TETRA TECH

Hazardous Building Materials Assessment of the Baltimore Flood Pumping Station

PRESENTED TO

Winnipeg

APRIL 17, 2018
ISSUED FOR REVIEW
FILE: 734-1800120700-REP-V0001-A

This “Issued for Review” report is provided solely for the purpose of client review and presents our findings and recommendations to date. Our findings and recommendations are provided only through an “Issued for Use” report, which will be issued subsequent to this review. You should not rely on the interim recommendations made herein. Once our report is issued for use, the “Issued for Review” document should be either returned to Tetra Tech Canada Inc. or destroyed.

Tetra Tech Canada Inc.
400-161 Portage Avenue East
Winnipeg, MB R3B 0Y4
Tel 204.954.6800 Fax 204.988.0546

This page intentionally left blank.

Hazardous Building Materials Assessment of the Baltimore Flood Pumping Station

APRIL 17, 2018
ISSUED FOR REVIEW
FILE: FILE: 734-1800120700-REP-V0001-A

PRESENTED TO

The City of Winnipeg
Corporate Finance Department
Materials Management Division
185 King Street, Main Floor
Winnipeg, MB R3B 1J1

PRESENTED BY

Tetra Tech Canada Inc.
400 – 161 Portage Ave. East
Winnipeg, MB R2N 3P4

P +1.204.954.6800
F +1.204.988.0546
tetratech.com

Prepared by:

Matthew Randell, B.Sc.
Environmental Scientist

April 17, 2018

Authorized by:

Brent Horning, P.Eng.
Sr. Environmental Engineer

April 17, 2018

TETRA TECH

EXECUTIVE SUMMARY

The City of Winnipeg retained Tetra Tech Canada Inc. (Tetra Tech) to complete the detailed design and contract administration for the Baltimore Flood Pumping Station upgrade. The Baltimore Flood Pumping Station (FPS) building is located at the corner of Churchill Drive and Baltimore Road in the City of Winnipeg, Manitoba, herein after referred to as "the station." One component of this project was a hazardous material assessment of possible lead and mercury containing paint and potential asbestos-containing materials (ACMs). This assessment was undertaken as part of the preliminary project design stage and included manual sample collection in accordance with industry standard practices and compliance with provincial and federal health and safety guidelines to ensure that no on-site personnel were potentially exposed to these materials during sampling efforts.

The FPS consists of a basic timber structure housing electrical and control systems, situated above underground concrete dry well, wet well, and discharge box structures.

The scope of work for the lead and mercury containing paint assessment included an initial visual inspection of the station followed by the collection of paint chip samples from accessible building materials. The visual inspection was performed on March 15, 2018 and identified the presence of ten different colours of paint on various pieces of equipment and the interior of the structure itself. Between one (1) and three (3) samples were collected from each of these paint colours/ locations depending on their relative extent within the station. A total of 19 paint samples were submitted for laboratory analysis.

The scope of work for the ACM assessment included an initial visual inspection of the facility to identify general structural, architectural, mechanical materials that could potentially contain asbestos, followed by the collection of bulk material samples from accessible building materials. This inspection was undertaken on March 15, 2018, and identified seven different materials of potential concern including press board type wall sheeting and associated backing material, concrete filler and sealant, spray foam and rigid foam insulation, and loose fiber insulation/ filler. Between one (1) and three (3) samples were collected from each of the materials identified, and a total of 11 bulk material samples were submitted for laboratory analysis.

The significant findings from the hazardous building materials assessment are described below.

- Analytical results for the paint samples indicated that 18 of the 19 samples collected contained lead at concentrations greater than the assessment environmental quality guidelines. Two (2) of the 19 samples collected contained mercury at concentrations greater than the assessment environmental quality guidelines.

- Analyses of four representative paint chip samples for toxicity characteristic leaching procedure (TCLP), showed three of the four produced a lead leachate in excess of the guideline for classification as a hazardous waste, and the fourth to be slightly below the guideline.

- Analytical results for the bulk building material samples collected indicated that one (1) of the 11 samples contained asbestos. This ACM was a joint sealant compound present between the concrete floor of the main level and a steel plate covering an opening for a float assembly in the subsurface wet well. This joint compound material is present as a strip about 50 mm wide around the perimeter of the steel plate, with a total length of about 1.0 m.

Based on these findings, it can be assumed that all painted surfaces within the structure can be considered to be lead containing. The lead containing paint present at the site should therefore be properly encapsulated (i.e., repainted) to minimize exposure, or removed in accordance with an appropriate abatement and disposal program for any painted surfaces anticipated to be disturbed during the course of the FPS upgrades. Based on the TCLP

analytical results, al paint striping residue should also be considered as hazardous waste, and so handled and disposed of accordingly.

Due to the limited extent of the asbestos containing joint compound, and its relatively poor condition, removal of this material should be done by a qualified asbestos abatement contractor. If the City of Winnipeg prefers to leave this material in place, an appropriate asbestos management plan (AMP) should be put into place in accordance with current Provincial Health and Safety regulations, including applicable staff training, signage, documentation and annual inspections.

TABLE OF CONTENTS

APPENDIX SECTIONS

APPENDICES

ACRONYMS & ABBREVIATIONS

Acronyms/Abbreviations	Definition
ACM	Asbestos Containing Material
AMP	Asbestos Management Plan
FPS	Flood Pumping Station
HPA	Hazardous Products Act
kg	Kilogram
LBP	Lead Based Paint
L	Litre
mg	Milligram
QA/QC	Quality Assurance/Quality Control
TCLP	Toxicity Characteristic Leaching Procedure
Tetra Tech	Tetra Tech Canada Incorporated

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of the City of Winnipeg and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than the City of Winnipeg, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.

1.0 INTRODUCTION

The City of Winnipeg (the City) retained Tetra Tech Canada Inc. (Tetra Tech) to complete the detailed design and contract administration for the Baltimore Flood Pumping Station upgrade. The Baltimore Flood Pumping Station (FPS) building is located at the corner of Churchill Drive and Baltimore Road in the City of Winnipeg, Manitoba, herein after referred to as "the station." One component of this project was a hazardous material assessment of possible lead and mercury containing paint and potential asbestos-containing materials (ACMs).

1.1 Scope of Work

The scope of work for this assessment included the following activities.

- Preparation of a sample collection plan based on the preliminary information provided.
- An initial site walkthrough/ visual inspection of the building interior to identify potential materials of concern.
- Collection of paint chip samples from the surface of accessible building materials and equipment suspected of being coated by lead and mercury containing paint.
- Collection of bulk material samples from accessible building materials that could potentially contain asbestos.
- Submission of samples to an appropriate analytical laboratory for confirmatory analysis.
- Preparation of a summary report which confirms the presence, location, and approximate extent of the indoor lead and mercury containing paint and ACMs.

2.0 SITE OVERVIEW

The Baltimore FPS was built in the early 1950's and is located in a residential area of Winnipeg at the end of Baltimore Avenue, on the west side of the Red River. The station consists of a single storey, open, wood framed aboveground building with a flat wood framed roof supported by the exterior walls and interior wood beams and posts, covering approximately 63 m^2. The exterior of the building is finished with vinyl siding and asphalt shingles. The interior walls of the building are uninsulated and are finished with press board paneling. Portions of the south and west walls of the building include the concrete walls for the adjacent discharge box structure. The floor is brushed concrete with numerous checker plate steel covers over openings to the underground infrastructure. Stairwell access to the underground dry well structure is contained within a small plywood walled vestibule. The building contains the electrical and control components for the pumps on the north and east walls, and contains the top drive portions of three separately coupled, overhung impeller centrifugal pumps which have been installed in the base of the dry well.

The substructure consists of a formed concrete wet well, dry well, and discharge box. The dry well is rectangular in shape and is 9.7 m deep with a footprint area of approximately 36 m^2 beneath the south half of the building. This structure contains an access stairwell and ladder, supports for the three drive shafts extending down from the main floor, and three floor mounted centrifugal pumps to transfer water from the wet well to the discharge box. The wet well is of similar concrete construction and underlies the north half of the building. The discharge box structure is located to the south and east of the building footprint. The wet well and discharge box structures are unfinished concrete with minimal equipment, and were therefore not included in the visual inspection of the station or the material sampling program.

General site plans showing the current building configuration are provided as Figures 1 and 2 in Appendix A. Photographs of the general building layout are provided in Appendix B.

3.0 INVESTIGATION METHODOLOGY

3.1 Project Scoping

Following project award, Tetra Tech undertook a review of the available information in order to develop a preliminary sampling plan of potential hazardous building materials. This included photographs compiled by Tetra Tech staffed during an initial walkthrough of the building during the proposal site visit on December 20, 2017, historic FPS construction and renovation drawings provided by the City, and the 2006 condition assessment report provided by the City. Review of the historic site drawings found no reference to the use of asbestos containing materials on-site. The condition assessment did not specifically discuss potential hazardous building materials, but did indicated the paint on the pumps and piping likely contained lead and that proper abatement would be required prior to repainting of these items.

Using this sampling plan as a base, a general visual inspection of the FPS was performed on March 15, 2018, to confirm the distribution of the potentially hazardous building materials identified and to confirm the extent of their distribution. Photographs of the site taken during this inspection are provided in Appendix B. During the course of this inspection, Tetra Tech staff verified and identified the following building materials that may contain potentially hazardous materials.

On the main level of the Baltimore FPS building.

- Lead based paint (LBP) may be present on the following surfaces:
  - the gray paint on the three (3) top drive units for the dry well centrifugal pumps;
  - the red paint on the piping coming from the top drive units;
  - the blue paint on the railings located throughout the main floor;
  - the gray paint on the electrical equipment box near the center of the room;
  - the brown paint on the framing surrounding the door at the main entrance;
  - the white paint on the partial frame around the window on the west wall;
  - the off-white paint on the framing around previous windows that have been removed and replaced with plywood, and the baseboards; and
  - the relatively new white paint on the wooden support post in the centre of the room and support board for electrical lines on the east wall.

- ACMs may be present in the following building materials:
  - the brown press board paneling on the interior walls;

- the lining between the brown press board paneling and the wood stud wall frame of the interior walls;
- the spray foam insulation/sealant between the concrete and wood wall sections in the southwest corner of the building;
- the spray foam insulation/ plug from a removed pipe or duct opening on the east wall;
- the rigid foam insulation from the back of the door to the dry well stairwell vestibule;
- the loose fibre insulation from the floor gap around the ventilation duct in the center of the room; and
- the sealant around the metal plate on the floor for the wet well float assembly along the north wall.

In the dry well of the Baltimore FPS building.

- Lead based paint may be present on the following surfaces:
  - the green paint on each of the three (3) pumps; and
  - the black paint on the piping from the pumps that is secured to the walls.
- ACMs may be present in the following building materials:
  - the cement filler on the northeast wall; and
  - the cement filler around the metal plate on the floor between pumps 2 and 3.

3.2 Site Safety

Prior to initiation of the site inspection and material sampling activities, Tetra Tech reviewed the scope of work, job hazards, safe work practices, and emergency procedures pertaining to the tasks being conducted and the jobsite itself. The Tetra Tech staff member tasked with conducting the hazardous materials sampling waited until all other team members had exited the areas of proposed material sampling in order to eliminate the risk of exposure to any disturbed materials. Appropriate personal protective equipment was donned for the sampling of hazardous materials.

3.3 General Sampling Procedure

Tetra Tech collected all samples of potential asbestos-containing materials and lead-containing paint in accordance with the *Manitoba Workplace Safety and Health Act and Regulation,* Manitoba's *Guide for Asbestos Management,* the federal *Hazardous Products Act* (HPA), and the most current amendment of the federal *Surface Coating Materials Regulation*. A unique sample identification and number was assigned to each sample in general accordance with a sample type identifier and consecutive sample number. The identifiers for the type of sample were included in the *Sample ID*, where LBP denoted lead based paint and ACM denoted asbestos containing material.

3.3.1 Lead and Mercury in Paint Sample Collection

Based on the initial visual inspection of the building, areas where possible lead and mercury containing paints were observed were selected for laboratory sample collection.

