

Snap Lake Environmental Monitoring Agency



**COMMENTS FROM THE SLEMA ENVIRONMENTAL ANALYST
ON THE
AIR QUALITY, METEOROLOGICAL MONITORING AND EMISSIONS REPORTING
2005 ANNUAL SUMMARY**

February 2007

We would like to thank you for the opportunity to review and provide comments on the on the DRAFT *Snap Lake Project Air Quality, Meteorological Monitoring and Emissions Reporting 2005 Annual Summary*. Included in this document is a list of observations and recommendations from SLEMA on the report. SLEMA has a responsibility to review, comment and consult with parties on related issues. Our mandate is outlined in Section 4.2 of the Environmental Agreement between De Beers and the signatory Parties. References to Air Quality and Air Emissions are contained in the Environmental Agreement in the specific sections mentioned below

Environmental Agreement

The Environmental Agreement Article VI section 6.3 (d) outlines requirements for an Air quality management plan and Section 6.3 (e) outlines the annual reporting requirements. To fulfill this commitment De Beers produced an *Air Quality and Emissions Management Plan-February 2006* (AQEMP). In addition section 7.2 of the Environmental Agreement outline the Environmental Monitoring Program that is meant to be complimentary to the management plans. In section 7.2 (a) provide more specific information on what is to be included as a minimum for an air quality monitoring program. In support the AQEMP De Beers produced an *Air Quality Monitoring Program – September 2005* (AQMP).

Observations and Comments

The report title infers that this Draft is intended to be an attempt to harmonize both the AQEMP and AQMP. However, this not clear at the beginning of the report, if it is indeed intended as a harmonized report then this should be clearly indicated as such. For the purposes of this review we will focus on the requirements and objectives from the Environmental Agreement, AQEMP and the AQMP and reference the Environmental Assessment Report (2002). The reason for this is that as the document stands it is not clear to what to evaluate the report against. The information presented in the report appears to fulfill aspects of both the AQEMP, which mainly deals with emission estimates, fuel use summary and the fugitive dust abatement program. In addition the report includes aspects of the AQMP, which deals with meteorological, hydro-meteorological, total suspended particulates (including PM₁₀, PM_{2.5}), and dustfall monitoring.

Report - Section 1.2 Objectives and Scope

The objectives listed in the report were taken from the AQMP – September 2005, however none of the objectives from the AQEMP have been included in the report. The AQEMP however is the document outlining emissions estimates and the methodologies for obtaining these estimates, as well as fuel use summary. Emission estimates and fuel use were included in the annual report yet the objectives from the AQEMP were not. It is for this reason that we recommended the objectives for both the AQMP and section 1.1 of the AQEMP be adopted and

included in the report. This would provide a more comprehensive approach on air quality and be a more inclusive annual report.

Report - Section 2 Meteorological Monitoring

2.1 Meteorological Station

This section should be updated to include the information on the individual monitoring parameters as outlined in section 2.1.4 *monitoring parameters* of the AQMP. Table 2-1 Meteorological station components could be updated to accommodate this to include the height of the individual sensors. (i.e. Temperature at 2m, etc.)

2.2 Precipitation

The reference to the installation of a second meteorological monitoring station is misleading and therefore should be revisited and referenced properly. While monitoring parameters such as wind speed, precipitation, air temperature, etc. are monitored by both stations, there are significant differences between these two stations. The objectives and orientation of the sensors for the new second station are different and therefore should be mentioned in the document. Discussion of the similarities and differences between the two monitoring stations should be included. The annual report, section 2.2.1 makes the reference to the installation of a second meteorological monitoring station in 2005 and this station was installed “to provide data for the calculation of lake evaporation.” Referring back to the AQMP section 2.2, the station is referred to as a **Hydro-meteorological** monitoring station, which also is “designed to measure parameters that allow calculation and recording of lake evaporation rates.” The assumption is that the “second Meteorological station” from section 2.2.1 of the Annual Report and the **Hydro-Meteorological** (HYD MET) station from section 2.2 of the AQMP is the same. This however should be clarified and include along with a table similar to Table 2-1 of the Annual report incorporating sensor heights, and instrumentation information. Sensor heights for the Hydro-meteorological were presented in section 2.2.4 of the AQMP.

