Manitoba **Memorandum**

DATE: December 22, 2014

TO: Tania Steele

FROM: Eshetu Beshada, Ph.D., P.Eng.
Environmental Engineer
Mines and Wastewater Section
123 Main Street
Ste. 160 Union Station
Winnipeg, Mb R3C 1A5
Ph:204 945-7023

SUBJECT: **Urbanmine Inc. – Information for Public Registries**

Tania,

Please find attached additional information received with respect to the Urbanmine Inc file (5684.00) for distribution to the public registries. The documents included is:

Additional Correspondence

- December 16, 2014 letter with attachment from Svent T. Hombach 116 pages

116 pages total

Thank you.

Eshetu Beshada, Ph.D., P. Eng.

FillmoreRiley

SVEN T. HOMBACH
Direct Tel (204) 957-8300
Direct Fax (204) 954-0300
shombach@fillmoreriley.com

LEGAL ASSISTANT
Karen Hoffman
Tel (204) 956-2970 ext. 229
khoffman@fillmoreriley.com

Our File Number: 427312-1/STH
FRDOCS_4592450.1

December 16, 2014

VIA EMAIL

Manitoba Conservation and Water Stewardship
Environmental Stewardship Division
Environmental Approvals Branch
123 Main Street, Suite 160
Winnipeg, MB R3C 1A5

Attention: Tracey Braun, Director of Approvals

Dear Madam:

Re: Urbanmine Inc. - Manitoba Conservation & Water Stewardship File 5684.00
72 Rothwell Road, Winnipeg
Noise, Vibration and Air Quality Report

In further support of Urbanmine Inc's ("Urbanmine") application for a licence issued under *The Environment Act*, please find attached a noise, vibration and air quality impact assessment prepared by Dillon Consulting ("Dillon").

With respect to noise emissions, Dillon notes only minor elevations in the LeqA sound levels above applicable Manitoba Guidelines in the range of approximately 2 dBA. While Dillon identified noise peaks relating to the operation of Urbanmine's equipment, the analyzed data also identified a number of unrelated noise peaks attributable to the industrial nature of the area (rail shunting, airplane noise, sirens, etc.).

To reduce the potential impact of peaking noise, Urbanmine has instructed all heavy machine operators at its facility to no longer drop or throw scrap metal onto piles, but rather place the material. This reduces noise peaks from metal colliding with metal. Urbanmine is also currently investigating the potential of obtaining a City of Winnipeg variance to increase the fence height along the northern edge of its property, which height if currently limited due to zoning restrictions. It is anticipated that this step could further reduce noise transmission from Urbanmine's yard.

As a result of the findings set out in the attached report, Urbanmine has commissioned Dillon to perform noise modelling to determine whether there are any other operationally and financially feasible mitigation steps Urbanmine could take with respect to noise emissions. However, such data will only become available in early 2015.

With respect to vibration, Dillon concludes that vibration levels at the nearest relevant point of impingement are well below the ISO-2631 standard suggested by Dillon in the absence of a binding Manitoba-specific standard.

With respect to dust emissions, Dillon concludes that there is no discernible difference between the daily average measured concentrations while Urbanmine operates its facility and the measured area background concentrations. However, in a further effort to minimize dust emissions, Urbanmine Inc. routinely treats its site with dust suppressant two to four times during the summer season and power-sweeps its paved Rothwell Road yard on a daily basis during the summer.

Urbanmine looks forward to discussing the report findings with Manitoba Conservation & Water Stewardship at your convenience.

Yours truly,

FILLMORE RILEY LLP

Per:

SVEN T. HOMBACH *

*Services provided by S.T. Hombach Law Corporation

Cc: Eshetu Beshada, Manitoba Conservation and Water Stewardship
Mark Chisick, Urbanmine Inc.

DILLON
CONSULTING

Environmental Monitoring – Noise, Vibration, and Air Quality

Urbanmine Inc., Winnipeg, Manitoba

Privileged and Confidential

December 2014 Final Report – 14-1071

Table of Contents

Figures

Tables

Appendices

Glossary

Decibels (dB) *is a logarithmic unit used to describe the level (loudness) of sound.*

A-weighting (dBA) *is a decibel level that is adjusted to reflect noise level as perceived by humans.*

Equivalent Sound Level (Leq) *is an average noise level over a given period of time. Hourly Leq is the average over the course of one hour.*

Vibration *is a form of energy directed outward in waves which results in movement in the ground.*

Velocity *is a factor that contributes to vibration and is a measure of how fast the particles in the ground move (measured in mm/s).*

Peak Particle Velocity *is the highest vibration speed achieved in a given time period (peak vibration velocity).*

Root-mean-square (RMS) *is a type of average to describe the level of vibration.*

TSP *Total Suspended Particulate matter, consisting of all airborne particulate matter with aerodynamic diameter of less than 100 μm.*

PM10 *is suspended particulate matter with aerodynamic diameter of less than 10 μm.*

Executive Summary

Dillon Consulting Limited (Dillon) was retained by Tapper Cuddy LLP (Tapper Cuddy) to develop and undertake a preliminary environmental monitoring program for noise, vibration, and air quality at and in the vicinity of the Urbanmine Inc.'s (Urbanmine's) scrap metal processing Facility in Winnipeg, Manitoba. The Facility essentially operates a transfer depot, where recyclable materials are brought to the site, sorted, sheared / cut, re-organized / packaged and shipped to the end processors.

The monitoring work was undertaken during the second and third week of October, 2014 and included periods when the Facility was operating and when it was not operating (i.e., background). The measured ambient noise levels are indicative of typical urban centres with average representative hourly noise levels for daytime ranging from low to mid 50s dBA and for nighttime from high-40s to low-50s dBA. The daytime ambient noise levels, when the Facility is not operating are less than the MCWS's guideline criterion of 55 dBA, while the nighttime levels (Facility not operating) exceed the 45 dBA criterion at both receptor fenceline locations. When the Facility is operating, the daytime sound level equivalent exceeds the criterion at one of the receptor locations by approximately 2 dB. The daytime noise levels for weekdays (with the Facility operating) versus weekends (when the Facility is not operating) are relatively similar; indicating road and possibly rail traffic as the dominant contributors to the background noise levels in the area.

The measurement data also shows short-duration high noise events (i.e., sharp peaks) for both weekdays and weekends which are confirmed to be attributed to both on-site (e.g., material drop) and off-site noise sources (e.g., rail shunting, airplane flyover, siren). These sharp peaks which can also be considered as impulsive noises may result in human annoyance. The monitoring results indicate that the noise generated at the Facility and those audible at the receptors likely do not have low frequency noise (LFN) characteristics.

The peak vibration velocity measurements indicate that the majority of on-site vibration is attributed to the shear loading bed operation, particularly the operation of the hydraulic arms used to fold and squeeze heavy gauge steel load. Although on-site activities at the Facility result in ground vibration, the levels dissipate rapidly with distance. The peak vibration velocities measured during worst-case operating scenario, on the east side of the Facility and at the nearest receptor are all well below the suggested ISO-2631 (Annex A) Standard of 0.14 mm/s (RMS).

Total Suspended Particulate matter (TSP) concentrations measured at the Urbanmine fenceline were not discernibly different from the background concentrations measured at the same locations during periods when the facility was not operating. The measured fenceline concentrations are well below the Province's Ambient Air Quality Criteria (AAQC) for total particulate matter. The measured metals concentrations at the fenceline were elevated from the background concentrations measured at the same locations; however, all concentrations were significantly lower than the provincial AAQC. The predicted concentration of total hydrocarbons at the nearest residential properties is well below available guideline values from other international agencies.

1.0 Summary

Dillon Consulting Limited (Dillon) was retained by Tapper Cuddy LLP (Tapper Cuddy) to develop and undertake a preliminary environmental monitoring program for noise, vibration, and air quality at and in the vicinity of Urbanmine Inc.'s (Urbanmine's) scrap metal processing facility located at 72 Rothwell Road in Winnipeg, Manitoba (the "Facility"). The monitoring work was undertaken during the second and third week of October, 2014 and included periods when the Facility was operating and when it was not operating to establish background levels.

The details of the Facility operations, the monitoring program and the results are discussed in subsequent sections.

2.0 Background

Urbanmine has been operating a ferrous and non-ferrous metal processing Facility since 2009. The Facility is located within a M3-zoned (Industrial, Heavy) area. The Facility is located immediately adjacent to rail and hydro right-of-ways (on the east side) owned by Canadian Pacific Railway Limited (CP Rail), Canadian National Railway (CN Rail), and Manitoba Hydro (Hydro). There are large industrial / commercial establishments to the north, south and west of the Facility. The Facility is approximately 300 m from Kenaston Boulevard (HWY 90), which is a well-travelled four-lane highway with a posted speed limit of 80 km/h. The closest residential area to the Facility is the Linden Woods community, located immediately east of the right-of-way corridor. The Facility and surrounding areas are presented in **Figure 1.**

CP Rail and CN Rail run approximately five trains per day, primarily servicing the Lafarge plant to the south. The section of the rails between the Facility and the nearest receptors are also used on regular basis by CP Rail and CN Rail for shunting.

The Facility essentially operates a transfer depot, where recyclable materials are brought to the site, sorted, sheared / cut, re-organized / packaged and shipped to the end processors. Various recyclable materials that are brought to the Facility are initially weighed, then stockpiled or stored on-site before being sorted and/or processed. The on-site processing is limited to shearing and torch-cutting larger pieces into smaller ones and briquetting so that material can be used by the end user. The Facility also processes vehicles on-site by draining the liquids (also referred to as fluid extraction process) and using a hydraulic flattener to flatten the vehicles. The flattened vehicles are then loaded onto tractor trailers and shipped to end processors. Typical scrap processed at the site include, punchings (i.e., left-over sheet-metals after going through a punching press), metal shavings, vehicles, batteries and electronics. The latter two are simply packaged and shipped to end processors. Fluid extraction from scrap automobiles is conducted on-site. In addition, the scrap automobiles are flattened using a hydraulic flattener.

For the above-mentioned activities the Facility utilized the following mobile equipment:

- Two (2) 934A Liebherr cranes
- One (1) 924A Liebherr crane
- One (1) Volvo L90 loader
- One (1) 780E Gehl skidsteer
- One (1) E-Z Crusher logger/baler
- One (1) Hitachi 270 mobile shear with Genesis head
- Three (3) propane-powered forklifts – one (1) operating indoors and outdoors, two (2) operating indoors only
- One (1) electric forklift – operating indoors and outdoors

The Facility also operates an electric shear (Sierra Model: T750-SL), a vehicle fluid extraction system and a vehicle flattener all of which operates outdoors in the Facility's yard. Inside the building, the Facility operates an electric-hydraulic briquetting press, an electric metal grinding/sorting system along with a dedicated dust collector.

Currently, Urbanmine is undergoing its initial application for a Class 1 Environment Act Licence under the Environment Act. A proposal was submitted to Manitoba Conservation and Water Stewardship (Manitoba Conservation) in April 2014 and was assigned file number 5684.00 by Manitoba Conservation.

The Facility typically operates weekdays from 8 am to 5 pm; however, to ensure that the Facility has the operational flexibility to respond to unusual circumstances or operational conditions, the Facility periodically operates extended hours (i.e., 6 am – 9 pm) Monday through Saturday.

FIGURE 1: AERIAL PHOTOGRAPH OF THE FACILITY AND SURROUNDING AREAS

3.0 Purpose

As a part of the Environment Act Licence application process, Manitoba Conservation and Water Stewardship has requested Urbanmine to address the environmental concerns raised by the nearby residential community. As such, Urbanmine has commissioned this study of ambient air quality, noise, and vibration monitoring to determine any potential impacts and whether further studies or mitigative measures are required.

4.0 Ambient Noise Monitoring

4.1 Methodology

In collaboration with Urbanmine, Dillon personnel gathered relevant information, including: site layout, operation details and schedules, list of dominant sources of noise and vibration at the Facility, and receptor-specific parameters. The latter included structures as well as distance and orientation in relation to on-site noise sources.

Dominant noise sources at the Facility include the shear, mobile equipment, material handling (i.e., material transport, material drop), vehicle flattener, torch cutting, briquetting machine, and exhaust fans.

A monitoring program was executed to capture potential noise impacts at the receptors corresponding to different operations and activities at the site as well as community noises (e.g., transportation related noise). Continuous ambient noise monitoring was undertaken at three locations from Wednesday, October 8 to Sunday, October 12, 2014.

The ambient noise monitoring program was completed using one Rion NL-52 Type I noise level meter with digital audio recording and 1/3 octave filter and two Rion NL-22 Type II noise level meters. In addition to being calibrated in the laboratory, each instrument was calibrated on-site, before and after each measurement period. Certificates of Calibration, including instrument serial numbers, are provided in **Appendix H**.

The following noise monitoring stations were set up:

1- **Facility Rooftop** – A NL-22 unit equipped with an environmental enclosure and an external battery was set up on the rooftop of the Facility with the microphone setup on a tripod at approximately 1.5 m above the roof. The microphone was situated to have direct line-of-sight with the dominant noise sources in the Facility's yard. The unit was set up to gather hourly A-weighted sound level equivalent (LeqA) as well as other statistical values of measured levels such as peak values, max / min and various percentile values such as 95th and 90th percentile values (L95, L90).

2- **Receptor Fence line 1** – A NL-22 unit equipped with an environmental enclosure and an external battery was set up along the right-of-way, near the backyard fence of the closest receptor to the most dominant on-site noise source (i.e., shortest distance to the shear). The microphone was installed on a tripod, approximately 1.5 m above the ground. For this receptor location, the dominant noise sources in the yard were shielded by the Facility's main building (i.e., no direct line-of-sight). The unit was set up to gather hourly A-weighted sound level equivalent (LeqA) as well as other statistical values of measured levels such as peak, max / min and various percentiles such as 95th and 90th percentiles (L95, L90).

3- **Receptor Fence line 2** – A NL-52 unit equipped with an environmental enclosure and an external battery was set up along the right-of-way, near the backyard fence of the closest receptor with direct line-of-sight to the most dominant on-site noise sources (e.g., material drop and shear). The microphone was installed on a tripod, at approximately 1.5 m above the ground. The unit was set up to gather A-weighted sound level equivalent (LeqA), 1/3 octave spectra for every minute, and other

statistical values mentioned above. The device was also programmed to audio record sound for levels exceeding 55 dBA. The threshold of 55 dBA is based on Manitoba Conservation's daytime guideline criterion. During the monitoring program the Facility was operating only during daytime hours. The 1-minute logging interval was chosen so that the peak noise events can be identified and the audio recording can be played back to determine the source(s). The NL-52 noise meter is also equipped with a sub-channel, capable of simultaneously recording C-weighted sound levels. The latter is to determine any low frequency characteristics of the sound (when compared against A-weighted sound level). Low frequency noise tends to cause more human annoyance. Furthermore, low frequency noise can contribute to noise-induced structural vibration. As such, the sub-channel was activated to simultaneously log C-weighted sound levels and calculate the difference between dBA and dBC. Manitoba does not have a low-frequency noise standard. However, according to Alberta's Directive 038, if the differential between the dBA and dBC of simultaneously measured sound levels is greater than 20 dB, the low frequency noise should be assessed further (AEUB, 2007).

Measurement methodology was based on CAN/CSA-ISO 1996-1 and the Ontario Ministry of the Environment and Climate Change (MOECC) noise publication document NPC-103. The operators at the Facility were advised to operate under typical operating scenario during the monitoring program, with the exception of the spot vibration measurements, for which the worst-case scenario was simulated (i.e., processing heaviest and hardest materials for material drop and shear operation). An operations log was kept for all on-site equipment/activities, which is included in **Appendix G**. During the monitoring program, the Facility operated on weekdays (Monday to Friday) from 8:00 am to 5:00 pm. The field pictures for the setups are presented in **Appendix I.**

4.2 Monitoring Locations

The ambient noise monitoring locations are illustrated in **Figure 2**, below.

FIGURE 2: AMBIENT NOISE MONITORING LOCATIONS

4.3 Guidelines

The ambient noise levels (i.e., hourly LeqA) were compared against Manitoba Conservation and Water Stewardship (MCWS) Guidelines for Noise Pollution, September 1992. This guideline stipulates maximum desirable sound levels of 55 dBA and 45 dBA for daytime and nighttime, respectively, for residential areas. The same guideline specified daytime hours from 7 am to 10 pm and nighttime hours from 10 pm to 7 am. The above-mentioned guideline criteria are for both continuous and intermittent sounds.

4.4 Results

The gathered noise data was analyzed for average, maximum and minimum LeqA, as well as overall sound level maxima and minima (i.e., Lmax and Lmin). The measurement data was correlated with onsite activities and/or other independent noise generating activities in the community through review of the operations / activities log and audio recordings.

The noise monitoring results are summarized on **Tables 1 and 2**, below.

TABLE 1: OVERALL MEASURED SOUND LEVEL EQUIVALENT LEVELS (DBA)

Monitoring Location		Measured Hourly Sound Pressure Levels (dBA)								
		Facility Operating (Daytime Only)			Facility Not Operating (Daytime)			Facility Not Operating (Nighttime)		
ID	Description	Leq avg	Leq max	Leq min	Leq avg	Leq max	Leq min	Leq avg	Leq max	Leq min
L1	Facility Rooftop	68.1	71.4	65.4	56.8	61.4	52.9	53.9	60.1	50.7
L2	Receptor Fenceline - no direct line of sight	56.9	63.9	47.0	52.5	62.4	47.6	51.7	63.0	44.7
L3	Receptor Fenceline - with direct line of sight	53.3	58.6	46.7	50.6	56.0	46.0	48.8	54.4	44.2

TABLE 2: MAXIMA AND MINIMA FOR MEASURED SOUND PRESSURE LEVELS

Monitoring Location		Measured Hourly Sound Pressure Levels (dBA)					
		Facility Operating (Daytime Only)		Facility Not Operating (Daytime)		Facility Not Operating (Nighttime)	
ID	Description	Lmax max	Lmin min	Lmax max	Lmin min	Lmax max	Lmin min
L1	Facility Rooftop	88.7	51.1	80.7	48.9	82.1	47.6
L2	Receptor Fenceline - no direct line of sight	87.3	40.8	89.3	39.8	87.4	39.3
L3	Receptor Fenceline - with direct line of sight	67.8	42.3	63.9	42.2	60.0	40.2

The ambient noise environment in the general area is impacted by traffic (road and rail) noise as well as general commercial/industrial activities in the area – contributions from the latter two are mainly during daytime hours. The measured ambient noise levels are indicative of typical urban centres with average representative hourly noise levels for daytime ranging from low to mid 50s dBA and for nighttime from high-40s to low-50s dBA. The daytime ambient noise levels, when the Facility is not operating are less than the MCWS's guideline criterion of 55 dBA, while the nighttime levels exceed the 45 dBA criterion at both receptor fenceline locations. When the Facility is operating, the daytime LeqA exceeds the criterion at one of the receptor fenceline locations by approximately 2 dB. The daytime noise levels for weekdays (with the Facility operating) versus weekends (when the Facility is not operating) are relatively similar, indicating road and possibly rail traffic as the dominant contributors to the background noise levels in the area. The average LeqA measured for daytime with the Facility operating is approximately 3 to 4 dB higher when compared against weekend daytime periods. This can be attributed to the lower vehicular traffic during weekends as well as contribution from the Facility, as evident from audio recordings.

The measurement data also shows short-duration high noise events (i.e., sharp peaks) for both weekdays and weekends – the corresponding digital audio recordings indicates both on-site (e.g., material drop) and offsite noise sources (e.g., rail shunting, airplane flyover, siren) contributing to the peak levels. The maxima presented on **Table 2**, specifically the rooftop measurements, are indicative of this. These sharp peaks which can also be considered as impulsive noises may result in higher human annoyance than a continuous noise.

The results also indicate that of the two receptor fenceline locations, the one without the direct line-of-sight (L2) is experiencing higher noise levels (approximate 2 to 3 dB) than the one with the direct line-of-sight (L3) to on-site noise sources. The same trend can be observed when the Facility is not operating. The direct distance from the on-site shear to L2 is approximately 155 m while the same for L3 is approximately 175 m. Similarly, L2 is approximately 440 m from Kenaston Boulevard (Route 90) while L3 is approximately 470 m. The L3 location is partially shielded from some of the on-site noise sources by the Facility's main building and the industrial building to the north of the Facility. It is also shielded from Kenaston Boulevard by two large industrial buildings. As such, the lower noise levels at L3 are attributed to larger setbacks from both the dominant on-site noise sources and the dominant transportation noise source (i.e., Kenaston Boulevard).

The evaluation of potential for Low Frequency Noise (LFN) at the receptor fenceline location (i.e., L3) was undertaken by determining differentials between simultaneously measured A-weighted and C-weighted sound levels. LFN can result in greater human annoyance and can also result in noise-induced structural vibration. The difference slightly exceeded the 20 dB threshold only during weekend daytime hours and for short period of time. Audio recordings confirm that strong winds are resulting in the detected LFN. As such, it can be concluded that the noise monitored at the Facility or the nearby receptors likely do not have LFN characteristics.

5.0 Ground Vibration Measurement

5.1 Methodology

The ground vibration measurement program consisted of spot measurements corresponding to various operational scenarios as well as train pass-bys. Measurements were completed using a Crystal CoCo-80 velocity and dynamic signal analyzer from Friday, October 17 to Tuesday, October 21, 2014. This device is capable of three Channel (tri-axial) measurements using three accelerometers (xy, xz, zy planes). The frequency range of approximately 3 Hz to over 400 Hz was covered.

The measurement methodology was based on the appropriate sections of ISO/TC 108. Typically, ground vibration is dominated in the vertical direction and is measured as such. However, for the purposes of this study, ground vibration in both horizontal directions were also included in determining the overall ground vibration. The instrument was set to calculate the peak vibration velocities and generate an overall (combined RMS) value in mm/s for each measurement.

Operations / equipment at the Facility that may result in ground vibration include, the shear, the vehicle flattener, and heavy mobile equipment, especially those without rubber tires (e.g., steel tracks). Off-site activities that may result in ground vibration include transportation, especially rail, as well as construction activities.

Calibration certificates for the instrument and the accelerometers are included in **Appendix H**.

5.2 Measurement Locations

The measurement locations included both on-site, near the shear and off-site, near the residential receptors [note: monitoring was not conducted at the receptor fence line locations due to interference with the overhead high-voltage transmission lines]. The ground vibration was measured at the following locations:

- V1 – On-site - adjacent to the shear in the processing yard of the Facility
- V2 – On-site - behind the Facility's main building, adjacent to CN and CP lines
- V3 – Off-site - at the property boundary of the closest receptors on Wingate Court (#54/58), 1 m from curb
- V4 – Off-site - at a vacant lot at Lindmere Drive/ Birmingham Place, in line with the south end of the Facility, 1 m from curb

The grounds between the Facility and the nearest residential receptors are generally flat and consist mainly of high clay-content soil. There are 3 to 5 rail tracks between the Facility and nearest receptors. The Facility building has a concrete footing for the entire length of the building. The shear is mounted on large concrete footings.

The vibration measurement locations are presented in **Figures 3 and 4**, below.

FIGURE 3: ON-SITE VIBRATION MEASUREMENT LOCATIONS

FIGURE 4: OFF-SITE VIBRATION MONITORING LOCATIONS

5.3 Guidelines

Manitoba Conservation and Water Stewardship (MCWS) does not have guideline limits for ground vibration pertaining to industrial activities other than quarry operations. The Manitoba Regulation MR65/92 specifies a limit of 12 mm/s for residential areas near quarry operations, which relates mainly to blasting operations at quarries. The Ontario Ministry of the Environment and Climate Change (MOECC) has a publication on ground vibration specific to impulse vibrations (NPC-207) which specified a limit on peak vibration velocity of 0.30 mm/s for both daytime and nighttime (for 20 or more impulses during the observation period).

The International Standards Organization (ISO) Standard 2631 (ISO-2631) refers to perceptibility of vibration in buildings but does not specify a quantitative limit. In an annex to ISO-2631 a tentative guidance criterion of 0.14 mm/s (RMS) is proposed for both continuous and intermittent vibration for nighttime residential settings.

For the purposes of this study, the measured peak vibration velocities were compared against the 0.14 mm/s (RMS) guidance criterion.

5.4 Results

The vibration velocity measurement results are summarized on **Table 3**. The description of the monitoring location IDs are provided above. Descriptions of onsite activities as well as those pertaining to rail operations and nearby vehicular traffic are included under 'Operating Scenarios' on **Table 3**.

The results indicate that the majority of on-site vibration is attributed to the shear loading bed operation, particularly the operation of the hydraulic arms used to fold and squeeze the load [note: the vibration measurements were conducted when the shear was operating under a worst-case scenario (i.e., processing heavy gauge steel)]. Although on-site activities at the Facility result in ground vibration, the levels dissipate rapidly with distance. For example, the levels measured on the east side of the Facility building (location V2) at approximately 70 m from the shear are approximately 40% of those measured near the shear. The peak vibration velocities measured on the east side of the Facility are all below the 0.14 mm/s (RMS) criterion with the exception of train pass-by, which results in a peak value of 0.25 mm/s.

The measured ranges of peak vibration velocities at the closest receptor (location V3) indicate no noticeable difference when the Facility is operating versus not operating. The measured ranges of peak vibration velocities for the second off-site location (location V4) indicates otherwise (i.e., higher vibration velocity when the Facility is operating); however, given the location V4 in relation to the Facility and the closest receptor (V3), it is likely that the higher measured peaks are associated with nearby road traffic. All measured peak vibration velocities at / near receptors indicate levels that are well below the 0.14 mm/s (RMS) criterion.