A total of 19 paint chip samples were collected from the subject site. Garbage bags were placed as drop sheets under the surfaces to be sampled in order to collect any paint chips that fell during sampling. Samples were collected using a chisel as a scraping tool to remove a sufficient amount of sample from the relevant substrate. The collected paint chip samples were individually scraped into a clean, clearly labelled single-use, sealable plastic sample bag. The labelled sample bags were wiped clean with a wet shop wipe and placed inside a second sample bag. The sampling instruments were wiped down with a wet wipe and wiped clean using a shop wipe after the collection of each sample to prevent cross-contamination between samples. The areas under the surfaces to be sampled were cleaned using water from a spray bottle and shop wipes to collect any suspect LBP material that was not contained on the drop sheet. Used drop sheets, wipes, and any other waste materials that came in contact with suspect LBP containing materials were collected and placed in labelled garbage bags that were held by Tetra Tech until sample analysis results were received and proper disposal methods could be determined.

3.3.2 Asbestos Sample Collection

Asbestos samples were collected using established methods from those materials that are most commonly associated with asbestos containing building materials and locations where asbestos may have been required for insulation purposes.

A total of 11 bulk samples were collected from materials deemed to be potentially asbestos containing. Minor damaging of these materials was required during sampling using pliers and a chisel and hammer. A wetting agent was applied to the material surfaces prior to sample collection to reduce the potential for air-borne fibre release. Collected samples were placed in clean, labelled, single-use, sealable plastic sample bags, and sealed immediately upon collection. The labelled sample bags were wiped down with a wet shop wipe and placed inside a second, clean sample bag. The sampling instruments were wiped down with wet wipes and wiped clean using a shop wipe after the collection of each sample to prevent cross contamination between samples. Used wipes and any other waste materials that came in contact with suspect ACMs were collected and placed in labelled garbage bags that were held by Tetra Tech until sample analysis results were received and proper disposal methods could be determined.

Upon completion of sample collection, the sampling sites were sealed with tape to ensure that if the materials were asbestos containing, the disturbed surfaces were not exposed and no further fibre release would occur.

3.3.3 Field Quality Assurance/Quality Control

Field Quality Assurance/Quality Control (QA/QC) procedures taken by Tetra Tech field staff included the cleaning of sampling equipment, and sample collection, handling and management procedures, as summarized below.

- New, clean, disposable nitrile gloves were worn when handling samples or sampling equipment. New gloves were donned for every sample collected.
- New, clean sampling containers were used to collect each sample.
- Sampling instruments were cleaned after the collection of each sample to prevent cross-contamination between samples.

- Sample containers submitted for laboratory analysis were identified using weatherproof labels and recorded on the laboratory chain of custody forms.

3.4 Laboratory Submission and Analysis

Upon completion of sampling activities, all samples were submitted to ALS Environmental Laboratories in Winnipeg, Manitoba for analysis. Paint chip samples were submitted for analysis of lead in paint and mercury in paint. Bulk material samples were submitted for the analysis of asbestos by polarized light microscopy with a 1% by volume detection limit.

3.5 Applicable Guidelines

Analytical results for the paint chip samples were reviewed relative to the federal *Hazardous Products Act* (HPA) (R.S.C, 1985, c. H-3) (Government of Canada, 1985), and the most current amendment of the federal *Surface Coating Materials Regulation* (SOR/2016-193) (Government of Canada, 2016). In accordance with these guidelines, the level of total lead allowed in paints and other surface coating materials is 90 mg/kg, and the level of total mercury allowed in paints must not exceed 10 mg/kg.

If analytical results confirm that lead and mercury are present at elevated concentrations in the submitted paint chip samples, toxicity characteristic leaching procedure (TCLP) analyses is required to determine the waste classification as either industrial or hazardous waste.In accordance with *The Dangerous Goods Handling and Transportation Act (C.C.S.M. c. D12) Hazardous Waste Regulation* (Government of Manitoba, 2015), a material containing lead or mercury at a TCLP concentration which exceeds 5 mg/L and 0.1 mg/L respectively, is classified as category 4 level hazardous waste, and must be disposed of at an appropriate waste management site.

Analytical results for the bulk asbestos samples were reviewed relative to Parts 6, 33, 35, 36 and 37 of the Manitoba Workplace Safety and Health Regulation (2016) (Government of Manitoba, 2016), and Manitoba Workplace, Safety and Health's *Guide for Asbestos Management* (Government of Manitoba, 2016). In accordance with these guidelines, any samples of non-friable material showing greater than or equal to 1% asbestos by volume were identified as an ACM. For friable materials (i.e., material that can be destroyed by hand pressure), any concentration of asbestos, even results denoted as containing trace amounts of asbestos, would classify the material as being an ACM. It should also be noted that the in-situ condition of the bulk material should be taken into consideration since a damaged non-friable material (e.g., floor tile) can be considered as a friable material if the conditions of the material, (i.e. damage, material wear or proposed demolition) results in small particles being released into the air.

4.0 SAMPLE RESULTS

The laboratory results for the paint samples and bulk ACM samples are summarized in Tables 1, 2, and 3, as presented in Appendix C. Approximate sample locations are shown graphically on Figures 1 and 2 provided in Appendix A. The formal laboratory analytical reports and chain-of-custody forms for all samples submitted for analyses are provided in Appendix D.

4.1 Paint Sample Results

The analytical results of the paint samples are presented in the units of mg/kg for both lead and mercury in paint. Of the 19 samples submitted for lead analysis, analytical results for 18 of the samples collected identified lead in paint at a concentration between 712 mg/kg and 38 800 mg/kg, significantly greater than the assessment environmental quality guideline of 90 mg/kg. Painted materials from the main level that exceeded assessment environmental quality guidelines included gray paint from the top drive units, red paint on the piping coming from the top drive units, blue paint from the railings, gray paint from the electrical box near the center of the room, brown paint around the door frame of the main entrance, and white paint on the window framing. Painted materials in the dry well that exceeded assessment environmental quality guidelines included green paint from each of the pump units, and black paint from the piping that attached the pump units to the walls.

In general, the painted surfaces showing elevated lead concentrations on the main floor were in fair to good condition with no significant indications of paint flaking. The paint on the railings (blue) and window frames did however appear heavily worn. The paint on the pumps in the dry well was in fair condition with visible signs of paint flaking due to corrosion (rusting) near joints.

Of the 19 samples submitted for mercury analysis, analytical results for two (2) samples collected identified mercury in paint at a concentration greater than the assessment environmental quality guideline of 10 mg/kg; sample LBP-16, brown paint from the door frame around the main entrance door on the northwest corner of the building identified mercury in paint at a concentration of 15.1 mg/kg; and sample LBP-17, white paint from framing around the window along the west wall of the building identified mercury in paint at a concentration of 61.5 mg/kg. Both of these paint samples also contained elevated lead concentrations.

Paint chip sample LBP-19, white paint from the wood post near the center of the main floor (see photos 4, 31 and 32 in Appendix B), was the only sample that did not contain a lead or a mercury concentration above the assessment environmental quality guidelines. This paint on the post does not appear to be part of the original structure construction, but appears to have been applied simply as a means of cleaning a paint roller, possibly associated with the painting of a wooden support board for the electrical cables on the wall in the northwest corner of the building (see photo 3).

4.1.1 Paint Sample Leachate Analysis

As a lead containing substance, federal and provincial Transportation of Dangerous Goods and industrial waste disposal regulations require an assessment of the potential for the lead and mercury contained in the paint to be adsorbed by exposure to water. Four (4) samples representative of different colours of paint were therefore submitted for TCLP analyses to determine if following removal of the paint (if performed), this material could be handled and disposed of as an industrial waste or if it would have to be classified as a hazardous waste.

Of the four (4) paint chip samples submitted for TCLP, analytical results for the following three (3) samples identified lead leachate at a concentration greater than the Manitoba guideline of 5.0 mg/L for the classification of hazardous waste.

- sample LBP-16, the brown paint from the door frame around the main entrance door on the northwest corner of the building produced a lead concentration of 7.43 mg/L.
- samples LBP-01, LBP-02, and LBP-03, the green paint from pumps one (1), two (2), and three (3) at the base of the dry well were combined into one sample based on the apparent consistent paint types, which produced a lead concentration of 50.2 mg/L.
- samples LBP-07, LBP-08, and LBP-09, the gray paint from the three (3) top drive units on the main level for the pumps in the dry well were combined into one sample based on the apparent consistent paint types, produced a lead concentration of 32.3 mg/L.

The fourth sample submitted for TCLP analyses was from the red paint and produced a result of 4.35 mg/L, so would be classified as industrial waste.

Analyses of all four paint samples for mercury by TCLP showed non-detectable results, below the applicable guideline value of 0.1 mg/L.

4.2 Asbestos Sampling Results

The analytical results of the bulk material samples are presented as a percent of the total volume of sample submitted. Of the 11 samples submitted for bulk asbestos analysis, only one (1) sample tested positive for asbestos, in the form of 10 to 25% chrysotile (serpentine) asbestos fibres. Sample ACM-11 was from a sealant around the metal plate in the concrete floor for a float assembly in the wet well, and is located near the north wall on the main floor (see photos 45 and 46 in Appendix B). The total extent of this sealant was as a strip of approximately 50 mm width and 1.0 m length.

At the time of this inspection, this material was found to be in poor condition with only limited sections of the surficial tar-like, grey painted surface still showing around the perimeter of the steel plate. This joint compound was not found around any of the other covered openings in the concrete floor of the main floor level.

4.3 Laboratory Quality Assurance/Quality Control

Each laboratory report provided by ALS Environmental includes a Quality Control Report confirming that equipment and method checks were within acceptable performance specifications. The ALS Environmental Quality Assurance Report is included at the back of the Analytical Laboratory Report provided in Appendix D. No concerns were found with the sample analyses.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Construction of the Baltimore Flood Pumping Station appears to have included a variety of lead containing paints. In order to comply with existing workplace health and safety regulations regarding potential exposure to hazardous materials, appropriate containment/ encapsulation or abatement measures will be required to ensure the safety of any persons in the building, or in the event of any site renovations requiring demolition works (e.g., paint stripping) which could potentially release these hazardous materials into the air as a dust-type material.

If the painted equipment and surfaces are to be left in place during the course of the proposed facility upgrades, appropriate containment measures will be required for the lead containing paint to minimize the potential for direct contact or damage to the materials which could result in the release of dust-type particulates. For general purposes, the repainting of the intact surfaces with lead free paint would be sufficient for encapsulation. If the existing paint is to be removed/ stripped through either use of solvents or mechanical action (e.g., sand blasting) prior to repainting/ recoating of any materials remaining in place, or if the paint is expected to be disturbed during painted joint disconnection, etc., an appropriate abatement program will be required to ensure the safe removal of this material in accordance with Provincial Health and Safety regulations, the proper containment of these materials, and their proper classification and disposal at approved waste disposal/ treatment facilities in accordance with Provincial industrial or hazardous waste regulations. Based on the analytical results for the TCLP analyses, three (3) of the paint types were determined to be classified as category 4 hazardous waste as per regulatory guidelines. If these paints are to be stripped off, all resulting paint residue must be disposed of at an appropriate hazardous waste management site.

Based on the limited amount of asbestos containing materials present, and its relatively poor condition, it is suggested that this material be removed from the site by a qualified asbestos abatement contractor and the remaining joint between the concrete floor and the steel plate be resealed with an appropriate, environmentally friendly material. If the asbestos containing joint compound is left in place, a formal Asbestos Management Plan, prepared in accordance with current Provincial Health and Safety regulations will be required, encompassing, among other things, a formal inventory of all materials, labelling of materials, employee training, and regular inspection and maintenance of these materials.