Regarding data from the Hydro- meteorological station, the AQMP section 2.2 says the station will be administered by the AQMP yet the data ties in with the Hydrology monitoring program, the data from the station will be processed, stored, analysed and reported by the Hydrology team. This infers the data collected from the station (Hydro-meteorological station) would be reported by and found in the **Hydrology program** and not in the Air Quality program.

However, we support and encourage the use of the data from the Hydro-Meteorological station in the Air Quality annual report. Using the information from both stations will allow for better modelling and an understanding of the local meteorology of the Snap Lake region. In addition both stations should be able to work parallel with one another allowing for maintenance, breakdowns, technical difficulties, etc. with one or the other instruments, without loss of data or at least minimize data loss. Data loss is evident with the programming error experienced rendering the precipitation data unusable, while these conditions are

expected from time to time, attempts to mitigate against data loss and improve data recovery is encouraged. Exploring the use of the Hydro-meteorological station for this purpose should be considered.

Furthermore, the lack of precipitation data that exist from November – March due to the MET STN being equipped with only a Tipping Bucket Rain Gage also demonstrates the importance of using data from the Hydro-Met station. Given that Snap Lake is north of 60, temperatures in this region are below 0 degrees for up to 6 months of the year. Therefore, using only the MET STN is inadequate for precipitation data and it is recommended that the MET STN be upgraded with a more versatile sensor to measure total precipitation.

General observations section 2

Section 2 of the Annual Report should include an additional heading for comparison of the annual data collected to the EAR report data, as is a requirement of the Environmental Agreement. In addition detailed actions to improve data recovery should be included for each of the parameters. It is recognized that data recover for most of the parameters has been greater than 90% for almost all the measurements and this achievement is applauded. However, if corrective actions are planned to improve data recovery than this information should be included. There is also questions regarding the movement of the MET-STN, during the EAR baseline the MET-STN was located South East of its present location. While the move is not expected to have significant impact on the data, we suggest better planning to keep stations in the same locations. This will also help with continuity of information by minimizing downtimes. Lengthy downtimes should be avoided and we suggest that procedures be revisited to avoid downtimes and address issues in a more timely fashion.

Section 3-Particulate Monitoring

It is recommended that the particulate monitoring program be expanded to include stations in the Regional Study Area as well as the camp vicinity. While TSP, PM10 and PM2.5 emissions are expected to be at maximum levels during operations, it is important to have background data to compare future results. While it is important to demonstrate “fence-line” compliance for particulates, it is also important to monitor beyond the “fence-line” of the camp to understand the extent the finer particulates may be transported. The long range transport of the finer particulates can have adverse affects on the receiving environment, namely wildlife, vegetation and water. In addition during the winter months there is a spike in vehicle traffic that extend beyond the camp “fence line” with the construction of and use of the winter spur road during January to March, therefore it is recommended that the monitoring program be extended along this corridor to reflect this spike in activity during the winter months.

It needs to be recognized that the mine exhaust vents located on the north shore of Snap Lake do not have sufficient monitoring stations for TSP, PM10, PM2.5 or Dustfall. The only station currently located on the North shore of Snap Lake is DF007 (dustfall station 7) and this station is located some distance from the exhaust vents. It is our opinion that the underground exhaust vents represents a significant source affecting air quality and we feel the current

monitoring design does not capture this source. It is for this reason that we recommend the expansion of the monitoring programs to extend to the North Shore of Snap Lake taking into account the underground exhaust ventilation.

The poor data recovery for the Hi-Vol samples and Partisol Samples is of great concern for 2005. It is generally accepted that difficulties with equipment will exist. However, with such a poor return of 2% data recovery (half being attributed to cold weather and half attributed to relocation of the stations) these issues should have triggered corrective actions and not result in such poor performance. Yet the report provides little or no information on corrective action taken by De Beers or future planned activities to improve such poor performance. Section 3.1.4 discussion simply states that it is recommended that the particulate sampling program be review on ways to improve data recovery. This information is intended to be a component of the annual report Section 6.3 e (iv) of the Environmental Agreement and therefore it is recommended that detailed corrective actions taken and planned actions are included in the annual report.

De Beers was aware of cold weather issues during the 2000-01 EAR data collection. This resulted in Hi VOL samplers being operated only during warmer periods from May to April. As the Snap Lake project moves into production year round TSP information is an important part of the air quality program and overcoming these challenges experienced is recommended. It is expected that TSP levels would be higher in the winter months, as is the case with the trends in dustfall.