TABLE 3: VIBRATION MEASUREMENTS

Date	Time	Monitoring Location ID	Operating Scenarios	Peak Vibration Velocity (RMS) (mm/s)
Fri Oct 17/2014	2:00 pm to 2:20 pm	V1	Shear loading bed, tipping bed, arms folding heavy gauge material, mobile cranes in operation, no train	0.20
Fri Oct 17/2014	2:00 pm to 2:20 pm	V1	Shear cutting heavy gauge material, mobile cranes in operation, no train	0.10
Fri Oct 17/2014	2:36 pm to 2:57 pm	V2	Shear loading bed, tipping bed, arms folding heavy gauge material, mobile cranes in operation, no train	0.08
Mon Oct 20/2014	4:16 pm to 4:36 pm	V3	Heavy operations, shearing and mobile cranes in operation, no train	0.01 - 0.03
Mon Oct 20/2014	4:25 pm to 4:45 pm	V4	Heavy operations, shearing and mobile cranes in operation, some road traffic, no train	0.03 - 0.06
Mon Oct 20/2014	4:32 pm to 4:42 pm	V4	No operations, no train, some road traffic	<0.01 - 0.01
Mon Oct 20/2014	4:45 pm to 4:55 pm	V3	No operations, no train	0.01 - 0.03
Mon Oct 20/2014	5:17 pm to 5:40 pm	V2	No operations, no train	<0.01 - 0.03
Tues Oct 21/2014	2:28 pm to 2:50 pm	V2	Heavy operations, shearing and mobile cranes in operation, no train	0.05 - 0.07
Tues Oct 21/2014	3:08 pm to 3:09 pm	V2	Heavy operations, shearing and mobile cranes in operation, train pass-by on CP line	0.25

*Peak vibration velocities rounded to two significant figures in most cases for comparison to criterion

6.0 Air Quality Monitoring

6.1 Methodology

Particulate

Ambient air testing was conducted for total suspended particulate matter ("TSP") and select metals. Measurements occurred over the period of Wednesday, October 8 to Sunday, October 12, 2014 at three monitoring points (MP1 to MP3).

Sources of particulate matter at the Facility include material handling, travel of mobile equipment on unpaved / paved surfaces (re-suspension of road dust), torch cutting, dust collector exhaust, and tail-pipe exhaust from onsite mobile equipment / machinery.

Three Gillian high volume air samplers mounted on tripods were operated at sample rates of 20 to 30 L/min. Samples were primarily collected from the roof of the building near the east property boundary (nearest to residential community to the east of the facility). The aim was to capture the scenario with the greatest potential impact on neighbouring residences, so sampling was conducted under dry conditions during a period of generally west to east winds (westerly winds) – downwind of dust generation activities. Meteorology data was recorded during the study period and is included in **Appendix K.**

The particulate samples were collected on 49 mm quartz filters which were left in place for approximately 24 hours. Four of the TSP filters with the highest visible loadings plus one blank filter were selected for metals analysis through acid digestion and ICP/MS. The analytical work was completed by Maxxam Analytics. The selected metals included, arsenic, cadmium, copper, lead, nickel, zinc.

Hydrocarbons

Hydrocarbons are not typically a significant contaminant of concern for scrap processing and metal recycling facilities. Potential sources of hydrocarbon emissions from this site include the vehicle fluid extraction operation, torching or plasma cutting operations, and diesel engine exhaust emissions from mobile equipment.

Available USEPA emission factors were used to estimate emissions for site operations that contribute to the Facility's hydrocarbon emissions. The estimated emission rates were input into a US EPA screening-level air dispersion model to predict contaminant concentrations at the property line and at distances which represent the nearest off-site receptors.

6.2 Monitoring Locations

The three ambient air monitoring locations are illustrated in the figure below.

FIGURE 5: AMBIENT AIR PARTICULATE MATTER MONITORING LOCATIONS

6.3 Guidelines

The ambient air monitoring results were compared to the following applicable guidelines:

- Manitoba Ambient Air Quality Criteria (AAQC) (2005)
- Manitoba Ambient Air Quality Data (2012) from Manitoba Conservation's ambient air quality monitoring program

These guidelines are also provided in **Appendix F**.

6.4 Results

6.4.1 Ambient Monitoring

Table 4 provides a summary of results for the particulate matter sampling program. For some of the test samples, no measureable particulate was found, so results are shown with a "< - less than" symbol. The filter blank particulate catch was non-detectable. Manitoba Ambient Air Quality Criteria (AAQC) for particulate matter are provided at the bottom of the table. Both the maximum acceptable and maximum desirable level concentrations are provided. In addition, Manitoba Ambient Air Quality Data for PM10 as presented in the 2012 Annual Pollutant Summary is provided for comparison.

Samples MP1-test 1 and MP3-test 3 were discarded due to pump failure.

For the first test at MP3 and the third test at MP2, sampling during production activities represented less than 5% of the total sample, so these samples were deemed to represent ambient background levels for the area.

The measured total particulate matter concentrations ranged from $<10\ \mu g/m^3$ to $123\ \mu g/m^3$, though it is noted that the $123\ \mu g/m^3$ result occurred at MP3, which is located within the Urbanmine processing yard and very close to potential dust generating activities. Results for MP1 and MP2, which better represent concentrations at the Urbanmine's property line ranged from $<10\ \mu g/m^3$ to $<36\ \mu g/m^3$. The two samples were deemed to represent background concentrations during periods of no operations at the Facility ranged from $12\ \mu g/m^3$ to $<29\ \mu g/m^3$. These results indicate no discernible difference between the daily average measured concentrations and the area background measured concentrations.

Table 5 provides a summary of the results for the metals analysis of selected particulate matter samples. The blank filter had non-detectable metals concentrations for all selected metals except copper which was detected slightly above the reportable detection limit. No blank correction was made to the copper results to ensure the use of a higher copper concentration for comparison to the Manitoba AAQC. Manitoba AAQC for individual metals are provided at the bottom of the table for comparison. Manitoba Ambient Air Quality Data for metals was not available for the Winnipeg area.

Metals concentrations obtained during periods of site operations were higher than those obtained during periods of no site activity; however, all measured concentrations of select metals are orders of magnitude below the Manitoba AAQC.

TABLE 4: PARTICULATE MATTER SAMPLING PROGRAM RESULTS

Sample ID	Sample Date (2014)	Particulate Catch	Sample Volume	Particulate Concentration
		(mg)	(m3)	($\mu g/m^3$)
A-MP2-1 14090529	Oct. 8th - 9th	0.8	39.7	20
A-MP3-1 14090528	Oct. 8th - 9th	<0.3	10.4	<29
A-MP1-2 14090530	Oct. 9th - 10th	<0.3	14.9	<20
A-MP2-2 14090531	Oct. 9th - 10th	<0.3	28.8	<10
A-MP3-2 14090532	Oct. 9th - 10th	3.3	26.9	123
A-MP1-3 14090533	Oct. 10th - 12th	<0.3	8.4	<36
A-MP2-3 14090534	Oct. 10th - 12th	0.6	50.5	12
			AAQC Maximum Acceptable Level Concentration ($\mu g/m^3$)	120
			AAQC Maximum Desirable Level Concentration ($\mu g/m^3$)	60
			2012 Annual Pollutant Summary - PM_{10} - Annual Average ($\mu g/m^3$)	14.9
			2012 Annual Pollutant Summary - PM_{10} - 24-hr Maximum ($\mu g/m^3$)	77.1

Notes:
$\mu g/m^3$ – micrograms per cubic metre
Results shown in blue highlight are representative of background levels (i.e., samples were collected during periods with no site activity)
AAQC - Manitoba Ambient Air Quality Criteria

Ambient monitoring data is from the 65 Ellen Street station in Winnipeg; PM_{10} data is provided as TSP data was not available.

TABLE 5: METALS SAMPLING PROGRAM RESULTS

				Metals Concentrations					
Sample ID	**Sample Date**	**Particulate Concentration**	**Sample Volume**	**Arsenic**	**Cadmium**	**Copper**	**Lead**	**Nickel**	**Zinc**
		($\mu g/m^3$)	(m^3)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
A-MP1-2 14090530	10/10/2014	<20	14.9	0.003	0.0009	0.195	0.051	0.056	0.289
A-MP2-2 14090531	10/10/2014	<10	28.8	0.002	0.0007	0.285	0.035	0.012	0.094
A-MP3-2 14090532	10/10/2014	123	26.9	0.025	0.0048	0.520	0.163	0.178	0.780
A-MP2-3 14090534	10/12/2014	12	50.5	0.001	0.0003	0.081	0.005	0.010	0.034
			Average:	0.008	0.002	0.270	0.063	0.064	0.299
AAQC Maximum Acceptable Level Concentration ($\mu g/m^3$):				0.3	2	50	2.0	2	120

Notes:
$\mu g/m^3$ – micrograms per cubic metre
Results shown in blue highlight are representative of background levels (i.e., samples were collected during periods with no site activity)
AAQC - Manitoba Ambient Air Quality Criteria

6.4.2 Dispersion Modelling

In terms of hydrocarbon emissions from this site, Dillon searched for available emission factors for the vehicle fluid extraction operation, torching or plasma cutting operations, and diesel and propane engine equipment operations. For vehicle fluid extraction operations, the activity deemed to have the greatest hydrocarbon/volatile organic compound (VOC) emission potential is the handling of gasoline for the vehicle fuel tanks, which would involve draining/transfer of gasoline from the vehicle fuel tanks to a bulk gasoline storage tank. US EPA Document AP-42 Chapter 7: Organic Liquid Storage Tanks contains a formula to estimate the emissions of VOCs associated with tank filling activities. The emission estimate is based on the estimated quantity of fuel handled on an annual basis.

For torching or plasma cutting of scrap metal, no emission factors were found for hydrocarbon emissions. Available emission factors were for particulates and metals only, both of which would be captured in the sampling program conducted.

For the operation of diesel and propane equipment at the site, emission estimates were made using the US EPA Report: Exhaust and Crankcase Emission Factors for Non-Road Engine Modelling - Compression-Ignition (2010). Emission rates are based on the estimated horsepower rating of the equipment and assuming the engines meet the Tier 2 technology standards which were felt to be representative of existing, older equipment (new equipment would meet Tier 3 or 4 emission standards). A load factor was applied assuming the equipment operated at full power 50% of the time and at idle for 50% of the time. To conservatively account for emissions from three propane-powered forklifts, despite two of the forklifts operating indoors only, it was assumed that all units operate outdoors, or with building doors open. The single electric forklift was assumed to have zero emissions.

The US EPA SCREEN3 air dispersion model was used to predict the impact of hydrocarbons at the nearest residential properties. The site hydrocarbon emissions were modelled as a volume source with a release height of 4 m (typical height of mobile diesel equipment exhaust) over an area (80 m x 110 m) representing the processing area of the site. Nearest residential properties were estimated at a distance of 175 m from the centre of site operations.

The total hydrocarbon emission rate for the site, representing diesel and propane equipment, and gasoline handling, was estimated as 0.1039 g/s. The screening level dispersion model predicted the off-site impact of this hydrocarbon emission to be 61.3 $\mu g/m^3$ at the nearest residential properties. This estimate would be much lower on a 24-hour basis as there would be no hydrocarbon emissions from the dominant sources indicated above when the facility is not operating.

The Province of Manitoba does not have an AAQC for total hydrocarbons or VOCs, nor do other Canadian provinces or federal environmental agencies. Similarly the province's ambient air monitoring program does not include measurement for total hydrocarbons. Certain US states (e.g., Kentucky and Delaware) have defined a total non-methane hydrocarbon guideline value of 160 $\mu g/m^3$, based on a three-hour period (6:00 am to 9:00 am), which is not to be exceeded more than once per year. Other health agencies have defined total VOC guidelines for indoor environments. The Commission of European Communities has set this guideline value at 300 $\mu g/m^3$ while the Health Council of the Netherlands (2000) has set this guideline at 200 $\mu g/m^3$. The predicted impact of total hydrocarbons of approximately 60 $\mu g/m^3$ is well below all of the above cited guideline values.

7.0 Conclusion

Dillon was retained to develop and undertake a preliminary environmental monitoring program for noise, vibration, and air quality at and in the vicinity of the Urbanmine's scrap metal processing Facility in Winnipeg, Manitoba, located at 72 Rothwell Road. The monitoring work was undertaken during the second and third week of October, 2014 and included periods when the Facility was operating and when it was not operating (i.e., background).

The measured ambient noise levels are indicative of typical urban centres with average representative hourly noise levels for daytime ranging from low to mid 50s dBA and for nighttime from high-40s to low-50s dBA. The daytime ambient noise levels, when the Facility is not operating are less than the MCWS's guideline criterion of 55 dBA, while the nighttime levels (Facility not operating) exceed the 45 dBA criterion at both receptor fenceline locations. When the Facility is operating, the daytime sound level equivalent exceeds the criterion at one of the receptor locations by approximately 2 dB. The daytime noise levels for weekdays (with the Facility operating) versus weekends (when the Facility is not operating) are relatively similar; indicating road and possibly rail traffic as the dominant contributors to the background noise levels in the area.

The measurement data also shows short-duration high noise events (i.e., sharp peaks) for both weekdays and weekends which are confirmed to be attributed to both on-site (e.g., material drop) and off-site noise sources (e.g., rail shunting, airplane flyover, siren). These sharp peaks which can also be considered as impulsive noises may result in human annoyance. The monitoring results indicate that the noise generated at the Facility does not have LFN characteristics.

The peak vibration velocity measurements indicate that the majority of on-site vibration is attributed to the shear loading bed operation, particularly the operation of the hydraulic arms used to fold and squeeze heavy gauge steel load. Although on-site activities at the Facility result in ground vibration, the levels dissipate rapidly with distance. The peak vibration velocities measured during a worst-case operating scenario, on the east side of the Facility and at the nearest receptor, are all well below the suggested ISO-2631 (Annex A) Standard of 0.14 mm/s (RMS).

The measured total particulate matter concentrations ranged from $<10\ \mu g/m^3$ to $123\ \mu g/m^3$, though it is noted that the $123\ \mu g/m^3$ result occurred at MP3, which is located within the Urbanmine processing yard and very close to potential dust generating activities. Results for MP1 and MP2, which better represent concentrations at the Urbanmine's property line ranged from $<10\ \mu g/m^3$ to $<36\ \mu g/m^3$. The two samples that were deemed to represent background concentrations during periods of no operation at the Facility ranged from $12\ \mu g/m^3$ to $<29\ \mu g/m^3$. These results indicate no discernible difference between the daily average measured concentrations and the area background measured concentrations. The site building that extends along the entire east property line appears to be an effective barrier in reducing the propagation of TSP to receptors to the east. The measured fenceline concentrations are well below the Provinces AAQC for total particulate matter.

The measured metals concentrations at the fenceline were elevated from the background concentrations measured at the same locations; however, all concentrations were several orders of magnitude lower than the provincial AAQC. Also, the predicted concentration of total hydrocarbons at the nearest residential properties is well below available guideline values from other international agencies.

Appendix A
Noise Level Data

DILLON CONSULTING

Monitoring Location L1 - Facility Rooftop

Address	Time	Measurment Time	LAeq	LAE	LAmax	LAmin	LA05	LA10	LA50	LA90	LA95	Lppeak
1	10/8/2014 15:47	1:00:00	60.1	95.7	82.1	49.7	64.6	61.6	54.3	52.2	51.5	110.9
2	10/8/2014 16:47	1:00:00	55.9	91.5	74.8	50	56.5	55.8	54.1	52.5	52.1	113.2
3	10/8/2014 17:47	1:00:00	56.5	92.1	72.9	50.9	59.6	56.6	54.2	52.9	52.5	106.6
4	10/8/2014 18:47	1:00:00	55.2	90.8	70.2	51.1	56.8	56.1	54.4	53.2	53	109.4
5	10/8/2014 19:47	1:00:00	54.1	89.7	65.2	50.7	56	55.5	53.7	52.3	52	110.1
6	10/8/2014 20:47	1:00:00	53.3	88.9	59.3	50	56.4	55.1	52.6	51.3	51	108.1
7	10/8/2014 21:47	1:00:00	53.3	88.9	58.7	49.1	56.5	55.3	52.7	51.3	50.8	102.4
8	10/8/2014 22:47	1:00:00	53	88.6	62.7	48.3	57.6	54.8	51.6	49.9	49.5	105
9	10/8/2014 23:47	1:00:00	53	88.6	65.4	47.8	59.6	56.2	50.1	48.9	48.7	100.3
10	10/9/2014 0:47	1:00:00	55.2	90.8	65.3	48.1	61.8	59.3	51.2	49.5	49.1	96
11	10/9/2014 1:47	1:00:00	51.6	87.2	63.1	47.8	56.8	53	49.8	48.7	48.5	99.8
12	10/9/2014 2:47	1:00:00	53	88.6	62.9	48.5	58.5	54.6	51.5	49.8	49.5	91.2
13	10/9/2014 3:47	1:00:00	53.4	89	60.3	48.5	57	56.1	52.4	50.1	49.7	103.2
14	10/9/2014 4:47	1:00:00	55.6	91.2	60.3	51.2	57.9	57.4	55.2	53.2	52.8	103.3
15	10/9/2014 5:47	1:00:00	66.8	102.4	80.7	53.5	72.5	70.5	64	55.9	55.3	103.6
16	10/9/2014 6:47	1:00:00	71.4	107	88.7	61.3	76.6	74.2	67.9	64.1	63.5	105.6
17	10/9/2014 7:47	1:00:00	67.7	103.3	82	57.1	73	70.9	65	60.7	59.8	108.7
18	10/9/2014 8:47	1:00:00	69	104.6	83.2	56.6	74.6	72.5	65.6	59.8	58.9	107.1
19	10/9/2014 9:47	1:00:00	69.7	105.3	82.9	60.2	74.8	73.1	67.1	63.8	63	111.1
20	10/9/2014 10:47	1:00:00	66.7	102.3	87.7	54.6	72	69.3	62.2	57.6	56.8	109.1
21	10/9/2014 11:47	1:00:00	68.8	104.4	83.3	58.1	73.6	72.1	66.6	62.5	61.7	111.4
22	10/9/2014 12:47	1:00:00	68.9	104.5	85.1	54.8	74	72	66	60.7	59.5	114
23	10/9/2014 13:47	1:00:00	67.9	103.5	83.3	57	73.1	71.1	65.2	60.8	59.7	114
24	10/9/2014 14:47	1:00:00	69.5	105.1	82.2	59.1	74.6	72.8	67.3	62.8	61.7	114
25	10/9/2014 15:47	1:00:00	59.1	94.7	77.3	49.4	64.6	61.4	54.4	52.4	51.9	113.9
26	10/9/2014 16:47	1:00:00	57.3	92.9	79	50.5	60.5	56.2	54	52.5	52.1	109
27	10/9/2014 17:47	1:00:00	52.9	88.5	59	49.9	54.8	54.4	52.6	51.3	51.1	104.7
28	10/9/2014 18:47	1:00:00	53.8	89.4	58.8	50.5	55.4	55	53.6	52.3	51.9	94.4
29	10/9/2014 19:47	1:00:00	54.4	90	63.9	50.9	57	55.9	54	52.5	52	90.3
30	10/9/2014 20:47	1:00:00	54.9	90.5	76.1	50.9	56.4	55.8	53.9	52.3	52	86.2
31	10/9/2014 21:47	1:00:00	54.9	90.5	63.9	50.6	57.6	56.5	54.3	52.5	52.1	92.7
32	10/9/2014 22:47	1:00:00	53.2	88.8	62.6	49.1	55.6	54.9	52.7	50.9	50.4	92.9
33	10/9/2014 23:47	1:00:00	53.3	88.9	64.9	49.2	56	55.1	52.5	50.5	50.2	91.9
34	10/10/2014 0:47	1:00:00	52.7	88.3	60.2	49.1	55.9	55	51.7	50.4	50.2	90.2
35	10/10/2014 1:47	1:00:00	52.9	88.5	58.4	49.3	55	54.4	52.6	51.2	50.8	85.8

36	10/10/2014 2:47	1:00:00	53.8	89.4	63	50.5	56.3	55.7	53.3	51.6	51.4	87.4
37	10/10/2014 3:47	1:00:00	56.2	91.8	62	51.3	59.1	58.2	55.6	53.6	53	87.2
38	10/10/2014 4:47	1:00:00	56.7	92.3	63.7	52.6	58.7	58.2	56.5	54.4	54	85.5
39	10/10/2014 5:47	1:00:00	66.3	101.9	86.6	53.4	72.5	69	61.2	56.7	55.9	101.6
40	10/10/2014 6:47	1:00:00	69.3	104.9	84.1	60.3	74.2	72.5	66.6	63.8	63.2	109
41	10/10/2014 7:47	1:00:00	67.6	103.2	81.7	57.6	72.5	70.8	65.5	61.3	60.2	106.3
42	10/10/2014 8:47	1:00:00	68	103.6	82	57.7	73.4	71.4	64.9	61.1	60.2	102
43	10/10/2014 9:47	1:00:00	68.2	103.8	82.4	59.2	72.8	71.2	66	62.9	62.3	105.3
44	10/10/2014 10:47	1:00:00	66.1	101.7	81.3	51.1	72.2	70.2	61.3	53.5	52.8	106.8
45	10/10/2014 11:47	1:00:00	65.4	101	82.8	53.5	70.3	68.2	62.8	58.4	56.5	102.6
46	10/10/2014 12:47	1:00:00	67.9	103.5	86.4	55.5	73.2	71.1	65.1	60.1	59	103.6
47	10/10/2014 13:47	1:00:00	69.2	104.8	85.6	57.6	74.4	72.2	65.8	61.8	60.9	108.2
48	10/10/2014 14:47	1:00:00	68.1	103.7	85.9	57.7	73	70.7	65.4	62.7	61.8	103.8
49	10/10/2014 15:47	1:00:00	56.6	92.2	73.2	48.5	63.2	59.3	52.1	50.1	49.7	101.7
50	10/10/2014 16:47	1:00:00	51.8	87.4	61.6	48.9	53.6	52.9	51.3	50.3	50	96.7
51	10/10/2014 17:47	1:00:00	53.9	89.5	64.6	49.8	56.1	55.2	53.3	51.7	51.4	98.9
52	10/10/2014 18:47	1:00:00	53.9	89.5	63.5	50.3	56.3	55.2	53.3	52	51.7	105.7
53	10/10/2014 19:47	1:00:00	53	88.6	58.9	50.4	54.7	54.2	52.8	51.6	51.3	102.5
54	10/10/2014 20:47	1:00:00	52.9	88.5	59.7	49.8	54.6	54	52.6	51.4	51	104.3
55	10/10/2014 21:47	1:00:00	53.5	89.1	67.6	50.2	55.4	54.7	52.9	51.6	51.3	107.7
56	10/10/2014 22:47	1:00:00	52.4	88	64.8	49.2	54.4	53.8	52	50.9	50.5	107.9
57	10/10/2014 23:47	1:00:00	52.2	87.8	67.1	48	54.8	54.2	51.6	49.8	49.3	104
58	10/11/2014 0:47	1:00:00	52.8	88.4	69	48.1	54.8	53	50.3	49.2	49	105.3
59	10/11/2014 1:47	1:00:00	51.9	87.5	60.6	47.9	57	54	50.2	49	48.7	103.9
60	10/11/2014 2:47	1:00:00	53.8	89.4	70	48	56	53.3	50.5	49.1	48.8	101.3
61	10/11/2014 3:47	1:00:00	53.7	89.3	71.1	48	59.3	57.1	51	49.2	48.9	99.9
62	10/11/2014 4:47	1:00:00	53.5	89.1	67.7	48.3	56.4	55.3	52.3	50.4	50	106.9
63	10/11/2014 5:47	1:00:00	54	89.6	61.1	49.7	56.8	56	53.3	51.7	51.3	102.4
64	10/11/2014 6:47	1:00:00	55.3	90.9	63.4	51.6	57.5	56.9	54.9	53.4	53	99.7
65	10/11/2014 7:47	1:00:00	54.7	90.3	61.7	50.6	56.6	56.1	54.4	52.9	52.6	106.2
66	10/11/2014 8:47	1:00:00	57.4	93	80.7	49.9	58.4	56	53.9	52.6	52.2	114
67	10/11/2014 9:47	1:00:00	56	91.6	66.3	49.9	59.2	58.1	55.2	53.2	52.6	114
68	10/11/2014 10:47	1:00:00	58.2	93.8	72.6	51.5	62.4	61	56.8	54.2	53.7	114
69	10/11/2014 11:47	1:00:00	59	94.6	70.1	51.7	63.7	62.2	57	54	53.6	114
70	10/11/2014 12:47	1:00:00	60.6	96.2	74.6	51.7	65.8	64.2	57.9	54.5	54	114
71	10/11/2014 13:47	1:00:00	61.4	97	77	52.5	66.1	64.7	59.1	55.1	54.5	114
72	10/11/2014 14:47	1:00:00	61	96.6	73.9	52.1	66.2	64.6	58.4	54.7	54.2	114