REFERENCES

National Institute for Occupational Safety and Health. (1994). *ASBESTOS and OTHER FIBERS by PCM: METHOD 7400, Issue 2.*

Government of Canada. (2010; 2016). *Canada Consumer Products Safety Act, Consumer Products Containing Lead (Contact with Mouth) Regulations SOR/2010-273.*

Government of Canada. (2010; 2016). *Canada Consumer Products Safety Act, Surface Coating Materials Regulations SOR/2016-193.*

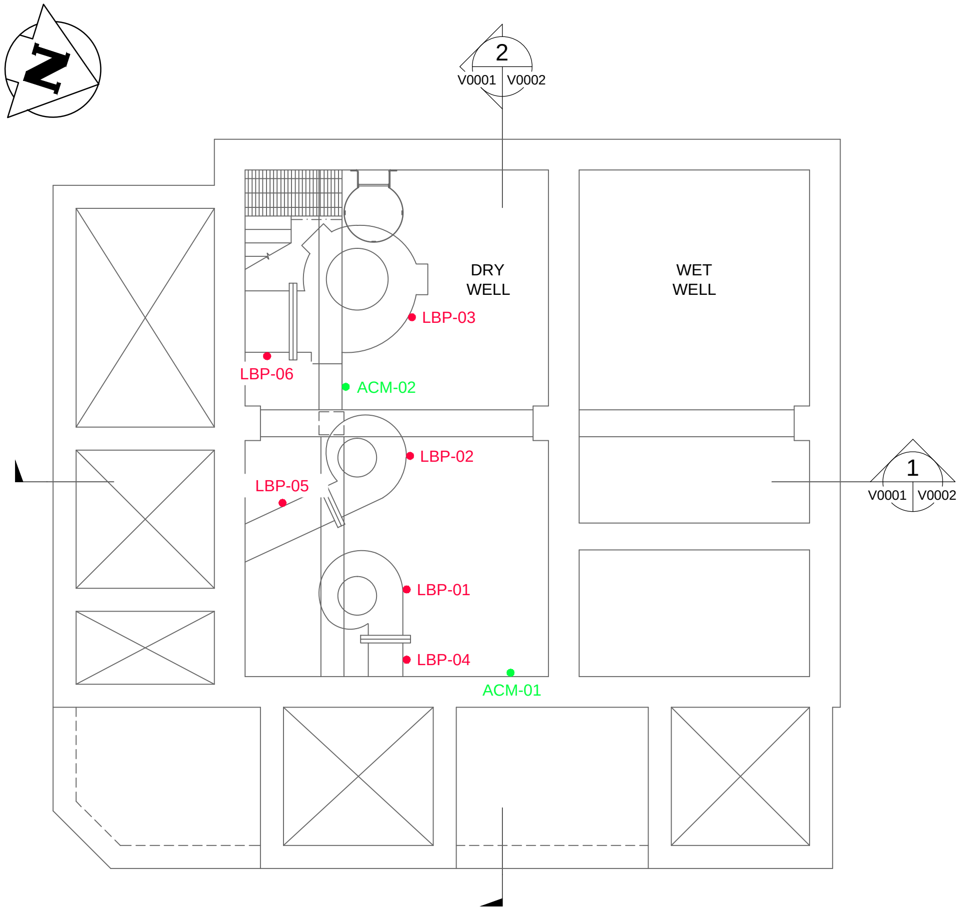
Government of Manitoba. (2016). *Manitoba Workplace Safety and Health Act and Regulation.*

Government of Manitoba. (2015). *The Dangerous Goods Handling and Transportation Act (C.C.S.M. c. D12) Hazardous Waste Regulation.*

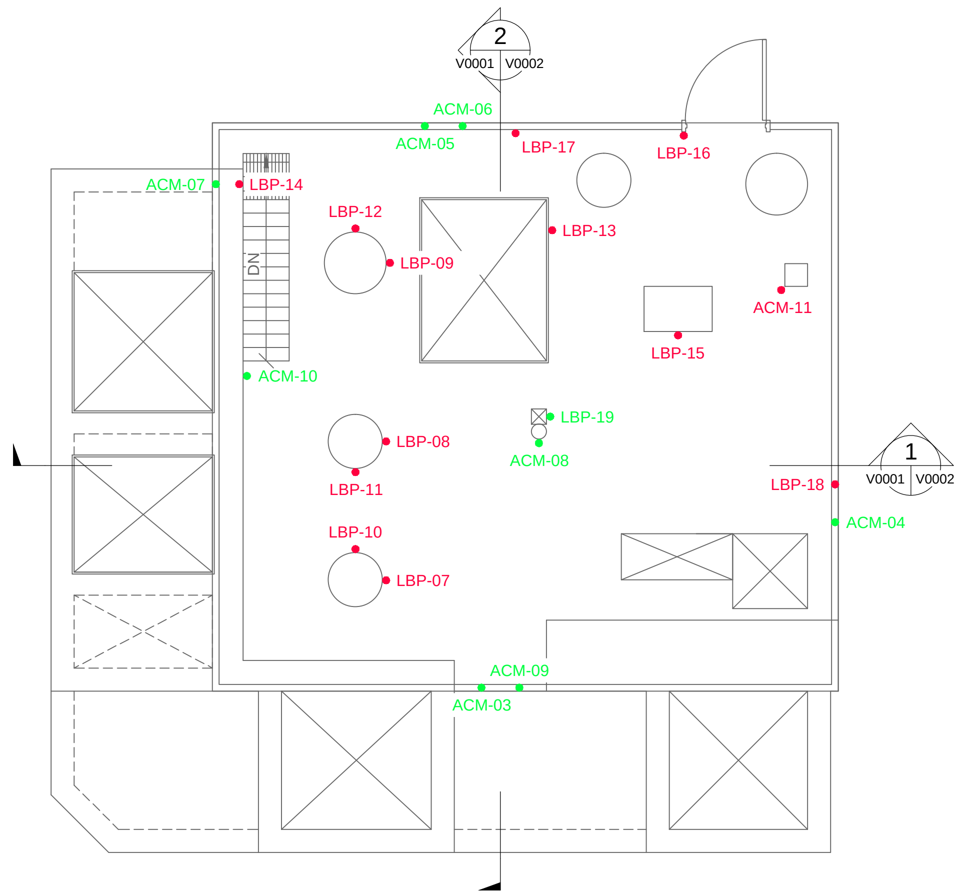
Safe Work Manitoba, 2017. *Guide for Asbestos Management.*

APPENDIX A

FIGURES



1 DRY/WET WELL PLAN
1 : 100



1 MOTOR FLOOR PLAN
1 : 100

LEGEND:

RED	ANALYTICAL ABOVE GUIDELINES
GREEN	ANALYTICAL BELOW GUIDELINES

REFERENCE DRAWINGS:

PRELIMINARY DRAWING

NOT TO BE USED FOR CONSTRUCTION

1:100

1 0 1 2 3 4 5m

APPROXIMATE SCALE

NO.	DATE	DESCRIPTION	ISSUED BY

REVISIONS/ISSUE

TETRA TECH

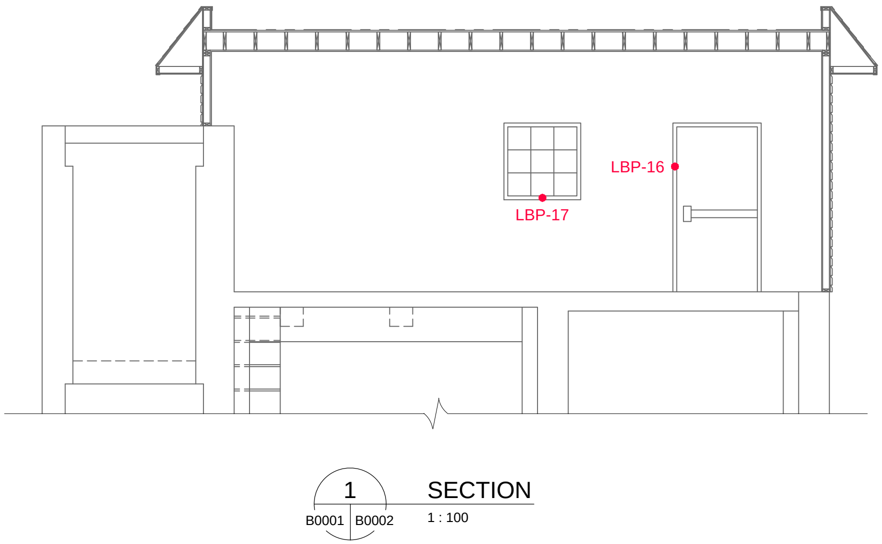
AUTHORIZED BY:
DATE: -
CLIENT DRAWING NO.

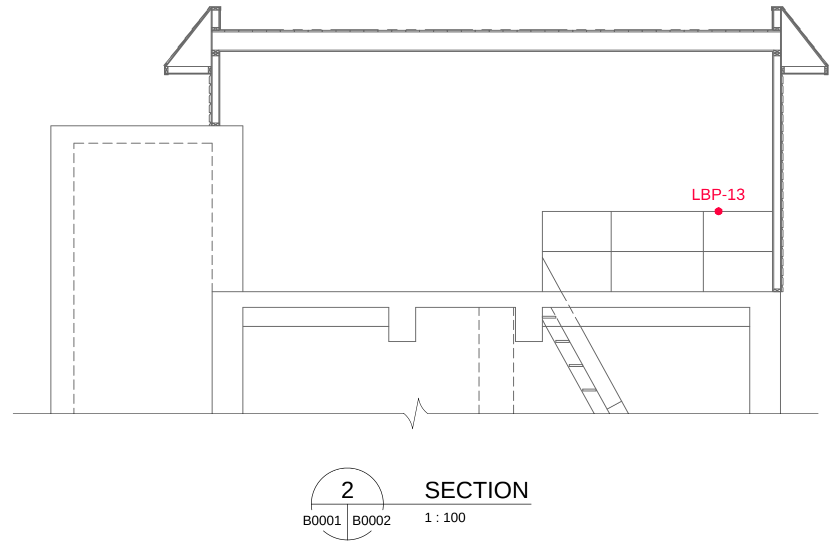
CLIENT
BALTIMORE FLOOD PUMPING STATION UPGRADES

DRAWING DESCRIPTION
FIGURE 1: HAZARDOUS MATERIALS SAMPLE ANALYTICAL RESULTS (PASS/FAIL)

DESIGNED BY: MR	DRAWN BY: EV	DRAWING NO.	REV.
REVIEWED BY: MR	SCALE: 1:100	1800120700-DWG-V0001	A

AL (11" x 8.5")





LEGEND:

RED ANALYTICAL ABOVE GUIDELINES

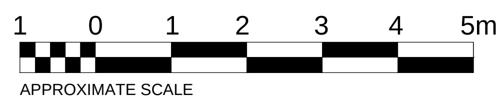
GREEN ANALYTICAL BELOW GUIDELINES

REFERENCE DRAWINGS:

PRELIMINARY DRAWING

NOT TO BE USED FOR CONSTRUCTION

1:100



NO.	DATE	DESCRIPTION	ISSUED BY

REVISIONS/ISSUE

TETRA TECH

AUTHORIZED BY:

DATE: -

CLIENT DRAWING NO.

