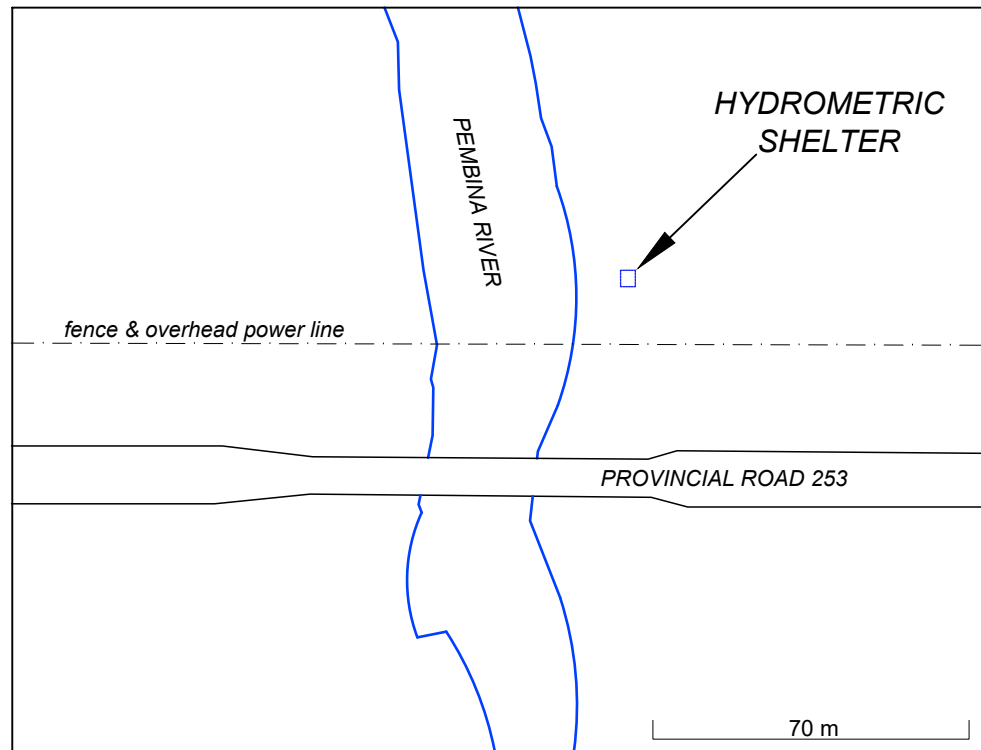
DRAWN BY:  
**MBM**

REVIEWED BY:  
**GEE**

DATE:  
**DECEMBER 2021**

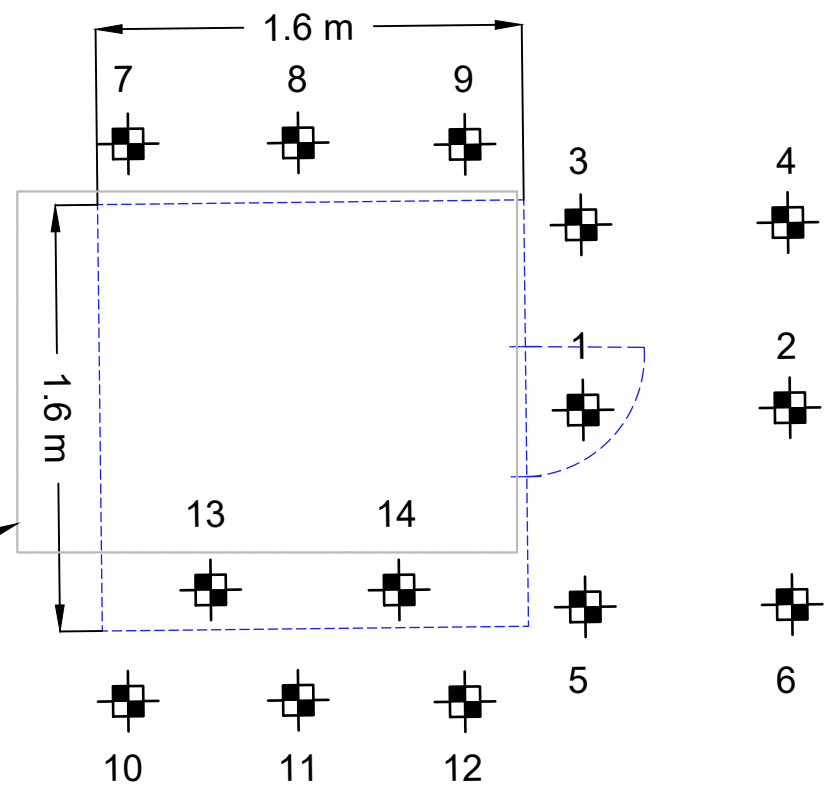
FIGURE NUMBER:  
**1**





← PEMBINA RIVER  
(APPROX. 10m WEST)

concrete anchor



**LEGEND**

- HYDROMETRIC SHELTER FOOTPRINT
- TEST PIT
- SLOPE DOWN

LEGEND IS COLOUR DEPENDENT.  
NON-COLOUR COPIES MAY ALTER  
INTERPRETATION.



PROJECT NAME:  
HYDROMETRIC STATION  
MERCURY ASSESSMENTS

CLIENT NAME:  
WINNIPEG ENVIRONMENTAL  
REMEDIATIONS INC.

PROJECT LOCATION:  
PEMBINA RIVER BELOW CRYSTAL CREEK  
(STATION # 05OB023)  
RM OF ARGYLE, MB

FIGURE NAME:  
TEST PIT LOCATION PLAN

PROJECT NUMBER:  
292865

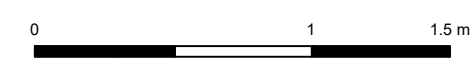
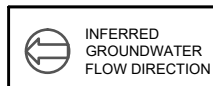
SCALE:  
AS SHOWN

DRAWN BY:  
MBM

REVIEWED BY:  
GEE




DATE:  
DECEMBER 2021

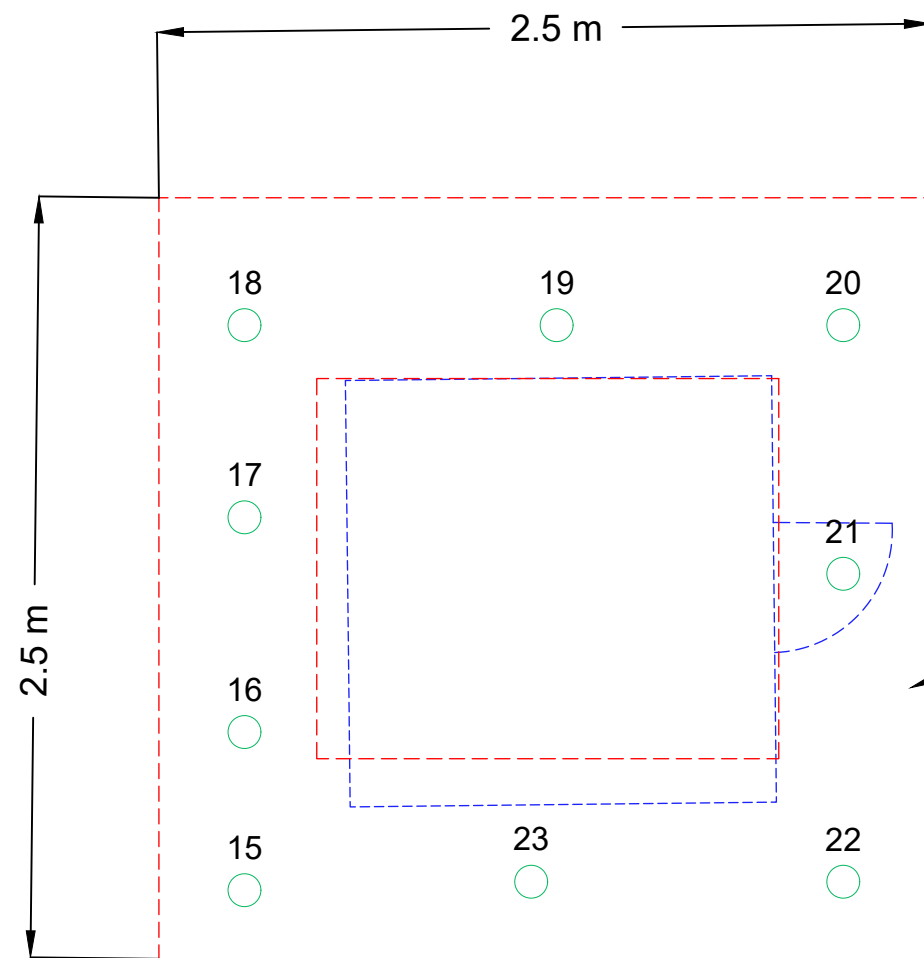
FIGURE NUMBER:  
2





**LEGEND**

-  HYDROMETRIC SHELTER FOOTPRINT
-  SOIL EXCAVATION FOOTPRINT
-  CONFIRMATORY SOIL SAMPLE SUBMITTED FOR LABORATORY ANALYSIS



**EXCAVATION DEPTH  
APPROXIMATELY 0.3 METRES  
BELOW GROUND SURFACE**

LEGEND IS COLOUR DEPENDENT.  
NON-COLOUR COPIES MAY ALTER  
INTERPRETATION.



