Peace Project Water Use Plan

Monitoring Program Terms of Reference

- **GMSMON-18 WLL Dust Control Monitoring**

Addendum 3

April 2, 2014

A3 Addendum to GMSMON-18 WLL Dust Control Monitoring

A3.1 Addendum Rationale

This project will continue the long-term air quality monitoring program in the Finlay Arm of the Williston Reservoir and more thoroughly address the original Terms of Reference. The first contract for this work focussed on developing the correct tools to address the regulatory requirements for Air Quality Monitoring quantifying the 24-hour average levels of particulate matter (PM) less than 10 µm and less than 2.5 µm in diameter (PM10 and PM2.5) in the airshed of the Finlay Arm. This addendum will add new metrics based on the interests of the local Frist Nation community at Tsay Keh Village. The monitoring will track daily maximum PM10 and PM2.5 concentrations, the duration of the maximum concentrations, visual correlation of the dust storm events, dustfall measurements and an expanded reservoir monitoring network that will enable more effective dust mitigation trial monitoring and contribute to the data requirements of Dust Prediction modelling (GMSWORKS-20).

The proposed monitoring program and the resulting data will provide additional means to evaluate the effectiveness of the control measures that will be used to reduce the emissions of PM10 and PM2.5 caused by wind erosion on the exposed beaches of the Williston Reservoir. Acquiring continuous data is important for assessing whether the PM levels are within the proposed standards set by the Provincial and Federal regulatory agencies. The combined data set can be used to evaluate the degree of exposure to airborne PM for people living in this area on an instantaneous basis, an event basis (storm duration plus maximum concentration) and on a daily average basis (regulatory).

In 2008 through 2010 this project conducted air monitoring throughout the Finlay Arm of Williston Reservoir. In 2008 and 2009, data collection occurred from early May through late June, a period coinciding with the lowest water levels and greatest potential for dust emissions from Williston beaches. In 2010, air monitoring was extended at a subset of locations through to the end of August due to low reservoir elevation that resulted in a longer period of beach exposure to wind and consequently a longer dust season. In 2011, the instrumentation was replaced with the improved and more suitable monitoring units allowing for monitoring air quality throughout the dust season in the drawdown zone and throughout the year in the communities of Tsay Keh and Fort Ware.

A2.1 Long-Term Air Quality Monitoring Program

The long-term air quality monitoring program is designed to answer the management question and objectives of the project as described in the original TOR.

The program includes:

- Monitoring concentrations of PM10 and PM2.5 and meteorological conditions (wind speed, wind direction, temperature, relative humidity, and atmospheric pressure) at all study sites
- Baseline monitoring stations
    - Tapered Element Oscillating Microbalances (TEOMs) installed at two sites, one each in the village of Tsay Keh and Fort Ware, have been in operation since December 2011. These instruments collect continuous air quality data that will allow us to understand the magnitude of daily maximum concentrations, the duration of dust storms, and the daily average concentrations.

- Installation of remote cameras that will be triggered to capture the visual images when dust concentrations exceed a specific threshold and/or wind velocities exceed a specific threshold. This will enable a calibration of the visual impact with the monitoring data.
- Dustfall monitoring stations will be established in Tsay Keh Village to improve our understanding of the impact on the community's quality of life.

- Remote air quality monitoring stations
  - Eight stations have been established at the same remote sites over the past 3 seasons along the shoreline of the reservoir. These stations will include a suite of meteorological instrumentation (wind speed and direction, temperature, precipitation and relative humidity). Air quality will be measured using two instruments: BGI's (regulatory frequency) and ESamplers (continuous monitoring). Operation of these stations will be from spring thaw to the first snowfall of the season (Mid October to Mid November) the 24-hour PM aerosol mass measurement will be taken every six days, at the same day the continuous ESampler data will be downloaded along with hourly average meteorological measurements.
  - An identical suite of instruments will be set up at the Tsay Keh baseline station to quantify the bias of the remote instruments.
- PM chemistry analysis for selected samples.
- QA/QC procedures (e.g., calibration of instruments, filter blanks, performance and system audits).
- Data analysis: The Baseline and Remote data set will provide the means to characterize and quantify the regional average 24-hour PM levels as a function of location and meteorological conditions in the Finlay Arm of Williston Reservoir. Analysis will include time series plots of the mean PM concentration as a function of location to compare measurements to criterion set by the regulating agencies. This data set will also characterize and quantify the maximum PM concentration as a function of location and meteorological conditions in the Finlay Arm. Analysis of this data will include time series plots of the maximum PM concentrations on hourly and/or daily time steps. The accumulation of the continuous record will form the basis for determining spatial and temporal trends in the regional air quality and link the trends with dust mitigation practices in the Finlay Arm of the reservoir.
- Data reporting will include the development of a database to store all data as well as semi-annual reports (see Section A2.3 for details).
- Engagement with the communities of Tsay Keh and Fort Ware.

A2.2 Revised Deliverables for GMSMON -18 WLL Dust Control Monitoring

All deliverables listed in the ToR.

A2.3 Revised Schedule

Ongoing implementation of the long-term air quality plan will continue in April 2014 the schedule is anticipated to be as follows:

- Air quality monitoring equipment maintenance and calibration – February and March 2014.

- Re-Installation of air quality monitoring and meteorological equipment at TKD, Fort Ware, and remote sites – March and April 2014.

Once re-installed the remote equipment will require site visits on a 6-day cycle to replace filters, download data, and provide any necessary maintenance. Remote stations will be removed from the field each year when the snowfall is expected to cover the beaches for the fall and winter period somewhere between October 15 and November 15. Remote equipment will be re-installed in the spring of the following year. Baseline stations located in Fort Ware and Tsay Key will operate year round with equipment maintenance and calibration recurring every 2nd year. Draft semi-annual reports are due in February and September and final reports in March and October of each year.

A2.4 Revised Budget for GMSMON-18 WLL Dust Control Monitoring

Total revised implementation cost: $5,621,243.