73	10/11/2014 15:47	1:00:00	58.4	94	69.8	51.3	63.2	61.7	56.3	53.8	53.2	114
74	10/11/2014 16:47	1:00:00	56.1	91.7	72	51	59.5	57.7	54.4	52.8	52.4	114
75	10/11/2014 17:47	1:00:00	54.7	90.3	65.3	50.4	57.4	56.3	54.1	52.6	52.2	114
76	10/11/2014 18:47	1:00:00	55.7	91.3	67.1	50.5	59.3	57.9	54.5	52.8	52.3	114
77	10/11/2014 19:47	1:00:00	56	91.6	66.2	50.6	60	58.5	54.7	52.6	52.2	114
78	10/11/2014 20:47	1:00:00	55.2	90.8	66.6	50.5	59.1	57.5	54	52.2	51.9	114
79	10/11/2014 21:47	1:00:00	54.5	90.1	66.5	49.6	58.1	56.8	53.4	51.6	51.2	114
80	10/11/2014 22:47	1:00:00	52.2	87.8	63	48.5	54.6	53.8	51.6	50.1	49.8	113.2
81	10/11/2014 23:47	1:00:00	51.1	86.7	59.6	47.8	53.4	52.7	50.6	49.3	49	114
82	10/12/2014 0:47	1:00:00	50.7	86.3	62.5	48	53	52	50.1	49.1	48.8	113.9
83	10/12/2014 1:47	1:00:00	51.1	86.7	62.4	47.8	54.1	53.1	50.1	48.8	48.6	114
84	10/12/2014 2:47	1:00:00	51.1	86.7	72.2	47.6	53.1	52.1	49.9	48.6	48.3	114
85	10/12/2014 3:47	1:00:00	51.5	87.1	67.7	47.6	55.2	53.4	49.8	48.6	48.3	114
86	10/12/2014 4:47	1:00:00	53.4	89	64.1	47.7	58.1	56.4	51.7	49.3	48.9	114
87	10/12/2014 5:47	1:00:00	52.9	88.5	63.1	48.9	55.9	54.7	52.1	50.5	50.2	113.8
88	10/12/2014 6:47	1:00:00	53.3	88.9	61.4	49.8	55.6	54.8	52.9	51.4	51	111.6
89	10/12/2014 7:47	1:00:00	53.9	89.5	63.8	50.4	55.8	55.1	53.3	52	51.7	107
90	10/12/2014 8:47	0:09:17	57.3	84.8	75.6	50.5	60.2	55.9	53.4	51.7	51.3	109

Monitoring Location L2 - Receptor Fenceline

Address	Time	Measurment Time	LAeq	LAE	LAmax	LAmin	LA05	LA10	LA50	LA90	LA95	Lppeak	Noise Description
1	10/8/2014 17:43	1:00:00	60.6	96.2	87.4	49	64.7	59.7	53.4	51.2	50.7	119.7	Equipment Setup
2	10/8/2014 18:43	1:00:00	59.6	95.2	80.6	49.4	62.8	58.9	53.3	51.5	51	101.9	Equipment Setup
3	10/8/2014 19:43	1:00:00	58.7	94.3	69.3	50	60.3	59.9	58.6	55	53.5	98.1	Equipment Setup
4	10/8/2014 20:43	1:00:00	53.8	89.4	69.3	48.6	56.5	55.4	52.9	50.9	50.3	99.8	<55 dBA
5	10/8/2014 21:43	1:00:00	52.3	87.9	59.6	46.2	56.2	54.4	51.4	49.3	48.8	99.7	<55 dBA
6	10/8/2014 22:43	1:00:00	52.2	87.8	59.8	45.5	56	54.4	51.3	49	48.4	93.4	<55 dBA
7	10/8/2014 23:43	1:00:00	51.4	87	60.7	42.1	56.4	54	50	46.7	46	94.9	<55 dBA
8	10/9/2014 0:43	1:00:00	50.4	86	64.2	41.1	57.2	53.8	46.9	44	43.4	94.3	<55 dBA
9	10/9/2014 1:43	1:00:00	51.8	87.4	62.4	40.1	58.7	56.1	47.7	44.3	43.5	92.5	<55 dBA
10	10/9/2014 2:43	1:00:00	50.4	86	62.8	39.3	58.5	52.5	46	43.3	42.5	89.4	<55 dBA
11	10/9/2014 3:43	1:00:00	52.5	88.1	64.4	42.4	59.5	56	48.7	45.7	45	91.9	<55 dBA
12	10/9/2014 4:43	1:00:00	51.8	87.4	60.7	43.9	57.1	54.3	50.3	46.9	46.2	89.1	<55 dBA
13	10/9/2014 5:43	1:00:00	54.3	89.9	59.8	48.1	57.3	56.6	53.6	51.4	50.6	93.6	<55 dBA
14	10/9/2014 6:43	1:00:00	57.3	92.9	65	51.4	61.8	59.5	56.2	54.3	53.8	89.5	Vehicle reverse alarm
15	10/9/2014 7:43	1:00:00	58.5	94.1	69.4	53.8	61.7	60.3	57.7	56	55.5	93.2	Plane
16	10/9/2014 8:43	1:00:00	58.3	93.9	73.2	51.9	61.8	60.2	57.2	55	54.4	98	Running water nearby
17	10/9/2014 9:43	1:00:00	59.9	95.5	83.5	51.4	65.5	61.6	56.3	53.7	53.1	106	Siren/Material Dropping
18	10/9/2014 10:43	1:00:00	58.2	93.8	71.6	51.4	62.5	60.6	56.6	54.4	53.9	96.9	Material Dropping
19	10/9/2014 11:43	1:00:00	56.1	91.7	68.2	49.2	60	58.1	54.7	52.3	51.8	99.2	Material Dropping
20	10/9/2014 12:43	1:00:00	57.8	93.4	71.6	51.3	61.8	60.2	56.3	54	53.4	105.8	Material Dropping/Train
21	10/9/2014 13:43	1:00:00	61.5	97.1	85.3	50.5	63.6	60.7	56.6	53.8	53	105.4	Material Dropping
22	10/9/2014 14:43	1:00:00	57.4	93	73.8	50.4	61.2	59.4	55.7	53.8	53.1	109.1	Material Dropping
23	10/9/2014 15:43	1:00:00	63	98.6	84.1	51.4	65.4	63.3	57.6	55	54.4	105.1	Siren/Material Dropping/Train
24	10/9/2014 16:43	1:00:00	59.1	94.7	78.4	47	65.2	62.6	53.6	50.7	50	107.5	Material Dropping
25	10/9/2014 17:43	1:00:00	57.2	92.8	75.5	48.1	60.9	56.4	52.9	51.1	50.5	100.1	Material Dropping
26	10/9/2014 18:43	1:00:00	51.1	86.7	64.1	45.8	53.7	52.9	50.6	48.3	47.8	98.5	<55 dBA
27	10/9/2014 19:43	1:00:00	51.9	87.5	64.5	46.6	54.3	53.8	51.5	49	48.5	82.2	<55 dBA
28	10/9/2014 20:43	1:00:00	52.8	88.4	61.5	47	55.9	55	52.1	50	49.4	85	<55 dBA
29	10/9/2014 21:43	1:00:00	52.8	88.4	71.4	47.3	55.2	54.5	52.2	49.9	49.3	87.5	<55 dBA
30	10/9/2014 22:43	1:00:00	55.4	91	76.9	47.2	58	56.3	53.5	50.8	50.1	88.2	Running water nearby
31	10/9/2014 23:43	1:00:00	52.4	88	59.9	44.3	55.5	54.7	51.7	49	48.2	81.7	<55 dBA
32	10/10/2014 0:43	1:00:00	52.2	87.8	62.6	44.8	56	54.9	51	47.6	47.1	92.1	<55 dBA
33	10/10/2014 1:43	1:00:00	50.8	86.4	62.1	44.1	55	54	49.4	46.9	46.4	86.1	<55 dBA
34	10/10/2014 2:43	1:00:00	51.2	86.8	59.2	45	54.7	53.6	50.4	47.9	47.4	89.3	<55 dBA
35	10/10/2014 3:43	1:00:00	52.6	88.2	66	47.3	55.7	54.7	51.7	49.3	48.9	89.5	<55 dBA
36	10/10/2014 4:43	1:00:00	54.9	90.5	62.2	47.6	57.9	57.3	54.2	51.1	49.8	91.4	<55 dBA
37	10/10/2014 5:43	1:00:00	56.3	91.9	65.6	50	58.7	58.1	55.9	53.4	52.8	87.5	No sound recording
38	10/10/2014 6:43	1:00:00	57.6	93.2	65.6	51.7	60	59.5	57.4	54.6	53.9	87.8	No sound recording
39	10/10/2014 7:43	1:00:00	59.7	95.3	69.8	55.2	61.8	61.2	59.3	57.3	57	89.3	No sound recording

40	10/10/2014 8:43	1:00:00	57.6	93.2	68.1	49.6	61.6	60.7	56.5	53.8	52.6	92.5	No sound recording
41	10/10/2014 9:43	1:00:00	55.8	91.4	76.2	44.4	58.5	56.3	50.4	47.8	47.1	97.6	No sound recording
42	10/10/2014 10:43	1:00:00	50.7	86.3	66.1	45.3	54.4	53	49.4	47.3	46.8	91.2	<55 dBA
43	10/10/2014 11:43	1:00:00	63.9	99.5	85.4	40.8	70.3	52.2	46.7	43.6	43	107.1	No sound recording
44	10/10/2014 12:43	1:00:00	47	82.6	61.1	41.8	50	48.7	46.1	44	43.6	90.3	<55 dBA
45	10/10/2014 13:43	1:00:00	48.8	84.4	64	42.8	52	50.5	47.2	45.1	44.3	95.7	<55 dBA
46	10/10/2014 14:43	1:00:00	60.6	96.2	87.3	43.4	60.6	54.7	49	46.4	45.3	101.1	No sound recording
47	10/10/2014 15:43	1:00:00	50.2	85.8	65.3	44.5	53.1	51.6	48.9	47	46.5	93.1	<55 dBA
48	10/10/2014 16:43	1:00:00	49.9	85.5	66.8	41.4	54.8	51.2	47.2	44.5	43.7	94.8	<55 dBA
49	10/10/2014 17:43	1:00:00	48.4	84	70.5	41.5	50.6	48.8	46	43.7	43.3	102.2	<55 dBA
50	10/10/2014 18:43	1:00:00	49.4	85	64.1	42	53.3	51	47.3	45.1	44.5	86.7	<55 dBA
51	10/10/2014 19:43	1:00:00	49.9	85.5	63.9	43.4	53.9	51.3	48.2	46.1	45.4	95.2	<55 dBA
52	10/10/2014 20:43	1:00:00	47.5	83.1	57.6	43.5	49.8	49.3	47	45.2	44.7	87	<55 dBA
53	10/10/2014 21:43	1:00:00	47.8	83.4	61.3	43.3	50.3	49.5	47	45.2	44.8	87.2	<55 dBA
54	10/10/2014 22:43	1:00:00	49.4	85	61.4	43.7	53.2	52	48.1	45.8	45.3	92.8	<55 dBA
55	10/10/2014 23:43	1:00:00	47.6	83.2	57	42.7	50	49.3	47.1	45.2	44.8	96.9	<55 dBA
56	10/11/2014 0:43	1:00:00	49.9	85.5	73.2	41.8	54.6	53.2	47.1	44.2	43.5	93.5	<55 dBA
57	10/11/2014 1:43	1:00:00	50	85.6	70.8	41.1	50.7	48	44.8	42.9	42.5	100.5	<55 dBA
58	10/11/2014 2:43	1:00:00	49.8	85.4	63	40.8	56.5	54.1	44.6	42.4	42	96.5	<55 dBA
59	10/11/2014 3:43	1:00:00	52.5	88.1	68.9	40.6	59.5	53.3	45.6	43.1	42.6	103.6	<55 dBA
60	10/11/2014 4:43	1:00:00	52.4	88	65.1	41.3	60.8	56.7	45.5	43.1	42.7	89.2	<55 dBA
61	10/11/2014 5:43	1:00:00	50.6	86.2	66.5	41.7	56	53.7	47.6	44.8	44.2	95.1	<55 dBA
62	10/11/2014 6:43	1:00:00	50.4	86	62.2	44.6	53.8	52.3	48.8	46.7	46.2	95.9	<55 dBA
63	10/11/2014 7:43	1:00:00	51.9	87.5	62.5	45.8	54.5	53.7	51.2	49	48.6	92.6	<55 dBA
64	10/11/2014 8:43	1:00:00	51.7	87.3	59	46.9	54.6	53.9	50.9	49	48.5	94.1	<55 dBA
65	10/11/2014 9:43	1:00:00	62.4	98	89.3	45.7	58.2	53.7	50.5	48.4	47.8	101.1	Train
66	10/11/2014 10:43	1:00:00	52.3	87.9	63.7	46	55	54	51.6	49.3	48.6	106.8	<55 dBA
67	10/11/2014 11:43	1:00:00	52.3	87.9	61.9	46.6	54.6	54	51.9	50.2	49.8	112	<55 dBA
68	10/11/2014 12:43	1:00:00	53.4	89	72	46	55.8	55.2	52.8	50.8	50.2	120.2	<55 dBA
69	10/11/2014 13:43	1:00:00	59.5	95.1	81.2	47.5	57.9	55.4	52.5	50.5	49.9	113.8	
70	10/11/2014 14:43	1:00:00	53.7	89.3	66.3	47.6	56.4	55.2	52.9	51	50.4	115.8	<55 dBA
71	10/11/2014 15:43	1:00:00	60.6	96.2	85.5	47.9	63.1	57.1	52.7	50.7	50.1	120.3	Train
72	10/11/2014 16:43	1:00:00	53.1	88.7	67.1	47.7	56.6	55	52.1	50	49.4	111.6	<55 dBA
73	10/11/2014 17:43	1:00:00	51.1	86.7	62.3	46.1	53	52.4	50.7	49	48.4	108.7	<55 dBA
74	10/11/2014 18:43	1:00:00	51.8	87.4	71	45.7	53	51.5	49.7	47.9	47.4	110.5	<55 dBA
75	10/11/2014 19:43	1:00:00	50.9	86.5	64.4	46	53.6	52.1	50	48.3	47.9	111.1	<55 dBA
76	10/11/2014 20:43	1:00:00	50.4	86	58.5	45.9	52.4	51.9	50.1	48.4	48	109.5	<55 dBA
77	10/11/2014 21:43	1:00:00	50	85.6	58.5	46.1	52	51.5	49.7	47.9	47.5	108.7	<55 dBA
78	10/11/2014 22:43	1:00:00	49.2	84.8	57.8	44.7	51.3	50.7	48.9	47.3	46.8	109.7	<55 dBA
79	10/11/2014 23:43	1:00:00	47.5	83.1	56.3	42.8	49.7	49.1	47.2	45.2	44.6	105.3	<55 dBA
80	10/12/2014 0:43	1:00:00	46.3	81.9	54.7	41.2	48.9	48.2	45.7	43.9	43.3	102.1	<55 dBA
81	10/12/2014 1:43	1:00:00	45	80.6	52.7	41.3	47.2	46.5	44.7	43.2	42.8	104.8	<55 dBA

82	10/12/2014 2:43	1:00:00	44.7	80.3	54	40.8	47	46.4	44.3	42.7	42.3	110.6	<55 dBA
83	10/12/2014 3:43	1:00:00	45.2	80.8	54.6	40.5	48.3	47.4	44.4	42.3	41.9	108.3	<55 dBA
84	10/12/2014 4:43	1:00:00	46.7	82.3	67	39.9	49.2	47.2	44.1	42.2	41.9	103.7	<55 dBA
85	10/12/2014 5:43	1:00:00	49.2	84.8	64.2	39.8	54.3	53.1	46.6	42.9	42.3	108.6	<55 dBA
86	10/12/2014 6:43	1:00:00	47.6	83.2	63	41.2	50.4	48.8	45.7	43.3	42.9	101.8	<55 dBA
87	10/12/2014 7:43	1:00:00	48.8	84.4	64.6	43.6	51.9	50.3	47.5	45.4	44.9	100.7	<55 dBA
88	10/12/2014 8:43	1:00:00	50.2	85.8	62.5	44.3	53	51.7	48.8	46.8	46.3	94.8	<55 dBA
89	10/12/2014 9:43	1:00:00	52.8	88.4	76.7	45.4	53.7	51.1	49	47.1	46.6	97.5	<55 dBA
90	10/12/2014 10:43	0:30:45	53.6	86.3	70.7	44.4	58.2	54.1	49.7	47.4	46.8	107.1	<55 dBA

Location L3: Receptor Fenceline				
Row Labels	**Average of Leq 1 hr**	**Average of Lmax 1 hr**	**Average of Lmin 1 hr**	**Average of LCeq - LAeq 1 hr**
10/8/14 6:00 PM	52.4	57.4	48.7	10.9
10/8/14 7:00 PM	54.1	60.0	50.2	11.4
10/8/14 8:00 PM	53.1	57.2	50.0	11.0
10/8/14 9:00 PM	51.1	55.7	47.8	8.5
10/8/14 10:00 PM	50.1	54.8	46.8	9.1
10/8/14 11:00 PM	50.4	55.0	46.9	9.6
10/9/14 12:00 AM	47.0	52.5	43.6	11.6
10/9/14 1:00 AM	47.2	52.2	43.7	13.8
10/9/14 2:00 AM	47.6	52.4	44.0	13.1
10/9/14 3:00 AM	46.0	51.1	42.5	12.8
10/9/14 4:00 AM	47.2	51.7	44.1	11.8
10/9/14 5:00 AM	50.2	54.3	47.4	10.9
10/9/14 6:00 AM	52.7	56.0	49.8	9.0
10/9/14 7:00 AM	55.5	61.9	52.7	10.0
10/9/14 8:00 AM	55.7	63.8	52.3	10.7
10/9/14 9:00 AM	54.4	63.5	50.9	11.3
10/9/14 10:00 AM	55.3	65.3	50.5	10.3
10/9/14 11:00 AM	55.3	65.5	50.7	9.6
10/9/14 12:00 PM	53.7	63.1	49.6	10.6
10/9/14 1:00 PM	55.7	65.8	50.8	9.3
10/9/14 2:00 PM	54.6	64.5	50.2	10.7
10/9/14 3:00 PM	54.5	64.2	50.2	12.0
10/9/14 4:00 PM	58.6	67.8	52.5	11.0
10/9/14 5:00 PM	51.8	57.0	48.2	11.1
10/9/14 6:00 PM	53.2	58.3	48.7	10.2
10/9/14 7:00 PM	48.1	53.0	45.2	9.4
10/9/14 8:00 PM	50.6	54.6	48.0	8.9
10/9/14 9:00 PM	51.4	56.1	48.2	8.6
10/9/14 10:00 PM	50.7	55.3	47.1	7.6
10/9/14 11:00 PM	51.5	56.3	47.7	8.3
10/10/14 12:00 AM	49.9	55.7	45.9	10.0
10/10/14 1:00 AM	50.1	55.1	46.7	13.5
10/10/14 2:00 AM	48.6	53.5	45.1	12.9
10/10/14 3:00 AM	49.7	55.0	46.3	10.5
10/10/14 4:00 AM	51.5	56.1	48.3	8.8
10/10/14 5:00 AM	54.4	58.1	51.5	8.4
10/10/14 6:00 AM	54.2	58.0	50.7	8.0
10/10/14 7:00 AM	56.5	61.4	53.5	8.8
10/10/14 8:00 AM	57.1	63.2	54.0	9.4
10/10/14 9:00 AM	53.5	59.7	50.1	12.2
10/10/14 10:00 AM	50.0	60.2	44.3	13.4
10/10/14 11:00 AM	51.9	61.0	46.2	12.2
10/10/14 12:00 PM	46.9	56.8	42.3	15.8
10/10/14 1:00 PM	46.7	55.4	43.0	15.0
10/10/14 2:00 PM	50.4	59.9	45.2	12.9
10/10/14 3:00 PM	50.0	59.8	44.9	12.1
10/10/14 4:00 PM	49.3	58.0	45.2	11.5
10/10/14 5:00 PM	46.6	52.4	41.9	10.4
10/10/14 6:00 PM	47.0	53.7	42.3	10.4

10/10/14 7:00 PM	48.8	54.6	44.8	9.8
10/10/14 8:00 PM	47.9	52.8	44.2	10.1
10/10/14 9:00 PM	47.2	52.3	43.9	10.2
10/10/14 10:00 PM	47.6	52.6	44.2	10.6
10/10/14 11:00 PM	48.0	53.6	44.7	10.9
10/11/14 12:00 AM	47.4	52.7	43.8	11.2
10/11/14 1:00 AM	45.6	51.6	41.9	13.0
10/11/14 2:00 AM	45.8	51.2	41.5	13.4
10/11/14 3:00 AM	45.4	51.1	41.5	13.2
10/11/14 4:00 AM	45.8	51.2	41.1	14.2
10/11/14 5:00 AM	47.8	53.5	43.5	12.4
10/11/14 6:00 AM	48.9	54.2	44.7	11.9
10/11/14 7:00 AM	49.5	54.9	45.6	9.9
10/11/14 8:00 AM	51.2	56.2	47.8	9.3
10/11/14 9:00 AM	51.2	56.0	47.4	10.3
10/11/14 10:00 AM	50.4	55.8	47.3	13.6
10/11/14 11:00 AM	52.1	58.1	48.3	20.0
10/11/14 12:00 PM	52.4	58.5	48.8	21.5
10/11/14 1:00 PM	52.8	59.5	49.1	20.4
10/11/14 2:00 PM	54.1	60.6	49.4	19.6
10/11/14 3:00 PM	56.0	63.9	50.5	18.8
10/11/14 4:00 PM	53.7	59.7	49.6	18.2
10/11/14 5:00 PM	51.7	57.5	48.3	17.7
10/11/14 6:00 PM	50.4	54.8	46.9	12.5
10/11/14 7:00 PM	50.0	55.7	46.8	13.3
10/11/14 8:00 PM	50.5	55.9	46.9	14.4
10/11/14 9:00 PM	50.6	55.1	47.1	15.4
10/11/14 10:00 PM	49.7	54.2	46.3	15.3
10/11/14 11:00 PM	48.6	53.4	45.3	14.6
10/12/14 12:00 AM	46.6	51.7	43.2	13.7
10/12/14 1:00 AM	45.2	50.5	41.7	13.1
10/12/14 2:00 AM	44.5	49.5	41.0	15.1
10/12/14 3:00 AM	44.5	49.4	40.9	15.8
10/12/14 4:00 AM	44.2	49.2	40.2	16.2
10/12/14 5:00 AM	45.7	52.7	41.2	14.4
10/12/14 6:00 AM	46.0	52.0	42.2	11.9
10/12/14 7:00 AM	46.7	53.2	42.6	12.8
10/12/14 8:00 AM	47.4	52.5	44.0	13.3
10/12/14 9:00 AM	48.4	53.1	44.8	11.9
10/12/14 10:00 AM	49.4	55.1	45.4	11.4

* The noise monitoring program included audio recording and general assessment of low frequency noise near the receptor boundary. These additional parameters were gathered at monitoring location L3 on one-minute intervals.

Appendix B

Vibration Data

Date	Time	Monitoring Location ID	Operating Scenarios	Peak Vibration Velocity (RMS) (mm/s)
Fri Oct 17/2014	2:00 pm to 2:20 pm	V1	Shear loading bed, tipping bed, arms folding heavy gauge material, mobile cranes in operation, no train	0.200
Fri Oct 17/2014	2:00 pm to 2:20 pm	V1	Shear cutting heavy gauge material, mobile cranes in operation, no train	0.100
Fri Oct 17/2014	2:36 pm to 2:57 pm	V2	Shear loading bed, tipping bed, arms folding heavy gauge material, mobile cranes in operation, no train	0.080
Mon Oct 20/2014	4:16 pm to 4:36 pm	V3	Heavy operations, shearing and mobile cranes in operation, no train	0.010 - 0.030
Mon Oct 20/2014	4:25 pm to 4:45 pm	V4	Heavy operations, shearing and mobile cranes in operation, some road traffic, no train	0.030 - 0.060
Mon Oct 20/2014	4:32 pm to 4:42 pm	V4	No operations, no train, some road traffic	0.004 - 0.009
Mon Oct 20/2014	4:45 pm to 4:55 pm	V3	No operations, no train	0.010 - 0.030
Mon Oct 20/2014	5:17 pm to 5:40 pm	V2	No operations, no train	0.005 - 0.030
Tues Oct 21/2014	2:28 pm to 2:50 pm	V2	Heavy operations, shearing and mobile cranes in operation, no train	0.050 - 0.070
Tues Oct 21/2014	3:08 pm to 3:09 pm	V2	Heavy operations, shearing and mobile cranes in operation, train pass-by on CP line	0.250

Appendix C

Air Quality Data

DILLON CONSULTING

Sample ID	Sample Date (2014)	Particulate Catch	Sample Volume	Particulate Concentration
		(mg)	(m3)	(ug/m3)
A-MP2-1 14090529	Oct. 8th - 9th	0.8	39.7	20
A-MP3-1 14090528	Oct. 8th - 9th	<0.3	10.4	<29
A-MP1-2 14090530	Oct. 9th - 10th	<0.3	14.9	<20
A-MP2-2 14090531	Oct. 9th - 10th	<0.3	28.8	<10
A-MP3-2 14090532	Oct. 9th - 10th	3.3	26.9	123
A-MP1-3 14090533	Oct. 10th - 12th	<0.3	8.4	<36
A-MP2-3 14090534	Oct. 10th - 12th	0.6	50.5	12
AAQC Maximum Acceptable Level Concentration (ug/m3)				120
AAQC Maximum Desirable Level Concentration (ug/m3)				60
2012 Annual Pollutant Summary - PM10 - Annual Average (ug/m3)				14.9
2012 Annual Pollutant Summary - PM10 - 24-hr Maximum (ug/m3)				77.1

Sample ID	Sample Date	Particulate Concentration	Sample Volume	Metals Concentrations					
				Arsenic	Cadmium	Copper	Lead	Nickel	Zinc
		(ug/m3)	(m3)	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)	(ug/m3)
A-MP1-2 14090530	10/10/2014	<20	14.9	0.003	0.0009	0.195	0.051	0.056	0.289
A-MP2-2 14090531	10/10/2014	<10	28.8	0.002	0.0007	0.285	0.035	0.012	0.094
A-MP3-2 14090532	10/10/2014	123	26.9	0.025	0.0048	0.520	0.163	0.178	0.780
A-MP2-3 14090534	10/12/2014	12	50.5	0.001	0.0003	0.081	0.005	0.010	0.034
			Average:	0.008	0.002	0.270	0.063	0.064	0.299
			AAQC Maximum Acceptable Level Concentration (ug/m3):	0.3	2	50	2.0	2	120

Urbanmine Inc.
14-1071

Calculation - Emissions from Mobile Combustion Units - Nonroad

Based on guidance provided by USEPA Exhaust and Crankcase Emission Factors for Non-Road Engine Modeling Compression-Ignition (2010).