CLIENT

BALTIMORE FLOOD PUMPING STATION UPGRADES

DRAWING DESCRIPTION

FIGURE 2: HAZARDOUS MATERIALS SAMPLE ANALYTICAL RESULTS (PASS/FAIL)

DESIGNED BY:	MR	DRAWN BY:	EV	DRAWING NO.	REV.
REVIEWED BY:	MR	SCALE:	1:100	1800120700-DWG-V0001	A

AL (11" x 8.5")

APPENDIX B

SITE PHOTOGRAPHS

Photo 1: General view of Baltimore Flood Pumping Station building looking southeast. (March 15, 2018)

Photo 2: General view of electrical controls in northwest corner of building interior. View looking north at north wall. (March 15, 2018)

Photo 3: General view of controls along north half of east wall. View looking east at east wall (March 15, 2018)

Photo 4: General view top drives units for centrifugal pumps positioned in the dry well. Vestibule for stairwell access to dry well is shown behind the centre drive unit. View looking south at south wall. (March 15, 2018)

Photo 5: General view of pump 1 in the dry well. (March 15, 2018)

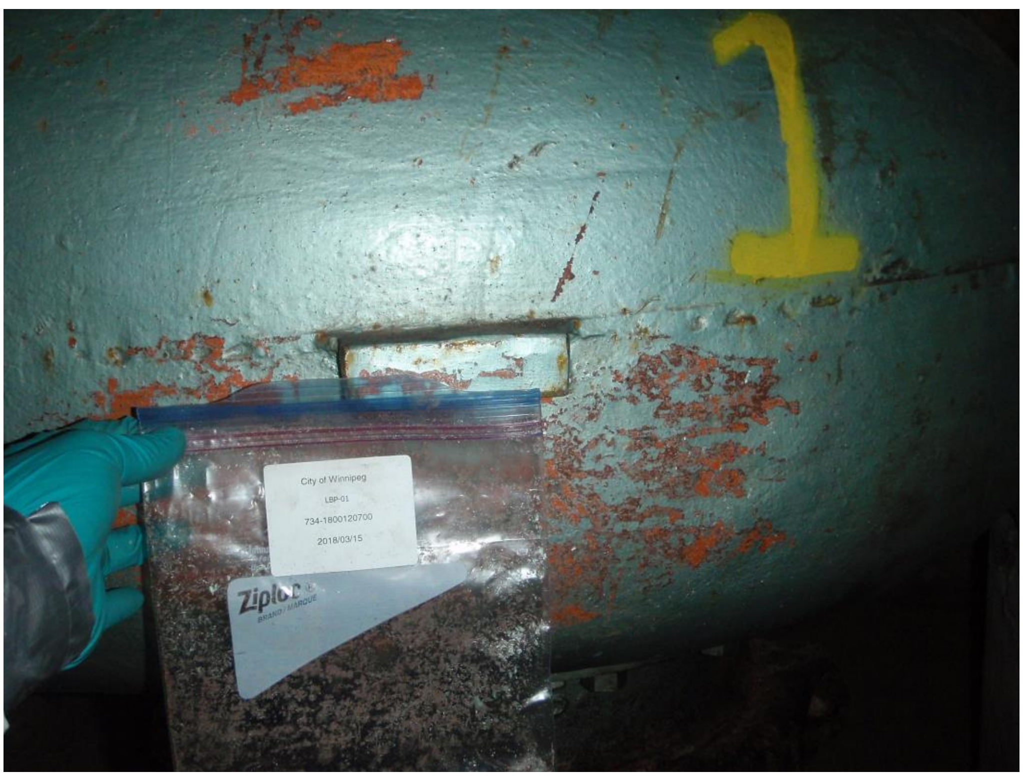


Photo 6: General view of paint chip sample sample LBP-01 location on pump 1 in the dry well. (March 15, 2018)

Photo 7: General view of pump 2 in the dry well. (March 15, 2018)

Photo 8: General view of the paint chip sample LBP-02 location on pump 2 in the dry well. (March 15, 2018)

Photo 9: General view of pump 3 in the dry well. (March 15, 2018)

Photo 10: General view of paint chip sample LBP-03 location on pump 3 in the dry well. (March 15, 2018)

Photo 11: General view of the piping for pump 1 in the dry well. (March 15, 2018)

Photo 12: General view of paint chip sample LBP-04 location on the piping for pump 1 in the dry well. (March 15, 2018)

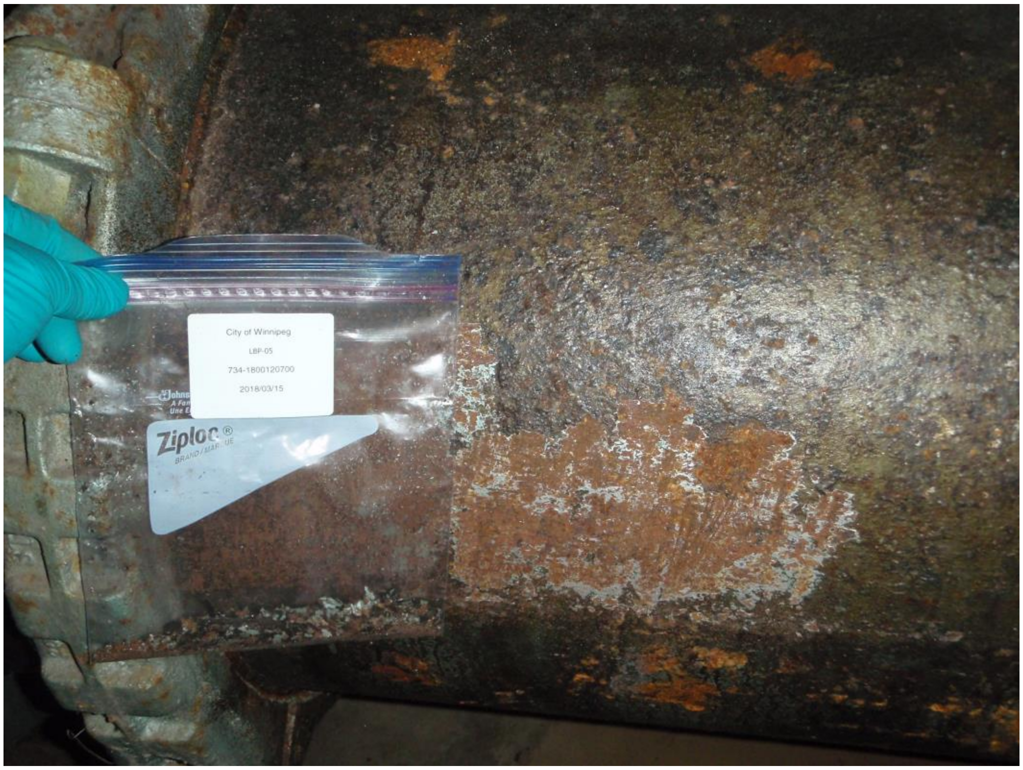


Photo 13: General view of paint chip sample location LBP-05 on the piping for pump 2 in the dry well. (March 15, 2018)

Photo 14: General view of paint chip sample LBP-06 location on the piping for pump 3 in the dry well. (March 15, 2018)

Photo 15: General view of top drive unit 1 on the main level. (March 15, 2018)

Photo 16: General view of the paint chip sample location LBP-07 on top drive unit 1 on the main level. (March 15, 2018)

Photo 17: General view of paint chip sample LBP-08 location on top drive unit 2 on the main level. (March 15, 2018)

Photo 18: General view of paint ship sample LBP-10 location on the piping coming from top drive unit 1 on the main floor. (March 15, 2018)

Photo 19: General view of paint chip sample LBP-11 location on the piping coming from the top drive unit 2 on the main level. (March 15, 2018)

Photo 20: General view of paint chip sample LBP-12 location on the piping coming from the top drive unit 3 on the main level. (March 15, 2018)

Photo 21: General view of paint chip sample LBP-13 location on the railing near the centre of the main level. (March 15, 2018)

Photo 22: General view of paint chip sample LBP-14 location on the railing near the southwest corner of the main level. (March 15, 2018)

Photo 23: General view of the electrical panel unit near the centre of the main level. (March 15, 2018)

Photo 24: General view of paint chip sample LBP-15 location on the electrical panel near the centre of the main level. (March 15, 2018)

Photo 25: General view of the frame around the door at the main entrance near the northwest corner of the main level. (March 15, 2018)

Photo 26: General view of paint chip sample LBP-16 location on the frame around the door at the main entrance near the northwest corner of the main level. (March 15, 2018)

Photo 27: General view of the window in the west wall of the main level. (March 15, 2018)

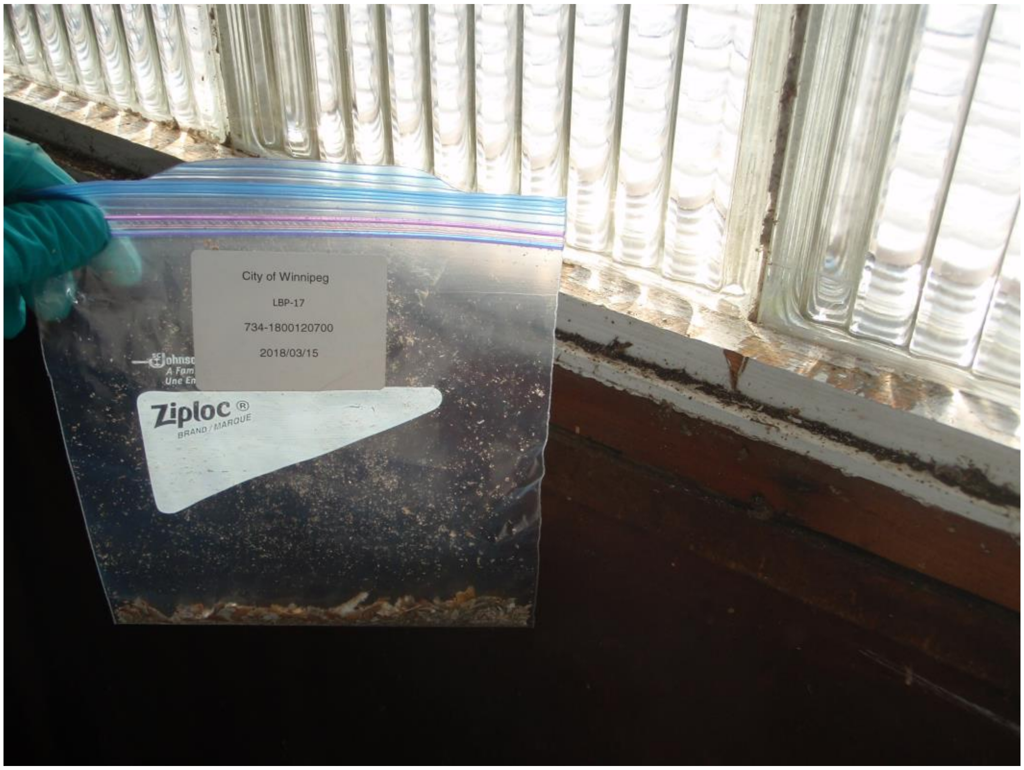


Photo 28: General view of paint chip sample LBP-17 location on the frame around the window along the west side of the main level. (March 15, 2018)

Photo 29: General view of the boarded opening on the north wall of the main level. (March 15, 2018)

Photo 30: General view of paint chip sample LBP-18 location on the frame around the boarded opening on the north wall of the main level (March 15, 2018)

Photo 31: General view of paint on the wooden post near the centre of the main level. (March 15, 2018)

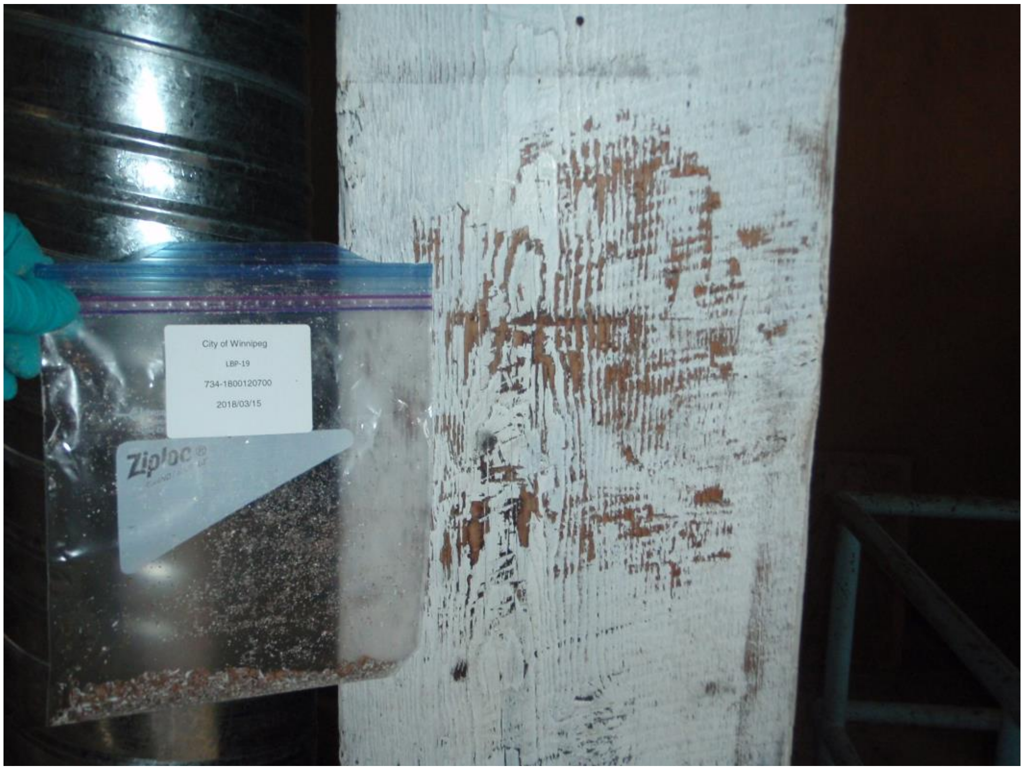


Photo 32: General view of paint chip sample LBP-19 location on the wooden post near the centre of the main level. (March 15, 2018)