PROJECT NAME:  
**HYDROMETRIC STATION  
MERCURY ASSESSMENTS**

CLIENT NAME:  
**WINNIPEG ENVIRONMENTAL  
REMEDIATIONS INC.**

PROJECT LOCATION:  
**PEMBINA RIVER BELOW CRYSTAL CREEK  
(STATION # 05OB023)  
RM OF ARGYLE, MB**

FIGURE NAME:  
**CONFIRMATORY SAMPLING  
PLAN**

PROJECT NUMBER:  
**292865**

SCALE:  
**AS SHOWN**

DRAWN BY:  
**MBM**

REVIEWED BY:  
**GEE**

DATE:  
**DECEMBER 2021**

FIGURE NUMBER:  
**3**



INFERRED  
GROUNDWATER  
FLOW DIRECTION

0 1 1.5 m



**APPENDIX II**  
**Field Logs/Forms**

**ENVIRONMENTAL OBSERVATION FORM**

Station No.: 0508023

Station Name: PENBINA RIVER BELOW

Date: 08 SEP 2021

CRYSTAL CREEK  
Staff: MSM

Topography SLOPING DOWN TOWARDS PENBINA RIVER

Drainage STORMWATER RUNOFF MOST LIKELY TO FLOW TOWARDS  
THE RIVER

Nearest Surface Water Body PENBINA RIVER, APPROX. 5m WEST OF SHELTER

Vegetation GRASS, SHRUBS, TREES

Wildlife BIRDS

Environmentally Sensitive Areas PENBINA RIVER

Soil Description BROWN SILT, SOME SAND

Immediate Groundwater Concerns X

Equipment Shelter 1.6 x 1.6m FOOT PRINT, EXT. WALL: VERTICAL METAL SHEET,  
INT. WALL: WOOD PANELS, ELEVATED WOOD FLOOR

Public Access and Land Use ~60m NORTH OF PROVINCIAL ROAD 253, RURAL/AGRI

Waste Products NONE

Other Site Structures NONE

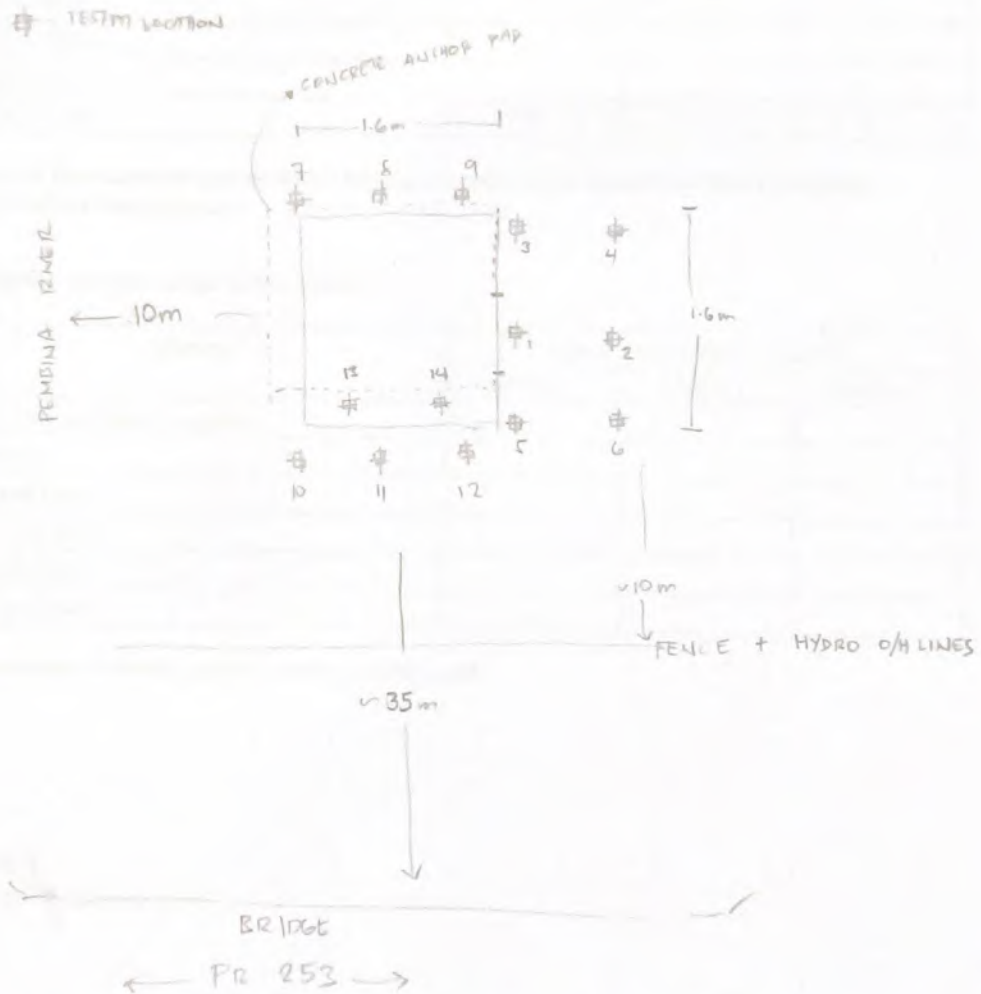
Other Relevant Information SHELTER WAS SET ON AN EXISTING CONCRETE ANCHOR PAD

### SITE PLAN

Site Status: Active / Decommissioned

Land Use: Urban / Remote

Site Sketch:



Note: Include north arrow, river/lake name and direction, shelter door and vents, sample locations and numbers, approximate distances/lengths, excavations, location of orifice holes and lines, and utilities etc.

**HYDROMETRIC SHELTER MERCURY VAPOUR SURVEY FORM**

Initial mercury vapour survey results:

Location	Vapour concentrations ( $\mu\text{g}/\text{m}^3$ ) $\text{ng}/\text{m}^3$		
	Reading 1	Reading 2	Reading 3
Background (outdoors, upwind)	0	0	0
Mid-level	0	0	0
Left front floor	0	0	0
Right front floor	0	0	0
Left back floor	0	0	0
Right back floor	0	0	0

If any of the results are greater than  $0.025 \text{ mg}/\text{m}^3$ , clean-up hydrometric shelter according to Step 4 of the Field Protocol.

Post-cleanup mercury vapour survey results:

Location	Vapour survey results ( $\text{mg}/\text{m}^3$ )		
	Reading 1	Reading 2	Reading 3
Background (outdoors, upwind)			
Mid-level			
Left front floor			
Right front floor			
Left back floor			
Right back floor			

Description of mercury contamination encountered:

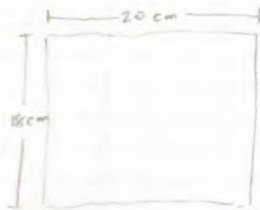
Details of clean-up tasks:

**SOIL SCREENING AND EXCAVATION SAMPLING FORM**

Standardized Calibration Soil used	NIST- ( mg/kg)
Number of Calibration points used	
Concentrations observed (mg/kg)	
Slope of Calibration Line	

**Sketch of Initial Test Pit**

PLAN VIEW:



COMPOSITE  
 1/2 SOIL SAMPLES OF ① + ②

↓ TEST PIT SKETCH  
 APPLIES TO ALL TEST PITS



Indicate soil zones, depths, sample locations

**SOIL SCREENING AND EXCAVATION SAMPLING FORM**

Sample ID	Sample Depth <small>Composite</small> 5' - 30 cm	Soil Type	Mercury Concentration ( $\mu\text{g}/\text{m}^3$ ) (3 readings/bag)			Time prior to screening	Soil Temp
			$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$		
CRYSTAL-01		SILT	0	0	0		
-02		0	0	0			
-03		0	0	0			
-04		0	0	0			
-05		0	0	0			
-06		0	0	0			
-07		0	0	0			
-08		0	0	0			
-09		0	0	0			
-10		0	0	0			
-11		0	0	0			
-12		0	0	0			
-13		0	0	0			
-14		0	0	0			
01 14 DUP1			0	0	0		
DUP2			0	0	0		

\* Note: Hg soil screening criteria for urban sites: 0.00625  $\text{mg}/\text{m}^3$ , for rural/remote sites: 0.0125  $\text{mg}/\text{m}^3$   
 Time prior to screening is time between collection of soil sample and reading. It should be between 4-6 minutes. Soil temperature measured at time of Hg vapour readings

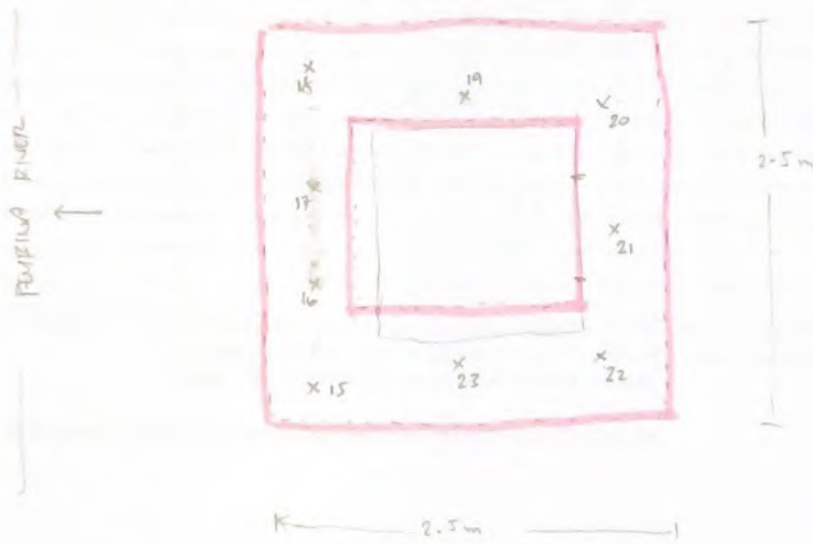
**Estimated volume of soil excavated and debris to be removed from site:**