Emission Factors

Zero-hour, steady-state emission factors for non-road CI Engines (US EPA, 2010, Table A4)

Engine Power (hp)	BSFC (lb/hp-hr)	Emission Factor (g/hp-hr)	Emission Factor (g/hp-hr)
		HC - Tier 2 Technology Type	HC - Tier 3 Technology Type
>0 to 11	0.408	0.5508	-
>11 to 16	0.408	0.4380	-
>16 to 25	0.408	0.4380	-
>25 to 50	0.408	0.2789	-
>50 to 75	0.408	0.3672	-
>75 to 100	0.408	0.3672	0.1836
>100 to 175	0.367	0.3384	0.1836
>175 to 300	0.367	0.3085	0.1836
>300 to 600	0.367	0.1669	0.1669
>600 to 750	0.367	0.1669	0.1669
>750 except generator sets	0.367	0.1669	-
Gen sets >750 to 1200	0.367	0.1669	-
Gen sets >1200	0.367	0.1669	-

Transient Adjustment Factors by Equipment type for nonroad CI equipment (US EPA, 2010, Table A5)

Equipment Type	Cycle	TAF Assignment	HC (unitless)
Excavator	Excavator	Hi LF	1.05
Cranes	None	None	1.00
Off-highway Trucks	Crawler	Hi LF	1.05
Off-highway Tractors	Crawler	Hi LF	1.05
Rubber Tire Loader	RTLoader	HI LF	1.05
Rubber Tire Dozer	Crawler	Hi LF	1.05
Tractors/Loaders/Backhoes	Backhoe	Lo LF	2.29
Other Construction Eqmt.	Crawler	Hi LF	1.05
Crushing/Proc. Equipment	None	None	1.00
Skid Steer Loader	SSLoader	Lo LF	2.29
Other General Industrial Equipment	None	None	1.00

Deterioration Factors for Nonroad Diesel Engines (US EPA, 2010, Table A6)

Pollutant	Tier 2 Relative Deterioration Factor (A) (%increase/%useful life)	Tier 3 Relative Deterioration Factor (A) (%increase/%useful life)
HC	0.034	0.027

Urbanmine Inc.
14-1071

Calculation - Emissions from Mobile Combustion Units - Nonroad

Nonroad Equipment

$$EF_{adj\ (HC\ ,CO\ ,NOx\ )} = EF_{ss} \times TAF \times DF \qquad \text{[Equation 1]}$$

where:
EF_{adj} = final emission factor used in model, after adjustments to account for transient operation and deterioration (g/hp-hr)
EF_{ss} = zero-hour, steady-state emission factor (g/hp-hr)
TAF = transient adjustment factor (unitless)
DF = deterioration factor (unitless)

Equipment Type	Power Rating (hp)	HC Emission Factor (g/hp-hr)	HC Emission Rate (g/s)
Maximum Operations			
934A Liebherr Crane	204	0.319	0.018
934A Liebherr Crane	204	0.319	0.018
924A Liebherr Crane	184	0.319	0.016
Volvo L90 Loader	175	0.730	0.036
780E Gehl skidsteer	99	0.869	0.024
E-Z Crusher logger/baler	300	0.335	0.028
Hitachi 270 mobile shear, Genesis Head	173	0.367	0.018
Overbilt car crusher	150	0.350	0.015
Propane forklift	48	0.288	0.004
Propane forklift	48	0.288	0.004
Propane forklift	48	0.288	0.004
		Total:	**0.184**

Notes:
(1) Based on the use of Tier 2 engines.
(2) Assumes a benzene mass fraction of HC of 0.02.
(3) T750SL Sierra Shear used at the site is electric powered.
(4) One forklift used at the site is electric powered.

Load Factor

Equipment Type	Power Rating (hp)	HC Emission Factor (g/hp-hr)	HC Emission Rate (g/s)
934A Liebherr Crane	204	0.319	0.010
934A Liebherr Crane	204	0.319	0.010
924A Liebherr Crane	184	0.319	0.009
Volvo L90 Loader	175	0.730	0.020
780E Gehl skidsteer	99	0.869	0.013
E-Z Crusher logger/baler	300	0.335	0.015
Hitachi 270 mobile shear, Genesis Head	173	0.367	0.010
Overbilt car crusher	150	0.350	0.008
Propane forklift	48	0.288	0.002
Propane forklift	48	0.288	0.002
Propane forklift	48	0.288	0.002
		Total:	**0.101**

Note:
(1) Assumes that equipment operates at full load for 50% of the time, and 10% load (idle) for 50% of the time.

Urbanmine Inc.
14-1071

Calculation - Scrap Vehicle Fluid Extraction

AP-42 Chapter 7: Organic Liquid Storage Tanks

7.1.3.1.2 Working Loss

The working loss, L_W, refers to the loss of stock vapors as a result of tank filling or emptying operations. Fixed roof tank working losses can be estimated from:

$$L_W = 0.0010\, M_V\, P_{VA}\, Q\, K_N\, K_P \qquad (1\text{-}29)$$

where:

L_W = working loss, lb/yr
M_V = vapor molecular weight, lb/lb-mole; see Note 1 to Equation 1-21
P_{VA} = vapor pressure at daily average liquid surface temperature, psia; see Notes 1 and 2 to Equation 1-21
Q = annual net throughput (tank capacity [bbl] times annual turnover rate), bbl/yr
K_N = working loss turnover (saturation) factor, dimensionless; see Figure 7.1-18
for turnovers >36, $K_N = (180 + N)/6N$
for turnovers ≤36, $K_N = 1$

N = number of turnovers per year, dimensionless

$$N = \frac{5.614\, Q}{V_{LX}} \qquad (1\text{-}30)$$

where:

V_{LX} = tank maximum liquid volume, ft^3

Total fuel transfer to tank per year: 100,000 litres

From Eqn. 1-29:

Lw = 0.0010 MvPvaQKnKp

Mv =	68	lb/lb-mol (Gasoline RVP 7 at 60oF from Table 7.1-2)
Pva =	3.5	psi (at 60oF from Table 7.1-2)
Q =	838.7	bbl/yr
		(annual net throughput) (litres x 0.26418 USG/L x 0.031746 bbls/USG)
Kn =	1	assume less than 36 turnovers per year
Kp =	1	for all organic liquids except crude oil
Lw =	200	lb/yr
	91	kg/yr
	0.0029	g/s

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 13043 ***

Urbanmine

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	VOLUME
EMISSION RATE (G/S)	=	1.000000
SOURCE HEIGHT (M)	=	4.0000
INIT. LATERAL DIMEN (M)	=	21.8000
INIT. VERTICAL DIMEN (M)	=	0.9300
RECEPTOR HEIGHT (M)	=	0.0000
URBAN/RURAL OPTION	=	URBAN

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = 0.000 M**4/S**3; MOM. FLUX = 0.000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
50.	1754.	5	1.0	1.0	10000.0	4.00	26.84	4.72	NO
100.	1077.	5	1.0	1.0	10000.0	4.00	31.79	8.27	NO
200.	501.7	5	1.0	1.0	10000.0	4.00	41.44	14.76	NO
300.	298.8	5	1.0	1.0	10000.0	4.00	50.78	20.59	NO
400.	203.0	5	1.0	1.0	10000.0	4.00	59.82	25.90	NO
500.	149.4	5	1.0	1.0	10000.0	4.00	68.59	30.79	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 50. M:

50.	1754.	5	1.0	1.0	10000.0	4.00	26.84	4.72	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
25.	0.000	0	0.0	0.0	0.0	0.00	0.00	0.00	
50.	1754.	5	1.0	1.0	10000.0	4.00	26.84	4.72	NO
75.	1378.	5	1.0	1.0	10000.0	4.00	29.33	6.53	NO
100.	1077.	5	1.0	1.0	10000.0	4.00	31.79	8.27	NO
125.	860.9	5	1.0	1.0	10000.0	4.00	34.23	9.96	NO
150.	705.0	5	1.0	1.0	10000.0	4.00	36.66	11.61	NO
175.	589.6	5	1.0	1.0	10000.0	4.00	39.06	13.20	NO
200.	501.7	5	1.0	1.0	10000.0	4.00	41.44	14.76	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
* SUMMARY OF TERRAIN HEIGHTS ENTERED FOR *
* SIMPLE ELEVATED TERRAIN PROCEDURE *
****

TERRAIN HT (M)	DISTANCE RANGE (M) MINIMUM	MAXIMUM
0.	50.	500.
0.	25.	--
0.	50.	--
0.	75.	--
0.	100.	--
0.	125.	--
0.	150.	--
0.	175.	--
0.	200.	--

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	1754.	50.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

Appendix D

Maxxam Certificate of Analysis

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your Project #: 14-1071-3000
Site Location: TAPPER CUDDY - ENV SER
Your C.O.C. #: 10445

Attention:Clement Lam

Dillon Consulting Limited
1558 WILLSON PLACE
Winnipeg, MB
CANADA R3T 0Y4

Report Date: 2014/10/31
Report #: R3207334
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4J3703
Received: 2014/10/17, 10:25

Sample Matrix: Filter
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Total Metals on Small Filter (6020mod)	5	2014/10/28	2014/10/29	BRL SOP-00103 / BRL SOP-00102	EPA 6020 m
Particulates/Filter (M5/315/NJATM1/M201)	10	N/A	2014/10/28	BRL SOP-00109	EPA 5/315/NJATM1 m

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International. is a NELAC accredited laboratory. Certificate # CANA001. Use of the NELAC logo however does not insure that Maxxam is accredited for all of the methods indicated. This certificate shall not be reproduced except in full, without the written approval of Maxxam Analytics Inc.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4J3703
Report Date: 2014/10/31

Dillon Consulting Limited
Client Project #: 14-1071-3000
Site Location: TAPPER CUDDY - ENV SER

RESULTS OF ANALYSES OF FILTER

Maxxam ID		YA7427	YA7428	YA7429	YA7430		
Sampling Date		2014/10/09 13:53	2014/10/09 13:48	2014/10/09 13:38	2014/10/10 14:46		
COC Number		10445	10445	10445	10445		
	Units	**A-MP1-1 14090526**	**A-MP2-1 14090529**	**A-MP3-1 14090528**	**A-MP1-2 14090530**	**RDL**	**QC Batch**
Front Half Particulate Weight on Filter	mg	<0.30	0.80	<0.30	<0.30	0.30	3792516

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		YA7431	YA7432	YA7433	YA7434		
Sampling Date		2014/10/10 14:47	2014/10/10 14:55	2014/10/12 10:01	2014/10/12 09:52		
COC Number		10445	10445	10445	10445		
	Units	**A-MP2-2 14090531**	**A-MP3-2 14090532**	**A-MP1-3 14090533**	**A-MP2-3 14090534**	**RDL**	**QC Batch**
Front Half Particulate Weight on Filter	mg	<0.30	3.30	<0.30	0.60	0.30	3792516

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		YA7435	YA7436		
Sampling Date		2014/10/12 09:41	2014/10/09 16:00		
COC Number		10445	10445		
	Units	**A-MP3-3 14090535**	**A-BLANK 14090536**	**RDL**	**QC Batch**
Front Half Particulate Weight on Filter	mg	0.80	<0.30	0.30	3792516

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4J3703
Report Date: 2014/10/31

Dillon Consulting Limited
Client Project #: 14-1071-3000
Site Location: TAPPER CUDDY - ENV SER

ELEMENTS BY ATOMIC SPECTROSCOPY (FILTER)

Maxxam ID		YA7430	YA7431	YA7432	YA7434		
Sampling Date		2014/10/10 14:46	2014/10/10 14:47	2014/10/10 14:55	2014/10/12 09:52		
COC Number		10445	10445	10445	10445		
	Units	**A-MP1-2 14090530**	**A-MP2-2 14090531**	**A-MP3-2 14090532**	**A-MP2-3 14090534**	**RDL**	**QC Batch**
Total Aluminum (Al)	ug	12	19	42	15	2.0	3802244
Total Antimony (Sb)	ug	0.077	0.090	0.27	<0.050	0.050	3802244
Total Arsenic (As)	ug	<0.050	<0.050	0.68	<0.050	0.050	3802244
Total Barium (Ba)	ug	0.55	0.88	1.9	0.67	0.050	3802244
Total Beryllium (Be)	ug	<0.030	<0.030	<0.030	<0.030	0.030	3802244
Total Bismuth (Bi)	ug	<0.050	<0.050	<0.050	<0.050	0.050	3802244
Total Boron (B)	ug	<1.0	<1.0	<1.0	<1.0	1.0	3802244
Total Cadmium (Cd)	ug	0.013	0.020	0.13	0.013	0.010	3802244
Total Calcium (Ca)	ug	120	270	460	190	5.0	3802244
Total Chromium (Cr)	ug	0.89	0.44	4.5	0.74	0.050	3802244
Total Cobalt (Co)	ug	<0.030	<0.030	0.14	<0.030	0.030	3802244
Total Copper (Cu)	ug	2.9	8.2	14	4.1	0.030	3802244
Total Iron (Fe)	ug	65	47	280	36	5.0	3802244
Total Lead (Pb)	ug	0.76	1.0	4.4	0.24	0.030	3802244
Total Magnesium (Mg)	ug	47	110	180	62	1.0	3802244
Total Manganese (Mn)	ug	1.9	2.2	7.6	4.2	0.050	3802244
Total Molybdenum (Mo)	ug	0.096	0.043	0.34	<0.030	0.030	3802244
Total Nickel (Ni)	ug	0.83	0.34	4.8	0.51	0.050	3802244
Total Potassium (K)	ug	5.9	7.4	11	16	5.0	3802244
Total Selenium (Se)	ug	<0.10	<0.10	<0.10	<0.10	0.10	3802244
Total Silver (Ag)	ug	0.051	0.14	0.25	0.042	0.010	3802244
Total Sodium (Na)	ug	11	7.3	9.0	53	5.0	3802244
Total Strontium (Sr)	ug	0.14	0.25	0.54	0.19	0.050	3802244
Total Thallium (Tl)	ug	<0.010	<0.010	<0.010	<0.010	0.010	3802244
Total Tin (Sn)	ug	0.10	0.13	0.62	0.049	0.030	3802244
Total Titanium (Ti)	ug	0.56	0.76	1.5	0.57	0.10	3802244
Total Uranium (U)	ug	<0.010	<0.010	<0.010	<0.010	0.010	3802244
Total Vanadium (V)	ug	0.047	0.072	0.18	0.052	0.030	3802244
Total Zinc (Zn)	ug	4.3	2.7	21	1.7	0.50	3802244

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4J3703
Report Date: 2014/10/31

Dillon Consulting Limited
Client Project #: 14-1071-3000
Site Location: TAPPER CUDDY - ENV SER

ELEMENTS BY ATOMIC SPECTROSCOPY (FILTER)

Maxxam ID		YA7436		
Sampling Date		2014/10/09 16:00		
COC Number		10445		
	Units	**A-BLANK 14090536**	**RDL**	**QC Batch**
Total Aluminum (Al)	ug	<2.0	2.0	3802244
Total Antimony (Sb)	ug	<0.050	0.050	3802244
Total Arsenic (As)	ug	<0.050	0.050	3802244
Total Barium (Ba)	ug	0.097	0.050	3802244
Total Beryllium (Be)	ug	<0.030	0.030	3802244
Total Bismuth (Bi)	ug	<0.050	0.050	3802244
Total Boron (B)	ug	<1.0	1.0	3802244
Total Cadmium (Cd)	ug	<0.010	0.010	3802244
Total Calcium (Ca)	ug	7.5	5.0	3802244
Total Chromium (Cr)	ug	<0.050	0.050	3802244
Total Cobalt (Co)	ug	<0.030	0.030	3802244
Total Copper (Cu)	ug	0.049	0.030	3802244
Total Iron (Fe)	ug	<5.0	5.0	3802244
Total Lead (Pb)	ug	<0.030	0.030	3802244
Total Magnesium (Mg)	ug	<1.0	1.0	3802244
Total Manganese (Mn)	ug	0.16	0.050	3802244
Total Molybdenum (Mo)	ug	<0.030	0.030	3802244
Total Nickel (Ni)	ug	<0.050	0.050	3802244
Total Potassium (K)	ug	<5.0	5.0	3802244
Total Selenium (Se)	ug	<0.10	0.10	3802244
Total Silver (Ag)	ug	<0.010	0.010	3802244
Total Sodium (Na)	ug	<5.0	5.0	3802244
Total Strontium (Sr)	ug	<0.050	0.050	3802244
Total Thallium (Tl)	ug	<0.010	0.010	3802244
Total Tin (Sn)	ug	<0.030	0.030	3802244
Total Titanium (Ti)	ug	<0.10	0.10	3802244
Total Uranium (U)	ug	<0.010	0.010	3802244
Total Vanadium (V)	ug	<0.030	0.030	3802244
Total Zinc (Zn)	ug	<0.50	0.50	3802244

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4J3703
Report Date: 2014/10/31

Dillon Consulting Limited
Client Project #: 14-1071-3000
Site Location: TAPPER CUDDY - ENV SER

GENERAL COMMENTS

RESULTS OF ANALYSES OF FILTER

Particulates/Filter (M5/315/NJATM1/M201): Negative results observed, see comments below

Maxxam #	Filter Condition
YA7427-01R	*DE**LFT*
YA7428-01R	*LFT*
YA7429-01R	*DE**LFT*
YA7430-01R	*DE**LFT*
YA7431-01R	*DE**LFT*
YA7432-01R	*LFT*
YA7433-01R	*DE**LFT*
YA7434-01R	*DE**LFT*FT*
YA7435-01R	*DE**LFT*
YA7436-01R	Normal

Normal Filters received in normal condition
LFT Loose filter material in the petri dish
DE Edges of the filter are frayed
FT Filter torn

ELEMENTS BY ATOMIC SPECTROSCOPY (FILTER)

Total Metals on Small Filter (6020mod): Post digestion duplicate and spike was done on sample YA7430.

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4J3703
Report Date: 2014/10/31

Dillon Consulting Limited
Client Project #: 14-1071-3000
Site Location: TAPPER CUDDY - ENV SER

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
3802244	N_R	Matrix Spike [YA7430-01]	Total Aluminum (Al)	2014/10/29		96	%	70 - 130
			Total Antimony (Sb)	2014/10/29		98	%	70 - 130
			Total Arsenic (As)	2014/10/29		97	%	70 - 130
			Total Barium (Ba)	2014/10/29		97	%	70 - 130
			Total Beryllium (Be)	2014/10/29		94	%	70 - 130
			Total Bismuth (Bi)	2014/10/29		100	%	70 - 130
			Total Boron (B)	2014/10/29		93	%	70 - 130
			Total Cadmium (Cd)	2014/10/29		99	%	70 - 130
			Total Calcium (Ca)	2014/10/29		105	%	70 - 130
			Total Chromium (Cr)	2014/10/29		100	%	70 - 130
			Total Cobalt (Co)	2014/10/29		102	%	70 - 130
			Total Copper (Cu)	2014/10/29		100	%	70 - 130
			Total Iron (Fe)	2014/10/29		102	%	70 - 130
			Total Lead (Pb)	2014/10/29		100	%	70 - 130
			Total Magnesium (Mg)	2014/10/29		106	%	70 - 130
			Total Manganese (Mn)	2014/10/29		102	%	70 - 130
			Total Molybdenum (Mo)	2014/10/29		99	%	70 - 130
			Total Nickel (Ni)	2014/10/29		100	%	70 - 130
			Total Potassium (K)	2014/10/29		96	%	70 - 130
			Total Selenium (Se)	2014/10/29		94	%	70 - 130
			Total Silver (Ag)	2014/10/29		99	%	70 - 130
			Total Sodium (Na)	2014/10/29		96	%	70 - 130
			Total Strontium (Sr)	2014/10/29		101	%	70 - 130
			Total Thallium (Tl)	2014/10/29		102	%	70 - 130
			Total Tin (Sn)	2014/10/29		98	%	70 - 130
			Total Titanium (Ti)	2014/10/29		99	%	70 - 130
			Total Uranium (U)	2014/10/29		99	%	70 - 130
			Total Vanadium (V)	2014/10/29		101	%	70 - 130
			Total Zinc (Zn)	2014/10/29		96	%	70 - 130
3802244	N_R	Spiked Blank	Total Aluminum (Al)	2014/10/29		106	%	85 - 115
			Total Antimony (Sb)	2014/10/29		98	%	85 - 115
			Total Arsenic (As)	2014/10/29		99	%	85 - 115
			Total Barium (Ba)	2014/10/29		97	%	85 - 115
			Total Beryllium (Be)	2014/10/29		98	%	85 - 115
			Total Bismuth (Bi)	2014/10/29		104	%	85 - 115
			Total Boron (B)	2014/10/29		97	%	85 - 115
			Total Cadmium (Cd)	2014/10/29		100	%	85 - 115
			Total Calcium (Ca)	2014/10/29		106	%	85 - 115
			Total Chromium (Cr)	2014/10/29		101	%	85 - 115
			Total Cobalt (Co)	2014/10/29		103	%	85 - 115
			Total Copper (Cu)	2014/10/29		99	%	85 - 115
			Total Iron (Fe)	2014/10/29		104	%	85 - 115
			Total Lead (Pb)	2014/10/29		102	%	85 - 115
			Total Magnesium (Mg)	2014/10/29		108	%	85 - 115
			Total Manganese (Mn)	2014/10/29		105	%	85 - 115
			Total Molybdenum (Mo)	2014/10/29		99	%	85 - 115
			Total Nickel (Ni)	2014/10/29		99	%	85 - 115
			Total Potassium (K)	2014/10/29		99	%	85 - 115
			Total Selenium (Se)	2014/10/29		96	%	85 - 115
			Total Silver (Ag)	2014/10/29		101	%	85 - 115
			Total Sodium (Na)	2014/10/29		96	%	85 - 115
			Total Strontium (Sr)	2014/10/29		100	%	85 - 115
			Total Thallium (Tl)	2014/10/29		102	%	85 - 115

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4J3703
Report Date: 2014/10/31

Dillon Consulting Limited
Client Project #: 14-1071-3000
Site Location: TAPPER CUDDY - ENV SER

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Total Tin (Sn)	2014/10/29		99	%	85 - 115
			Total Titanium (Ti)	2014/10/29		101	%	85 - 115
			Total Uranium (U)	2014/10/29		101	%	85 - 115
			Total Vanadium (V)	2014/10/29		104	%	85 - 115
			Total Zinc (Zn)	2014/10/29		100	%	85 - 115
3802244	N_R	RPD	Total Aluminum (Al)	2014/10/29	0.049		%	20
			Total Antimony (Sb)	2014/10/29	2.5		%	20
			Total Arsenic (As)	2014/10/29	0.60		%	20
			Total Barium (Ba)	2014/10/29	3.6		%	20
			Total Beryllium (Be)	2014/10/29	1.2		%	20
			Total Bismuth (Bi)	2014/10/29	0.10		%	20
			Total Boron (B)	2014/10/29	3.1		%	20
			Total Cadmium (Cd)	2014/10/29	0.52		%	20
			Total Calcium (Ca)	2014/10/29	1.3		%	20
			Total Chromium (Cr)	2014/10/29	2.3		%	20
			Total Cobalt (Co)	2014/10/29	0.40		%	20
			Total Copper (Cu)	2014/10/29	0.98		%	20
			Total Iron (Fe)	2014/10/29	0.57		%	20
			Total Lead (Pb)	2014/10/29	0.46		%	20
			Total Magnesium (Mg)	2014/10/29	0.27		%	20
			Total Manganese (Mn)	2014/10/29	1.4		%	20
			Total Molybdenum (Mo)	2014/10/29	1.1		%	20
			Total Nickel (Ni)	2014/10/29	0.030		%	20
			Total Potassium (K)	2014/10/29	1.0		%	20
			Total Selenium (Se)	2014/10/29	0.044		%	20
			Total Silver (Ag)	2014/10/29	1.4		%	20
			Total Sodium (Na)	2014/10/29	1.0		%	20
			Total Strontium (Sr)	2014/10/29	1.4		%	20
			Total Thallium (Tl)	2014/10/29	0.20		%	20
			Total Tin (Sn)	2014/10/29	2.3		%	20
			Total Titanium (Ti)	2014/10/29	0.31		%	20
			Total Uranium (U)	2014/10/29	0.23		%	20
			Total Vanadium (V)	2014/10/29	1.1		%	20
			Total Zinc (Zn)	2014/10/29	0.14		%	20
3802244	N_R	Method Blank	Total Aluminum (Al)	2014/10/29	<2.0		ug	
			Total Antimony (Sb)	2014/10/29	<0.050		ug	
			Total Arsenic (As)	2014/10/29	<0.050		ug	
			Total Barium (Ba)	2014/10/29	<0.050		ug	
			Total Beryllium (Be)	2014/10/29	<0.030		ug	
			Total Bismuth (Bi)	2014/10/29	<0.050		ug	
			Total Boron (B)	2014/10/29	<1.0		ug	
			Total Cadmium (Cd)	2014/10/29	<0.010		ug	
			Total Calcium (Ca)	2014/10/29	<5.0		ug	
			Total Chromium (Cr)	2014/10/29	<0.050		ug	
			Total Cobalt (Co)	2014/10/29	<0.030		ug	
			Total Copper (Cu)	2014/10/29	<0.030		ug	
			Total Iron (Fe)	2014/10/29	<5.0		ug	
			Total Lead (Pb)	2014/10/29	<0.030		ug	
			Total Magnesium (Mg)	2014/10/29	<1.0		ug	
			Total Manganese (Mn)	2014/10/29	<0.050		ug	
			Total Molybdenum (Mo)	2014/10/29	<0.030		ug	
			Total Nickel (Ni)	2014/10/29	<0.050		ug	
			Total Potassium (K)	2014/10/29	<5.0		ug	

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4J3703
Report Date: 2014/10/31

Dillon Consulting Limited
Client Project #: 14-1071-3000
Site Location: TAPPER CUDDY - ENV SER

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Total Selenium (Se)	2014/10/29	<0.10		ug	
			Total Silver (Ag)	2014/10/29	<0.010		ug	
			Total Sodium (Na)	2014/10/29	<5.0		ug	
			Total Strontium (Sr)	2014/10/29	<0.050		ug	
			Total Thallium (Tl)	2014/10/29	<0.010		ug	
			Total Tin (Sn)	2014/10/29	<0.030		ug	
			Total Titanium (Ti)	2014/10/29	<0.10		ug	
			Total Uranium (U)	2014/10/29	<0.010		ug	
			Total Vanadium (V)	2014/10/29	<0.030		ug	
			Total Zinc (Zn)	2014/10/29	<0.50		ug	
3802244	N_R	RPD [YA7430-01]	Total Aluminum (Al)	2014/10/29	1.1		%	20
			Total Antimony (Sb)	2014/10/29	NC		%	20
			Total Arsenic (As)	2014/10/29	NC		%	20
			Total Barium (Ba)	2014/10/29	1.1		%	20
			Total Beryllium (Be)	2014/10/29	NC		%	20
			Total Bismuth (Bi)	2014/10/29	NC		%	20
			Total Boron (B)	2014/10/29	NC		%	20
			Total Cadmium (Cd)	2014/10/29	NC		%	20
			Total Calcium (Ca)	2014/10/29	4.2		%	20
			Total Chromium (Cr)	2014/10/29	0.70		%	20
			Total Cobalt (Co)	2014/10/29	NC		%	20
			Total Copper (Cu)	2014/10/29	1.2		%	20
			Total Iron (Fe)	2014/10/29	2.1		%	20
			Total Lead (Pb)	2014/10/29	2.6		%	20
			Total Magnesium (Mg)	2014/10/29	2.8		%	20
			Total Manganese (Mn)	2014/10/29	5.4		%	20
			Total Molybdenum (Mo)	2014/10/29	NC		%	20
			Total Nickel (Ni)	2014/10/29	2.4		%	20
			Total Potassium (K)	2014/10/29	NC		%	20
			Total Selenium (Se)	2014/10/29	NC		%	20
			Total Silver (Ag)	2014/10/29	NC		%	20
			Total Sodium (Na)	2014/10/29	NC		%	20
			Total Strontium (Sr)	2014/10/29	NC		%	20
			Total Thallium (Tl)	2014/10/29	NC		%	20
			Total Tin (Sn)	2014/10/29	NC		%	20
			Total Titanium (Ti)	2014/10/29	3.8		%	20
			Total Uranium (U)	2014/10/29	NC		%	20
			Total Vanadium (V)	2014/10/29	NC		%	20
			Total Zinc (Zn)	2014/10/29	1.4		%	20

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 (one or both samples < 5x RDL).