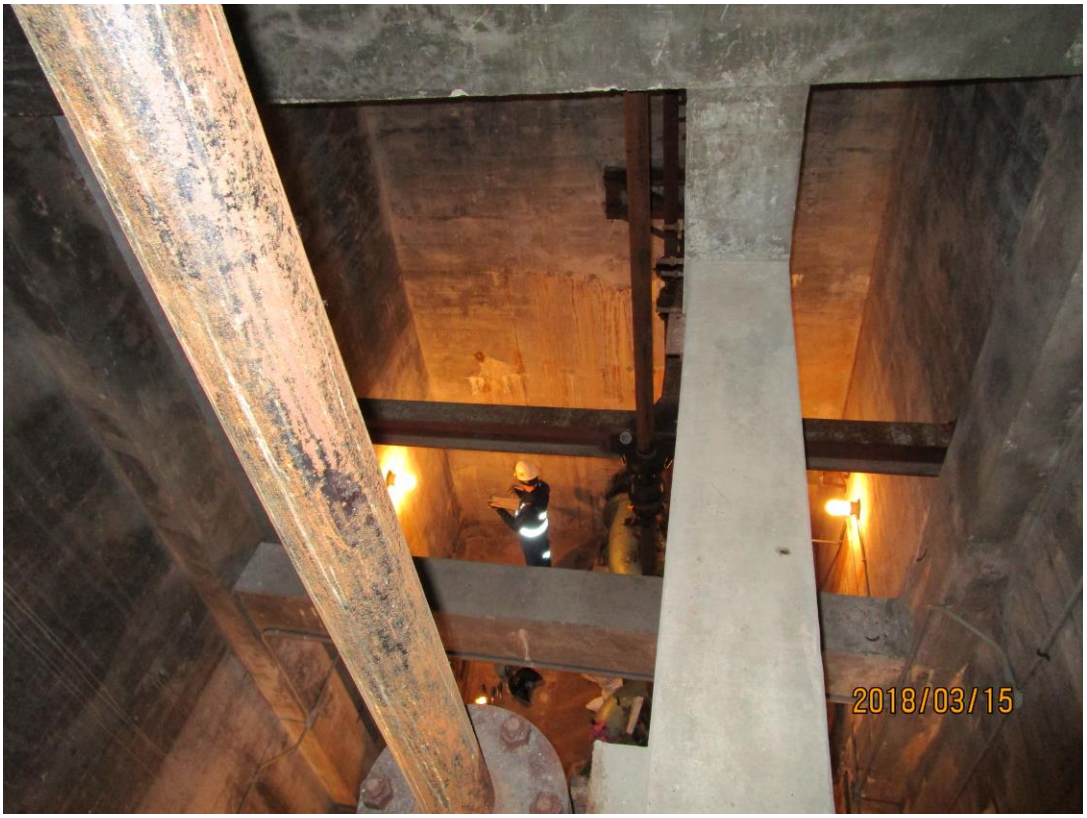


Photo 33: General view of the interior of the dry well. (March 15, 2018)

Photo 34: General view of concrete patch work on the northeast wall of the dry well. (March 15, 2018)

Photo 35: General view of bulk material sample ACM-01 location on the northwest wall in the dry well. (March 15, 2018)

Photo 36: General view of bulk material sample ACM-02 location from the joint compound around a steel plate in the floor between pumps 2 and 3 in the dry well. (March 15, 2018)

Photo 37: General view of bulk material sample ACM-03 location from the brown press board paneling on the east wall of the main level. (March 15, 2018)

Photo 38: General view of bulk material sample ACM-04 location from the brown press board paneling on the north wall of the main level. (March 15, 2018)

Photo 39: General view of bulk material sample ACM-05 location from the brown press board paneling on the west wall of the main level. (March 15, 2018)

Photo 40: General view of bulk material sample ACM-06 location from the lining between the brown press board panelling and the wall studs on the west wall on the main level. (March 15, 2018)

Photo 41: General view of bulk material sample ACM-07 location from the spray foam from the southwest corner of the main level. (March 15, 2018)

Photo 42: General view of bulk material sample ACM-08 location from the loose fibre insulation from the floor gap around the duct near the centre of the main level. (March 15, 2018)

Photo 43: General view of bulk material sample ACM-09 location from spray foam from a removed pipe or duct opening on the east wall of the main level. (March 15, 2018)

Photo 44: General view of bulk material sample ACM-10 location from foam insulation from the back of the vestibule door leading to the dry well. (March 15, 2018)

Photo 45: General view of bulk material sample ACM-11 from the sealant around a metal plate on the floor of the main level along the north wall. (March 15, 2018)

Photo 46: General view of condition of the sealant found to contain asbestos around the metal plate for the wet well float level on the floor of the main level along the north wall. (March 15, 2018)

APPENDIX C

TABLES

Table 1

Paint Chip Sample Laboratory Analytical Results
Hazardous Building Materials Assessment
City of Winnipeg Baltimore Flood Pumping Station, Winnipeg, Manitoba

Sample ID	Date Sampled	Material Description	General Condition	Paint Chip Samples	
				Lead (mg/kg)	Mercury (mg/kg)
LBP-01	15-Mar-18	Green paint - pump 1 at bottom of dry well	Fair - some paint flaking due to corrosion at joints. (Photos 5 & 6)	***35 100***	1.44
LBP-02	15-Mar-18	Green paint - pump 2 at bottom of dry well	Fair - some paint flaking due to corrosion at joints. (Photos 7 & 8)	***9220***	1.51
LBP-03	15-Mar-18	Green paint - pump 3 at bottom of dry well	Fair - some paint flaking due to corrosion at joints. (Photos 9 & 10)	***38 800***	0.448
LBP-04	15-Mar-18	Black paint - pump 1 at bottom of dry well	Fair - some flaking due to pitting and corrosion of steel pipe. (Photos 11 & 12)	***4940***	0.437
LBP-05	15-Mar-18	Black paint - pump 2 at bottom of dry well	Fair - some flaking due to pitting and corrosion of steel pipe. (Photo 13)	***12 100***	0.896
LBP-06	15-Mar-18	Black paint - pump 3 at bottom of dry well	Fair - some flaking due to pitting and corrosion of steel pipe. (Photo 14)	***1690***	0.135
LBP-07	15-Mar-18	Gray paint - top drive unit for pump 1 on the main floor	Good (Photos 15 & 16)	***3810***	0.152
LBP-08	15-Mar-18	Gray paint - top drive unit for pump 2 on the main floor	Good (Photo 17)	***3770***	0.140
LBP-09	15-Mar-18	Gray paint - top drive unit for pump 3 on the main floor	Good	***712***	0.159
LBP-10	15-Mar-18	Red paint - piping from top drive unit for pump 1 on main floor	Good (Photo 18)	***24 400***	4.02
LBP-11	15-Mar-18	Red paint - piping from top drive unit for pump 2 on main floor	Good (Photo 19)	***19 900***	6.02
LBP-12	15-Mar-18	Red paint - piping from top drive unit for pump 3 on main floor	Good (Photo 20)	***29 400***	2.49
LBP-13	15-Mar-18	Blue paint - railing near 2 and 3 on main floor	Fair - extensive physical wear (Photo 21)	***1180***	0.793
LBP-14	15-Mar-18	Blue paint - railing near southwest corner on main floor	Fair - extensive physical wear (Photo 22)	***1200***	2.64
LBP-15	15-Mar-18	Gray paint - electrical panel near the center of the main floor room	Good (Photos 23 & 24)	***3290***	0.938
LBP-16	15-Mar-18	Brown paint - door frame around entrance near northwest corner on the main floor	Good (Photos 25 & 26)	***11 800***	***15.1***
LBP-17	15-Mar-18	White paint - frame around window along west wall of the main floor	Fair - weathering and water damage. (Photos 27 & 28)	***898***	***61.5***
LBP-18	15-Mar-18	White paint - frame around boarded opening near electrical panels on the north wall and baseboards	Poor - only partially frames opening and extensive physical damage (photos 29 and 30)	***4340***	2.69
LBP-19	15-Mar-18	White paint - wooden support post in center of the room on the main floor	Good - only limited coverage on 3 sides of wooden post (Photos 31 & 32)	72.0	0.893
Referenced Environmental Quality Guideline				90[a]	10[a]

Notes: Analytical exceedances shown in ***bold*** text.
[a] Government of Canada, 2010; 2016. *Canada Consumer Products Safety Act*, *Consumer Products Containing Lead (Contact with Mouth) Regulations SOR/2010-273*; *Surface Coating Materials Regulations SOR/2016-193*.

Table 2

Paint Chip Sample Toxicitiy Characteristic Leaching Procedure Laboratory Analytical Results
Hazardous Building Materials Assessment
City of Winnipeg Baltimore Flood Pumping Station, Winnipeg, Manitoba

Sample ID	Date Sampled	Material Description	General Condition	Paint Chip Samples	
				Lead (mg/L)	Mercury (mg/L)
LBP-01 + LBP-02 + LBP-03	15-Mar-18	Green paint - pumps 1, 2, and 3 at the bottom of dry well	Fair - some paint flaking due to corrosion at joints. (Photos 5 & 6)	***50.2***	<0.01
LBP-07 + LBP-08 +LBP-09	15-Mar-18	Gray paint - top drive units 1, 2, and 3 on the main floor	Good (Photos 15, 16 & 17)	***32.3***	<0.01
LBP-10 + LBP-11 + LBP-12	15-Mar-18	Red paint - piping from top drive units 1, 2, and 3 on main floor	Good (Photo 18, 19, & 20)	4.4	<0.01
LBP-16	15-Mar-18	Brown paint - door frame around entrance near northwest corner on the main floor	Good (Photos 25 & 26)	***7.4***	<0.01
Referenced Environmental Quality Guideline				5[a]	0.1[a]

Notes: Analytical exceedances shown in ***bold*** text.
[a] Government of Manitoba, 2015. *The Dangerous Goods Handling and Transportation Act (C.C.S.M. c. D12) Hazardous Waste Regulation.*

Table 3

Bulk Sample for Asbestos Laboratory Analytical Results
Building Hazardous Materials Assessment
City of Winnipeg Baltimore Flood Pumping Station, Winnipeg, Manitoba