**SOIL SCREENING AND EXCAVATION SAMPLING FORM**

Standardized Calibration Soil used	NIST- (                      )	mg/kg)
Number of Calibration points used		
Concentrations observed (mg/kg)		
Slope of Calibration Line		

Sketch of Initial Test Pit

SAMPLE DEPTHS: 0-3-lys



- AREA OF SOIL EXCAVATED POST SHELTER REMOVAL

Indicate soil zones, depths, sample locations

**SOIL SCREENING AND EXCAVATION SAMPLING FORM**

Sample ID	Sample Depth	Soil Type	Mercury Concentration (3 readings/bag)			Time prior to screening	Soil Temp.
			ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>		
EEV570L-15	0.3	SLT	0	0	0		
-16			0	0	0		
-17			0	0	0		
-18			0	0	0		
-19			0	0	0		
-20			0	0	0		
-21			0	0	0		
-22			0	0	0		
-23			0	0	0		
-DUP3			0	0	0		

\* Note: Hg soil screening criteria for urban sites: 0.00625 mg/m<sup>3</sup> for rural/remote sites: 0.0125 mg/m<sup>3</sup>  
 Time prior to screening is time between collection of soil sample and reading. It should be between 4-6 minutes. Soil temperature measured at time of Hg vapour readings

Estimated volume of soil excavated and debris to be removed from site:

**APPENDIX III**  
**Photographs**



Photo 1 –Photo of the hydrometric shelter.



Photo 2 – Close up photo of the hydrometric shelter.



**Hydrometric Station Mercury Assessment**

Pembina River Below Crystal Creek – Station # 05OB023, Rural Municipality of Argyle,  
Manitoba  
Photographs

Appendix III  
Pinchin File: 292865



Photo 3 – Interior of the hydrometric shelter showing flooring and interior walls.



Photo 4 – Another photo of hydrometric shelter interior, showing interior ceiling and walls.



Photo 5 – A former concrete anchor under the hydrometric shelter.



Photo 6 – Another photo of the former concrete anchor under the hydrometric shelter.



Photo 7 – Photo of the Pembina River, bridge along Provincial Road 253 in the background.



Photo 8 – One of the test pits advanced around the hydrometric shelter.



Photo 9 – Former concrete anchor exposed following removal of the hydrometric shelter.



**Hydrometric Station Mercury Assessment**

Pembina River Below Crystal Creek – Station # 05OB023, Rural Municipality of Argyle,  
Manitoba  
Photographs

Appendix III  
Pinchin File: 292865



Photo 10 – Confirmatory sampling locations indicated by sample bags following soil excavation and regrading of the site.

**APPENDIX IV**  
**Waste Manifests and Weigh Bills**



DYCK FORAGES & GRASSES LTD.

P.O. BOX 275  
ELIE, MB Canada  
R0H 0H0

# Invoice

Date	Invoice #
2021-07-19	15999

**PAID**  
**2021-07-19**

Invoice To

WERI  
Winnipeg Environmental Remediation Inc.  
4040 main St.  
West St. Paul , MB R4A 1A7

Ship To

S.O. No.	P.O. No.	Terms	Ship	Via	Due Date
					2021-07-19

Quantity	Item	Description	Price per lb	Amount
50	Retail	lbs Parkside lawn Mix ( 40 % KENTUCKY BLUEGRASS, 40 % CREEPING RED FESCUE & 20 % ANNUAL RYEGRASS)		

GST/HST No. 125429787	<b>Sales Tax Summary</b>
	GST (3) On Sales@5.0% CAD 7 PST (1) On Sales@7.0% CAD 1 Total Tax CAD 1

Service charge 1.5% per month (19.56% per annum) will be added on all overdue accounts			<b>Total</b>	CAD .
Phone #	Fax #	Web Site	<b>Payments/Credits</b>	CAD -
204-353-2885	204 353-2401	www.dyckseeds.com	<b>Balance Due</b>	CAD 0.00

# Invoice

**Premium Soils & Composting Ltd.**  
**66 2nd Street**  
**West St Paul, MB**  
**R2P 0G5**

Date	Invoice #
10/26/2021	1473

Invoice To
WERI 4040 Main St West St Paul, MB R4A 1A7

P.O. No.	Terms
	Due on receipt

Date	Description	Qty	Rate	Amount
Oct 20/21	70/30 picked up ticket 6555 for Osborne	8		

### Sales Tax Summary

GST@5.0%  
 Total Tax

All the best to you in 2021! Thank you for your business.

**Total**

GST/HST No.  
 775131915

Phone: (204)339-4643

Fax: (204)334-2226

email:  
 premiumsoiloffice@gmail.com

**APPENDIX V**  
**Laboratory Certificates of Analysis**



Your P.O. #: B70359  
 Your Project #: 292865  
 Site#: 05OB023  
 Site Location: Pembina River below Crystal Creek  
 Your C.O.C. #: 41061

**Attention: MARIO MUAN**

PINCHIN LTD.  
 54 Terracon Pl.  
 Winnipeg, MB  
 CANADA R2J 4G7

**Report Date: 2021/09/15**  
 Report #: R3071858  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BV LABS JOB #: C167479**

**Received: 2021/09/10, 13:53**

Sample Matrix: Soil  
 # Samples Received: 26

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Elements by ICPMS - Soils (1)	9	2021/09/13	2021/09/14	AB SOP-00001 / AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Soils (1)	9	2021/09/14	2021/09/14	AB SOP-00001 / AB SOP-00043	EPA 6020b R2 m
Elements by ICPMS - Soils (1)	8	2021/09/14	2021/09/15	AB SOP-00001 / AB SOP-00043	EPA 6020b R2 m

**Remarks:**

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Calgary Environmental



**Attention: MARIO MUAN**

PINCHIN LTD.  
54 Terracon Pl.  
Winnipeg, MB  
CANADA R2J 4G7

Your P.O. #: B70359  
Your Project #: 292865  
Site#: 05OB023  
Site Location: Pembina River below Crystal Creek  
Your C.O.C. #: 41061

**Report Date: 2021/09/15**  
Report #: R3071858  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BV LABS JOB #: C167479**  
**Received: 2021/09/10, 13:53**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.  
Cynny Hagen, Key Account Specialist  
Email: Cynny.HAGEN@bureauveritas.com  
Phone# (403)735-2273

=====  
This report has been generated and distributed using a secure automated process.  
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



BUREAU  
VERITAS

BV Labs Job #: C167479  
Report Date: 2021/09/15

PINCHIN LTD.  
Client Project #: 292865  
Site Location: Pembina River below Crystal Creek  
Your P.O. #: B70359

### ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		AFR073	AFR074	AFR075		AFR076		AFR077		
Sampling Date		2021/09/08	2021/09/08	2021/09/08		2021/09/08		2021/09/08		
COC Number		41061	41061	41061		41061		41061		
	UNITS	Crystal-01	Crystal-02	Crystal-03	QC Batch	Crystal-04	QC Batch	Crystal-05	RDL	QC Batch

Elements										
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	A350526	<0.050	A350495	<0.050	0.050	A351453
RDL = Reportable Detection Limit										

BV Labs ID		AFR078		AFR079		AFR080		AFR081		
Sampling Date		2021/09/08		2021/09/08		2021/09/08		2021/09/08		
COC Number		41061		41061		41061		41061		
	UNITS	Crystal-06	QC Batch	Crystal-07	QC Batch	Crystal-08	QC Batch	Crystal-09	RDL	QC Batch

Elements										
Total Mercury (Hg)	mg/kg	<0.050	A350495	<0.050	A351008	<0.050	A351453	<0.050	0.050	A351008
RDL = Reportable Detection Limit										

BV Labs ID		AFR082		AFR083		AFR084		AFR085	AFR086		
Sampling Date		2021/09/08		2021/09/08		2021/09/08		2021/09/08	2021/09/08		
COC Number		41061		41061		41061		41061	41061		
	UNITS	Crystal-10	QC Batch	Crystal-11	QC Batch	Crystal-12	QC Batch	Crystal-13	Crystal-14	RDL	QC Batch

Elements											
Total Mercury (Hg)	mg/kg	<0.050	A351453	<0.050	A350495	<0.050	A352212	<0.050	<0.050	0.050	A350836
RDL = Reportable Detection Limit											

BV Labs ID		AFR087	AFR088		AFR089		AFR090	AFR091		
Sampling Date		2021/09/08	2021/09/08		2021/09/08		2021/09/08	2021/09/08		
COC Number		41061	41061		41061		41061	41061		
	UNITS	Crystal-Dup1	Crystal-Dup2	QC Batch	Crystal-15	QC Batch	Crystal-16	Crystal-17	RDL	QC Batch

Elements										
Total Mercury (Hg)	mg/kg	<0.050	0.062	A350836	<0.050	A350495	<0.050	<0.050	0.050	A350836
RDL = Reportable Detection Limit										

BV Labs ID		AFR092		AFR093		AFR094		AFR095		
Sampling Date		2021/09/08		2021/09/08		2021/09/08		2021/09/08		
COC Number		41061		41061		41061		41061		
	UNITS	Crystal-18	QC Batch	Crystal-19	QC Batch	Crystal-20	QC Batch	Crystal-21	RDL	QC Batch

Elements										
Total Mercury (Hg)	mg/kg	<0.050	A350836	<0.050	A351008	<0.050	A350836	<0.050	0.050	A351453
RDL = Reportable Detection Limit										



BUREAU  
VERITAS

BV Labs Job #: C167479

Report Date: 2021/09/15

PINCHIN LTD.