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Chain of Custody Form - AIR

10445

Maxxam
6740 Campobello Rd
Mississauga Ontario ,L5N 2L8
www.maxxamanalytics.com
Toll Free: 1-800-668-0639
Phone: (905) 817-5700
Fax: (905) 817-5777

CLIENT INFORMATION

Company Name: DILLON CONSULTING LIMITED
Project Manager: CLEMENT LAM / Dennis Heinrichs
e-mail: clam@dillon.ca / dheinrichs@dillon.ca
Address: 1558 WILLSON PLACE, WPG, MB R3T 0Y4
Phone: (204) 453-2301 Fax: (204) 452-4412
Sampled by: CKL/STC

SECTION

ANALYSIS REQUESTED

Field Sample ID	Total Volume Sampled (h)	(L/min) Flow Rate	Collection Date	Sample Collection Time	Total Suspended Particles (TSP)	Full List Metals Scan
A-MP1-1 14090526	1:37	30	Oct 9/14	1:53 pm	X	
A-MP2-1 14090529	22:03	30	↓	1:48 pm	X	
A-MP3-1 14090528	5:47	30	↓	1:38 pm	X	
A-MP1-2 14090530	12:25	20	Oct 10/14	2:46 pm	X	X
A-MP2-2 14090531	24:00	20	↓	2:47 pm	X	X
A-MP3-2 14090532	22:26	20	↓	2:55 pm	X	X
A-MP1-3 14090533	7:01	20	Oct 11/14	10:01 am	X	
A-MP2-3 14090534	42:07	20	↓	9:52 am	X	X
A-MP3-3 14090535	1:29	20	↓	9:41 am	X	
A-BLANK 14090536	—	—	Oct 9/14	4:00 pm	X	X

TAT Requirement

STD 10 Business day ☒
Rush 5 Business day * ☐
Rush 2 Business day * ☐
* need approval from Maxxam

PROJECT INFORMATION

Project #: 14-1071-3000
Name: TAPPER CUDDY - ENV. SER.
PO #:
Maxxam Quote #:
Maxxam Contact: Petro Oh

REPORTING REQUIREMENTS

Summary Report only ☒
EDD ☐
Regulation

Notes

PROJECT SPECIFIC COMMENTS

Client Signature:
Affiliation: Dillon Consulting Limited
Date/Time:

Received by:
Affiliation:
Date/Time:

Dillon	B4H6702	Pall		14090526	0.09410
	XR8615-01	47mm Quartz		14090527	0.09540
		p/n 7202		14090528	0.11105
		lot# 57628		14090529	0.10885
				14090530	0.10675
				14090531	0.10570
				14090532	0.11315
				14090533	0.10860
				14090534	0.11205
				14090535	0.10980
				14090536	0.11120
				14090537	0.10845
				14090538	0.11465
				14090539	0.09125
				14090540	0.10920

Appendix E

Noise Guidelines

DILLON CONSULTING

PROVINCE OF MANITOBA ENVIRONMENT
Box 7, Bldg. 2, 139 Tuxedo Ave.
Winnipeg, Manitoba R3N 0H6

GUIDELINES FOR SOUND POLLUTION

PREPARED BY

ENVIRONMENTAL MANAGEMENT DIVISION

PURPOSE:

The purpose of these objectives is to provide information, in the form of Environmental Sound Level Objectives, for the evaluation or assessment of sound (noise) in the outdoor environment. These objectives, as well as providing a planning tool for industry, consultants and planners, also provide a framework for noise pollution control activities under the Clean Environment Act. It is important to note, however, that the following are objectives and not strict standards, and as such recommendations made to the Clean Environment Commission for site assessments may vary from time to time as consideration is given to such factors as existing background levels, technological practicability, social attitudes and economics, in order to eventually reach the limits set out in the objectives.

CRITERIA:

The sound level objectives of this guideline are based on the following criteria.

Maximum Desirable Level (Residential and Commercial Areas) - This level defines the long term goal and represents the existing noise level in many quiet urban and suburban areas. This level has been identified by the United States Environmental Protection Agency as requisite to protect the public health and welfare with an adequate margin of safety. At this level, less than 1% of households would be expected to complain, although 17% of the people may respond as highly annoyed when questioned in a social survey. No reaction would be expected in the average community, and noise would be the least important factor in attitude towards neighborhood.

Maximum Acceptable Level (Residential Areas) - This level is intended to provide adequate protection against effects on personal comfort and well being. At this level, less than 2% of households would be expected to complain, although up to 23% of the people may respond as highly annoyed when questioned. Some community reaction (sporadic complaints) would be expected in the average community, and noise would be a minor factor in attitude towards neighborhood. This level is at least 10 decibels below the level requisite to protect against noise induced hearing loss. This level provides an adequate acoustical environment for speech communication, indoors and outside.

. . . /2

Maximum Acceptable Level (Commercial and Industrial Areas) - This level is intended to provide adequate protection against noise-induced hearing loss. The level identified is designed to protect virtually the entire population (greater than 96%) from suffering detectable hearing loss (5 dB at 4,000 Hz).

Where sound levels exceed these "maximum acceptable levels," the sound level is considered to be excessive, and follow-up action under the Clean Environment Act may be warranted, depending on a variety of factors.

Maximum Tolerable Levels (All Areas) - Prolonged exposure to sound levels of this magnitude are believed to pose a serious threat to health and welfare, requiring immediate abatement action to stop or reduce sound emissions to acceptable levels. Where it is in the public interest to continue such operations and practical means of reducing sound emissions are not available, persons likely to be affected by the sound may be removed from the area. Exposure to sound levels of this magnitude may be permitted for short periods.

DEFINITIONS

The following definitions were prepared for the interpretation/application of this guideline. For more precise scientific definition reference should be made to Canadian Standards Association Z107.1 1973 - Specification for Sound Level Meters, or American National Standard S1.1 - 1960 (R1971) - Acoustical Terminology.

1. A-weighted sound level is the sound level measured with a sound level meter set on the A-weighting network, a filter designed to approximate the relative sensitivity of the normal human ear to different frequencies of sound. The unit of measurement is denoted dBA.

2. Appreciable impulsive/impact character - sounds which by subjective evaluation have a significant amount of impulsive or impact character, such as repeated hammering, explosions, clanking or banging. Impulsive or impact sounds are sounds of short duration, usually less than one second, with an abrupt onset and rapid decay.

3. Commercial areas for the purpose of this guideline, include hotels, motels, retail and financial service facilities, offices and miscellaneous commercial services. They do not include warehouses, manufacturing plants or other industrial facilities.

. . ./3

4. Daytime - the period between 7:00 a.m. and 10:00 p.m.

5. Decibel (dB) - is a dimensionless measure of sound level or sound pressure level. Sound Level = $20 \log_{10} \frac{\text{pressure (actual)}}{\text{Pressure (reference)}}$

6. Hearing Loss - for the purpose of the guideline, hearing loss means a change in hearing threshold of 5 decibels at 4,000 Hertz. This criterion is based on statistical study of large populations, and may not relate to specific individuals.

7. Industrial areas, for the purpose of this guideline, include such facilities as manufacturing plants, warehouses, storage areas, distribution facilities and mining operations. Agricultural operations exclusive of residences would be included in this category.

8. $L_{equivalent}$ (L_{eq}) - the equivalent, A-weighted sound level is the intensity (dBA) of the constant or steady sound level that would result in exposure to the same total A-weighted energy as would the specified time varying sound, if the constant sound level persisted over an equal time interval. Note $L_{eq}(1)$ is the equivalent sound level for a 1 hour period, and similarly, the $L_{eq}(24)$ represents the equivalent sound level for a 24 hour period.

   For example, the permitted durations of sound at various intensities resulting in a 1 hour L_{eq} of 60 dBA (neglecting the sound level the "off" or "quiet" period) are as follows:

DURATION (Minutes per Hour)	SOUND LEVEL (dBA)
60	60
30	63
15	66
7.5	69
3.8	72
1.9	75

   Thus a sound level of 66 dBA persisting for 15 minutes during a one hour period would be equivalent to a level of 60 dBA for the full hour.

9. $L_{day-night}$ or L_{dn} is the day-night average sound level; the 24 hour A-weight equivalent sound level, with a 10 decibel penalty added to night-time (10:00 p.m. to 7:00 a.m.) levels.

10. Night-time - the period between 10:00 p.m. of one day and 7:00 a.m. the following day.

11. Noise - unwanted or undesirable sound; sounds which create detrimental effects.

12. One-third octave band sound level - the sound level for the sound being measured contained within the specified 1/3 octave band.

13. Point of reception - is any point on the premises of a person where sound originating from other than those premises is received.

14. Predominant discrete tone - sound having a one-third octave band sound level which, when measured in a one-third octave band, exceeds the arithmetic average of the sound levels of the two adjacent one-third octave bands on either side of such one-third octave band by:

    (a) 5 dB for such one-third octave band with a center frequency from 500 Hertz to 20,000 Hertz, inclusive, provided such one-third octave band sound level exceeds the sound level of each adjacent one-third octave band, or;

    (b) 8 dB for such one-third octave band with a center frequency from 160 Hertz to 400 Hertz, inclusive, provided that such one-third octave band sound level exceeds the sound level of each adjacent one-third octave band, or;

    (c) 15 dB for such one-third octave band with a center frequency from 25 Hertz to 125 Hertz, inclusive, provided such one-third octave band sound level exceeds the sound level of each adjacent one-third octave band.

15. Residential areas, for the purpose of this guideline, are areas, where human beings live, including apartments, hospitals, schools, seasonal residences, and mobile homes, as well as year round residences, since these are places where people sleep and often spend extended periods of time. A quiet environment is necessary in both urban and rural residential areas in order to prevent activity interference and annoyance, and to permit the hearing mechanism to recuperate if it is exposed to higher levels of noise during other periods of the day.

16. Summer - the months of May to September, inclusive.

17. Winter - the months of October to April, inclusive.

ENVIRONMENTAL SOUND LEVEL OBJECTIVES:

SCHEDULE A

RESIDENTIAL AREA:

Continuous or Intermittent Sounds

	L_{eq} (24)	L_{dn}	$L_{eq}(1)$ (day) 7:00 a.m. to 10:00 p.m.	$L_{eq}(1)$ (night) 10:00 p.m. to 7:00 a.m.
a) MAXIMUM DESIRABLE	-	55	55	45
b) MAXIMUM ACCEPTABLE				
i) Summer or year round operations	-	60	60	50
ii) predominant discrete tone (s) or appreciable impulsive/impact character	-	55	55	45
iii) winter operations only or temporary operations	-	65	65	55

SCHEDULE B

COMMERCIAL AREAS: (excluding residential areas)

Continuous or Intermittent Sounds

	$L_{eq(24)}$	L_{dn}	$L_{eq(1)}$ (day) 7:00 a.m. to 10:00 p.m.	$L_{eq(1)}$ (night) 10:00 p.m. to 7:00 a.m.
a) MAXIMUM DESIRABLE	-	55	55	45
b) MAXIMUM ACCEPTABLE	-	70	70	60

SCHEDULE C

~~INDUSTRIAL AREAS:~~

Continuous or Intermittent Sounds

	$L_{eq(24)}$	L_{dn}	$L_{eq(1)}$ (day) 7:00 a.m. to 10:00 p.m.	$L_{eq(1)}$ (night) 10:00 p.m. to 7:00 a.m.
a) MAXIMUM DESIRABLE	70	-	70	70
b) MAXIMUM ACCEPTABLE	70	-	70	70

Appendix F

Vibration Guidelines

DILLON CONSULTING

Impulse Vibration in Residential Buildings

1. Scope

The purpose of this Publication is to provide a method for assessment of impulse vibration measured inside occupied residential buildings, caused by the operation of stationary sources of vibration including, but not limited to, stamping presses and forging hammers. This Publication includes technical definitions, description of instrumentation and measurement procedures, and applicable vibration limits. The physical quantity used in the measurement and assessment is the Peak Vibration Velocity. Vibration due to blasting is addressed in Publication NPC-212, Blasting.

TABLE 207-1

Table of Contents

2. Technical Definitions

(1) Impulse Vibration

For the purpose of this Publication, an impulse vibration is defined as a short duration event whose time characteristic exhibits the form of a pulse or sequence of pulses, each consisting of a build-up followed by a decay, resulting from the operation of stationary sources of vibration including, but not limited to, stamping presses and forging hammers.

(2) Vibration Transducer

Vibration Transducer is a device that converts a vibrational motion into an electrical output signal that is proportional to the motion.

(a) Accelerometer

Accelerometer is a vibration transducer that produces an electrical output signal proportional to acceleration.

(b) Velocity transducer

Velocity transducer is a vibration transducer that produces an electrical output signal proportional to velocity.

(3) Observation Period - Vibration

When measuring impulse vibration the observation period, as defined in Publication NPC-201, Technical Definitions, includes the effective time of measurements and interruptions between meter readings.

(4) For other technical terms, see Publication NPC-201, Technical Definitions.

3. Instrumentation for Measurement of Impulse Vibration

(1) General Description

The vibration measuring instrumentation shall consist of the following parts, separate or combined: a vibration transducer, an amplifying device, and a Peak Vibration Velocity indicator. A tape recorder may also be used to record and subsequently play back the recorded vibration signal through the Peak Vibration Velocity indicator. If an accelerometer is used, the amplifying device must incorporate an acceleration-to-velocity integration network. A chart recorder may be used to obtain a permanent record.

(2) Specification

(a) The instrumentation specification shall be compatible with recommendations in IEC Publication 184, Methods for Specifying the Characteristics of Electromechanical Transducers for Shock and Vibration Measurements, and IEC Publication 222, Methods for Specifying the Characteristics of Auxiliary Equipment for Shock and Vibration Measurement.

(b) The instrumentation shall be capable of measuring Peak Vibration Velocity from 0.1 millimetres per second (mm/s) to 20 millimetres per second (mm/s).

(c) The instrumentation shall have a flat frequency response * 3 dB in the frequency range of at least 3 Hz to 100 Hz.

(d) The transverse sensitivity of the vibration transducer shall be less than 10% of the sensitivity along its axis of maximum sensitivity.

(e) If an accelerometer is used as the vibration transducer, special care must be taken in choosing the amplifying/integration network so that the overall specifications fall within those given in (2)(b) and (2)(c). It is recommended that an accelerometer be used in conjunction with a charge amplifier rather than a voltage amplifier, to ensure that the low frequency cut-off occurs outside the specified frequency range.

(f) The instrument shall include a reference electrical signal source capable of calibrating the instrumentation, excluding the vibration transducer, to an accuracy of ° 5%.

(g) A battery life indicator shall be provided for battery powered instrumentation.

(h) The calibration of the vibration instrumentation, including the vibration transducer, shall be traceable to the standard maintained by the National Research Council of Canada.

4. Measurement of Impulse Vibration

It is intended that the measured vibration velocity be associated with bending vibration of the floor or with vertical motion of the whole building.

(1) Measurement Location

The measurement location shall be at a point of reception inside the building, as close as possible to a point that has the maximum vertical velocity amplitude of all reasonable points of entry of the vibration into the human occupants. The preferred transducer location is on the floor at mid-span or centre of a room.

(2) Use of Instrumentation

(a) Battery Check

If the instrumentation is battery powered, the condition of the battery shall be checked after the instrumentation has been allowed to warm up and stabilize. The battery condition shall be rechecked at least once per hour during a series of measurements and at the conclusion of such measurements. The instrumentation shall not be used unless the battery condition is confirmed to be within the range recommended by the manufacturer for proper operation.

(b) Calibration

Field calibration shall be carried out after the instrumentation has been allowed to warmup and stabilize, and after the measurement has been completed or according to specific manufacturer's recommendation. Field calibration shall be performed using an internal reference electrical signal or a reference vibration source. Laboratory calibration of the complete measuring instrumentation as used in the field, including the vibration transducer, shall be carried out not less than once per calendar year and the result certified. Laboratory calibration shall be performed using a reference vibration source.

(c) Instrumentation Setting

The instrumentation shall be set for the measurement of Peak Vibration Velocity.

(3) Instrumentation Configuration

(a) Transducer Mounting

The transducer shall be mounted in accordance with manufacturer's instructions on a hard floor surface so as to prevent movement of the transducer relative to the floor surface.

(b) Transducer Orientation

The transducer shall be oriented so as to measure the vertical component of the floor vibration.

(4) Measurement Procedure

(a) Peak Vibration Velocity

Measurement of the Peak Vibration Velocity of individual impulse events shall be made.

(b) Observation Period

Measurement shall extend over an observation period of not less than twenty minutes and not less than twenty readings shall be reported.

(c) Extension of Observation Period

(i) If less than 20 impulses occur within the twenty minute period, the observation period shall be extended to not more than one hour (60 minutes) and not less than 20 readings shall be reported.

(ii) If less than 20 impulses occur within the one hour period (60 minutes), the observation period shall be extended to not more than two hours and not less than 20 readings shall be reported.

(iii) If less than 20 impulses occur within the two-hour period (120 minutes), all readings shall be reported.

(d) Variation in Calibration

Measurements shall not be reported if the field calibration has changed by more than 5% during the observation period, or the field calibration does not comply with specific manufacturer's recommendation.

(e) Impulse Repetition Rate

The typical time interval between successive impulses shall be measured and reported.

(5) Results

(a) All values of Peak Vibration Velocity obtained in accordance with 4(4), shall be reported in millimetres per second (mm/s), rounded off to two significant places.

(b) The Average Peak Vibration Velocity shall be calculated and reported, provided at least twenty impulses occur in the observation period of up to two hours, as per 4(4)(b), 4(4)(c)(i)i and 4(4)(c)(ii).

(c) If less than 20 impulses occur in the observation period of two hours, as per 4(4)(c)(ii), the Average Peak Vibration Velocity shall not be calculated; the Peak Vibration Velocities of the individual impulses shall only be reported.

5. Limits for Impulse Vibration

The following limits apply at a point of reception inside occupied residential buildings.

(1) Frequent Impulses

If twenty (20) or more discrete impulses occur in the observation period not exceeding two hours, the limit on the Average Peak Vibration Velocity, expressed in millimetres per second (mm/s), is given in Table 207-2.

(2) Infrequent Impulses

If less than twenty (20) discrete impulses occur in the observation period of two hours, the limit on the Peak Vibration Velocity of any individual impulse, expressed in millimetres per second (mm/s), is given in Table 207-3.

6. Documentation

The following represents the minimum information which snail be contained in a report of investigation.

(1) Environment

(a) Location and description of vibration sources.
(b) Dimensioned sketch, including photographs if necessary, of the vibration source and the measurement location.
(c) Physical and topographical description of the ground between the source and the measurement location.
(d) Structural description, including photographs if necessary, of the interior and exterior of the residential building where measurement was performed.
(e) Meteorological conditions prevailing at the time of the investigation including the condition of the ground, such as moisture content, snow coverage, etc.
(f) Sub-soil conditions, if known.

(2) Instrumentation Data

The type, model, and serial number of instrumentation, including peripheral equipment (tape recorder, chart recorder), used in carrying out the measurements, shall be listed.

(3) Vibration Data

The following information shall be provided:

(a) Location of vibration transducer, using a sketch if necessary.
(b) Measurements of the Peak Vibration Velocity in millimetres per second (mm/s). The measurements shall preferably be listed in tabular form, specifying relevant data required for calculation.
(c) The Average Peak Vibration Velocity in millimetres per second (mm/s).
(d) Details of calculations.
(e) Applicable limit as per Table 207-2 or Table 207-3.
(f) The excess over the prescribed limit.

(4) **Source Identification**

All relevant information relating to the impulse vibration source identification such as, but not limited to:

(a) Time of beginning and end of measurement.
(b) Time of commencement and cessation of the impulse vibration.
(c) Typical time interval between successive impulses.
(d) Source (machine) idling periods.
(e) Number and location of sources detected.
(f) Any change in character or mode of source operation.

