

STATE OF ALASKA

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November 28, 2005

CERTIFIED MAIL: #7002 2410 0005 3104 4355
RETURN RECEIPT REQUESTED.

Jim Kulas, Environmental Superintendent
Teck Cominco Alaska Inc.
3105 Lakeshore Drive
Building A, Suite 101
Anchorage, AK 99517

Subject: Protocol for Evaluation of Fugitive Dust Sources of Lead and Zinc at Red Dog Mine

Dear Mr. Kulas:

The State Team has completed its review of Teck-Cominco Alaska Inc. (TCAI) *Protocol for Evaluation of Fugitive Dust Sources of Lead and Zinc at Red Dog Mine* prepared by SENES-Consultants Limited, dated September 26, 2005. Specific comments were provided by DEC Air Permits Program, and DNR Office of Project Management and Permitting (including fisheries managers in the DNR Office of Habitat Management and Permitting). In considering this review and its non-regulatory status¹, the state agencies have elected to provide input which is not detailed, but more advisory. In this review, the State Team assumes that TCAI will continue to enhance the level of detail, quality and expertise as this project unfolds and communicate the thinking and logic of future project adjustments and improvements. Specific comments of the team are contained below.

Table 2.1 Mine Operations

The particulate matter emission estimation methods for mine operations and some mill operations rely exclusively on AP-42 emission factors. DEC staff has expressed concern about the applicability of those factors for your operations. Since the company has identified emission factors to be critical elements in the modeling work, we trust TCAI will critically evaluate existing emission factors and make the effort to develop site specific emission factors where needed. We would like to have further discussions about the selected emission factors before they are used in the modeling including the underlying assumptions used in selecting those values (ex. road silt content)

¹ TCAI is proceeding with this project as an environmental inquiry. The state agencies are not working in a regulatory mode because the wind transport of mine dust is not resulting in a compliance deficiency either inside or outside of the ambient air boundary for the Red Dog Mine.

Also, it is not clear whether all the fugitive emissions associated with material hauling will be accounted for in the emission inventory. For example, the protocol does not make reference to those emissions that result from the erosion of material from the cargo on the ore trucks. Likewise, the protocol does not provide specifics regarding emissions from other vehicles not necessarily connected to ore handling, but routinely travel throughout mine area property. Finally, it is not clear whether emissions from all the service roads (not just those that are routinely used) will be accounted for in the model.

Section 3.2 CALMET

A cursory review of the twelve vertical layers for the wind field leads the Department to believe there might be an error in the Middle Level Height (line 12) calculation.

In general, there is some concern about CALMET and the grid data with regard to how much it simulates reality. The Department expects significant deposition to take place on windy days that would prevent most of the fugitive dust material getting very high into the air. If the model indicates the contrary, the modeling results should be critically re-assessed as they may lead to erroneous conclusions.

3.2.1 Meteorology

The modeling protocol does not mention the Sled and Anarraq meteorological stations and whether these, or other stations, are located in or near the modeling domain. If they are, please note whether the datasets are concurrent with the Mine PAC and Bons Creek (Airport) data. If so, it is expected that TCAI would include data from these sites, or otherwise document the reason why the data was not included as part of the modeling exercise.

The statement mentioned in the modeling protocol, "...it is anticipated the hourly meteorological field will be developed over the domain for hours corresponding to the monitoring data..." is not clear. Does TCAI plan to pair the modeled results to the monitoring results on a time and space basis? Pairing in time is inappropriate when comparing values representing different meteorological data years.

Using a constant meteorological data set is appropriate for comparing the affects of emission controls and changes in emission inventories on ambient impacts. This practice, however, introduces a level of potential error when comparing modeled impacts to monitoring data collected during a different meteorological period (due to year-to-year variation in meteorology). Please note this potential error when comparing modeled impacts to monitoring data.

The surface roughness parameter used in the model is a critical factor not to be overlooked as it relates to surface roughness of the snow. The snow will most likely not stay soft; instead it will form a hard packed light weight material which will not stop or collect much of the material that comes in contact with it. Because of this, the airborne material that falls out of the air column will likely blow and tumble along the snow surface to much greater distances than the model might predict. In essence, deposition may not be deposition, but deposition is comprised of fallout and lateral transfer along the surface perhaps meters or even kilometers away from the initial modeled location of deposition. The modeling protocol does not appear to address this

important real world situation. While we do not have specific advice to offer, we believe the phenomena warrants further inquiry and refinement.

3.2.2 Terrain

One degree DEM data is probably adequate for the Red Dog topography. However, DEM files sometimes contain very notable errors. Therefore, it is recommended to compare the DEM elevations to a USGS or similar topographic map of the area. Thereafter, correct errors, as needed, and discuss this comparison in the modeling report.

The protocol initially mentions the inclusion of only one body of water (the tailing impoundment), but then states that additional wetland and body of water information will be added prior to modeling. It is not clear whether or not the freshwater impoundment (Bons Pond) and the streams around the mine site will be included in the modeling.

3.3 CALPUFF Modeling

Particle size distribution is normally a key component of a deposition analysis. It is questionable as to whether the distributions from AP-42 would be adequate for performing a deposition analysis for the Red Dog mine fugitive emissions. We understand your work will include new site specific sample collections of wind erodable material. We would appreciate knowing if, or to what extent, the project work will incorporate any new particle size data into the deposition modeling.

3.3.1 Source Parameters

Source characterization is a critical component of any modeling analysis. The modeling protocol does not provide a discussion on the assumptions related to the selection of emission factors and the assumed efficiency of pollution control measures and equipment.

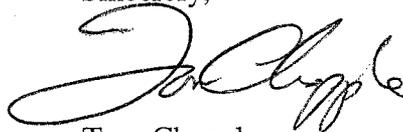
Regarding roadway lead and zinc speciation, the protocol does not provide a discussion on values used for the model as representative of actual conditions for the selected modeled years. We would appreciate greater clarity on this. For example, if the sample analysis to be used is more than two years old, it may be advisable that TCAI re-sample concentrations of these pollutants. Figure 4 of the Protocol report seems to indicate that new road sampling will occur or has occurred. We are uncertain if the lead, zinc and particle size characteristics of the samples indicated in this figure will be used for the modeling.

TCAI appropriately plans to use the UTM coordinate system for the modeling exercise. UTM coordinates are typically based on one of two datums, the North American Datum 1927 (NAD27) or the North American Datum 1983 (NAD83). However, the modeling protocol does not indicate whether the source coordinates are in the same datum as all other coordinates, nor does it indicate which datum will be used in the modeling analysis (e.g., NAD27). Please use the same datum for all coordinates and note in the modeling report which datum was used for this analysis.

The plan does not currently describe the emission release point parameters for modeling inputs. This would be helpful to know if we are to provide a full depth of advice on the modeling work.

If you have any questions or require additional information, please contact me.

Sincerely,



Tom Chapple
Director

On Behalf of the State Team

cc: Kurt Fredriksson, DEC Commissioner

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