Client Project #: 292865

Site Location: Pembina River below Crystal Creek

Your P.O. #: B70359

### ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		AFR096		AFR097	AFR098		
Sampling Date		2021/09/08		2021/09/08	2021/09/08		
COC Number		41061		41061	41061		
	<b>UNITS</b>	<b>Crystal-22</b>	<b>QC Batch</b>	<b>Crystal-23</b>	<b>Crystal-Dup3</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Elements</b>							
Total Mercury (Hg)	mg/kg	<0.050	A350836	<0.050	<0.050	0.050	A350495
RDL = Reportable Detection Limit							



**BUREAU  
VERITAS**

BV Labs Job #: C167479

Report Date: 2021/09/15

PINCHIN LTD.

Client Project #: 292865

Site Location: Pembina River below Crystal Creek

Your P.O. #: B70359

### GENERAL COMMENTS

Results relate only to the items tested.



BUREAU  
VERITAS

BV Labs Job #: C167479  
Report Date: 2021/09/15

### QUALITY ASSURANCE REPORT

PINCHIN LTD.  
Client Project #: 292865  
Site Location: Pembina River below Crystal Creek  
Your P.O. #: B70359

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A350495	Total Mercury (Hg)	2021/09/14	87	75 - 125	101	80 - 120	<0.050	mg/kg	NC	35
A350526	Total Mercury (Hg)	2021/09/14	104	75 - 125	100	80 - 120	<0.050	mg/kg	NC	35
A350836	Total Mercury (Hg)	2021/09/14	96	75 - 125	99	80 - 120	<0.050	mg/kg	24	35
A351008	Total Mercury (Hg)	2021/09/14	96	75 - 125	102	80 - 120	<0.050	mg/kg	2.3	35
A351453	Total Mercury (Hg)	2021/09/15	96	75 - 125	118	80 - 120	<0.050	mg/kg	13	35
A352212	Total Mercury (Hg)	2021/09/15	101	75 - 125	105	80 - 120	<0.050	mg/kg	NC	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU  
VERITAS

BV Labs Job #: C167479  
Report Date: 2021/09/15

PINCHIN LTD.  
Client Project #: 292865  
Site Location: Pembina River below Crystal Creek  
Your P.O. #: B70359

### VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

---

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

---

Sandy Yuan, M.Sc., QP, Scientific Specialist

---

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



eCOC: W41061



C167479

Results Required By: 2021/09/15 14:30  
Expected Arrival: 2021/09/10 14:30  
Submitted By: Mario Muan  
Submitted To: Winnipeg

**Invoice Information**

Attn: ACCOUNTS PAYABLE  
PINCHIN LTD.  
54 Terracon Pl.  
Winnipeg, MB, R2J 4G7  
Email to:  
ap@pinchin.com

**Report Information**

Attn: MARIO MUAN  
PINCHIN LTD.  
54 Terracon Pl.  
Winnipeg, MB, R2J 4G7  
Email to:  
mmuan@pinchin.com  
vtyshchuk@pinchin.com

**Project Information**

Quote #:  
PO/AFE#: B70359  
Project #: 292865  
Site Location: Pembina River below Crystal  
Creek  
Site #: 05OB023

**Analytical Summary**

M: Manually added test

Client Sample ID	Clnt Ref	Sampling Date/Time	Matrix	#Cont	Mercury in soil
Crystal-01	1	2021/09/08	SOIL	1	M
Crystal-02	2	2021/09/08	SOIL	1	M
Crystal-03	3	2021/09/08	SOIL	1	M
Crystal-04	4	2021/09/08	SOIL	1	M
Crystal-05	5	2021/09/08	SOIL	1	M
Crystal-06	6	2021/09/08	SOIL	1	M
Crystal-07	7	2021/09/08	SOIL	1	M
Crystal-08	8	2021/09/08	SOIL	1	M
Crystal-09	9	2021/09/08	SOIL	1	M
Crystal-10	10	2021/09/08	SOIL	1	M
Crystal-11	11	2021/09/08	SOIL	1	M
Crystal-12	12	2021/09/08	SOIL	1	M
Crystal-13	13	2021/09/08	SOIL	1	M
Crystal-14	14	2021/09/08	SOIL	1	M
Crystal-Dup1	15	2021/09/08	SOIL	1	M
Crystal-Dup2	16	2021/09/08	SOIL	1	M
Crystal-15	17	2021/09/08	SOIL	1	M
Crystal-16	18	2021/09/08	SOIL	1	M
Crystal-17	19	2021/09/08	SOIL	1	M
Crystal-18	20	2021/09/08	SOIL	1	M
Crystal-19	21	2021/09/08	SOIL	1	M
Crystal-20	22	2021/09/08	SOIL	1	M
Crystal-21	23	2021/09/08	SOIL	1	M
Crystal-22	24	2021/09/08	SOIL	1	M
Crystal-23	25	2021/09/08	SOIL	1	M
Crystal-Dup3	26	2021/09/08	SOIL	1	M

87 Adam Fishleigh 2021/09/11 09:30  
see ACTR

RUSH REF #  
CH121091101

Rec'd 2021/09/10 @ 1353  
BA Brooklyn Hiebert  
1. 8.1, 5.7, 9.4  
2. 7.2, 7.1, 8.9  
3. 7.1, 4.4, 5.7

Deadlines are estimates only and are subject to change. Please refer to your Job Confirmation report for final due dates.



eCOC: W41061



Project Information: C167479  
 Job Received: 2021/09/10 13:53  
 Results Required By: 2021/09/15 14:30  
 Expected Arrival: 2021/09/10 14:30  
 Submitted By: Mario Muan  
 Submitted To: Winnipeg

**Invoice Information**

**Report Information**

**Project Information**

Attn: ACCOUNTS PAYABLE  
 PINCHIN LTD.  
 54 Terracon Pl.  
 Winnipeg , MB , R2J 4G7  
 Email to:  
 ap@pinchin.com

Attn: MARIO MUAN  
 PINCHIN LTD.  
 54 Terracon Pl.  
 Winnipeg , MB , R2J 4G7  
 Email to:  
 mmuan@pinchin.com  
 vtyshchuk@pinchin.com

**Quote #:**  
**PO/AFE#:** B70359  
**Project #:** 292865  
**Site Location:** Pembina River below Crystal Creek  
**Site #:** 050B023

**Analytical Summary**

M: Manually added test

Client Sample ID	Clnt Ref	Sampling Date/Time	Matrix	#Cont	Mercury in soil
Crystal-01	1	2021/09/08	SOIL	1	M
Crystal-02	2	2021/09/08	SOIL	1	M
Crystal-03	3	2021/09/08	SOIL	1	M
Crystal-04	4	2021/09/08	SOIL	1	M
Crystal-05	5	2021/09/08	SOIL	1	M
Crystal-06	6	2021/09/08	SOIL	1	M
Crystal-07	7	2021/09/08	SOIL	1	M
Crystal-08	8	2021/09/08	SOIL	1	M
Crystal-09	9	2021/09/08	SOIL	1	M
Crystal-10	10	2021/09/08	SOIL	1	M
Crystal-11	11	2021/09/08	SOIL	1	M
Crystal-12	12	2021/09/08	SOIL	1	M
Crystal-13	13	2021/09/08	SOIL	1	M
Crystal-14	14	2021/09/08	SOIL	1	M
Crystal-Dup1	15	2021/09/08	SOIL	1	M
Crystal-Dup2	16	2021/09/08	SOIL	1	M
Crystal-15	17	2021/09/08	SOIL	1	M
Crystal-16	18	2021/09/08	SOIL	1	M
Crystal-17	19	2021/09/08	SOIL	1	M
Crystal-18	20	2021/09/08	SOIL	1	M
Crystal-19	21	2021/09/08	SOIL	1	M
Crystal-20	22	2021/09/08	SOIL	1	M
Crystal-21	23	2021/09/08	SOIL	1	M
Crystal-22	24	2021/09/08	SOIL	1	M
Crystal-23	25	2021/09/08	SOIL	1	M
Crystal-Dup3	26	2021/09/08	SOIL	1	M

Deadlines are estimates only and are subject to change. Please refer to your Job Confirmation report for final due dates.



eCOC: W41061



Project Information: C167479  
Job Received: 2021/09/10 13:53  
Results Required By: 2021/09/15 14:30  
Expected Arrival: 2021/09/10 14:30  
Submitted By: Mario Muan  
Submitted To: Winnipeg

---

**Submission Information**

# of Samples: 26

---

eCOC: W41061 - Field Data

Project Information: C167479  
 Job Received: 2021/09/10 13:53  
 Results Required By: 2021/09/15 14:30