TABLE 207-2

VIBRATION LIMITS FOR FREQUENT IMPULSES
(20 or More Impulses Reported in Observation Period)

Applicable Clause	Observation Period Minutes	Limit on the Average Peak Vibration Velocity mm/s	
		Day-Time 07:00 - 23:00	Night-Time 23:00 - 07:00
4(4)(b)	20 minutes or less	0.30	0.30
4(4)(c)(i)	Less or equal to 60 minutes but more than 20 minutes	0.60	0.30
4(4)(c)(i)	Less or equal to 120 minutes but more than 60 minutes	1.00	0.30

TABLE 207-3
VIBRATION LIMITS FOR INFREQUENT IMPULSES
(Less than 20 Impulses Reported in Observation Period)

Applicable Clause	Observation Period Minutes	Limit on the Peak Vibration Velocity of Individual Impulses mm/s	
		Day-time 07:00 - 23:00	Night-time 23:00 - 07:00
4(4)(c)(iii)	120 minutes	10.00	0.30

Appendix G

Air Quality Guidelines

DILLON CONSULTING

Name of Contaminant	*Criteria Classification*	*Units of Concentration Measurement*	*Period of Time Contaminant is Measured*	*Maximum Tolerable Level Concentration*	*Maximum Acceptable Level Concentration*	*Maximum Desirable Level Concentration*	*Reference*
Ammonia	Guideline	Milligrams per cubic metre (parts per million) of air	1 - hour average		1.4 (2.0)		7
Arsenic	Guideline **(*new*)**	Micrograms per cubic metre of air	24 - hour average		0.3		20
Cadmium	Guideline **(*new*)**	Micrograms per cubic metre of air	24 - hour average		2		20
Carbon Monoxide	Objective	Milligrams per cubic metre (parts per million) of air	1 - hour average 8 - hour average	20 (17)	35 (30) 15 (13)	15 (13) 6 (5)	5,9
Chromic Acid (as Cr^{+6})	Guideline	Micrograms per cubic metre of air	1 - hour average		4.5		11
Copper	Guideline **(*new*)**	Micrograms per cubic metre of air	24 - hour average		50		20
Fluorides (as HF)	Guideline	Micrograms per cubic metre (parts per billion) of air	24 - hour average 7 - day average 30 - day average 70 - day average		0.85 (1.06) 0.55 (0.69) 0.35 (0.44) 0.20 (0.25)	0.40 (0.50) 0.22 (0.28)	3
Formaldehyde	Guideline	Micrograms per cubic metre (parts per billion) of air	1 - hour average		60 (49)		16
Hydrogen Chloride	Guideline	Micrograms per cubic metre (parts per billion) of air	1 - hour average		100 (70)		8

Name of Contaminant	***Criteria Classification***	***Units of Concentration Measurement***	***Period of Time Contaminant is Measured***	***Maximum Tolerable Level Concentration***	***Maximum Acceptable Level Concentration***	***Maximum Desirable Level Concentration***	***Reference***
Hydrogen Sulfide	Guideline	Micrograms per cubic metre (parts per billion) of air	1 - hour average 24 - hour average	1400 (1000)	15 (11.0) 5 (4.0)	1 (0.7)	4,12
Hydrogen Cyanide	Guideline	Micrograms per cubic metre (parts per billion) of air	1 - hour average annual average		40 (36) 3 (2.7)		13
Lead	Guideline **(*revised*)**	Micrograms per cubic metre of air	24 - hour average 30 - day average		2.0 0.7		2
Methylene Diphenyl Diisocyanate (MDI)	Guideline	Micrograms per cubic metre (parts per billion) of air	1 - hour average annual average		3 (0.3) 0.5 (0.05)		14
Nickel	Guideline **(*new*)**	Micrograms per cubic metre of air	24 - hour average		2		20
Nitrogen Dioxide	Objective	Micrograms per cubic metre (parts per million) of air	1 - hour average 24 - hour average Annual arithmetic mean	1000 (0.53)	400 (0.213) 200 (0.106) 100 (0.053)	60 (0.032)	5,9
Odours (see note 1)	Guideline	Odour units	two tests not less than 15 minutes apart nor more than 60 minutes apart		<u>Residential Zone</u> 2.0 (see note 2) <u>Industrial Zone</u> 7.0 (see note 3)	<1.0 (less than the odour threshold)	6
Ground-level Ozone	Objective	Micrograms per cubic metre (parts per billion) of air	1 - hour average Annual arithmetic mean	400 (200)	160 (82) 30 (15)	100 (50)	5,9

Name of Contaminant	***Criteria Classification***	***Units of Concentration Measurement***	***Period of Time Contaminant is Measured***	***Maximum Tolerable Level Concentration***	***Maximum Acceptable Level Concentration***	***Maximum Desirable Level Concentration***	***Reference***
Ground-level Ozone	Canada-wide Standard **(*new*)**	Micrograms per cubic metre (parts per billion) of air	8 - hour average (see note 4)		128 (65)		18
Particulate Matter less than 2.5 µm in diameter ($PM_{2.5}$)	Canada-Wide Standard **(*new*)**	Micrograms per cubic metre of air	24 - hour average (see note 5)		30		18
Particulate Matter less than 10 µm in diameter (PM_{10})	Guideline **(*new*)**	Micrograms per cubic metre of air	24 - hour average		50		19
Phenol	Guideline	Micrograms per cubic metre (parts per billion) of air	1 - hour average		63 (16)		15
Styrene	Guideline	Micrograms per cubic metre (parts per billion) of air	24 - hour average		400 (94)		17
Sulphur Dioxide	Objective	Micrograms per cubic metre (parts per million) of air	1 - hour average 24 - hour average Annual arithmetic mean	800 (0.31)	900 (0.34) 300 (0.11) 60 (0.02)	450 (0.17) 150 (0.06) 30 (0.01)	5,9
Sulphuric Acid Mist	Guideline	Micrograms per cubic metre (parts per million) of air	1 - hour average		100 (0.025)		10
Suspended Particulate Matter	Objective	Micrograms per cubic metre of air	24 - hour average Annual geometric mean	400	120 70	60	5
Zinc	Guideline **(*new*)**	Micrograms per cubic metre of air	24 - hour average		120		20

All measurements of air quality are corrected to a reference temperature of 25 ^{o}C and to a reference pressure of 101.3 kilopascals.

note 1: Nuisance odours from environmentally-regulated developments are managed using a strategy based on the prevention/minimization of odour releases and the use of a community based standard to determine the acceptability of the ambient odour in the community. It is intended that the odour unit limits be used only for evaluating potential impacts on a community during the environmental impact assessment of new or modified developments.

note 2: One volume of odorous air diluted with one volume of odour free air.

note 3: One volume of odorous air diluted with six volumes of odour free air.

note 4: The 8-hour average objective for ozone is the national Canada-wide Standard (CWS) for ozone. (See www.ccme.ca/initiatives/standards.html for more details.)

note 5: The 24-hour average objective for $PM_{2.5}$ is the national CWS for $PM_{2.5}$. (See www.ccme.ca/initiatives/standards.html for more details.)

REFERENCES

1 Environmental Health Laboratory, 1971. Internal Committee. Manitoba Department of Health.

2 Hazardous Contaminants Branch, October 1993. *Rationale for the Development of Soil, Drinking Water, and Air Quality Criteria for Lead.* Ontario Ministry of Environment and Energy.

3 Federal - Provincial Committee on Air Pollution, 1975. Environment Canada. Unpublished.

4 Federal - Provincial Committee on Air Pollution, 1976. Environment Canada. Unpublished.

5 Fisheries and Environment Canada, November 1976. *Criteria for National Air Quality Objectives.* Federal - Provincial Committee on Air Pollution. 41 pp.

6 Environment Management Division, 1978. *Internal Guideline*. Manitoba Department of Mines, Resources and Environmental Management.

7 Campbell, A. M., May 1982. *Proposed Manitoba Ambient Air Guideline for Ammonia*. Manitoba Environmental Management Division. 28 pp.

8 Environment Management Division, 1982. *Internal Tentative Guideline*. Manitoba Department of Environment and Workplace Safety and Health.

9 Federal - Provincial Committee on Air Pollution, 1982. Environment Canada. Unpublished.

10 Environment Management Division, 1983. *Internal Tentative Guideline*. Manitoba Department of Environment and Workplace Safety and Health.

11 Environment Management Division, 1985. *Internal Tentative Guideline*. Manitoba Department of Environment and Workplace Safety and Health.

12 Federal - Provincial Committee Advisory Committee on Air Quality, 1985. Environment Canada. Unpublished.

13 Van Dusen, J., 1996. *Ambient Air Quality Guidelines for Hydrogen Cyanide.* Manitoba Department of Environment.

14 Van Dusen, J., 1996. *Ambient Air Quality Guidelines for Methylene Diphenyl Diisocyanate (MDI).* Manitoba Department of Environment.

15 Van Dusen, J., 1996. *Ambient Air Quality Guidelines for Phenol.* Manitoba Department of Environment.

16 Air Quality Criteria Task Group, 1999. *Interim Ambient Air Quality Guideline for Formaldehyde.* Manitoba Department of Environment.

17 Air Quality Criteria Task Group, 1999. *Ambient Air Quality Guideline for Styrene.* Manitoba Department of Environment.

18 Canadian Council of Ministers of the Environment (CCME), 2000. *Canada-Wide Standards for Particulate Matter (PM) and Ozone.* CCME.

19 Ontario Ministry of Environment and Energy, 1997. *Interim Ambient Air Quality Criterion – PM10.* EBR Registry Number: PA7E0006.

20 Ontario Ministry of the Environment, September 2001. *Summary of Point of Impingement Standards, Point of Impingement Guidelines, and Ambient Air Quality Criteria (AAQCs).* Standards Development Branch.

Manitoba Ambient Air Quality Data - 2012 Annual Pollutant Summary - Continuous Monitoring

POLLUTANT Conc. Units	STATION NUMBER & LOCATION	ANNUAL MEAN	MAXIMUM DATA VALUES 1-HR	MAXIMUM DATA VALUES 24-HR	# OF SAMPLES ABOVE M.D.L. 1-HR	# OF SAMPLES ABOVE M.D.L. 24-HR	# OF SAMPLES ABOVE M.A.L. 1-HR	# OF SAMPLES ABOVE M.A.L. 24-HR	# OF SAMPLES ABOVE M.T.L. 1-HR	# OF SAMPLES ABOVE M.T.L. 24-HR
CARBON	9118 WINNIPEG, SCOTIA & JEFFERSON	0.26	1.6	1.00$^{\Delta}$	0	0$^{\Delta}$	0	0$^{\Delta}$	--	0$^{\Delta}$
MONOXIDE (CO)	9119 WINNIPEG, 65 ELLEN STREET	0.26	1.6	1.01$^{\Delta}$	0	0$^{\Delta}$	0	0$^{\Delta}$	--	0$^{\Delta}$
ppm										
NITROGEN	5131 BRANDON, ASSIN. COMM.COLLEGE	5.21	43.8	21.89°	--	--	0	0°	0	--
DIOXIDE (NO2)	9118 WINNIPEG, SCOTIA & JEFFERSON	5.82	70.6	28.07°	--	--	0	0°	0	--
ppb	9119 WINNIPEG, 65 ELLEN STREET	9.95	49.7	30.28°	--	--	0	0°	0	--
NITRIC	5131 BRANDON, ASSIN. COMM.COLLEGE	3.36	165.9	41.73°	--	--	--	--	--	--
OXIDE (NO)	9118 WINNIPEG, SCOTIA & JEFFERSON	2.59	128.2	43.45°	--	--	--	--	--	--
ppb	9119 WINNIPEG, 65 ELLEN STREET	5.12	226.9	79.45°	--	--	--	--	--	--
NITROGEN	5131 BRANDON, ASSIN. COMM.COLLEGE	8.57	201.7	60.86°	--	--	--	--	--	--
OXIDES (NOx)	9118 WINNIPEG, SCOTIA & JEFFERSON	8.65	146.2	66.87°	--	--	--	--	--	--
ppb	9119 WINNIPEG, 65 ELLEN STREET	15.08	262.1	108.8°	--	--	--	--	--	--
SULPHUR	7251 FLIN FLON, 143 MAIN STREET	0.33	22.0	7.1°	0	0°	0	0°	--	0°
DIOXIDE	7351^{+} THOMPSON, WATER TREAT. PLANT	0.63	266.0	54.13°	5	0°	0	0°	--	0°
(SO2)	7361^{+} THOMPSON, EASTWOOD SCHOOL	1.16	357.0	43.54°	9	0°	1	0°	--	0°
ppb[10]	7371^{+} THOMPSON, RIVERSIDE SCHOOL	1.08	308.0	46.58°	11	0°	0	0°	--	0°
	7381^{+} THOMPSON, WESTWOOD	2.33	321.0	67.92°	7	8°	0	0°	--	0°
	9119 WINNIPEG, 65 ELLEN STREET	0.19	18.0	2.29°	0	0°	0	0°	--	0°
OXIDANTS	5131 BRANDON, ASSIN. COMM.COLLEGE	25.06	66.9	43.95°	114	--	0	~	0	--
OZONE (O3)	9118 WINNIPEG, SCOTIA & JEFFERSON	27.27	74.40	49.98°	290	--	0	~	0	--
ppb[11]	9119 WINNIPEG, 65 ELLEN STREET	23.52	65.3	44.73°	132	--	0	~	0	--
AMMONIA (NH3)	5131 BRANDON, ASSIN. COMM.COLLEGE	13.58	1578.0	241.9°	--	--	0	--	--	--
ppb[12]										

Notes: $^{\Delta}$ **Averaged over 8 hours**

$^{+}$ **Company supplied data**

$^{\circ}$ **Using 24-hour moving average**

~ Numerous exceedences of the 24 hour MAL which is under review

-- No guideline or objective

Maximum Desirable Level (MDL), Maximum Acceptable Level (MAL), Maximum Tolerable Level (MTL)

[10] **- SO2 guidelines (ppm): MDL: 1hr-0.170, 24hr-0.060; MAL: 1hr-0.340, 24hr-0.110; MTL: 24hr-0.310**

[11] **- 03 guidelines (ppb): MDL: 1hr-50; MAL: 1hr-82, 24hr-15; MTL: 1hr-200**

[12] **- NH3 guidelines (ppm): MAL: 1hr-2.0**

POLLUTANT	STATION NUMBER & LOCATION	ANNUAL ARITH/GEO MEAN	MAXIMUM DATA VALUES 24/1-HR	# OF ABOVE 1-HR	# OF ABOVE 24-HR	# OF SAMPLES ABOVE M.A.L. 1-HR	# OF SAMPLES ABOVE M.A.L. 24-HR	# OF SAMPLES ABOVE M.T.L. 1-HR	# OF SAMPLES ABOVE M.T.L. 24-HR
INHALABLE PARTICULATE (PM_{10})	7251[5] FLIN FLON, 143 MAIN STREET	11.57/5.31	124.10/1124.70	--	--	--	4	--	--
	7251[3] FLIN FLON, 143 MAIN STREET	11.37/8.33	101.46/-	--	--	--	1	--	--
	7283[4,+] CREIGHTON SK, HIGH SCHOOL	15.09/12.60	105.42/-	--	--	--	4	--	--
	7284[1,+] FLIN FLON, RUTH BETTS	8.55/7.03	26.35/-	--	--	--	0	--	--
	7381[5] THOMPSON, WESTWOOD	8.98/6.20	85.60/767.10	--	--	--	1	--	--
	9119[5] WINNIPEG, 65 ELLEN STREET	5.61/4.75	41.60/142.50	--	--	--	0	--	--
	9119[2] WINNIPEG, 65 ELLEN STREET	14.91/11.61	77.07/-	--	--	--	2	--	--
	5131[5] BRANDON, ASSIN.COMM.COLLEGE	18.14/8.45	177.60/782.30	--	--	--	23	--	--
LEAD (Pb)	7283[4,9,+] CREIGHTON SK, HIGH SCHOOL	0.17/0.17	0.19/-	--	--	--	0	--	--
	7284[1,+] FLIN FLON, RUTH BETTS	0.01/0.01	0.03/-	--	--	--	0	--	--
SULPHATES ($SO_4^=$)	7284[1,+] FLIN FLON, RUTH BETTS	0.72/0.57	1.59/-	--	--	--	--	--	--
ARSENIC (As)	7283[4,9,+] CREIGHTON SK, HIGH SCHOOL	0.00/0.00	0.11/-	--	--	--	0	--	--
	7284[1,+] FLIN FLON, RUTH BETTS	0.00/0.00	0.03/-	--	--	--	0	--	--
CADMIUM (Cd)	7283[4,9,+] CREIGHTON SK, HIGH SCHOOL	0.01/0.01	0.11/-	--	--	--	0	--	--
	7284[1,+] FLIN FLON, RUTH BETTS	0.00/0.00	0.01/-	--	--	--	0	--	--
COPPER (Cu)	7283[4,9,+] CREIGHTON SK, HIGH SCHOOL	0.02/0.02	0.12/-	--	--	--	0	--	--
	7284[1,+] FLIN FLON, RUTH BETTS	0.03/0.02	0.14/-	--	--	--	0	--	--
ZINC (Zn)	7283[4,9,+] CREIGHTON SK, HIGH SCHOOL	0.06/0.03	1.21/-	--	--	--	0	--	--
	7284[1,+] FLIN FLON, RUTH BETTS	0.62/0.03	4.50/-	--	--	--	0	--	--

Notes:

All Concentration units for the above Table 4a are in micrograms per cubic metre (ug/m^3)

-- No guideline or objective

- No data available

[1] – 24 Hour sample collected every six days (HI-VOL)

[2] – 24 Hour sample collected every six days according to NAPS schedule (Dichotomous)

[3] – 24 Hour sample collected every three days according to NAPS schedule (Dichotomous)

[4] – 24 Hour sample collected daily (Dichotomous)

[5] – Real-time continuous monitoring (TEOM)

[9] – Majority of data at or below detection limit

[+] Company supplied data

POLLUTANT	STATION NUMBER & LOCATION	ANNUAL ARITH/GEO MEAN	MAXIMUM DATA VALUES 24/1-HR	# OF SAMPLES ABOVE M.D.L. 1-HR	# OF SAMPLES ABOVE M.D.L. 24-HR	# OF SAMPLES ABOVE M.A.L. 1-HR	# OF SAMPLES ABOVE M.A.L. 24-HR	# OF SAMPLES ABOVE M.T.L. 1-HR	# OF SAMPLES ABOVE M.T.L. 24-HR
INHALABLE PARTICULATE ($PM_{2.5}$)	9118[3] WINNIPEG, SCOTIA & JEFFERSON	7.21/4.74	59.98/97.20	--	--	--	1[6]	--	--
	9119[2] WINNIPEG, 65 ELLEN STREET	6.37/5.11	39.63/-	--	--	--	1[6]	--	--
	9119[3] WINNIPEG, 65 ELLEN STREET	6.58/4.75	50.13/535.40	--	--	--	2[6]	--	--
	5131[3] BRANDON, ASSIN. COMM.COLLEGE	6.64/5.08	752.00/58.46	--	--	--	1[6]	--	--
	7251[3] FLIN FLON, 143 MAIN STREET	5.85/4.03	93.10/128.70	--	--	--	6[6]	--	--
	7251[1] FLIN FLON, 143 MAIN STREET	6.02/3.96	84.40/-	--	--	--	2[6]	--	--
	7283[4+] CREIGHTON SK, HIGH SCHOOL	9.56/7.40	86.57/-	--	--	--	10[6]	--	--
	7381[5] THOMPSON, WESTWOOD	3.59/2.08	31.60/303.20	--	--	--	1[6]	--	--

Notes:

All Concentration units for the above Table 4b are in micrograms per cubic metre (ug/m^3)

-- No guideline or objective

- No data available

[1] – 24 Hour sample collected every three days synchronized with the NAPS schedule (Dichotomous)

[2] – 24 Hour sample collected every six days according to NAPS schedule (Dichotomous)

[3] – Real-time continuous monitoring (SHARP)

[4] – 24 Hour sample collected daily (Dichotomous)

[5] – Real-time continuous monitoring (TEOM)

[6] – Based on Canada Wide Standard "level" for $PM_{2.5}$ (not the actual metric of the 98th percentile annual value averaged over 3 years)

[+] Company supplied data

Manitoba Ambient Air Quality Data - 2012 Annual Pollutant Summary - Particulate Matter Monitoring (TSP)

POLLUTANT	STATION NUMBER & LOCATION	ANNUAL ARITH/GEO MEAN	MAXIMUM DATA VALUES 24-HR	# OF SAMPLES ABOVE M.D.L. 1-HR	# OF SAMPLES ABOVE M.D.L. 24-HR	# OF SAMPLES ABOVE M.A.L. 1-HR	# OF SAMPLES ABOVE M.A.L. 24-HR	# OF SAMPLES ABOVE M.T.L. 1-HR	# OF SAMPLES ABOVE M.T.L. 24-HR
TOTAL SUSPENDED PARTICULATE (TSP)	7251[1] FLIN FLON, 143 MAIN STREET	29.30/22.75	137.00	--	--	--	2	--	0
	7283[3+] CREIGHTON SK, HIGH SCHOOL	19.89/15.57	127.53	--	--	--	1	--	0
	7284[2+] FLIN FLON, RUTH BETTS	21.21/15.01	148.10	--	--	--	1	--	0
LEAD (Pb)	7251[1] FLIN FLON, 143 MAIN STREET	0.04/0.03	0.39	--	--	--	0	--	--
	7283[3+] CREIGHTON SK, HIGH SCHOOL	0.01/0.01	0.04	--	--	--	0	--	--
	7284[2+] FLIN FLON, RUTH BETTS	0.01/0.01	0.06	--	--	--	0	--	--
SULPHATES (SO4=)	7251[1] FLIN FLON, 143 MAIN STREET	1.13/0.90	4.74	--	--	--	--	--	--
	7283[3+] CREIGHTON SK, HIGH SCHOOL	0.82/0.68	2.31	--	--	--	--	--	--
	7284[2+] FLIN FLON, RUTH BETTS	0.84/0.67	2.20	--	--	--	--	--	--
NITRATES (NO3-)	7251[1] FLIN FLON, 143 MAIN STREET	0.19/0.13	0.99	--	--	--	--	--	--
ARSENIC (As)[13]	7251[1] FLIN FLON, 143 MAIN STREET	0.01/0.01	0.18	--	--	--	0	--	--
	7283[3+] CREIGHTON SK, HIGH SCHOOL	0.00/0.00	0.05	--	--	--	0	--	--
	7284[2+] FLIN FLON, RUTH BETTS	0.00/0.00	0.06	--	--	--	0	--	--
CADMIUM (Cd)	7251[1] FLIN FLON, 143 MAIN STREET	0.00/0.00	0.05	--	--	--	0	--	--
	7283[3+] CREIGHTON SK, HIGH SCHOOL	0.00/0.00	0.00	--	--	--	0	--	--
	7284[2+] FLIN FLON, RUTH BETTS	0.00/0.00	0.01	--	--	--	0	--	--
COPPER (Cu)	7251[1] FLIN FLON, 143 MAIN STREET	0.33/0.25	2.20	--	--	--	0	--	--
	7283[3+] CREIGHTON SK, HIGH SCHOOL	0.02/0.01	0.19	--	--	--	0	--	--
	7284[2+] FLIN FLON, RUTH BETTS	0.03/0.04	0.48	--	--	--	0	--	--
ZINC (Zn)	7251[1] FLIN FLON, 143 MAIN STREET	2.88/1.71	16.23	--	--	--	0	--	--
	7283[3+] CREIGHTON SK, HIGH SCHOOL	0.38/0.02	4.87	--	--	--	0	--	--
	7284[2+] FLIN FLON, RUTH BETTS	0.72/0.06	6.20	--	--	--	0	--	--

Notes:

All Concentration units for the above Table 4c are in micrograms per cubic metre (ug/m^3)

-- No guideline or objective

[+] Company supplied data

[1] – 24 Hour sample collected every two out of three days, synchronized with the NAPS schedule (with numerous exceptions)

[2] – 24 Hour sample collected every three days, synchronized with the NAPS schedule (with numerous exceptions)

[3] – 24 Hour sample collected every second day

[13] – As guidelines (µg/m3): MAL: 24hr-0.300

Appendix H
Operations Logs

DILLON CONSULTING

Oct - 8th

Machine	Runtime Hours
934 (Track)	7:00 - 9:30 / 9:45 - 2:30 / 2:45 - 4:58 /
Sierra	7:00 - 9:30 / 9:45 - 2:30 / 2:45 - 4:30 /
924	7:00 - 12:50 / 1:20 - 3:00 / 3:15 - 4:58 /
934	7:15 - 9:05 / 2:20 - 3:25 / 3:40 - 4:58 / (being serviced) 9:05 - 2:20
GEHL	7:30 - 10:00 / 10:15 - 12:00 / 12:30 - 2:30 / 2:45 - 4:58
Loader	7:00 - 9:30 / 9:45 - 12:00 / 12:35 - 1:30 / 2:00 - 2:30 / 2:45 - 4:58 /
Hitachi	9:10 - 10:30 / 10:45 - 12:00 /
Ez-crusher	1:10 - 2:30 / 2:45 - 3:25 /
Car crusher	8:30 - 10:30 /
Torch	8:00 - 10:30 / 10:45 - 12:30 (Sorting transformers / cast iron rotors) / 2:00 - 3:00 / 3:15 - 4:50
Plasma	7:30 - 10:30 / 10:45 - 12:30 / 1:00 - 3:00 / 3:15 - 4:55 /
B-Train (Shred) Loading hours	9:30 - 10:10 / 11:35 - 12:10 / 2:35 - 3:06 /
End dump trailer (#1 steel) Loading hours	7:30 - 8:10 / 10:35 - 11:15 / Hilroy

Oct 9th.