Sample ID	Date Sampled	Material Description	General Classification	General Condition	Asbestos Content (%)
ACM-01	15-Mar-18	Cement filler on northeast wall in dry well.	Non-Friable	Fair - rough patch but seems to be cohesive. (Photo 35)	<1
ACM-02	15-Mar-18	Concrete filler around metal plate on floor of dry well between pumps 2 and 3.	Non-Friable	Poor - extensive cracking and some missing portions. (Photo 36)	<1
ACM-03	15-Mar-18	Brown press board on the east wall of the main floor.	Non-Friable	Fair - some minor physical damage and water staining. (Photos 3 & 37)	<1
ACM-04	15-Mar-18	Brown press board on the north wall of the main floor.	Non-Friable	Fair - some minor physical damage and water staining. (Photos 2 & 38)	<1
ACM-05	15-Mar-18	Brown press board on the west wall of the main floor.	Non-Friable	Fair - some minor physical damage and water staining. (Photos 27 & 39)	<1
ACM-06	15-Mar-18	Lining between brown press board and wall studs on the west wall on the main floor.	Non-Friable	Good (Photo 40)	<1
ACM-07	15-Mar-18	Spray foam insulation between concrete and wooden wall in southwest corner of the main floor.	Friable	Good (Photo 41)	<1
ACM-08	15-Mar-18	Loose fibre insulation from the floor gap around the duct in the center of the main floor.	Friable	Poor - coarse, dirty hair like substance with limited sealing capability. (Photo 42)	<1
ACM-09	15-Mar-18	Spray foam insulation from removed pipe or duct opening on the east wall of the main floor.	Friable	Good (Photo 43)	<1
ACM-10	15-Mar-18	Rigid foam insulation on the back of the door to the vestibule to the dry well stairwell along the south wall.	Friable	Good (Photo 44)	<1
ACM-11	15-Mar-18	Sealant around metal plate in concrete floor for wet well float level near the north wall on the main floor.	Non-Friable	Poor - dry and brittle, paint surface coating broken off over most of the plate perimeter. (Photos 45 & 46)	***10 - 25 (Chrysotile)***
Referenced Environmental Quality Guideline					<1 [a, b]

Notes: Analytical exceedances shown in ***bold*** text.
[a] Government of Manitoba, 2016. *Manitoba Workplace Safety and Health Act and Regulation*.
[b] Safe Work Manitoba, 2017. *Guide for Asbestos Management.*

APPENDIX D

LABORATORY RESULTS

Tetra Tech Canada Inc.
ATTN: BRENT HORNING
400-161 Portage Ave East
Winnipeg MB R3B 0Y4

Date Received: 20-MAR-18
Report Date: 20-APR-18 07:19 (MT)
Version: FINAL REV. 2

Client Phone: 204-954-6860

Certificate of Analysis

Lab Work Order #: L2070021

Project P.O. #: NOT SUBMITTED
Job Reference: 734-1800120700
C of C Numbers:
Legal Site Desc: BALTIMORE FPS

Comments: ADDITIONAL 10-APR-18 14:27
Fraction 28 - insufficient sample to run the TCLP analysis.

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2070021-1 ACM-01							
Sampled By: MR on 15-MAR-18							
Matrix: BULK							
Bulk Asbestos Content							
Asbestos	<1		1	%		02-APR-18	R4002572
Other Non Fibrous: Filler	100		1	%		02-APR-18	R4002572
Note: No asbestos fibres were observed.							
L2070021-2 ACM-02							
Sampled By: MR on 15-MAR-18							
Matrix: BULK							
Bulk Asbestos Content							
Asbestos	<1		1	%		02-APR-18	R4002572
Other Non Fibrous: Filler	100		1	%		02-APR-18	R4002572
Note: No asbestos fibres were observed.							
L2070021-3 ACM-03							
Sampled By: MR on 15-MAR-18							
Matrix: BULK							
Bulk Asbestos Content							
Asbestos	<1		1	%		02-APR-18	R4002572
Other Fibres: Cellulose	100		1	%		02-APR-18	R4002572
Note: No asbestos fibres were observed.							
L2070021-4 ACM-04							
Sampled By: MR on 15-MAR-18							
Matrix: BULK							
Bulk Asbestos Content							
Asbestos	<1		1	%		02-APR-18	R4002572
Other Fibres: Cellulose	100		1	%		02-APR-18	R4002572
Note: No asbestos fibres were observed.							
L2070021-5 ACM-05							
Sampled By: MR on 15-MAR-18							
Matrix: BULK							
Bulk Asbestos Content							
Asbestos	<1		1	%		02-APR-18	R4002572
Other Fibres: Cellulose	100		1	%		02-APR-18	R4002572
Note: No asbestos fibres were observed.							
L2070021-6 ACM-06							
Sampled By: MR on 15-MAR-18							
Matrix: BULK							
Bulk Asbestos Content							
Asbestos	<1		1	%		02-APR-18	R4002572
Other Fibres: Cellulose	75-99		1	%		02-APR-18	R4002572
Other Non Fibrous: Tar	0		1	%		02-APR-18	R4002572
Note: No asbestos fibres were observed.							
L2070021-7 ACM-07							
Sampled By: MR on 15-MAR-18							
Matrix: BULK							
Bulk Asbestos Content							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2070021-7 ACM-07							
Sampled By: MR on 15-MAR-18							
Matrix: BULK							
Bulk Asbestos Content							
Asbestos	<1		1	%		02-APR-18	R4002572
Other Non Fibrous: Filler	100		1	%		02-APR-18	R4002572
Note: No asbestos fibres were observed.							
L2070021-8 ACM-08							
Sampled By: MR on 15-MAR-18							
Matrix: BULK							
Bulk Asbestos Content							
Asbestos	<1		1	%		02-APR-18	R4002572
Other Fibres: Cellulose	100		1	%		02-APR-18	R4002572
Note: No asbestos fibres were observed.							
L2070021-9 ACM-09							
Sampled By: MR on 15-MAR-18							
Matrix: BULK							
Bulk Asbestos Content							
Asbestos	<1		1	%		02-APR-18	R4002572
Other Fibres: Cellulose	1-5		1	%		02-APR-18	R4002572
Other Non Fibrous: Filler and Aluminum	75-99		1	%		02-APR-18	R4002572
Note: No asbestos fibres were observed.							
L2070021-10 ACM-10							
Sampled By: MR on 15-MAR-18							
Matrix: BULK							
Bulk Asbestos Content							
Asbestos	<1		1	%		02-APR-18	R4002572
Other Non Fibrous: Filler	100		1	%		02-APR-18	R4002572
Note: No asbestos fibres were observed.							
L2070021-11 ACM-11							
Sampled By: MR on 15-MAR-18							
Matrix: BULK							
Bulk Asbestos Content							
Asbestos: Chrysotile (Serpentine)	10-25		1	%		02-APR-18	R4002572
Other Non Fibrous: Filler and Tar	75-99		1	%		02-APR-18	R4002572
Note: Sample contains asbestos							
L2070021-12 LBP-01							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Miscellaneous Parameters							
Mercury (Hg)	1.44		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint							
Metals							
Lead (Pb)	35100		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-13 LBP-02							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Miscellaneous Parameters							
Mercury (Hg)	1.51		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2070021-13 LBP-02							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Metals							
Lead (Pb)	9220		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-14 LBP-03							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Miscellaneous Parameters							
Mercury (Hg)	0.448		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint							
Metals							
Lead (Pb)	38800		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-15 LBP-04							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Miscellaneous Parameters							
Mercury (Hg)	0.437		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint							
Metals							
Lead (Pb)	4940		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-16 LBP-05							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Miscellaneous Parameters							
Mercury (Hg)	0.896		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint							
Metals							
Lead (Pb)	12100		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-17 LBP-06							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Miscellaneous Parameters							
Mercury (Hg)	0.135		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint							
Metals							
Lead (Pb)	1690		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-18 LBP-07							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Miscellaneous Parameters							
Mercury (Hg)	0.152		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint							
Metals							
Lead (Pb)	3810		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-19 LBP-08							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Miscellaneous Parameters							
Mercury (Hg)	0.140		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint							
Metals							
Lead (Pb)	3770		20	mg/kg	22-MAR-18	23-MAR-18	R3995575

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2070021-19	LBP-08							
Sampled By:	MR on 15-MAR-18							
Matrix:	PAINT							
L2070021-20	LBP-09							
Sampled By:	MR on 15-MAR-18							
Matrix:	PAINT							
Miscellaneous Parameters								
Mercury (Hg)		0.159		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint								
Metals								
Lead (Pb)		712		0.20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-21	LBP-10							
Sampled By:	MR on 15-MAR-18							
Matrix:	PAINT							
Miscellaneous Parameters								
Mercury (Hg)		4.02		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint								
Metals								
Lead (Pb)		24400		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-22	LBP-11							
Sampled By:	MR on 15-MAR-18							
Matrix:	PAINT							
Miscellaneous Parameters								
Mercury (Hg)		6.02		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint								
Metals								
Lead (Pb)		19900		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-23	LBP-12							
Sampled By:	MR on 15-MAR-18							
Matrix:	PAINT							
Miscellaneous Parameters								
Mercury (Hg)		2.49		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint								
Metals								
Lead (Pb)		29400		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-24	LBP-13							
Sampled By:	MR on 15-MAR-18							
Matrix:	PAINT							
Miscellaneous Parameters								
Mercury (Hg)		0.793		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint								
Metals								
Lead (Pb)		1180		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-25	LBP-14							
Sampled By:	MR on 15-MAR-18							
Matrix:	PAINT							
Miscellaneous Parameters								
Mercury (Hg)		2.64		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint								
Metals								
Lead (Pb)		1200		20	mg/kg	22-MAR-18	23-MAR-18	R3995575