Field Data		START DEPTH	STOP DEPTH
Client Sample ID	Matrix		
Crystal-01	S	0.05	0.3
Crystal-02	S	0.05	0.3
Crystal-03	S	0.05	0.3
Crystal-04	S	0.05	0.3
Crystal-05	S	0.05	0.3
Crystal-06	S	0.05	0.3
Crystal-07	S	0.05	0.3
Crystal-08	S	0.05	0.3
Crystal-09	S	0.05	0.3
Crystal-10	S	0.05	0.3
Crystal-11	S	0.05	0.3
Crystal-12	S	0.05	0.3
Crystal-13	S	0.05	0.3
Crystal-14	S	0.05	0.3
Crystal-Dup1	S	0.05	0.3
Crystal-Dup2	S	0.05	0.3
Crystal-15	S	0.3	0.3
Crystal-16	S	0.3	0.3
Crystal-17	S	0.3	0.3
Crystal-18	S	0.3	0.3
Crystal-19	S	0.3	0.3
Crystal-20	S	0.3	0.3
Crystal-21	S	0.3	0.3
Crystal-22	S	0.3	0.3
Crystal-23	S	0.3	0.3
Crystal-Dup3	S	0.3	0.3

**APPENDIX VI**  
**Regulatory Authorizations**



July 13, 2021

Manitoba Conservation and Climate  
Programs and Strategies  
1007 Century Street  
Winnipeg, MB R3H 0W4

E-mail: [warren.rospad@gov.mb.ca](mailto:warren.rospad@gov.mb.ca)

Attention: Warren Rospad

**Re: Remedial Action Plan**  
SW21-03-12-W1, Hydrometric Station 05OB021, Pembina River below Crystal Creek,  
Manitoba  
Pinchin File: 292865

Pinchin Ltd. (Pinchin) is pleased to provide Manitoba Conservation and Climate with the following Remedial Plan (RAP) for approval prior to completing potential remedial excavation at SW21-03-12-W1, Hydrometric Station 05OB021, Pembina River below Crystal Creek, Manitoba (Site).

The Site is developed with an Environment and Climate Change Canada (ECCC) hydrometric monitoring station, which is located on privately-owned land (see Appendix I).

Contact Information for the Landowner is as follows:

**Mr. Doug Wilson and Ms. Trudy Wilson**

**Phone: 204.825.2773**

## **1.0 BACKGROUND**

It is understood by Pinchin that ECCC has engaged Winnipeg Environmental Remediations Inc. (Contractor) to complete decommissioning of an existing hydrometric station located at the Site. As part of the decommissioning activities, an assessment of the structure and soils below and around the structure are required to be completed by an Environmental Consultant to assess for presence of mercury in soils prior to decommissioning, in accordance with the document entitled "Update to the National Hydrometric Station Mercury Remediation Guidance Document" prepared by Dillon Consulting for Public Services and Procurement Canada, dated March, 2020 (2020 Mercury Guidance Document).

The scope of work presented in this RAP outlines proposed requirements for completion of remedial excavation in the event that assessment of soils at the Site identifies concentrations of mercury in excess of applicable criteria.



## Remedial Action Plan

SW21-03-12-W1, Hydrometric Station 05OB021, Pembina River below Crystal Creek,  
Manitoba  
Manitoba Conservation and Climate  
Programs and Strategies

July 13, 2021  
Pinchin File: 292865

## 2.0 SCOPE OF WORK

In the event that assessment of soils at the Site identifies concentrations of mercury in excess of applicable criteria, the scope of work to be completed includes excavation of impacted soils, verification soil sampling, and excavation backfilling.

The remedial excavation will be conducted in general accordance with the following documents:

- Manitoba Conservation and Climate guidelines entitled:
  - *“Environmental Site Assessments in Manitoba”*, dated June 2016.
- Manitoba Conservation and Climate information bulletins entitled:
  - *“Contaminated Sites Remediation Regulation Reporting Requirements and Standards”*, dated October 2015.
- Canadian Council of Ministers of the Environment (CCME) publication entitled “Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment – Volume 4 Analytical Methods”, dated 2016.
- Pinchin’s standard operating procedures (SOPs).
- Canadian Standards Association publication entitled “Phase II Environmental Site Assessment, CSA Standard Z769-00 (R 2018)”.
- 2020 Mercury Guidance Document.

## 2.1 Remediation Activities

### 2.1.1 Pre-Excavation Activities

Prior to any remedial activities, the following will be completed:

- Pinchin will submit the Remedial Action Plan to Manitoba Conservation and Climate for approval;
- The Contractor will retain the services of an independent contractor and public utility services to identify the locations of buried and overhead utility services prior to any excavation activities;
- The Contractor will pre-arrange for acceptance of soil to be disposed of at Waste Connections disposal facility in Stony Mountain;
- The Contractor will obtain all necessary provincial and municipal permits for completion of remedial excavation;



### Remedial Action Plan

SW21-03-12-W1, Hydrometric Station 05OB021, Pembina River below Crystal Creek,  
Manitoba  
Manitoba Conservation and Climate  
Programs and Strategies

July 13, 2021

Pinchin File: 292865

- Pinchin will mobilize to the Site with the Contractor and conduct a mercury vapour survey using a Lumex RA-915M instrument (if available) or Jerome 505 Mercury Vapour Analyzer to confirm vapour concentrations of mercury within the shelters and exterior are below applicable guidelines and consistent with findings of previous shelter assessments;
- Advance up to fifteen (15) test pits at the Site with shovel or hand-auger to a maximum depth of 0.3 metres around and underneath the shelter to assess soil quality for presence of mercury and to provide information on Site-specific geological characteristics, in accordance with requirements set out in the 2020 Mercury Guidance Document;
- Perform field sample screening using the Lumex RA-915M instrument (if available) on samples collected from each test pit, including duplicate samples on 10% of samples, and compare to applicable criteria, in accordance with requirements set out in the 2020 Mercury Guidance Document. Samples collected for field screening will also be submitted for laboratory analysis of mercury. Advancement of additional test pits may be required based on results of sample field screening; and
- Advise the Contractor if remediation of soils is required based on results of field screening;

## 2.2 Soil Remediation Activities

### 2.2.1.1 Soil Excavation

Upon completion of the pre-excavation activities and if remediation of soils is warranted based on presence of mercury concentrations in soils exceeding applicable criteria, the Contractor, working under the direction of Pinchin, will complete the following:

- Using an excavator, soil with identified mercury impacts will be excavated from the ground and placed into pails or soil bags. The impacted soil will then be transported directly from the Site for disposal at the Waste Connections disposal facility in Stony Mountain as hazardous waste.

### 2.2.1.2 Submittals

- Copies of waybills/bills of lading produced by the licenced disposal facility for the received hazardous waste to the Contractor will be presented to Pinchin for review.



## **Remedial Action Plan**

SW21-03-12-W1, Hydrometric Station 05OB021, Pembina River below Crystal Creek,  
Manitoba  
Manitoba Conservation and Climate  
Programs and Strategies

July 13, 2021  
Pinchin File: 292865

### **2.2.1.3 Verification Soil Sampling**

Following completion of the remedial excavation, Pinchin will document the environmental status of the soil at the excavation limits by completing the following:

- Pinchin will complete confirmatory sampling of remediated area in accordance with the 2020 Mercury Guidance Document using the Lumex RA-915M instrument (if available). A total of eleven (11) confirmatory samples has been assumed for the Site, including duplicate samples on 10% of samples. Samples collected for verification soil sampling will also be submitted for laboratory analysis of mercury. Additional remediation may be required if confirmatory field and/or laboratory samples are noted to have concentrations of mercury above applicable criteria.

### **2.2.1.4 Restoration**

Following successful remediation of impacted soils (if required), the excavation will be backfilled by the Contractor, with clean imported fill material.

The grading will be re-instated to match existing terrain.

## **2.3 Analytical Laboratory**

Soil samples from test pits and verification soil sampling (if required) will be delivered to Bureau Veritas Laboratories (BV Labs) in Winnipeg, Manitoba for analysis of mercury using cold vapour atomic adsorption spectrophotometry (EPA Method 7471). BV Labs is an independent laboratory accredited by the Standards Council of Canada and the Canadian Association for Laboratory Accreditation. Formal chain of custody records of the sample submissions will be maintained between Pinchin and the staff at BV Labs. The soil samples will be submitted on 3 business day rush turnaround time.

## **2.4 QA/QC Protocols**

Various quality assurance/quality control (QA/QC) protocols will be followed during the remedial excavation to ensure that representative samples are obtained and that representative analytical data is reported by the laboratory.

Field QA/QC protocols that will be employed by Pinchin will include the following:

- Soil samples will be extracted from areas not in direct contact with the excavator bucket and/or sampling equipment, where possible, to minimize the potential for cross-contamination;
- Soil samples will be placed in laboratory-supplied sample jars;



### **Remedial Action Plan**

SW21-03-12-W1, Hydrometric Station 05OB021, Pembina River below Crystal Creek,  
Manitoba  
Manitoba Conservation and Climate  
Programs and Strategies

July 13, 2021  
Pinchin File: 292865

- Dedicated and disposable nitrile gloves will be used for sample handling;
- Non-dedicated sampling equipment will be cleaned before initial use and between uses to minimize the potential for cross-contamination; and
- Sample collection and handling procedures will be performed in general accordance with the 2020 Mercury Guidance Document, Manitoba Conservation and Climate Guidelines and Pinchin's SOPs.

BV Lab's internal laboratory QA/QC consists of the analysis of laboratory duplicate, method blank, matrix spike and spiked blank samples, and an evaluation of surrogate recoveries.

