

STATE OF ALASKA

FRANK H. MURKOWSKI, GOVERNOR

DEPT. OF ENVIRONMENTAL CONSERVATION
DIVISION OF AIR QUALITY
AIR MONITORING & QUALITY ASSURANCE

555 Cordova Street
Anchorage, AK 99501-2617
PHONE: (907) 269-3070
FAX: (907) 269-7508
<http://www.state.ak.us/dec/>

October 13, 2005

Jim Kulas, Manager Environmental
Teck Cominco Alaska Inc.
Red Dog Operations
3105 Lakeshore Drive
Building A, Suite 101
Anchorage, AK 99517

Re: Comparison of Total Suspended Particulate Collection Efficiency of a HI-Vol Particulate Collection System and a R&P 1400 AB TEOM Particulate Collection System

Dear Mr. Kulas:

The following is a response to the study plan Teck Cominco Alaska Inc. submitted to the Department of Environmental Conservation in August regarding comparison of the total suspended particulate collection efficiency of a HI-Vol particulate collection system and a R&P 1400 AB TEOM particulate collection system.

I. Purpose of Proposed Study

Teck Cominco is currently conducting air sampling for lead and zinc within the boundary of their monitoring operations to assess levels and potential transport of airborne dust containing lead and zinc. Monitoring is being performed using the R&P TEOM which is a continuous sampler. Teck Cominco would like to compare the TEOM results to the Wedding TSP sampler results so that they can use older TSP data in a historical data modeling exercise. They do not intend to use TEOM data for PSD/Title V permit purposes or to compare lead monitoring results to the quarterly standard.

The stated purpose for this study is to develop a relationship between the TEOM and HI-Vol sample collection systems and the comparison of their ability to measure TSP, lead (Pb), and zinc (Zn). Subsequently, Cominco would like to incorporate the relationship into the historic fugitive emission model for the Red Dog Mine that is currently under development, and to gain an understanding of how TEOM monitoring results compare to approved TSP and Pb sampling devices.

II. Finding

The layout and operation of this study appears to be well thought out and should provide good data for use in developing a comparison when sampling for lead with an EPA TSP Hi-Vol (FRM) sampler and the TEOM method sampler configured to collect TSP. DEC supports Teck Cominco's intent to use a continuous monitoring platform to collect Pb/TSP in lieu of the manual sampling method for collecting TSP/Pb data as the continuous sampler will capture a more complete picture of the TSP and Pb/Zn levels over the selected sampling period while minimizing operating costs. Based on the intended use of the data and the department's review of Teck Cominco's sampling plan, the

Clean Air

department believes that the procedures listed in the sampling plan will be sufficient to develop the correlation desired by the facility.

III. Future Considerations

While the sampling plan proposed for this monitor project is sufficient for the intended use of the collected data, the sampling plan would require some additional considerations if the data were to be used in a PSD/Title V/standard compliance monitoring effort. The following information is provided for informational purpose and should be considered if the need should arise in the future to use TEOM TSP/Pb data for a regulatory compliance purpose.