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2070021-26 LBP-15							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Miscellaneous Parameters							
Mercury (Hg)	0.938		0.050	mg/kg	22-MAR-18	26-MAR-18	R3995310
Lead In Paint							
Metals							
Lead (Pb)	3290		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-27 LBP-16							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Leachate metals by TCLP							
Leachate prep TCLP							
1st Preliminary pH	4.99		0.10	pH		17-APR-18	R4016309
2nd Preliminary pH	NA		0.10	pH		17-APR-18	R4016309
Extraction Solution Initial pH	4.96		0.10	pH		17-APR-18	R4016309
Final pH	5.00		0.10	pH		17-APR-18	R4016309
Mercury Total by TCLP prep							
Mercury (Hg)-Total	<0.010		0.010	mg/L	17-APR-18	19-APR-18	R4017377
Total Metals by ICP-MS							
Antimony (Sb)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Arsenic (As)-Leachable	0.088		0.020	mg/L	18-APR-18	18-APR-18	R4016767
Barium (Ba)-Leachable	0.114		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Beryllium (Be)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Boron (B)-Leachable	0.52		0.50	mg/L	18-APR-18	18-APR-18	R4016767
Cadmium (Cd)-Leachable	0.782		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Calcium (Ca)-Leachable	28.5		3.0	mg/L	18-APR-18	18-APR-18	R4016767
Chromium (Cr)-Leachable	0.071		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Cobalt (Co)-Leachable	0.396		0.020	mg/L	18-APR-18	18-APR-18	R4016767
Copper (Cu)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Iron (Fe)-Leachable	<0.50		0.50	mg/L	18-APR-18	18-APR-18	R4016767
Lead (Pb)-Leachable	7.43		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Magnesium (Mg)-Leachable	3.68		0.50	mg/L	18-APR-18	18-APR-18	R4016767
Manganese (Mn)-Leachable	0.596		0.010	mg/L	18-APR-18	18-APR-18	R4016767
Molybdenum (Mo)-Leachable	<0.0050		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Nickel (Ni)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Potassium (K)-Leachable	6.7		1.5	mg/L	18-APR-18	18-APR-18	R4016767
Selenium (Se)-Leachable	<0.020		0.020	mg/L	18-APR-18	18-APR-18	R4016767
Silver (Ag)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Strontium (Sr)-Leachable	0.0653		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Thallium (Tl)-Leachable	<0.010		0.010	mg/L	18-APR-18	18-APR-18	R4016767
Tin (Sn)-Leachable	<0.0050		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Uranium (U)-Leachable	<0.0050		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Vanadium (V)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Zinc (Zn)-Leachable	122		10	mg/L	18-APR-18	18-APR-18	R4016767
Zirconium (Zr)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Miscellaneous Parameters							
Mercury (Hg)	15.1		0.50	mg/kg	22-MAR-18	27-MAR-18	R3995310
Lead In Paint							
Metals							
Lead (Pb)	11800		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-28 LBP-17							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Miscellaneous Parameters							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2070021-28 LBP-17							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Mercury (Hg)	61.5		0.50	mg/kg	22-MAR-18	27-MAR-18	R3995310
Lead In Paint							
Metals							
Lead (Pb)	898		0.20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-29 LBP-18							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Miscellaneous Parameters							
Mercury (Hg)	2.69		0.050	mg/kg	22-MAR-18	27-MAR-18	R3995310
Lead In Paint							
Metals							
Lead (Pb)	4340		20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-30 LBP-19							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Miscellaneous Parameters							
Mercury (Hg)	0.893		0.050	mg/kg	22-MAR-18	27-MAR-18	R3995310
Lead In Paint							
Metals							
Lead (Pb)	72.0		0.20	mg/kg	22-MAR-18	23-MAR-18	R3995575
L2070021-31 COMB: LBP-01 + LBP-02 + LBP-03							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Leachate metals by TCLP							
Leachate prep TCLP							
1st Preliminary pH	8.09		0.10	pH		17-APR-18	R4016309
2nd Preliminary pH	1.89		0.10	pH		17-APR-18	R4016309
Extraction Solution Initial pH	4.96		0.10	pH		17-APR-18	R4016309
Final pH	5.38		0.10	pH		17-APR-18	R4016309
Mercury Total by TCLP prep							
Mercury (Hg)-Total	<0.010		0.010	mg/L	17-APR-18	19-APR-18	R4017377
Total Metals by ICP-MS							
Antimony (Sb)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Arsenic (As)-Leachable	<0.020		0.020	mg/L	18-APR-18	18-APR-18	R4016767
Barium (Ba)-Leachable	0.813		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Beryllium (Be)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Boron (B)-Leachable	0.54		0.50	mg/L	18-APR-18	18-APR-18	R4016767
Cadmium (Cd)-Leachable	0.634		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Calcium (Ca)-Leachable	287		3.0	mg/L	18-APR-18	18-APR-18	R4016767
Chromium (Cr)-Leachable	0.110		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Cobalt (Co)-Leachable	0.277		0.020	mg/L	18-APR-18	18-APR-18	R4016767
Copper (Cu)-Leachable	0.093		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Iron (Fe)-Leachable	12.3		0.50	mg/L	18-APR-18	18-APR-18	R4016767
Lead (Pb)-Leachable	50.2		5.0	mg/L	18-APR-18	18-APR-18	R4016767
Magnesium (Mg)-Leachable	13.0		0.50	mg/L	18-APR-18	18-APR-18	R4016767
Manganese (Mn)-Leachable	2.62		0.010	mg/L	18-APR-18	18-APR-18	R4016767
Molybdenum (Mo)-Leachable	<0.0050		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Nickel (Ni)-Leachable	0.451		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Potassium (K)-Leachable	9.3		1.5	mg/L	18-APR-18	18-APR-18	R4016767
Selenium (Se)-Leachable	<0.020		0.020	mg/L	18-APR-18	18-APR-18	R4016767
Silver (Ag)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2070021-31 COMB: LBP-01 + LBP-02 + LBP-03							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Total Metals by ICP-MS							
Strontium (Sr)-Leachable	0.647		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Thallium (Tl)-Leachable	<0.010		0.010	mg/L	18-APR-18	18-APR-18	R4016767
Tin (Sn)-Leachable	<0.0050		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Uranium (U)-Leachable	<0.0050		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Vanadium (V)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Zinc (Zn)-Leachable	8.13		0.10	mg/L	18-APR-18	18-APR-18	R4016767
Zirconium (Zr)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
L2070021-32 COMB: LBP-07 + LBP-08 + LBP-09							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Leachate metals by TCLP							
Leachate prep TCLP							
1st Preliminary pH	6.39		0.10	pH		17-APR-18	R4016309
2nd Preliminary pH	1.78		0.10	pH		17-APR-18	R4016309
Extraction Solution Initial pH	4.96		0.10	pH		17-APR-18	R4016309
Final pH	5.33		0.10	pH		17-APR-18	R4016309
Mercury Total by TCLP prep							
Mercury (Hg)-Total	<0.010		0.010	mg/L	17-APR-18	19-APR-18	R4017377
Total Metals by ICP-MS							
Antimony (Sb)-Leachable	0.209		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Arsenic (As)-Leachable	<0.020		0.020	mg/L	18-APR-18	18-APR-18	R4016767
Barium (Ba)-Leachable	0.140		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Beryllium (Be)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Boron (B)-Leachable	<0.50		0.50	mg/L	18-APR-18	18-APR-18	R4016767
Cadmium (Cd)-Leachable	0.0185		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Calcium (Ca)-Leachable	272		3.0	mg/L	18-APR-18	18-APR-18	R4016767
Chromium (Cr)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Cobalt (Co)-Leachable	0.724		0.020	mg/L	18-APR-18	18-APR-18	R4016767
Copper (Cu)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Iron (Fe)-Leachable	48.9		0.50	mg/L	18-APR-18	18-APR-18	R4016767
Lead (Pb)-Leachable	32.3		5.0	mg/L	18-APR-18	18-APR-18	R4016767
Magnesium (Mg)-Leachable	4.80		0.50	mg/L	18-APR-18	18-APR-18	R4016767
Manganese (Mn)-Leachable	1.96		0.010	mg/L	18-APR-18	18-APR-18	R4016767
Molybdenum (Mo)-Leachable	<0.0050		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Nickel (Ni)-Leachable	0.116		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Potassium (K)-Leachable	6.4		1.5	mg/L	18-APR-18	18-APR-18	R4016767
Selenium (Se)-Leachable	<0.020		0.020	mg/L	18-APR-18	18-APR-18	R4016767
Silver (Ag)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Strontium (Sr)-Leachable	0.440		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Thallium (Tl)-Leachable	<0.010		0.010	mg/L	18-APR-18	18-APR-18	R4016767
Tin (Sn)-Leachable	<0.0050		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Uranium (U)-Leachable	<0.0050		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Vanadium (V)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Zinc (Zn)-Leachable	116		10	mg/L	18-APR-18	18-APR-18	R4016767
Zirconium (Zr)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
L2070021-33 COMB: LBP-10 + LBP-11 + LBP-12							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Leachate metals by TCLP							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2070021-33 COMB: LBP-10 + LBP-11 + LBP-12							
Sampled By: MR on 15-MAR-18							
Matrix: PAINT							
Leachate prep TCLP							
1st Preliminary pH	6.85		0.10	pH		17-APR-18	R4016309
2nd Preliminary pH	4.22		0.10	pH		17-APR-18	R4016309
Extraction Solution Initial pH	4.96		0.10	pH		17-APR-18	R4016309
Final pH	6.32		0.10	pH		17-APR-18	R4016309
Mercury Total by TCLP prep							
Mercury (Hg)-Total	<0.010		0.010	mg/L	17-APR-18	19-APR-18	R4017377
Total Metals by ICP-MS							
Antimony (Sb)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Arsenic (As)-Leachable	<0.020		0.020	mg/L	18-APR-18	18-APR-18	R4016767
Barium (Ba)-Leachable	0.390		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Beryllium (Be)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Boron (B)-Leachable	0.51		0.50	mg/L	18-APR-18	18-APR-18	R4016767
Cadmium (Cd)-Leachable	0.357		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Calcium (Ca)-Leachable	55.4		3.0	mg/L	18-APR-18	18-APR-18	R4016767
Chromium (Cr)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Cobalt (Co)-Leachable	1.03		0.020	mg/L	18-APR-18	18-APR-18	R4016767
Copper (Cu)-Leachable	0.101		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Iron (Fe)-Leachable	<0.50		0.50	mg/L	18-APR-18	18-APR-18	R4016767
Lead (Pb)-Leachable	4.35		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Magnesium (Mg)-Leachable	4.20		0.50	mg/L	18-APR-18	18-APR-18	R4016767
Manganese (Mn)-Leachable	0.735		0.010	mg/L	18-APR-18	18-APR-18	R4016767
Molybdenum (Mo)-Leachable	0.0253		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Nickel (Ni)-Leachable	0.057		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Potassium (K)-Leachable	5.2		1.5	mg/L	18-APR-18	18-APR-18	R4016767
Selenium (Se)-Leachable	<0.020		0.020	mg/L	18-APR-18	18-APR-18	R4016767
Silver (Ag)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Strontium (Sr)-Leachable	0.161		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Thallium (Tl)-Leachable	<0.010		0.010	mg/L	18-APR-18	18-APR-18	R4016767
Tin (Sn)-Leachable	<0.0050		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Uranium (U)-Leachable	<0.0050		0.0050	mg/L	18-APR-18	18-APR-18	R4016767
Vanadium (V)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767
Zinc (Zn)-Leachable	1340		100	mg/L	18-APR-18	19-APR-18	R4017700
Zirconium (Zr)-Leachable	<0.050		0.050	mg/L	18-APR-18	18-APR-18	R4016767

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Qualifiers for Individual Samples Listed:

Sample Numbe	Client ID	Qualifier	Description
L2070021-27	LBP-16	LTIS	Limited sample was available for TCLP or SPLP inorganics & semi-volatiles extraction (<100 grams). Extraction fluid volume &/or other elements of the method were scaled down proportionately to permit analysis. Test results from modified leach procedures may be unsuitable for regulatory purposes.
L2070021-31	COMB: LBP-01 + LBP-02 + L	LTIS	Limited sample was available for TCLP or SPLP inorganics & semi-volatiles extraction (<100 grams). Extraction fluid volume &/or other elements of the method were scaled down proportionately to permit analysis. Test results from modified leach procedures may be unsuitable for regulatory purposes.
L2070021-32	COMB: LBP-07 + LBP-08 + L	LTIS	Limited sample was available for TCLP or SPLP inorganics & semi-volatiles extraction (<100 grams). Extraction fluid volume &/or other elements of the method were scaled down proportionately to permit analysis. Test results from modified leach procedures may be unsuitable for regulatory purposes.
L2070021-33	COMB: LBP-10 + LBP-11 + L	LTIS	Limited sample was available for TCLP or SPLP inorganics & semi-volatiles extraction (<100 grams). Extraction fluid volume &/or other elements of the method were scaled down proportionately to permit analysis. Test results from modified leach procedures may be unsuitable for regulatory purposes.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ASBESTOS-WP	Bulk	Bulk Asbestos Content	NIOSH 9002-Polarized Light Microscopy

Bulk samples are examined under a stereoscopic microscope. Individual fibers or fibre bundles are mounted in refractive index liquids and are observed under a polarized light microscope with a special dispersion staining objective. The dispersion staining colours are compared to reference samples of known asbestiforms.

Polarized microscopy is not a definitive technique for negative results for non-friable organically bound material (i.e.floor tiles).

HG-200.2-CVAF-WP	Soil	Mercury in Soil by CVAFS	EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

HG-TCLP-CVAF-WP	Waste	Mercury Total by TCLP prep	EPA245.7 V2.0

Mercury in filtered and unfiltered waters is oxidized with Bromine monochloride and analyzed by cold-vapour atomic fluorescence spectrometry.

MET-200.2-MS-WP	Soil	Metals	EPA 200.2/6020A

Samples for analysis are homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested by block digester (EPA 200.2). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

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

MET-TCLP-MS-WP	Waste	Total Metals by ICP-MS	U.S. EPA 200.8-T

Total Metals by ICP-MS: This analysis is carried out using sample preparation procedures adapted from Standard Methods for the examination of Water and Wastewater Method 3030E and analytical procedures adapted from U.S EPA Method 200.8 for analyis of metals by inductively coupled-mass spectrometery.

PREP-TCLP-INORG-WP	Waste	Leachate prep TCLP	EPA SW846 1311

The TCLP leachate method is used to characterize material based on the ability of contaminants to partition or leach into a simulated landfill solution. The leachate is designed to determine the mobility of contaminants present in liquid, solid and multiple phase samples under acidic conditions. This method may be applied to liquid samples, multiple phase samples and solid materials.