### **2.5 Regulatory Criteria**

Analytical results of soil samples will be compared to the CCME Soil Quality Guidelines for mercury.

### **2.6 Reporting**

Pinchin will prepare a factual Final Report for the Site documenting the findings. A copy of the report will be provided to Manitoba Conservation and Climate for review.

### **3.0 PROJECT SCHEDULE**

The shelter decommissioning and soil assessment activities are anticipated to begin July 26<sup>th</sup>, 2021.



**Remedial Action Plan**

SW21-03-12-W1, Hydrometric Station 05OB021, Pembina River below Crystal Creek,  
Manitoba  
Manitoba Conservation and Climate  
Programs and Strategies

July 13, 2021  
Pinchin File: 292865

**4.0 CLOSING**

We trust that the information provided herein is sufficient for Manitoba Conservation and Climate to approve the RAP.

If you have any questions, or require additional information, please do not hesitate to contact the undersigned.

Sincerely,

**Pinchin Ltd.**

Prepared by:

Valeriy Tyshchuk, B.E.Sc., P.Eng., QP<sub>ESA</sub>  
Senior Project Manager  
204.891.9171  
[vtyshchuk@pinchin.com](mailto:vtyshchuk@pinchin.com)

Reviewed by:

Grant Eftoda, B.Sc. (Eng.)  
Regional Practice Lead  
204.452.0983 ext. 2224  
[geftoda@pinchin.com](mailto:geftoda@pinchin.com)

Attach: APPENDIX I – Site Location Map

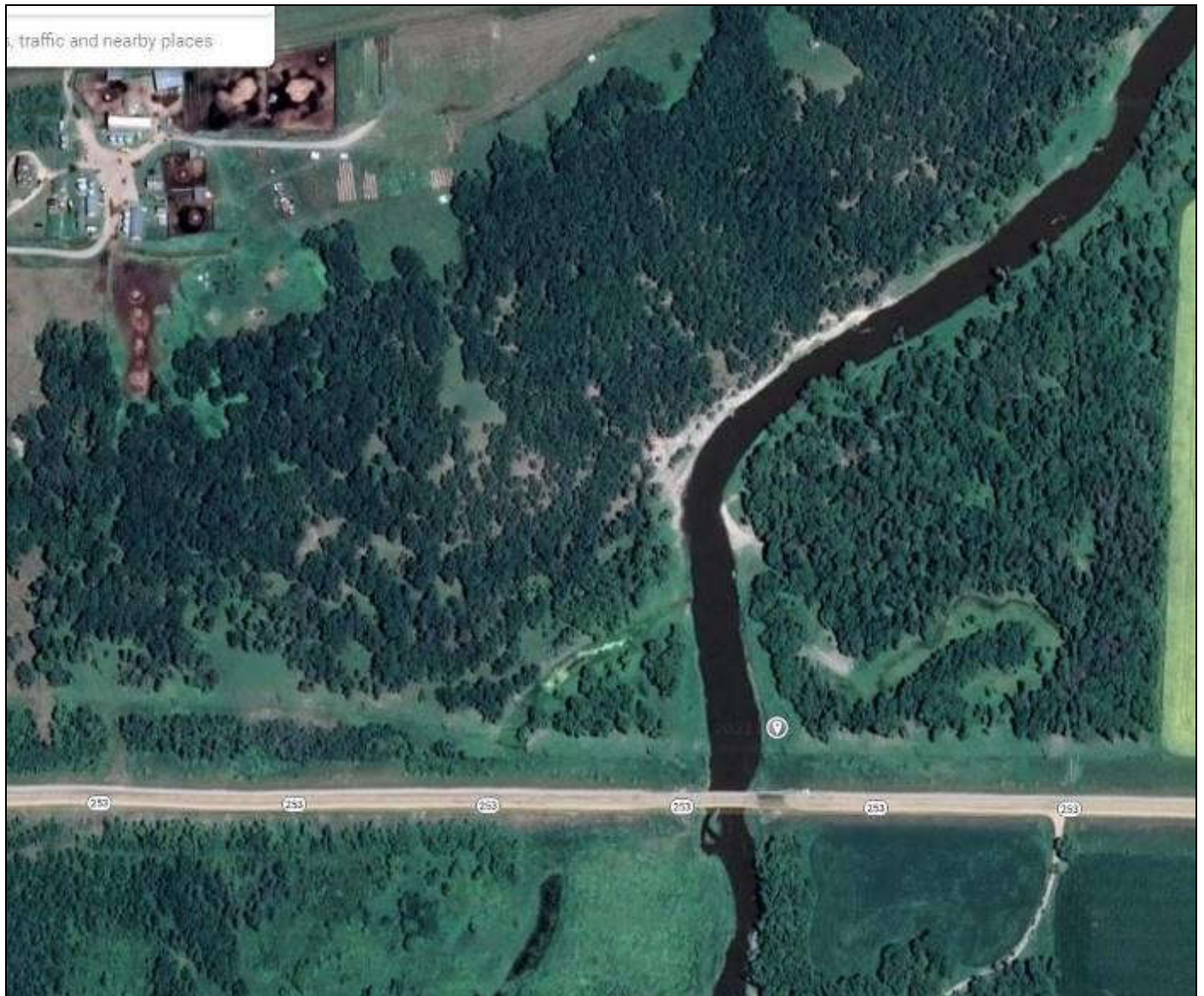
\\pinchin.com\wpg\Job\292000s\0292865.000 WERI,ClearwaterHydrometric,EDR,MercSoil\Deliverables\Remedial Plan - 05OB023 Pembina River below Crystal Creek\292865.000 - Remedial Plan 05OB023 Pembina River below Crystal Creek, MB WERI July 13, 2021.docx

Template: Phase II ESA Stage II PSI Proposal Template, EDR, April 7, 2020

**APPENDIX I**  
**Site Location Map**



## Appendix I: Site Location



**Photo 1:** Aerial photo of station location.



**Conservation and Climate**

Environmental Stewardship Division  
Environmental Compliance and Enforcement Branch  
1007 Century Street, Winnipeg, Manitoba R3H 0W4  
T 204-945-0675 F 204-948-2338  
[www.gov.mb.ca/sd](http://www.gov.mb.ca/sd)

Doug and Trudy Wilson  
RM of Argyle, MB

August 19, 2021

Dear Mr. and Ms. Wilson:

Re: Proposed Remediation Plan for SW 21-03-12W, RM of Argyle, Manitoba;  
Approval under the Contaminated Sites Remediation Act

This will acknowledge receipt of the Remediation Plan for the above noted property (the site) dated July 13, 2021 and prepared by Pinchin Ltd.

This letter constitutes written authorization as specified under The Contaminated Sites Remediation Act, C.C.S.M, c. C205, s. 17.1 (1) for Environment and Climate Change Canada to proceed with the remediation of the site as described in the Remediation Plan. Any change to the Remediation Plan must be approved by the undersigned prior to initiating the change.

It is requested that a Summary Report documenting the remediation is submitted to this office for review at the completion of the Remediation Plan.

It should be noted that the position of Manitoba Conservation and Climate as stated in this letter is based on the information provided to this office by Pinchin Ltd. and relates only to the matters within the scope of the Remediation Plan submitted by Pinchin Ltd.

If you have any questions regarding this letter, please contact Warren Rospad, Contaminated Sites Program Specialist at 204-330-2685 or [warren.rospad@gov.mb.ca](mailto:warren.rospad@gov.mb.ca). Please note that electronic submissions are preferred for documents and correspondence.

Sincerely,

Kristal Harman  
Director, Environmental Compliance and Enforcement

c. File: 81399  
Valeriy Tyshchuk (Pinchin Ltd.)  
Regional Supervisor

**APPENDIX VII**  
**Field Protocols**



# **Environmental Management Plan**

SW21-03-12-W1, Hydrometric  
Station 05OB021, Pembina River  
below Crystal Creek, Manitoba

Prepared for:

## **Winnipeg Environmental Remediations Inc.**

4040 Main Street  
West St. Paul, MB R4A 1A7

August 30, 2021

Pinchin File: 292865



**Environmental Management Plan**

SW21-03-12-W1, Hydrometric Station 05OB021, Pembina River below Crystal Creek,  
Manitoba

Winnipeg Environmental Remediations Inc.

August 30, 2021

Pinchin File: 292865

**Issued To:** Winnipeg Environmental Remediations Inc.  
**Issued On:** August 30, 2021  
**Pinchin File:** 292865  
**Issuing Office:** 54 Terracon Place, Winnipeg, MB R2J 4G7  
**Primary Pinchin Contact:** Valeriy Tyshchuk, B.E.Sc., P.Eng., QP<sub>ESA</sub>  
Senior Project Manager  
204.891.9171  
[vtyshchuk@pinchin.com](mailto:vtyshchuk@pinchin.com)

---

Author:

---

Valeriy Tyshchuk, B.E.Sc., P.Eng., QP<sub>ESA</sub>  
Senior Project Manager  
204.891.9171  
[vtyshchuk@pinchin.com](mailto:vtyshchuk@pinchin.com)

Reviewer:

---

Grant Eftoda, B.Sc.(Eng.)  
Regional Practice Lead  
204.770.8919  
[geftoda@pinchin.com](mailto:geftoda@pinchin.com)



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## **1.0 INTRODUCTION**

This Environmental Management Plan (EMP) is prepared for the property located at SW21-03-12-W1, Hydrometric Station 05OB021, Pembina River below Crystal Creek in Manitoba (Site) by Pinchin Ltd. (Pinchin) on behalf of Winnipeg Environmental Remediations Inc. (WERI or Contractor) and will be submitted to Environment and Climate Change Canada (ECCC) to demonstrate general understanding of the environmental component of the Project.