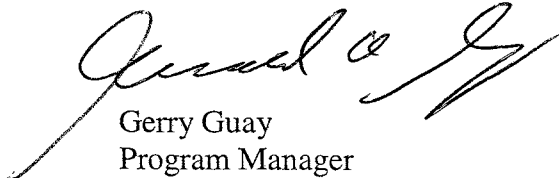
1. **Sampling Time Frame:** Demonstration of comparability between two different monitoring platforms usually requires the collection of 12 months of data normally using a 1-in-3 sampling schedule. Collecting data using a 1-in-2 sampling schedule would provide a more robust dataset, but is considered very labor intensive. The 12-month sampling period is normally selected to provide a good interpretation of the annual pollution cycle in the area. This is especially important when local meteorology changes drastically throughout the year as it does at the Red Dog Mine. To ensure that a good correlation is developed, it is critical to correlate the TEOM data with the HI-Vol data for all seasons in order for the two methods to be considered comparable.
2. **Completeness:** The comparison process requires a demonstration to show statistical significance of both the proposed number of collected samples (Pb-Zn/TSP samples using the Wedding HI-Vol sampler and the R&P TEOM) and the statistical formulas employed to ensure a valid correlation exists between the two methods. EPA's AMTIC web site contains guidance for establishing these types of correlations between manual and continuous PM data sets.
3. **Accuracy:** It is important to address accuracy for all aspects of the monitoring. This includes on-site gravimetric analysis of TSP filters including filter conditioning criteria/controls/ frequency, QC check standards for mass, temperature, relative humidity, pressure, time standards, leak checks and QC check frequencies/criteria, and calibration QC check frequency/criteria of TEOM microbalance, etc. We encourage the use of tables for addressing all QC criteria for a study, as well as including any independent field/gravimetric lab audits (frequency and acceptance criteria) of on-site operations.
4. **Comparability between analytical methods:** The current study analyzes Pb/Zn samples by XRF and references Cooper Environmental Services (CES) XRF-PM standard operating procedure (SOP), but specific criteria are not presented for determination of comparability. For a more in depth study, we recommend inclusion of a subset of sample filters analyzed by both XRF and one of the acid digestion/analytical procedures (Flame AA, ICPOES, ICPMS, etc). Including these analyses helps determine agreement between the two analytical methods for filter analysis as well as laboratory precision criteria. We also note that 40CFR Part 58 Appendix B indicates that if the monitoring is for PSD purposes, the monitoring operations are required to participate in EPA's National Performance Audit Program (NPAP). This program provides for mail order audits of flow rate (both Hi-Vol and low volume) and Pb on glass fiber filter strip. In a previous Pb-TSP study, Cooper Environmental participated in a type of blind audit different than the spiked Pb nitrate filter strips as used in EPA's Pb filter strip audit program that provided a means to independently

assess Pb/Zn analyses by CES. We suggest incorporating this procedure into the study's regimen. To enroll in EPA NPAP blind audit program for the Pb on TSP, HI-Vol and Low-Vol flow audits, please contact Mark Shannis of USEPA (919-541-1323).

5. **Precision:** A more robust monitoring study would want to address how sampling and analytical precision will be assessed for each sampling/analytical method. This process would need to describe detailed procedures/methods, frequency, and acceptance criteria. In order to validate the precision of the TSP data, two HI-Vol systems would need to be collocated. We would suggest setting one HI-Vol on a 1 in 3 day schedule, and the other on a 1 in 6 day schedule, with a TEOM running continuously. With the increased use of continuous monitors, EPA is proposing changes to 40CFR for PM continuous methods which will require precision to be assessed via a percentage of collocated continuous monitors within a monitoring network. We assume this would require a PSD related study to have two TEOM samplers sited next to each other to assess precision.
6. **Representativeness:** The process for siting a sampler must show/specify that the sampler is appropriately located for the study per EPA PM siting criteria. If a TEOM sampler is installed indoors and uses an extended probe which goes through the roof, the sample PM inlet must be located at the same height as the TSP sample inlet and the spacing must conform to EPA siting criteria. Other issues that will need to be considered are:
 - a. Length of the extended probe from the top of the TEOM instrument case to the PM-TSP inlet
 - b. Frequency of QC flow checks (including at sample inlet)
 - c. Need to maintain/verify design flow within specified criteria from the inlet through to the flow sensor in the TEOM case (particularly during strong temp differentials between inlet air temp and sample air within the TEOM where temperature/flow rate is measured).

In summary, DEC, Air Quality division finds the proposed plan is adequate for your purposes of developing a relationship between the TEOM and HI-Vol sampling systems and the comparison of their ability to measure TSP, lead (Pb), and zinc (Zn). However, if in the future Teck Cominco wishes to expand the scope of this sampling plan to encompass PSD/Title V/standard compliance monitoring, the suggestions listed above should be considered. If you have any questions regarding this letter, please contact me at 269-3070 or Heidi Strader at 269-7676.

Sincerely,



Gerry Guay
Program Manager

cc: Tom Chapple, Director Air Quality
Rich Sundet, DEC, CS
Ed Fogels, DNR
Scott Arnold, DHSS