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

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

Laboratory Definition Code	Laboratory Location
	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
WP			

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Tetra Tech Canada Inc.
400-161 Portage Ave East
Winnipeg MB R3B 0Y4

Contact: BRENT HORNING

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAF-WP	**Soil**							
Batch R3995310								
WG2739542-3 CRM		**CANMET TILL-1**						
Mercury (Hg)			108.9		%		70-130	23-MAR-18
WG2739542-2 LCS								
Mercury (Hg)			107.9		%		80-120	23-MAR-18
WG2739542-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	23-MAR-18
MET-200.2-MS-WP	**Soil**							
Batch R3995575								
WG2738461-3 CRM		**CANMET TILL-1**						
Lead (Pb)			97.6		%		70-130	23-MAR-18
WG2738461-2 LCS								
Lead (Pb)			99.6		%		80-120	23-MAR-18
WG2738461-1 MB								
Lead (Pb)			0.86	B	mg/kg		0.2	23-MAR-18
HG-TCLP-CVAF-WP	**Waste**							
Batch R4017377								
WG2754620-2 LCS								
Mercury (Hg)-Total			102.9		%		80-120	19-APR-18
WG2754620-1 MB								
Mercury (Hg)-Total			<0.010		mg/L		0.01	19-APR-18
MET-TCLP-MS-WP	**Waste**							
Batch R4016767								
WG2753389-2 LCS								
Antimony (Sb)-Leachable			102.8		%		80-120	18-APR-18
Arsenic (As)-Leachable			101.7		%		80-120	18-APR-18
Barium (Ba)-Leachable			100.7		%		80-120	18-APR-18
Beryllium (Be)-Leachable			100.3		%		80-120	18-APR-18
Boron (B)-Leachable			98.8		%		80-120	18-APR-18
Cadmium (Cd)-Leachable			102.2		%		80-120	18-APR-18
Calcium (Ca)-Leachable			97.9		%		80-120	18-APR-18
Chromium (Cr)-Leachable			99.4		%		80-120	18-APR-18
Cobalt (Co)-Leachable			102.7		%		80-120	18-APR-18
Copper (Cu)-Leachable			104.7		%		80-120	18-APR-18
Iron (Fe)-Leachable			101.2		%		80-120	18-APR-18
Lead (Pb)-Leachable			101.0		%		80-120	18-APR-18
Magnesium (Mg)-Leachable			106.1		%		80-120	18-APR-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-MS-WP	**Waste**							
Batch R4016767								
WG2753389-2 LCS								
Manganese (Mn)-Leachable			100.1		%		80-120	18-APR-18
Molybdenum (Mo)-Leachable			101.0		%		80-120	18-APR-18
Nickel (Ni)-Leachable			101.8		%		80-120	18-APR-18
Potassium (K)-Leachable			100.4		%		80-120	18-APR-18
Selenium (Se)-Leachable			100.1		%		80-120	18-APR-18
Silver (Ag)-Leachable			98.6		%		80-120	18-APR-18
Strontium (Sr)-Leachable			102.4		%		80-120	18-APR-18
Thallium (Tl)-Leachable			99.9		%		80-120	18-APR-18
Tin (Sn)-Leachable			101.0		%		80-120	18-APR-18
Uranium (U)-Leachable			99.96		%		80-120	18-APR-18
Vanadium (V)-Leachable			102.3		%		80-120	18-APR-18
Zinc (Zn)-Leachable			99.8		%		80-120	18-APR-18
Zirconium (Zr)-Leachable			101.4		%		80-120	18-APR-18
WG2753389-1 MB								
Antimony (Sb)-Leachable			<0.050		mg/L		0.05	18-APR-18
Arsenic (As)-Leachable			<0.020		mg/L		0.02	18-APR-18
Barium (Ba)-Leachable			<0.050		mg/L		0.05	18-APR-18
Beryllium (Be)-Leachable			<0.050		mg/L		0.05	18-APR-18
Boron (B)-Leachable			<0.50		mg/L		0.5	18-APR-18
Cadmium (Cd)-Leachable			<0.0050		mg/L		0.005	18-APR-18
Calcium (Ca)-Leachable			3.7	B	mg/L		3	18-APR-18
Chromium (Cr)-Leachable			<0.050		mg/L		0.05	18-APR-18
Cobalt (Co)-Leachable			<0.020		mg/L		0.02	18-APR-18
Copper (Cu)-Leachable			<0.050		mg/L		0.05	18-APR-18
Iron (Fe)-Leachable			<0.50		mg/L		0.5	18-APR-18
Lead (Pb)-Leachable			<0.050		mg/L		0.05	18-APR-18
Magnesium (Mg)-Leachable			<0.50		mg/L		0.5	18-APR-18
Manganese (Mn)-Leachable			<0.010		mg/L		0.01	18-APR-18
Molybdenum (Mo)-Leachable			<0.0050		mg/L		0.005	18-APR-18
Nickel (Ni)-Leachable			<0.050		mg/L		0.05	18-APR-18
Potassium (K)-Leachable			<1.5		mg/L		1.5	18-APR-18
Selenium (Se)-Leachable			<0.020		mg/L		0.02	18-APR-18
Silver (Ag)-Leachable			<0.050		mg/L		0.05	18-APR-18
Strontium (Sr)-Leachable			<0.0050		mg/L		0.005	18-APR-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-MS-WP	**Waste**							
Batch R4016767								
WG2753389-1 MB								
Thallium (Tl)-Leachable			<0.010		mg/L		0.01	18-APR-18
Tin (Sn)-Leachable			<0.0050		mg/L		0.005	18-APR-18
Uranium (U)-Leachable			<0.0050		mg/L		0.005	18-APR-18
Vanadium (V)-Leachable			<0.050		mg/L		0.05	18-APR-18
Zinc (Zn)-Leachable			<0.10		mg/L		0.1	18-APR-18
Zirconium (Zr)-Leachable			<0.050		mg/L		0.05	18-APR-18

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Total Metals							
Mercury Total by TCLP prep							
	27	15-MAR-18	17-APR-18 16:00	28	33	days	EHT
	31	15-MAR-18	17-APR-18 16:00	28	33	days	EHT
	32	15-MAR-18	17-APR-18 16:00	28	33	days	EHT
	33	15-MAR-18	17-APR-18 16:00	28	33	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2070021 were received on 20-MAR-18 15:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2070021-COFC

COC Number: 17 - 1800120700

Report To	Contact and company name below will appear on the final report
Company:	Tetra Tech Canada Inc.
Contact:	Brent Horning
Phone:	(204) 954-6860
	Company address below will appear on the final report
Street:	400-161 Portage Avenue East
City/Province:	Winnipeg, MB
Postal Code:	R3B 0Y4
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: labresultsmb@tetratech.com
Email 2: Brent.Horning@tetratech.com
Email 3: Matt.Randell@tetratech.com

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: labresultsmb@tetratech.com
Email 2: Brent.Horning@tetratech.com

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐; 3 day [P3-25%] ☐; 2 day [P2-50%] ☐
EMERGENCY: 1 Business day [E1 - 100%] ☐; Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:
Job #: 734-1800120700
PO / AFE:
LSD: Baltimore FPS

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#
Major/Minor Code: | Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only):
ALS Contact: JD
Sampler: MR

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Asbestos: PLM (1% DL)	Lead in Paint	~~Mec~~ Mercury in Paint	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
1	ACM-01	15-Mar-18	AM	Bulk	X				X	1
2	ACM-02	15-Mar-18	AM	↓	X				X	1
3	ACM-03	15-Mar-18	PM	↓	X				X	1
4	ACM-04	15-Mar-18	PM	↓	X				X	1
5	ACM-05	15-Mar-18	PM	↓	X				X	1
6	ACM-06	15-Mar-18	PM	↓	X				X	1
7	ACM-07	15-Mar-18	PM	↓	X				X	1
8	ACM-08	15-Mar-18	PM	↓	X				X	1
9	ACM-09	15-Mar-18	PM	↓	X				X	1
10	ACM-10	15-Mar-18	PM	↓	X				X	1
11	ACM-11	15-Mar-18	PM	↓	X				X	1
12	LBP-01	15-Mar-18	AM	Paint		X	X		X	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Samples possibly contain Asbestos, lead, and/or mercury. Please handle with care.
CCME

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C: 18.6
FINAL COOLER TEMPERATURES °C:

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Matt Randell (signature)	Date: ~~March 19, 2018~~ MR March 20, 2018	Time: 9:00AM	Received by: AAL	Date: 20/3/18	Time: 2:30	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2070021-COFC

COC Number: 17 - 1800120700

Report To	Contact and company name below will appear on the final report
Company:	Tetra Tech Canada Inc.
Contact:	Brent Horning
Phone:	(204) 954-6860
	Company address below will appear on the final report
Street:	400-161 Portage Avenue East
City/Province:	Winnipeg, MB
Postal Code:	R3B 0Y4
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: labresultsmb@tetratech.com
Email 2: Brent.Horning@tetratech.com
Email 3: Matt.Randell@tetratech.com

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: labresultsmb@tetratech.com
Email 2: Brent.Horning@tetratech.com

Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ 3 day [P3-25%] ☐ 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E1 - 100%] ☐ Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	
Job #:	734-1800120700
PO / AFE:	
LSD:	Baltimore FPS
ALS Lab Work Order # (lab use only):	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact: JD	Sampler: MR

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Asbestos: PLM (1%DL)	Lead in Paint	Mercury in Paint	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
13	LBP-02	15-Mar-18	AM	Paint		X	X		X	1
14	LBP-03	15-Mar-18	AM	↓		X	X		X	1
15	LBP-04	15-Mar-18	AM			X	X		X	1
16	LBP-05	15-Mar-18	AM			X	X		X	1
17	LBP-06	15-Mar-18	AM			X	X		X	1
18	LBP-07	15-Mar-18	PM			X	X		X	1
19	LBP-08	15-Mar-18	PM			X	X		X	1
20	LBP-09	15-Mar-18	PM			X	X		X	1
21	LBP-10	15-Mar-18	PM			X	X		X	1
22	LBP-11	15-Mar-18	PM			X	X		X	1
23	LBP-12	15-Mar-18	PM			X	X		X	1
24	LBP-13	15-Mar-18	PM	↓		X	X		X	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Samples possibly contain lead and/or Mercury
CCME

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C: 19.8
FINAL COOLER TEMPERATURES °C:

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Matt Randell (signature)	Date: ~~March 19, 2018~~ MR March 20, 2018	Time: 9:00 AM	Received by: AAL	Date: 20/3/18	Time: 2:30	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY — SEPT 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2070021-COFC

COC Number: 17 - 1800120700

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	
Company:	Tetra Tech Canada Inc.	Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Contact:	Brent Horning	Quality Control (QC) Report with Report	☑ YES ☐ NO
Phone:	(204) 954-6860	☐ Compare Results to Criteria on Report - provide details below if box checked	
	Company address below will appear on the final report	Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Street:	400-161 Portage Avenue East	Email 1 or Fax	labresultsmb@tetratech.com
City/Province:	Winnipeg, MB	Email 2	Brent.Horning@tetratech.com
Postal Code:	R3B 0Y4	Email 3	Matt.Randell@tetratech.com
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Distribution	
	Copy of Invoice with Report ☐ YES ☑ NO	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Company:		Email 1 or Fax	labresultsmb@tetratech.com
Contact:		Email 2	Brent.Horning@tetratech.com

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

- Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
- PRIORITY (Business Days): 4 day [P4-20%] ☐; 3 day [P3-25%] ☐; 2 day [P2-50%] ☐
- EMERGENCY: 1 Business day [E1 - 100%] ☐; Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	734-1800120700	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:	Baltimore FPS	Location:	
ALS Lab Work Order # (lab use only):		ALS Contact: JD	Sampler: MR

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Asbestos: PLM (1% DL)	Lead in Paint	Mercury in Paint	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
25	LBP-14	15-Mar-18	PM	Paint		X	X		X	1
26	LBP-15	15-Mar-18	PM	↓		X	X		X	1
27	LBP-16	15-Mar-18	PM	↓		X	X		X	1
27	LBP-17	15-Mar-18	PM	↓		X	X		X	1
28	LBP-18	15-Mar-18	PM	↓		X	X		X	1
29	LBP-19	15-Mar-18	PM	↓		X	X		X	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Samples possibly contain lead and/or mercury

CCME

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C: 18.8

FINAL COOLER TEMPERATURES °C:

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Matt Randell (signature)	Date: ~~March 19, 2018~~ March 20, 2018	Time: 9:00AM	Received by: AAL	Date: 20/3/18	Time: 2:30	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.