### **1.1 Project Description**

It is understood by Pinchin that ECCC has engaged WERI to complete decommissioning of an existing hydrometric station located at the Site. As part of the decommissioning activities, an assessment of the structure and soils below and around the structure are required to be completed by an Environmental Consultant to assess for presence of mercury in soils prior to decommissioning, in accordance with the document entitled "Update to the National Hydrometric Station Mercury Remediation Guidance Document" prepared by Dillon Consulting for Public Services and Procurement Canada, dated March, 2020 (2020 Mercury Guidance Document).

### **1.2 Purpose of the EMP**

The EMP provides detailed procedures to be followed by the Contractor and Project environmental personnel on how to complete work activities and undertakings during decommissioning to avoid and/or mitigate any potential negative environmental effects. Revisions to the EMP will be recommended by the Project environmental personnel for discussion between the Contractor and ECCC for further consultation with relevant agencies, if applicable, prior to commencement of work, when new conditions are encountered, or in the case of emergencies, prior to resuming work activities.

The EMP will form a part of an Environmental Protection Plan (EPP) prepared by the Contractor to act as the governing environmental plan for the Project. All Project personnel will receive orientation including the EMP and are responsible to ensure compliance at all times. The Site-specific EMP sections include but are not limited to, Emergency Response, Waste Management, Contaminated Soil Considerations and Erosion and Sediment Control.

## **2.0 ENVIRONMENTAL MANAGEMENT PLANS**

The following subsections present the requisite plans and procedures developed for the Project, which are to be effectively implemented by Project personnel during the decommissioning phase.

These EMPs include procedures that are based on regulatory requirements, best management practices (BMP), and any specific measures identified within ECCC's project requirements.



## **2.1 Training Plan**

It is the responsibility of the Contractor to develop a Training Plan to inform and train all Project personnel as necessary to perform their assigned tasks safely and with due regard for environmental conditions. This Plan will be developed, and all personnel training will be completed before starting the work at the Site. Such training will range from Project Site orientation and basic safety routines to task-specific training including measures to protect the environment. In addition, all Project personnel are to be familiar with the EMP prior to undertaking decommissioning activities.

## **2.2 Health and Safety Plan**

The Contractor has developed a Site-specific Health and Safety Plan (SSHSP) based on ECCC's specifications that considers public and occupational health and safety issues. The Plan details how the Contractor proposes to limit Project Site access so as to protect the public from the Project activities, encourage and enforce the use of Personal Protective Equipment (PPE), report accidents and incidents, and maintain equipment cleanliness and safe operation. In addition, the Plan outlines the roles and responsibilities of all parties with respect to health and safety. The Contractor is responsible for overall safety and security on the Project.

## **2.3 Emergency Response Procedures**

The Contractor has developed Emergency Response procedures within the EPP and SSHSP for the range of scenarios that could occur during the Project. Specific response measures are included to address the following scenarios:

- General emergencies;
- Employee injuries;
- Spill Response procedures; and
- Fire emergencies.

The intent of these procedures is to ensure that any environmental emergency will be dealt with in a rapid, safe and effective manner and includes, but is not limited to, specific requirements and information relating to emergency contacts, directions to the nearest hospital(s), spill and fire control, emergency communications, emergency response procedures for a spill or fire, medical emergency procedures, and notification and reporting protocols.



In addition to the procedures outlined in the EPP and SSHSP, the Project shall comply with Project-specific Emergency Response procedures for Mercury-Related incidents as outlined below:

#### Eye Exposure

If liquid mercury gets into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. If irritation is present after washing, get medical attention. Contact lenses will not be worn when working with this chemical.

#### Skin Exposure

If liquid mercury gets on the skin, promptly wash the contaminated skin using soap or mild detergent and water. If liquid mercury penetrates through the clothing, remove the clothing promptly and wash the skin using soap or mild detergent and water. If irritation persists after washing, get medical attention.

#### Breathing

If a person breathes in large amounts of mercury, move the exposed person to fresh air at once. If breathing has stopped, perform appropriate first aid/CPR procedures. Keep the affected person warm and at rest. Get medical attention as soon as possible.

#### Swallowing

When large quantities of mercury have been swallowed or mercury has been swallowed repeatedly and the person is conscious, give the person large quantities of water immediately. After the water has been swallowed, try to get the person to vomit by having the affected person touch the back of their throat with their finger. Do not make an unconscious person vomit. Get medical attention immediately.

#### Rescue

Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency response rescue procedures. Do not become a casualty. Understand the appropriate emergency rescue procedures and know the locations of rescue equipment before the need arises.

It is recognized that the Contractor and other Project related personnel will work in a coordinated, efficient manner when faced with an emergency situation requiring clear and concise definitions of the appropriate agency contacts and their roles and responsibilities to ensure that the effect of any emergency will be minimized. Regular training will serve to ensure that all Project personnel are prepared to quickly and decisively respond to any potential emergency (e.g., fire or spill).



It is noted that the Contractor and all other Project related personnel, are required to follow all federal, and provincial regulations requiring notification when pollutants are released into the environment as a result of an incident. The Emergency Response procedures aim to ensure every incident with an environmental effect is immediately reported to government authorities and that any effect is contained to a minimum. The safety of the public and of workers is a top priority.

## **2.4 Erosion and Sediment Control Measures**

The purpose of the Erosion and Sediment Control (ESC) measures is to detail how the Contractor proposes to control drainage, erosion and sediment migration during decommissioning/remedial operations, as well as to include post-decommissioning/remediation rehabilitation procedures. The ESC controls will remain in place until all disturbed areas are fully stabilized to retain sediment onsite and prevent spills into nearby watercourses/bodies within the Project area.

The following provides a narrative summary of the potential controls to be implemented for this Project:

- The Contractor is to conduct daily monitoring of all Project activities to ensure that disturbed soils remain intact (i.e., do not migrate from the work area);
- If there are excessive amounts of rain, disturbed soils shall be secured using tarps, straw mulch, silt fencing and straw/hay bales, where appropriate;
- Disturbed ground cover during decommissioning/remedial activities shall be stabilized as soon as reasonably possible following completion with a native (non-invasive) cover to minimize erosion;
- An erosion buffer zone of 15 m will be established from the edge of the water body. Where the work area must extend within the erosion buffer zone (i.e. closer than 15 m to the water body) or where otherwise warranted, geotextile cloths and/or silt fencing will be installed to minimize offsite silt movement, prior to start of earthwork activities;
- All decommissioning/remedial activities will be performed as expeditiously as possible to minimize environmental effects;
- Minimizing the amount of exposed soil to precipitation is the best mitigation available. Thus, planning decommissioning/remedial activities for dry weather conditions when rainfall potential is lowest will minimize the potential for erosion and sedimentation. When this is not possible, skipping the most erosion-sensitive areas until drier conditions is preferential;



- A wet weather shutdown policy will be implemented in the event that wet weather conditions (e.g., forecasted periods of heavy or prolonged rainfall) might cause slope instability or increased risk of erosion in sensitive areas. In the event that decommissioning/remedial activities must occur during prolonged wet weather conditions, special protective measures shall be implemented to reduce the effects of soil erosion, soil compaction, watercourse siltation, and vegetation damage;
- Stabilization of disturbed soil with straw mulch to reduce or eliminate erosion associated with high winds, resulting soil loss and fugitive dust;
- Application of water to the working area to temporarily control fugitive dust emissions during dry seasonal weather;
- All soil piles will be placed on stable ground to minimize erosion potential;
- Stockpiles will be located away from environmentally sensitive areas, if determined to be present; and
- Excavated material that is to be removed offsite will be disposed of in accordance with all applicable legislation and will be placed in such a way that it does not discharge to any nearby watercourse/body and/or their associated floodplains.

The Contractor will be responsible for the installation and regular maintenance of drainage mitigation measures, including inspection of their integrity on a daily basis and during deteriorating weather conditions, to ensure they are working effectively. The Contractor will immediately correct any identified deficiencies to ensure compliance with the above specifications. These components will be maintained until the work areas are completely stabilized and there is no longer a risk of sediment release to aquatic habitat and/or drainage courses that outlet surface waters.

The Contractor is also prepared to anticipate and deal with the need for emergency erosion protection. Personnel and equipment will be made available onsite to deal with potential emergencies.

## **2.5 Agricultural Considerations**

Portions of the Project exist on or nearby agricultural lands and will be given special consideration to ensure the commitment to protecting the land and property owners. Necessary designated access routes will restrict travel over agricultural lands to minimize the effects as detailed in the following subsections. Access over agricultural lands, outside of designated, pre-established access routes will not be permitted.

Wherever possible, travel and associated effects should be avoided otherwise planned to minimize effects to agricultural lands.



### *2.5.1 Interference with Farm Operations*

The Contractor may avoid interfering with farm operations and notify relevant property owners and stakeholders of the Project and construction activities, access route and schedule to minimize potential effects on crops. The Contractor will install temporary fencing with gates along the ROW, access routes and other areas as required to ensure the protection of livestock.