Machine	Runtime Hours
934 (Track)	7:00 - 9:30 / 9:45 - 12:00 / 12:30 - 2:30 2:45 - 4:58
Sierra	7:10 - 9:30 / 9:55 - 12:00 / 12:30 - 2:30 2:45 - 4:58
924	7:00 - 10:00 / 10:15 - 12:35 / 1:05 - 3:00 3:15 - 4:58
934	7:15 - 11:00 / 11:15 - 12:45 / 1:15 - 3:35 / 3:50 - 4:58
GEHL	7:30 - 10:00 / 10:15 - 12:00 / 12:30 - 2:30 2:45 - 4:58
Loader	8:10 - 9:30 / switching to the GEHL to Loader / 10:00 12:00 12:00 - 2:30 / 2:50 - 4:58
Hitachi	7:00 - 8:10 / 2:45 - 4:58
EZ-crusher	1:00 - 2:50
Car crusher	2:45 - 4:30
Torch	8:00 - 10:30 / 10:45 - 11:20 / 1:00 - 3:00 3:15 - 4:50
Plasma	7:30 - 10:30 / 10:45 - 11:20 / 1:00 - 3:00 3:15 - 4:57
B-train (Shred)	7:26 - 8:00 / 9:25 - 9:50 (#2 steel) / 10:20 - 11:00 / 12:00 - 12:35 / 1:15 - 1:50 / 2:45 - 3:30
End dump trailer (#1 steel)	

Hilroy

Oct 10th

Machine	Runtime Hours
934 (Track)	7:00 - 9:30 / 9:45 - 12:00 / 12:30 - 2:30 / 2:45 - 4:58
Sierra	7:30 - 9:30 / 9:45 - 12:00 / 12:30 - 2:30 / 2:45 - 4:58
924	7:00 - 10:00 / 10:15 - 12:45 / 1:15 - 3:00 / 3:15 - 4:58
934	7:15 - 10:35 / 10:50 - 12:35 / 1:05 - 3:00 / 3:15 - 4:58
GEHL	7:30 - 10:00 / 10:15 - 12:00 / 12:30 - 2:30 / 2:45 -
Loader	7:00 - 9:30 / 9:45 - 12:15 / 12:45 - 2:30 / 2:45 - 4:58
Hitachi	
Ez-crusher	
Car-Crusher	7:00 - 10:30 / 12:00 - 12:15 / 12:45 - 2:30 / 2:45 - 4:20 /
Torch	8:00 - 10:30 / 10:45 - 12:30 / 1:00 - 3:00 / 3:15 - 4:58
Plasma	7:30 - 10:30 / 10:45 - 12:30 / 1:00 - 3:00 / 3:15 - 4:58
B-train (Shred)	7:25 - 8:05 / 9:35 - 10:00 / 10:35 - 11:06 /
End dump trailer (#1 steel)	2:05 - 2:45

Hilroy

Appendix I
Calibration Certificates

2370 Owen Street
Santa Clara, CA 95054
Phone: (408)986-8880
Fax: (408)834-7818
Email: sales@go-ci.com
Website: www.crystalinstruments.com

CERTIFICATE OF CALIBRATION

Customer: Clement Lam
P.O.#: 2616BRL
Certificate No. #: MO-3344

CALIBRATION CONDITIONS
Calibration Date: 10/06/2014
Due Date: 11/06/2015
Calibration Cycle: 13 Mo.
Temperature: 23 ± 5°C
Relative Humidity: 50 ± 30%RH
Cal Procedure: CI User's Manual (Version1.0)

INSTRUMENT/ID

Model: CoCo-80 **Serial No: 75831**
Description: Dynamic Signal Analyzer

This certifies that the above instrument was calibrated in compliance with the quality system registered to ISO 9001:2008 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to NIST, natural physical constants, consensus standards or derived by ratio type calibrations. Expanded uncertainties are determined as required with a distribution that corresponds to a probability of approximately 95% (k=2sigma), no sampling plan or other process was used for this calibration, the results reported herein apply only to the item described above.

Standard Utilized

Serial Number	Manufacturer	Model No.	Calib.Date	Due Date	Traceability Cert.No.
MY54200027	AGILENT	34450A	5/30/2014	5/30/2015	2-CL7TQ-2-1

TECHNICIAN: **QC:**

RION Supplied Accessories

Model	NL-52	Product Name	Sound Level Meter, Class 1

Ensure all the items below are in the package.
If there is a missing part, please contact your supplier.

Type	Description	Quantity	Note
NL-52	Main unit	1	# 00342826
NL-42-025	Storage case	1	UC-58 # 06344
WS-10	Windscreen	1	NH-25 # 42854
NL-42-033	Windscreen fall prevention rubber	1	attached to the main unit
VM-63-017	Hand strap	1	
LR6	Size AA alkaline batteries	4	
	CD-ROM (Instruction manual, Serial Interface manual, Technical notes, Program option manual)	1	
	Description for IEC 61672-1	1	
	SD memory card (512 MByte)	1	only when NX-42EX is pre-installed
	Inspection certificate	1	This sheet
	Document for China RoHS	1	only to China

Inspection Certificate

INSPECTOR 10/1/2014

M. Kidaka

We hereby certify that this product has been tested and calibrated at our factory according to RION specifications and that the product satisfies all relevant requirements.

RION CO., LTD.
3-20-41 Higashimotomachi, Kokubunji,
Tokyo 185-8533,
Japan

Sound and Vibration Measuring Instrument Section Product information and software downloads can be found on our web-site:
http://svmeas.rion.co.jp/
Please check it out.

№C11030502

C E R T I F I C A T E of C A L I B R A T I O N

Make :	RION Co. Ltd	Reference # :	130609
Model :	NL-22	Customer :	Dillon Consulting Ltd Oakville, ON
Descr. :	Sound Level Meter Type 2		
Serial # :	01073403	P. Order :	73000
Asset # :	DCL-02		

Cal. status : Received in spec's, minor adjustment made.
Unit was reading -0.9dB, cal.cycle as per customer

Navair Technologies certifies that the above listed instrument was calibrated on date noted and was released from this laboratory performing in accordance with the specifications set forth by the manufacturer.

Unless otherwise noted in the calibration report a 4:1 accuracy ratio was maintained for this calibration.

Our calibration system complies with the requirements of ISO-17025 standard, working standards used for calibration are certified by or traceable to the National Research Council of Canada or the National Institute of Standards and Technology.

Calibrated : Jul 08, 2013 By : Raposo

Cal. Due : Jul 08, 2015 J. Raposo

Temperature : 23 °C ± 2 °C Relative Humidity : 30% to 70%

Standards used : J-216 J-512

Navair Technologies

REPAIR AND CALIBRATION TRACEABLE TO NRC AND NIST
6375 Dixie Rd. Mississauga, ON, L5T 2E7 http: // www.navair.com
Phone : 905 565 1584 Fax: 905 565 8325 e-Mail: navair @ navair.com

C E R T I F I C A T E of C A L I B R A T I O N

Make :	RION Co. Ltd	Reference # :	130608
Model :	NL-22	Customer :	Dillon Consulting Ltd Oakville, ON
Descr. :	Sound Level Meter Type 2		
Serial # :	00773200	P. Order :	73000
Asset # :	DCL-01		

Cal. status : Received in spec's, no adjustment made.
cal.cycle as per customer.

Navair Technologies certifies that the above listed instrument was calibrated on date noted and was released from this laboratory performing in accordance with the specifications set forth by the manufacturer.

Unless otherwise noted in the calibration report a 4:1 accuracy ratio was maintained for this calibration.

Our calibration system complies with the requirements of ISO-17025 standard, working standards used for calibration are certified by or traceable to the National Research Council of Canada or the National Institute of Standards and Technology.

Calibrated : Jul 08, 2013 By : Naposo

Cal. Due : Jul 08, 2015 J. Raposo

Temperature : 23 °C ± 2 °C Relative Humidity : 30% to 70%

Standards used : J-216 J-512

Navair Technologies

REPAIR AND CALIBRATION TRACEABLE TO NRC AND NIST
6375 Dixie Rd. Mississauga, ON, L5T 2E7 http: // www.navair.com
Phone : 905 565 1584 Fax: 905 565 8325 e-Mail: navair @ navair.com

~Calibration Certificate~

THE MODAL SHOP INC. A PCB GROUP CO.

3149 East Kemper Rd.
Cincinnati, OH 45241
Ph : 513-351-9919
Fax: 513-458-2172
www.modalshop.com

Sensor Information

Model Number:	393B04
Serial Number:	34616
Manufacturer:	PCB
ID Number:	46418
Description:	ICP® Accelerometer

Calibration Data

Sensitivity @ 100 Hz:	989.61	mV/g
Phase @ 100 Hz:	-4.44	deg.
Test Level:	1.00	g
Output Bias Level:	12.5	VDC

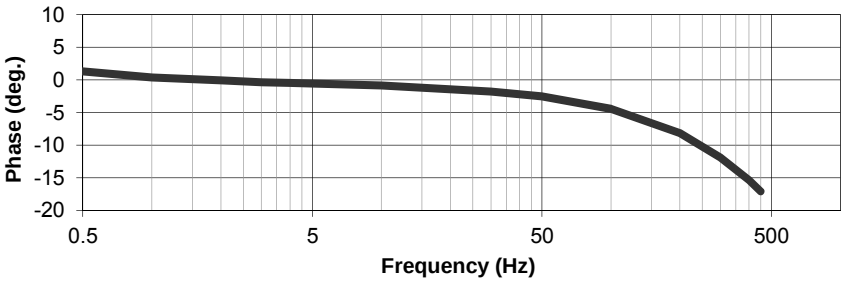
Transducer Specifications

Amp. Range:	± 5	g
Resolution:	0.000003	g
Resonant Freq:	≥ 2500	Hz
Temp. Range:	-18 to 80	°C
	0 to 176	°F
Axis:	Uni-Axial	

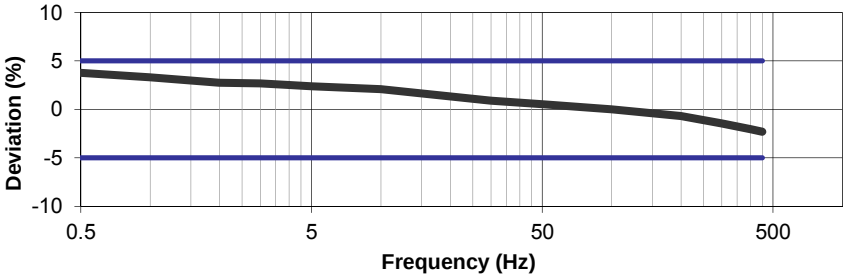
Data Table

Freq. (Hz)	Deviation (%)	Phase (deg)
0.5	3.7729	1.2756
1	3.3092	0.3501
2	2.7396	-0.1002
3	2.6670	-0.3573
4	2.5249	-0.4839
5	2.3806	-0.5759
10	2.0861	-0.8496
30	0.9029	-1.8198
50	0.5361	-2.5218
100	0.0000	-4.4442
200	-0.7013	-8.1538
300	-1.4378	-11.9200
400	-2.0439	-15.3780
450	-2.3040	-17.0870

Phase Response



Amplitude Response



Notes

Results relate only to the items calibrated.

This certificate may not be reproduced except in full, without written permision.

Method: Calibration is performed in compliance with ISO 9001 and ISO 17025

This calibration was performed with TMS 9155 Calibration Workstation version 5.4.0

Calibration traceable to NIST (project number 822/271196).

Back-to-Back Comparison Calibration per ISO 16063-21

Procedures Used: PRD-P220, PRD-P214

Measurement uncertainty (95% confidence level with coverage factor 2) for frequency ranges tested during calibration are as follows: 0.5-1 Hz; 1.10%; >1-10 Hz; ± 0.80%, 11-99 Hz; ±1.20%, 100 Hz; ± 0.75%, 101-920 Hz; ± 1.00%, 921-5000 Hz; ± 1.40%, 5001-10,000 Hz; ± 1.90%, 10,001-15,000 Hz; ± 2.20%, 15,001-20,000 Hz; ± 2.8%.

Customer

TMS Rental
3149 E. Kemper Rd
Cincinnati, OH 45241

User Notes

Lab Conditions

Temperature: 71 (22) °F (°C)
Humidity: 54 %

Unit Condition

As Found: In Tolerance
As Left: In Tolerance

Cal Date: 23-Jun-14
Due Date:

Approval Information

Technician: Wayne Underwood
Approval:

ACCREDITED
2649.01

Cal ID: 23939 Calibration Lab

Equipment Used

Description	Manufacturer	Model	Serial	Due Date
Data Aquisition Card	NI	4461	E4F2A4	11/20/2014
Ref Std Conditioner	NI	PCI-6251	136F2A3	1/1/2015
Reference Std	PCB	080A200	110553	12/3/2014
Air Bearing Shaker	PCB	396C11	603	n/a
Ref Std Conditioner	PCB	442A102	305	12/3/2014
SUT Signal Conditioner	PCB	443B101	373	10/9/2014
Power Amplifier	TMS	2100E21-C	1074	n/a
Reference Std	TMS	2129E025	111	1/1/2015
Long Stroke Shaker	TMS	2129E025-779	111	n/a

~Calibration Certificate~

THE MODAL SHOP INC. A PCB GROUP CO.
3149 East Kemper Rd.
Cincinnati, OH 45241
Ph : 513-351-9919
Fax: 513-458-2172
www.modalshop.com

Sensor Information

Model Number:	393B04
Serial Number:	34621
Manufacturer:	PCB
ID Number:	46414
Description:	ICP® Accelerometer

Calibration Data

Sensitivity @ 100 Hz:	988.37	mV/g
Phase @ 100 Hz:	-4.45	deg.
Test Level:	1.00	g
Output Bias Level:	11.3	VDC

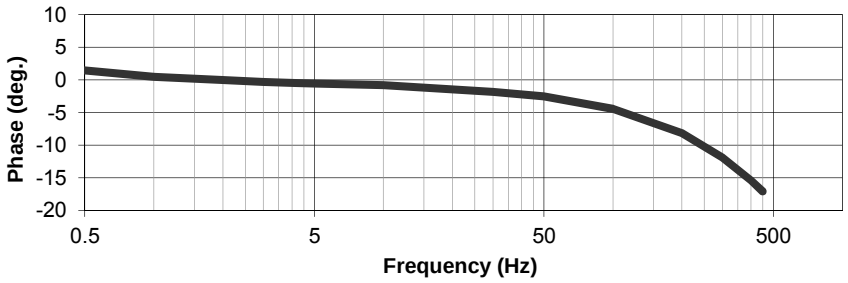
Transducer Specifications

Amp. Range:	± 5	g
Resolution:	0.000003	g
Resonant Freq:	≥ 2500	Hz
Temp. Range:	-18 to 80	°C
	0 to 176	°F
Axis:	Uni-Axial	

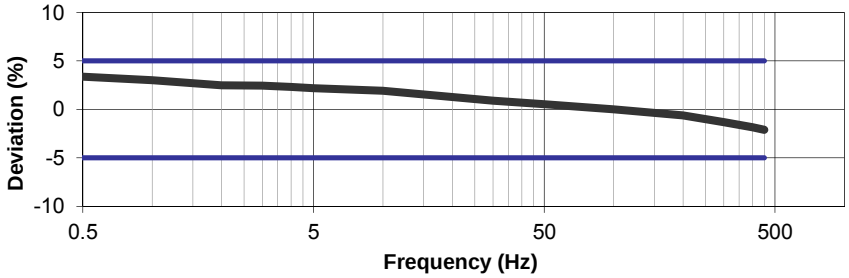
Data Table

Freq. (Hz)	Deviation (%)	Phase (deg)
0.5	3.3741	1.4558
1	3.0130	0.4436
2	2.4905	-0.0503
3	2.4432	-0.3257
4	2.3234	-0.4599
5	2.1893	-0.5564
10	1.9072	-0.8413
30	0.8962	-1.8350
50	0.5431	-2.5397
100	0.0000	-4.4502
200	-0.6342	-8.1607
300	-1.2994	-11.9110
400	-1.8383	-15.4082
450	-2.1025	-17.1048

Phase Response



Amplitude Response



Notes

Results relate only to the items calibrated.

This certificate may not be reproduced except in full, without written permision.

Method: Calibration is performed in compliance with ISO 9001 and ISO 17025

This calibration was performed with TMS 9155 Calibration Workstation version 5.4.0

Calibration traceable to NIST (project number 822/271196).

Back-to-Back Comparison Calibration per ISO 16063-21

Procedures Used: PRD-P220, PRD-P214

Measurement uncertainty (95% confidence level with coverage factor 2) for frequency ranges tested during calibration are as follows: 0.5-1 Hz; 1.10%; >1-10 Hz; ± 0.80%, 11-99 Hz; ±1.20%, 100 Hz; ± 0.75%, 101-920 Hz; ± 1.00%, 921-5000 Hz; ± 1.40%, 5001-10,000 Hz; ± 1.90%, 10,001-15,000 Hz; ± 2.20%, 15,001-20,000 Hz; ± 2.8%.

Customer

TMS Rental
3149 E. Kemper Rd
Cincinnati, OH 45241

User Notes

Lab Conditions

Temperature: 71 (22) °F (°C)
Humidity: 54 %

Cal Date: 23-Jun-14
Due Date:

Unit Condition

As Found: In Tolerance
As Left: In Tolerance

Equipment Used

Description	Manufacturer	Model	Serial	Due Date
Data Aquisition Card	NI	4461	E4F2A4	11/20/2014
Ref Std Conditioner	NI	PCI-6251	136F2A3	1/1/2015
Reference Std	PCB	080A200	110553	12/3/2014
Air Bearing Shaker	PCB	396C11	603	n/a
Ref Std Conditioner	PCB	442A102	305	12/3/2014
SUT Signal Conditioner	PCB	443B101	373	10/9/2014
Power Amplifier	TMS	2100E21-C	1074	n/a
Reference Std	TMS	2129E025	111	1/1/2015
Long Stroke Shaker	TMS	2129E025-779	111	n/a

Approval Information

Technician: Wayne Underwood
Approval:

ACCREDITED
2649.01

Cal ID: 23941 Calibration Lab

~Calibration Certificate~

THE MODAL SHOP INC. A PCB GROUP CO.
3149 East Kemper Rd.
Cincinnati, OH 45241
Ph : 513-351-9919
Fax: 513-458-2172
www.modalshop.com

Sensor Information

Model Number:	393B05
Serial Number:	32061
Manufacturer:	PCB
ID Number:	45192
Description:	ICP® Accelerometer

Calibration Data

Sensitivity @ 100 Hz:	9,885.66	mV/g
Phase @ 100 Hz:	-4.19	deg.
Test Level:	0.30	g
Output Bias Level:	11.7	VDC

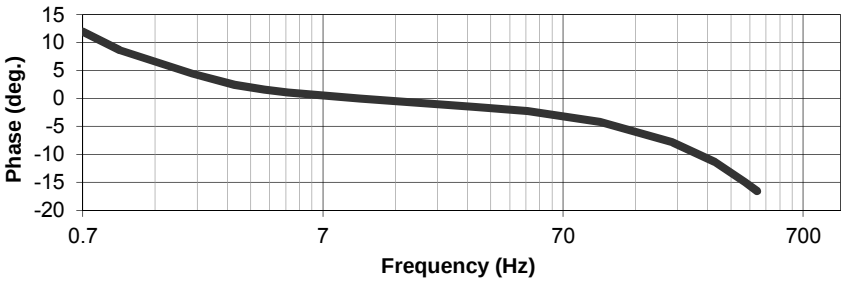
Transducer Specifications

Amp. Range:	± 0.5	g
Resolution:	0.000004	g
Resonant Freq:	≥ 2500	Hz
Temp. Range:	-18 to 80	°C
	0 to 176	°F
Axis:	Uni-Axial	

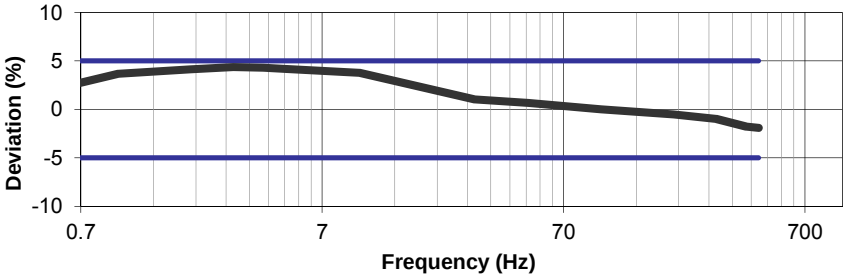
Data Table

Freq. (Hz)	Deviation (%)	Phase (deg)
0.7	2.7573	11.9405
1	3.6680	8.6011
2	4.1230	4.4344
3	4.3502	2.4391
4	4.2875	1.5869
5	4.1653	1.0790
10	3.7584	-0.0234
30	1.0219	-1.4851
50	0.6596	-2.2383
100	0.0000	-4.1881
200	-0.5084	-7.8544
300	-0.9773	-11.3533
400	-1.7718	-14.9325
450	-1.9056	-16.5522

Phase Response



Amplitude Response



Notes

Results relate only to the items calibrated.
This certificate may not be reproduced except in full, without written permision.
Method: Calibration is performed in compliance with ISO 9001 and ISO 17025
This calibration was performed with TMS 9155 Calibration Workstation version 5.4.0
Calibration traceable to NIST (project number 822/271196).
Back-to-Back Comparison Calibration per ISO 16063-21
Procedures Used: PRD-P220, PRD-P214
Measurement uncertainty (95% confidence level with coverage factor 2) for frequency ranges tested during calibration are as follows: 0.5-1 Hz; 1.10%; >1-10 Hz; ± 0.80%, 11-99 Hz; ±1.20%, 100 Hz; ± 0.75%, 101-920 Hz; ± 1.00%, 921-5000 Hz; ± 1.40%, 5001-10,000 Hz; ± 1.90%, 10,001-15,000 Hz; ± 2.20%, 15,001-20,000 Hz; ± 2.8%.

Customer
TMS Rental
3149 E. Kemper Rd
Cincinnati, OH 45241

User Notes

Lab Conditions

Temperature:	71 (22)	°F (°C)
Humidity:	46	%

Cal Date: 8-Aug-14
Due Date:

Unit Condition

As Found:	In Tolerance
As Left:	In Tolerance

Equipment Used

Description	Manufacturer	Model	Serial	Due Date
Data Aquisition Card	NI	4461	E4F2A4	11/20/2014
Ref Std Conditioner	NI	PCI-6251	136F2A3	1/1/2015
Reference Std	PCB	080A200	169783	3/14/2015
Air Bearing Shaker	PCB	396C11	603	n/a
Ref Std Conditioner	PCB	442A102	349	3/14/2015
SUT Signal Conditioner	PCB	443B101	373	10/9/2014
Power Amplifier	TMS	2100E21-C	1074	n/a
Reference Std	TMS	2129E025	111	1/1/2015
Long Stroke Shaker	TMS	2129E025-779	111	n/a

Approval Information

Technician: Wayne Underwood
Approval:

ACCREDITED
2649.01

Cal ID: 24368 Calibration Lab

Appendix J
Photographs

DILLON CONSULTING

Site Photographs

Field Set Up – Ambient Noise Monitoring

Monitoring location L1: at rooftop of Urbanmine building.

Monitoring location L2: at Receptor Fence line – Without Direct Line-of-sight

View towards the Facility from monitoring location L2.

Monitoring location L3: at receptor fence line with direct Line-of-sight

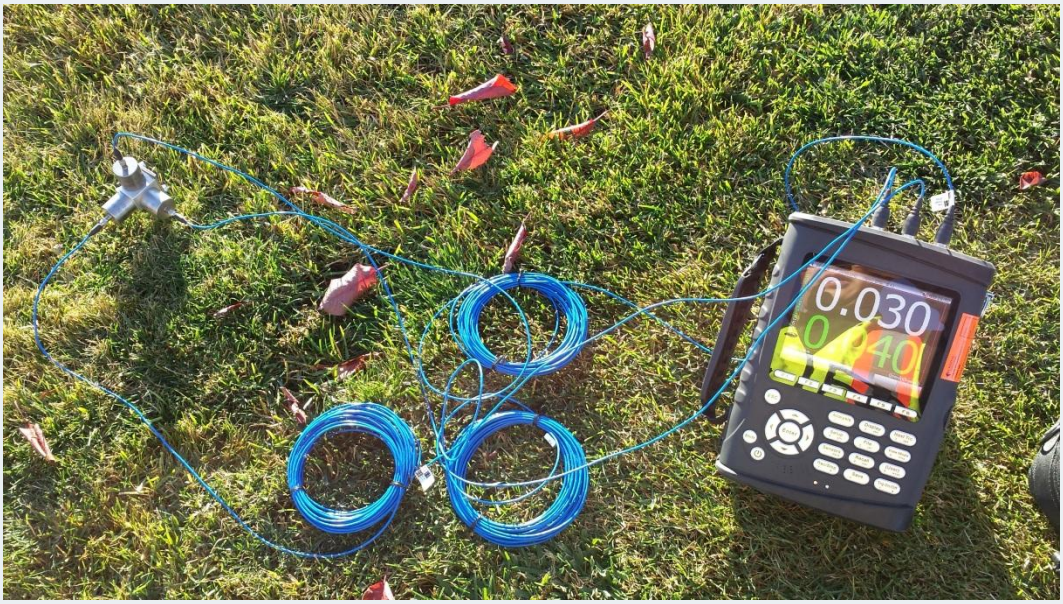
View from monitoring location L3.

Field Set Up – Vibration Measurements

Monitoring location V1 - directly adjacent to Sierra Shear at north property boundary.

Set up for tri-axial vibration measurements at V1.

Monitoring location V4 - at Birmingham Place/Lindmere Drive.



7.1.1.2 Field Set Up – Air Quality Monitoring – Particulate Matter

MP1 located at northeast corner of roof of Urbanmine building.

MP2 located at eastern edge of roof of the Urbanmine building, within the operations area.

MP3 located within the yard – centre of all operations including shearing, torch cutting, and plasma cutting.

Appendix K

Meteorological Data During Environmental Monitoring

Government of Canada Gouvernement du Canada

Canada

Climate

Home > Data

Hourly Data Report for October 08, 2014

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

WINNIPEG INTL A MANITOBA					
Latitude:	49°54'36.000" N	Longitude:	97°14'24.000" W	Elevation:	238.70 m
Climate ID:	5023227	WMO ID:		TC ID:	YWG

	Temp °C	Dew Point Temp °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Visibility km	Stn Press kPa	Hmdx	Wind Chill	Weather
TIME										
00:00 ‡	-0.6	-2.3	88	30	15	24.1	98.23		-5	Mainly Clear
01:00 ‡	-0.3	-1.9	89	31	19	24.1	98.28		-5	NA
02:00 ‡	0.4	-0.9	91	29	16	24.1	98.31			NA
03:00 ‡	1.8	0.0	88	29	22	24.1	98.35			Mostly Cloudy
04:00 ‡	0.0	-0.6	96	28	18	24.1	98.39		-5	NA
05:00 ‡	-0.5	-1.2	95	28	14	24.1	98.47		-5	NA
06:00 ‡	0.7	-0.3	93	29	14	24.1	98.54			Mostly Cloudy
07:00 ‡	1.5	0.5	93	30	17	24.1	98.62			NA
08:00 ‡	3.1	-0.2	79	33	27	24.1	98.68			NA
09:00 ‡	4.0	0.2	76	32	39	24.1	98.74			Mostly Cloudy
10:00 ‡	4.5	0.1	73	33	31	24.1	98.80			NA
11:00 ‡	5.3	0.5	71	33	32	24.1	98.86			NA
12:00 ‡	6.4	-0.1	63	33	30	24.1	98.90			Mostly Cloudy
13:00 ‡	6.3	0.0	64	30	27	24.1	98.92			NA
14:00 ‡	6.7	0.6	65	31	25	24.1	98.94			NA
15:00 ‡	6.6	0.9	67	32	25	24.1	98.97			Mostly Cloudy
16:00 ‡	6.9	0.1	62	33	21	24.1	99.00			NA
17:00 ‡	5.8	-0.5	64	31	25	24.1	99.00			NA
18:00 ‡	4.0	-0.2	74	30	16	24.1	99.02			Mainly Clear
19:00 ‡	1.6	-1.0	83	30	17	24.1	99.07			NA
20:00 ‡	0.5	-1.4	87	31	16	24.1	99.10			NA
21:00 ‡	0.1	-1.7	88	30	15	24.1	99.15			Clear
22:00 ‡	-1.7	-2.5	94	28	15	24.1	99.19		-7	NA
23:00 ‡	-1.4	-2.4	93	29	17	24.1	99.22		-7	NA

Notes on Data Quality.

Legend

- E = Estimated
- M = Missing

- NA = Not Available
- ‡ = Partner data that is not subject to review by the National Climate Archives

Date modified: 2014-04-30

Government of Canada Gouvernement du Canada

Canada

Climate

Home > Data

Hourly Data Report for October 09, 2014

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

WINNIPEG INTL A MANITOBA					
Latitude:	49°54'36.000" N	Longitude:	97°14'24.000" W	Elevation:	238.70 m
Climate ID:	5023227	WMO ID:		TC ID:	YWG

	Temp °C	Dew Point Temp °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Visibility km	Stn Press kPa	Hmdx	Wind Chill	Weather
TIME										
00:00 ‡	-2.1	-3.1	93	31	17	24.1	99.22		-7	Clear
01:00 ‡	-2.2	-2.9	95	28	16	24.1	99.21		-7	NA
02:00 ‡	-1.5	-2.3	94	28	15	24.1	99.27		-6	NA
03:00 ‡	-1.5	-2.5	93	31	13	24.1	99.29		-6	Clear
04:00 ‡	-2.3	-3.0	95	28	11	24.1	99.34		-6	NA
05:00 ‡	-1.8	-2.2	97	31	5	24.1	99.39		-4	NA
06:00 ‡	-0.6	-1.0	97	28	10	24.1	99.41		-4	Mostly Cloudy
07:00 ‡	0.6	-0.1	95	30	14	24.1	99.44			NA
08:00 ‡	2.8	1.3	90	31	20	24.1	99.47			NA
09:00 ‡	3.9	1.9	87	31	18	24.1	99.51			Mostly Cloudy
10:00 ‡	5.5	2.7	82	31	21	24.1	99.54			NA
11:00 ‡	6.3	1.1	69	31	25	24.1	99.56			NA
12:00 ‡	6.8	0.9	66	29	21	24.1	99.61			Mostly Cloudy
13:00 ‡	7.3	-0.2	59	32	22	24.1	99.60			NA
14:00 ‡	7.4	0.2	60	30	23	24.1	99.60			NA
15:00 ‡	5.8	-0.9	62	30	25	24.1	99.59			Mainly Clear
16:00 ‡	5.9	-0.8	62	30	21	24.1	99.61			NA
17:00 ‡	5.2	-0.6	66	30	20	24.1	99.62			NA
18:00 ‡	4.8	-1.2	65	32	13	24.1	99.62			Mostly Cloudy
19:00 ‡	1.0	-2.6	77	31	13	24.1	99.63			NA
20:00 ‡	-2.4	-3.8	90	30	13	24.1	99.64		-7	NA
21:00 ‡	-0.3	-2.4	86	29	8	24.1	99.63		-3	Clear
22:00 ‡	-2.2	-3.5	91	26	16	24.1	99.64		-7	NA
23:00 ‡	-3.4	-4.5	92	27	13	24.1	99.66		-8	NA

Notes on Data Quality.

Legend

- E = Estimated
- M = Missing

- NA = Not Available
- ‡ = Partner data that is not subject to review by the National Climate Archives

Date modified: 2014-04-30

Government of Canada Gouvernement du Canada

Canada

Climate

Home > Data

Hourly Data Report for October 10, 2014

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

WINNIPEG INTL A MANITOBA					
Latitude:	49°54'36.000" N	Longitude:	97°14'24.000" W	Elevation:	238.70 m
Climate ID:	5023227	WMO ID:		TC ID:	YWG

	Temp °C	Dew Point Temp °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Visibility km	Stn Press kPa	Hmdx	Wind Chill	Weather
TIME										
00:00 ‡	-3.5	-4.3	94	28	13	24.1	99.66		-8	Clear
01:00 ‡	-3.7	-4.4	95	28	10	24.1	99.66		-8	NA
02:00 ‡	-4.3	-4.8	96	28	13	24.1	99.68		-9	NA
03:00 ‡	-4.4	-5.1	95	28	9	24.1	99.68		-8	Mainly Clear
04:00 ‡	-3.5	-4.2	95	27	13	24.1	99.71		-8	NA
05:00 ‡	-2.5	-3.2	95	28	9	24.1	99.70		-6	NA
06:00 ‡	-2.4	-3.0	96	29	10	24.1	99.70		-6	Mostly Cloudy
07:00 ‡	-3.9	-4.5	96	0	1	24.1	99.70		-4	NA
08:00 ‡	-0.4	-1.3	94	29	5	24.1	99.71		-2	NA
09:00 ‡	3.2	1.9	91	28	5	24.1	99.70			Mainly Clear
10:00 ‡	5.8	0.8	70	30	5	24.1	99.68			NA
11:00 ‡	6.4	0.7	67	25	4	24.1	99.65			NA
12:00 ‡	7.8	-0.4	56	12	3	24.1	99.61			Mainly Clear
13:00 ‡	9.2	-0.1	52	24	8	24.1	99.53			NA
14:00 ‡	9.9	-0.3	49	20	16	24.1	99.44			NA
15:00 ‡	10.8	0.3	48	19	10	24.1	99.38			Mainly Clear
16:00 ‡	10.7	-0.1	47	19	11	24.1	99.31			NA
17:00 ‡	9.4	0.3	53	15	13	24.1	99.24			NA
18:00 ‡	6.2	-0.1	64	15	15	24.1	99.19			Mostly Cloudy
19:00 ‡	6.1	0.2	66	16	17	24.1	99.14			NA
20:00 ‡	5.6	0.4	69	15	15	24.1	99.07			NA
21:00 ‡	5.5	0.1	68	14	18	24.1	99.02			Mainly Clear
22:00 ‡	5.0	0.0	70	16	20	24.1	98.96			NA
23:00 ‡	5.6	0.0	67	17	22	24.1	98.90			NA

Notes on Data Quality.

Legend

- E = Estimated
- M = Missing

- NA = Not Available
- ‡ = Partner data that is not subject to review by the National Climate Archives

Date modified: 2014-04-30

Government of Canada Gouvernement du Canada

Canada

Climate

Home > Data

Hourly Data Report for October 11, 2014

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

WINNIPEG INTL A MANITOBA					
Latitude:	49°54'36.000" N	Longitude:	97°14'24.000" W	Elevation:	238.70 m
Climate ID:	5023227	WMO ID:		TC ID:	YWG

	Temp °C	Dew Point Temp °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Visibility km	Stn Press kPa	Hmdx	Wind Chill	Weather
TIME										
00:00 ‡	4.9	-0.1	70	18	21	24.1	98.85			Mainly Clear
01:00 ‡	4.4	-0.4	71	19	15	24.1	98.82			NA
02:00 ‡	4.4	-0.8	69	19	19	24.1	98.77			NA
03:00 ‡	4.7	-1.1	66	21	16	24.1	98.74			Clear
04:00 ‡	3.7	-1.3	70	18	16	24.1	98.73			NA
05:00 ‡	2.7	-1.5	74	18	16	24.1	98.71			NA
06:00 ‡	2.9	-1.5	73	19	16	24.1	98.68			Clear
07:00 ‡	3.5	-1.5	70	20	20	24.1	98.65			NA
08:00 ‡	5.2	-1.3	63	20	26	24.1	98.64			NA
09:00 ‡	8.0	0.0	57	19	23	24.1	98.61			Clear
10:00 ‡	11.3	1.0	49	19	25	24.1	98.53			NA
11:00 ‡	13.7	0.8	41	19	36	24.1	98.42			NA
12:00 ‡	14.9	0.0	36	18	44	24.1	98.30			Clear
13:00 ‡	15.4	0.5	36	18	37	24.1	98.15			NA
14:00 ‡	16.2	0.4	34	19	44	24.1	98.00			NA
15:00 ‡	16.5	0.7	34	18	52	24.1	97.87			Mainly Clear
16:00 ‡	16.6	0.8	34	17	50	24.1	97.75			NA
17:00 ‡	15.9	0.9	36	18	40	24.1	97.69			NA
18:00 ‡	14.1	1.5	42	17	37	24.1	97.61			Mainly Clear
19:00 ‡	13.2	1.9	46	17	35	24.1	97.54			NA
20:00 ‡	12.7	2.0	48	17	39	24.1	97.46			NA
21:00 ‡	12.3	2.0	49	18	41	24.1	97.40			Mainly Clear
22:00 ‡	11.4	2.2	53	18	33	24.1	97.35			NA
23:00 ‡	11.1	2.7	56	18	31	24.1	97.30			NA

Notes on Data Quality.

Legend

- E = Estimated
- M = Missing

- NA = Not Available
- ‡ = Partner data that is not subject to review by the National Climate Archives

Date modified: 2014-04-30

Government of Canada Gouvernement du Canada

Canada

Climate

Home > Data

Hourly Data Report for October 12, 2014

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

WINNIPEG INTL A MANITOBA					
Latitude:	49°54'36.000" N	Longitude:	97°14'24.000" W	Elevation:	238.70 m
Climate ID:	5023227	WMO ID:		TC ID:	YWG

	Temp °C	Dew Point Temp °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Visibility km	Stn Press kPa	Hmdx	Wind Chill	Weather
TIME										
00:00 ‡	11.0	3.1	58	18	31	24.1	97.25			Clear
01:00 ‡	11.0	3.3	59	18	33	24.1	97.19			NA
02:00 ‡	10.7	3.5	61	18	32	24.1	97.17			NA
03:00 ‡	10.5	3.6	62	18	27	24.1	97.11			Mainly Clear
04:00 ‡	10.2	4.0	65	17	30	24.1	97.16			NA
05:00 ‡	8.8	5.9	82	17	27	24.1	97.15			Rain Showers
06:00 ‡	8.0	5.7	85	17	25	24.1	97.15			Mostly Cloudy
07:00 ‡	7.8	4.8	81	18	25	24.1	97.16			NA
08:00 ‡	7.8	4.6	80	18	22	24.1	97.24			NA
09:00 ‡	8.2	5.2	81	18	20	24.1	97.27			Rain Showers
10:00 ‡	9.2	6.1	81	18	14	24.1	97.28			Rain Showers
11:00 ‡	10.8	7.5	80	16	15	24.1	97.33			NA
12:00 ‡	13.2	7.7	69	20	9	24.1	97.40			Mostly Cloudy
13:00 ‡	13.8	8.5	70	22	10	24.1	97.45			NA
14:00 ‡	14.3	8.3	67	4	8	24.1	97.45			NA
15:00 ‡	14.8	7.7	62	1	12	24.1	97.49			Mostly Cloudy
16:00 ‡	14.4	8.0	65	7	5	24.1	97.56			NA
17:00 ‡	13.4	8.7	73	14	10	24.1	97.62			NA
18:00 ‡	12.1	8.2	77	16	10	24.1	97.68			Mostly Cloudy
19:00 ‡	11.7	8.0	78	19	8	24.1	97.73			NA
20:00 ‡	10.5	7.4	81	17	6	24.1	97.76			NA
21:00 ‡	10.3	7.2	81	24	9	24.1	97.81			Mostly Cloudy
22:00 ‡	7.3	6.1	92	25	9	24.1	97.84			NA
23:00 ‡	5.7	5.0	95	27	10	24.1	97.86			NA

Notes on Data Quality.

Legend

- E = Estimated
- M = Missing

- NA = Not Available
- ‡ = Partner data that is not subject to review by the National Climate Archives

Date modified: 2014-04-30

Government of Canada Gouvernement du Canada

Canada

Climate

Home > Data

Hourly Data Report for October 17, 2014

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

WINNIPEG INTL A MANITOBA					
Latitude:	49°54'36.000" N	Longitude:	97°14'24.000" W	Elevation:	238.70 m
Climate ID:	5023227	WMO ID:		TC ID:	YWG

	Temp °C	Dew Point Temp °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Visibility km	Stn Press kPa	Hmdx	Wind Chill	Weather
TIME										
00:00 ‡	6.3	5.0	91	36	34	24.1	98.16			Cloudy
01:00 ‡	6.1	4.3	88	36	36	24.1	98.28			NA
02:00 ‡	5.7	3.9	88	36	32	24.1	98.35			NA
03:00 ‡	5.5	3.4	86	35	35	24.1	98.44			Cloudy
04:00 ‡	5.3	3.0	85	35	35	24.1	98.54			NA
05:00 ‡	5.1	2.6	84	36	31	24.1	98.62			NA
06:00 ‡	4.9	2.1	82	36	32	24.1	98.73			Cloudy
07:00 ‡	4.5	1.5	81	36	36	24.1	98.85			NA
08:00 ‡	4.6	1.5	80	35	37	24.1	98.96			NA
09:00 ‡	4.7	1.7	81	36	39	24.1	99.02			Cloudy
10:00 ‡	5.2	2.6	83	36	34	24.1	99.08			NA
11:00 ‡	5.7	2.5	80	36	33	24.1	99.10			NA
12:00 ‡	6.2	2.7	78	36	28	24.1	99.16			Cloudy
13:00 ‡	6.7	2.2	73	1	27	24.1	99.20			NA
14:00 ‡	6.6	2.1	73	1	30	24.1	99.23			NA
15:00 ‡	6.2	1.9	74	36	33	24.1	99.30			Cloudy
16:00 ‡	5.8	2.1	77	2	30	24.1	99.37			NA
17:00 ‡	5.8	1.5	74	2	25	24.1	99.42			NA
18:00 ‡	5.8	1.7	75	3	22	24.1	99.45			Cloudy
19:00 ‡	5.1	1.6	78	1	14	24.1	99.51			NA
20:00 ‡	5.5	1.6	76	1	20	24.1	99.52			NA
21:00 ‡	5.3	1.6	77	35	16	24.1	99.54			Cloudy
22:00 ‡	5.2	1.5	77	36	13	24.1	99.55			NA
23:00 ‡	5.0	1.5	78	4	13	24.1	99.51			NA

Notes on Data Quality.

Legend

- E = Estimated
- M = Missing

- NA = Not Available
- ‡ = Partner data that is not subject to review by the National Climate Archives

Date modified: 2014-04-30

Government of Canada Gouvernement du Canada

Canada

Climate

Home > Data

Hourly Data Report for October 18, 2014

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

WINNIPEG INTL A MANITOBA					
Latitude:	49°54'36.000" N	Longitude:	97°14'24.000" W	Elevation:	238.70 m
Climate ID:	5023227	WMO ID:		TC ID:	YWG

	Temp °C	Dew Point Temp °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Visibility km	Stn Press kPa	Hmdx	Wind Chill	Weather
TIME										
00:00 ‡	4.5	0.3	74	7	8	24.1	99.54			Cloudy
01:00 ‡	3.7	-0.5	74	3	4	24.1	99.54			NA
02:00 ‡	2.8	-0.8	77	3	4	24.1	99.53			NA
03:00 ‡	2.1	-0.5	83	29	4	24.1	99.54			Mostly Cloudy
04:00 ‡	1.6	-0.7	85	36	2	24.1	99.55			NA
05:00 ‡	2.0	-0.1	86	6	6	24.1	99.51			NA
06:00 ‡	2.6	0.3	85	36	3	24.1	99.49			Cloudy
07:00 ‡	3.5	0.7	82	13	8	24.1	99.46			NA
08:00 ‡	3.9	0.4	78	15	12	24.1	99.44			NA
09:00 ‡	4.3	0.6	77	16	16	24.1	99.41			Cloudy
10:00 ‡	4.6	1.1	78	17	15	24.1	99.39			NA
11:00 ‡	4.7	1.2	78	19	21	24.1	99.31			NA
12:00 ‡	5.1	1.8	79	19	24	24.1	99.20			Cloudy
13:00 ‡	4.8	1.8	81	18	27	24.1	99.11			NA
14:00 ‡	5.9	2.0	76	17	28	24.1	98.98			NA
15:00 ‡	6.7	2.2	73	17	28	24.1	98.87			Cloudy
16:00 ‡	6.9	2.2	72	17	34	24.1	98.78			NA
17:00 ‡	6.7	2.4	74	17	36	24.1	98.66			NA
18:00 ‡	6.6	2.7	76	17	31	24.1	98.58			Mostly Cloudy
19:00 ‡	6.4	3.0	79	19	22	24.1	98.53			NA
20:00 ‡	5.8	2.8	81	18	36	24.1	98.44			NA
21:00 ‡	5.9	3.1	82	18	29	24.1	98.40			Cloudy
22:00 ‡	5.6	3.1	84	17	33	24.1	98.33			NA
23:00 ‡	5.6	3.5	86	17	31	24.1	98.16			NA

Notes on Data Quality.

Legend

- E = Estimated
- M = Missing

- NA = Not Available
- ‡ = Partner data that is not subject to review by the National Climate Archives

Date modified: 2014-04-30

Government of Canada Gouvernement du Canada

Canada

Climate

Home > Data

Hourly Data Report for October 19, 2014

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

WINNIPEG INTL A MANITOBA					
Latitude:	49°54'36.000" N	Longitude:	97°14'24.000" W	Elevation:	238.70 m
Climate ID:	5023227	WMO ID:		TC ID:	YWG

	Temp °C	Dew Point Temp °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Visibility km	Stn Press kPa	Hmdx	Wind Chill	Weather
TIME										
00:00 ‡	5.4	3.3	86	17	27	24.1	98.07			Cloudy
01:00 ‡	5.6	3.5	86	17	28	24.1	97.99			NA
02:00 ‡	5.7	3.6	86	17	26	24.1	97.91			NA
03:00 ‡	5.4	3.4	87	18	19	24.1	97.85			Cloudy
04:00 ‡	5.2	3.4	88	17	13	24.1	97.80			NA
05:00 ‡	4.3	3.0	91	22	6	24.1	97.81			NA
06:00 ‡	3.8	2.6	92	20	13	24.1	97.80			Mainly Clear
07:00 ‡	2.7	1.8	94	23	10	24.1	97.83			NA
08:00 ‡	4.4	3.1	91	27	13	24.1	97.87			NA
09:00 ‡	7.5	5.0	84	31	22	24.1	97.94			Clear
10:00 ‡	10.6	6.2	74	32	23	24.1	98.00			NA
11:00 ‡	13.2	6.1	62	33	32	24.1	98.03			NA
12:00 ‡	15.2	6.3	55	32	30	24.1	98.05			Clear
13:00 ‡	15.9	6.7	54	30	25	24.1	98.08			NA
14:00 ‡	16.2	5.6	49	30	28	24.1	98.10			NA
15:00 ‡	17.0	6.0	48	32	26	24.1	98.12			Mainly Clear
16:00 ‡	17.6	6.0	46	31	26	24.1	98.14			NA
17:00 ‡	15.6	5.0	49	31	29	24.1	98.21			NA
18:00 ‡	13.1	4.8	57	33	23	24.1	98.28			Mainly Clear
19:00 ‡	9.1	3.7	69	32	13	24.1	98.34			NA
20:00 ‡	5.9	2.6	79	35	13	24.1	98.41			NA
21:00 ‡	3.9	1.6	85	35	10	24.1	98.45			Clear
22:00 ‡	6.3	3.8	84	4	8	24.1	98.53			NA
23:00 ‡	4.9	4.3	96	1	4	24.1	98.59			NA

Notes on Data Quality.

Legend

- E = Estimated
- M = Missing

- NA = Not Available
- ‡ = Partner data that is not subject to review by the National Climate Archives

Date modified: 2014-04-30

Government of Canada Gouvernement du Canada

Canada

Climate

Home > Data

Hourly Data Report for October 20, 2014

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

WINNIPEG INTL A MANITOBA					
Latitude:	49°54'36.000" N	Longitude:	97°14'24.000" W	Elevation:	238.70 m
Climate ID:	5023227	WMO ID:		TC ID:	YWG

	Temp °C	Dew Point Temp °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Visibility km	Stn Press kPa	Hmdx	Wind Chill	Weather
TIME										
00:00 ‡	3.7	3.3	97	33	8	24.1	98.63			Clear
01:00 ‡	1.0	0.6	97	35	13	24.1	98.69			NA
02:00 ‡	2.0	1.4	96	36	13	24.1	98.77			NA
03:00 ‡	3.8	3.2	96	36	13	24.1	98.84			Mostly Cloudy
04:00 ‡	5.5	4.0	90	36	10	24.1	98.88			NA
05:00 ‡	5.6	3.6	87	2	10	24.1	98.90			NA
06:00 ‡	4.7	3.2	90	33	12	24.1	98.92			Cloudy
07:00 ‡	5.3	3.2	86	1	11	24.1	98.97			NA
08:00 ‡	5.5	3.4	86	1	5	24.1	99.02			NA
09:00 ‡	6.0	3.5	84	6	3	24.1	99.06			Cloudy
10:00 ‡	6.4	3.6	82	8	7	24.1	99.10			NA
11:00 ‡	6.6	3.4	80	20	3	24.1	99.06			NA
12:00 ‡	7.5	3.6	76	18	4	24.1	99.04			Mostly Cloudy
13:00 ‡	9.2	3.8	69	12	8	24.1	98.97			NA
14:00 ‡	10.1	3.6	64	8	8	24.1	98.91			NA
15:00 ‡	11.3	3.4	58	14	8	24.1	98.90			Clear
16:00 ‡	11.7	4.0	59	13	10	24.1	98.92			NA
17:00 ‡	9.7	3.9	67	14	9	24.1	98.92			NA
18:00 ‡	7.3	3.2	75	12	10	24.1	98.91			Clear
19:00 ‡	6.8	3.1	77	12	14	24.1	98.87			NA
20:00 ‡	6.5	3.1	79	13	14	24.1	98.88			NA
21:00 ‡	6.7	3.2	78	13	17	24.1	98.87			Clear
22:00 ‡	6.3	2.8	78	14	19	24.1	98.88			NA
23:00 ‡	6.0	2.8	80	15	23	24.1	98.88			NA

Notes on Data Quality.

Legend

- E = Estimated
- M = Missing

- NA = Not Available
- ‡ = Partner data that is not subject to review by the National Climate Archives

Date modified: 2014-04-30

Government of Canada Gouvernement du Canada

Canada

Climate

Home > Data

Hourly Data Report for October 21, 2014

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and when it is observed.

WINNIPEG INTL A MANITOBA					
Latitude:	49°54'36.000" N	Longitude:	97°14'24.000" W	Elevation:	238.70 m
Climate ID:	5023227	WMO ID:		TC ID:	YWG

	Temp °C	Dew Point Temp °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Visibility km	Stn Press kPa	Hmdx	Wind Chill	Weather
TIME										
00:00 ‡	5.3	2.3	81	16	22	24.1	98.91			Clear
01:00 ‡	4.8	2.0	82	15	23	24.1	98.88			NA
02:00 ‡	4.6	2.0	83	15	26	24.1	98.88			NA
03:00 ‡	4.3	2.0	85	15	21	24.1	98.88			Clear
04:00 ‡	4.1	2.1	87	15	24	24.1	98.83			NA
05:00 ‡	4.3	2.5	88	15	24	24.1	98.83			NA
06:00 ‡	4.1	2.5	89	15	22	24.1	98.81			Clear
07:00 ‡	3.9	2.3	89	15	22	24.1	98.81			NA
08:00 ‡	4.8	2.5	85	15	25	24.1	98.75			NA
09:00 ‡	6.9	3.4	78	16	26	24.1	98.73			Clear
10:00 ‡	9.2	4.0	70	16	31	24.1	98.73			NA
11:00 ‡	11.8	5.0	63	15	26	24.1	98.67			NA
12:00 ‡	13.3	5.0	57	14	32	24.1	98.59			Clear
13:00 ‡	15.1	5.1	51	15	32	24.1	98.48			NA
14:00 ‡	16.3	4.4	45	15	40	24.1	98.33			NA
15:00 ‡	16.5	4.6	45	14	41	24.1	98.23			Clear
16:00 ‡	15.9	4.7	47	15	43	24.1	98.18			NA
17:00 ‡	14.7	4.8	51	15	40	24.1	98.19			NA
18:00 ‡	13.0	4.5	56	15	31	24.1	98.19			Clear
19:00 ‡	12.1	4.4	59	15	29	24.1	98.17			NA
20:00 ‡	11.8	4.3	60	15	37	24.1	98.15			NA
21:00 ‡	11.7	4.2	60	15	38	24.1	98.14			Clear
22:00 ‡	11.7	4.2	60	16	39	24.1	98.10			NA
23:00 ‡	12.4	4.7	59	17	45	24.1	98.08			NA

Notes on Data Quality.

Legend

- E = Estimated
- M = Missing

- NA = Not Available
- ‡ = Partner data that is not subject to review by the National Climate Archives

Date modified: 2014-04-30