### *2.5.2 Spread of Invasive Species*

Care will be taken to minimize the potential for invasive species to be spread between agricultural lands. Mitigative measures to be taken by Site personnel include regular equipment cleaning, boot cleaning stations and brushing off clothing before leaving a work area. In addition, Site personnel will remain on access roads and within the established work areas.

## **2.6 Vegetation Management Plan**

### *2.6.1 Vegetation Clearing and Disposal*

Vegetation clearing consists of the removal and disposal of trees, shrubs, grasses, weeds, fallen logs and other surface litter within the work area. Vegetation clearing may be required prior to the decommissioning/ remedial activities at the Site.

In general, vegetation clearing and disposal has the potential to alter wildlife habitat and degrade sensitive natural heritage features, such as riparian zones around water bodies. Removal of forest or hedgerow vegetation can result in wind stress, desiccation, and increased soil erosion. Over-cutting also exposes remaining trees to an increased risk of blow down. Removed riparian vegetation may reduce fish habitat quality. Piled cut vegetation near or in a watercourse could degrade aquatic habitat, impact nesting habitats of wetland associated birds, and/or obstruct fish passage.

In areas where vegetation is to be cleared, the following mitigation measures will apply:

- Vegetation removals will be kept to the minimum necessary to complete the decommissioning/remedial activities;
- Environmental sensitive areas identified during completion of site activities will be sectioned off to minimize access and disturbance of the areas;
- BMP will be implemented to prevent fallen trees and branches, as well as newly exposed sediments, from entering watercourses and wetlands;
- Erosion and sediment control measures will be used to prevent newly exposed substrates from entering water bodies (See Section 2.4);



- Tree limbs, branches and brush will be disposed of by chipping or removal to a designated area;
- Chipping is not permitted in or near watercourses;
- Stumps will be cut flush to ground where possible;
- Woody material or slash will not be burned; and
- Slash and any other construction material or debris will not be permitted to enter any watercourse.

### *2.6.2 Vegetation Management and Restoration*

To minimize the negative impacts and to maintain the form and function of wildlife habitat, restoring areas through natural regeneration and re-vegetation with native plant and seed species where vegetation has been removed will be implemented.

### *2.6.3 Invasive and Noxious Vegetation Mitigation*

The spread of noxious weeds and non-native species during decommissioning/remedial activities is a potential effect to agricultural lands. Machinery and personnel involved in the decommissioning/remedial activities can quickly cause the spread of noxious weeds as disturbing the soil allows opportunity for weeds to become established. Weeds are often the first plants to establish within disturbed soils, dispersing seeds effectively therefore rapidly spreading and growing.

In relation to Noxious Vegetation Mitigation measures, consideration shall be given to the following measures to minimize the spread of invasive and noxious weeds at the Site:

- Care should be taken to ensure that the seeds of noxious and invasive weeds and seeds are not carried by machinery and personnel onto agricultural lands. Machinery and personnel footwear should be visually inspected for presence of excessive detritus and scrubbed/washed off prior to entering onto agricultural lands. Washing should be carried out in a designated area and with consideration for ESC measures outlined in Section 2.4;
- Revegetate disturbed areas with native seed mixtures or plants as soon as possible after disturbance;
- Use only clean materials (soil and gravel) for maintenance operations or restoration activities;
- Minimize waste soil, brush and wood piles to reduce potential germination; and



- Require workers, to remain on established paths and trails through any areas that are left in a natural condition.

## **2.7 Waste Management**

Throughout the construction phases, all wastes that cannot be reused and/or recycled will be managed in accordance with measures outlined in the following subsections.

### *2.7.1 Non-Hazardous Wastes*

The Contractor has developed waste management and reduction procedures as outlined in the EPP for non-hazardous wastes.

### *2.7.2 Hazardous Wastes*

Contractor may generate hazardous wastes including, but not limited to, waste oils, solvents and lubricants during the decommissioning/remedial activities and maintenance of construction equipment and vehicles. Additionally, mercury-impacted construction material may be generated during the decommissioning/remedial activities. Labelling requirements for transportation of mercury-impacted material is indicated in Section 2.8.1 below.

Should a spill occur at the Site during decommissioning/remedial activities (refer to Section 2.3), any contaminated material and spill clean-up materials (e.g., used absorbent) will be treated as hazardous waste. All hazardous wastes will be containerized and removed offsite by the Contractor, a licensed hazardous waste hauler.

Handling and storage of all hazardous products, including wastes, will be conducted in accordance with the Contractor's Health & Safety Policy and The Dangerous Goods Handling and Transportation Act. Handling and storage of hazardous substances will be located at a minimum distance of 30 m from any water body. Where appropriate, secondary containment measures will be installed for bulk storage of liquid hazardous wastes.



## **2.8 Contaminated Soil Considerations**

### *2.8.1 Mercury-Contaminated Soils*

Soils identified to be potentially contaminated by mercury based on soil vapour assessment will be excavated by hand shovel or excavator bucket and placed in 5-gallon pails or soil bags. Following successful excavation of mercury-contaminated soils, pails and/or soil bags containing the mercury-contaminated soils will be sealed shut and affixed with WHMIS labels and Transportation of Dangerous Goods product identifier label, as follows:

- A Class 8 Corrosive label with “MERCURY UN2809” is required for any materials containing visible mercury; or
- A Class 9 label with “ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Soil contaminated with mercury), UN3077” for materials contaminated with nonvisible mercury residue.

### *2.8.2 Non-Mercury Contaminated Soils*

In the event that contaminated soils/materials not including mercury are discovered during the course of decommissioning/remedial activities, Pinchin will provide guidance as to proper disposal methods.

Proposed management of any soils or materials suspected of being contaminated, other than mercury, shall be proposed by the Contractor and approved by ECCC.

Fill material brought to the Site will consist of clean material sourced from an approved commercial aggregate source.

## **2.9 Air Quality and Dust Control**

The Project has the potential to affect the air quality in the immediate vicinity of the Project area due to the generation of dust (suspended particles) and combustion (diesel) emissions from construction machinery/equipment such as CO, NO<sub>x</sub>, SO<sub>x</sub> and VOCs. These emissions are temporary and short term in duration and unlikely to have any long-term effect on adjacent land uses.

During construction, the Contractor will implement dust suppression measures to reduce the potential for particulate matter resulting from decommissioning/remedial activities. The Air Quality and Dust Control measures for this Project, which includes identification of sources and mitigation strategies, are outlined in the subsections below.



### 2.9.1 Source Identification

The following potential sources of fugitive dust and air emissions have been identified for this Project:

- Vehicle traffic on gravel access roads;
- Emissions resulting from operating fuel-fired machinery, equipment and vehicles;
- Stockpile storage;
- Bare soils during decommissioning/remedial activities;
- Vegetation clearing activities;
- Hauling of building materials, soils and wastes to/from the Site; and
- Storage of building materials and granular material at the Site.

### 2.9.2 Control Methods

The most common control method is the application of water on exposed soils and gravel roads to prevent dust from becoming airborne. Use of water for purpose of dust control should be carried out in accordance with the ESC measures outlined in Section 2.4.

The use of well-maintained construction machinery and equipment shall ensure that combustion emissions are kept to a minimum. In addition, idling of equipment and vehicles will be minimized. The machinery and equipment to be used at this Project is conventional in design and equipped with manufacturer installed emission control devices.

The Contractor will also give consideration to the following mitigation measures if deemed appropriate to further avoid or significantly reduce the potential for decreased ambient air quality from increased emissions and concentrations of chemical pollutants, dust and other particulate matter, during the Project:

- Avoid Site preparation, clearing and construction during windy and prolonged dry periods, if possible;
- Minimize vehicle traffic on exposed soils;
- Stabilize exposed soil and other material storage piles against wind erosion, using straw mulch, geotextile cloths and/or silt fencing to minimize offsite silt movement;
- Stabilize exposed soil with native seeding mix upon decommissioning completion;
- Cover and contain fine particulate materials during transportation to and from the project Site. Install a tarpaulin on material stockpiles and haulage trucks, as appropriate;



- Use new or well-maintained equipment and machinery, preferably fitted with fully functional emission control systems/muffler/exhaust system baffles and engine covers; and
- Dust control will be visually monitored during the Project and any demonstrated effects will be corrected and compensated immediately.

## **2.10 Site Restoration**

Following construction, the Contractor will conduct clean-up activities and restore the Site and affected areas to their pre-construction condition as much as is possible. This will entail removing all construction related materials from the working areas including equipment, salvageable materials and debris. Materials from the working areas will be removed and disposed in at a licensed waste facility, in accordance with the Waste Management measures outlined in the EPP and above (Section 2.7).

All materials removed during construction such as brush, trimmed trees/shrubs, stumps and other debris, will be removed and appropriately disposed. Restoration will involve use of native materials such as non-invasive species indigenous to Manitoba.

All surfaces which have been compacted as a result of decommissioning/remedial activities will be protected and vegetated as soon as reasonably possible. This may include the placement of native soils and/or erosion control blankets, hydro-seeding of the affected area, and revegetation with native trees, shrubs, and herbaceous cover.

Revegetation of disturbed soils will take into consideration:

- The existing conditions and suitability which is based on proximity of utilities, soil preference, moisture needs of the various species, slope stability and existing drainage conditions; and
- Any conditions noted by the property owner to restore the Project to pre-construction condition.

The purpose of the Site Restoration measures is to ensure that all disturbed lands are either restored to their original condition and environmentally sound.