It is also recommended that De Beers characterize TSP samples collected to get an understanding on what the TSP is made up of. The analysis currently being carried out is simply a gravimetric (weighing) method. However, if additional analysis was carried out on the sample, harmful compounds can be identified. The information would help understand the extent of impact by identifying the levels of potentially harmful compounds in the samples. In addition the EAR presented predictions for metals and polycyclic aromatic hydrocarbons present in diesel and processed kimberlite (table 7.3-8) obtained from literature, yet these parameters have not been tested in the existing plan.

It is recommended that the dustfall monitoring include metal scans and characterization of the dust collected from the monitoring stations. One of the goals of the program is to monitor fugitive dust to determine the effects of dust deposition on the surrounding environment (EA section 7.2 a (ii)). This can only be done if the composition of the dust and particulate matter being deposited is known. While predictions are presented in the EAR the annual report provided no information on the composition of the dust and therefore predictions made in the EAR cannot be proven with the existing program. The information is valuable when determining the effects that air quality has on a regional scale and again by knowing the compounds that are present in dust will allow for a better understanding on the effect that it may have on the receiving environment.

It must be noted that this section does not contain a comprehensive snow survey program and in fact does not include any snow survey information. It is recommended that the air quality monitoring design and incorporate a snow survey program. Snow surveys are a valuable source of information relating to

the deposition and long range transport of contaminants. They also provide valuable information on quality, quantity and mechanisms these contaminants are transported to the receiving environment. The Air quality section (section 7.2.2.2.2 of the EAR) show snow survey being part of baseline data. However, no additional work has been done in this area since the EAR report. With the increased activity in the regional area as well as the increased emissions realized since 2004, it is suggested that a comprehensive snow survey program would aid in determining the project impacts.

General observations section 3

It is noted that for each of the particulate monitoring programs HI-VOL, Fine particulate and dustfall programs. Monitoring station locations within each of the programs have changed from year to year, due mostly in part to construction activities around individual stations in question. This is a concern and should be addressed.

Moving the monitoring stations result in down-time and loss of data which has been stated in several sections throughout the annual report. Movement of stations from year to year also result in slight variations in the data recovered, making it difficult to compare information annually. These slight variations coupled with the limited number of monitoring stations to begin with, can greatly decrease confidence in the data presented.

It also maybe suggested that the stations are moved out of convenience to avoid collecting what potentially are high values due to adjacent construction activities, in fact this is what we are attempting to establish, to what extent the project is affecting the surrounding environment and construction activities are part of that assessment. NOTE we are **not** suggesting this is the case and understand changes from time to time are required and is an integral part of projects of this magnitude. However, we are recommending that better planning and consideration be given to the location of these stations prior to installation. This will minimize movements of the stations for later successive programs.

We also suggest that if movement of stations is unavoidable, alternate station locations should be selected and monitored prior to existing stations being decommissioned. Sampling of both stations should be performed in parallel to one another. This will allow the data to be compared and demonstrate variations are within acceptable allowances or in cases of exceeding acceptable limits, allow alternate sites to be selected and monitored. For example, in the case of Hi-Vol 3 section 3.1.2 of the annual report "*Hi-Vol 3 retained its original name because sampling results were not expected to be affected by the relocation.*" Yet there has been no information to prove or disprove this finding, there was no parallel testing/sampling performed at the new station 200 M north. Furthermore, this practice will avoid down times and discontinuity in data recovery and result in improved confidence levels.

Within this section there were many values presented from various jurisdictions for targets, guidelines, objectives and standards De Beers is adopting as their internal air quality objectives. While these values are referenced in the paragraph, Section 8 Reference section does not include these

references and should be undated. In addition Table 3-2 does not have unit measurements included on the table.

Section 5 – Summary of 2005 Emissions

The AQEMP was developed by De Beers for compliance with Article 6.3(d & e) and 7.2 (a) of the Environmental Agreement (Section 1.1 AQEMP). The AQEMP was to present results of the monitoring programs and provide a discussion in an Annual Report. Objectives and Scope. Section 1.1 of the AQEMP outline the three main components of the management plan namely, 1) Emission estimates, 2) fuel use summary and 3) fugitive dust abatement. Review of the Annual report showed only two of the three components with emission estimates and fuel summary provided.

Further review of section 5.1 in the Annual report indicated that Article 6.3 of the EA is the section requiring annual estimates of emissions from the facility, apportioned by major sources. In fact this information is found in Article 7.2 of the EA. "Emissions include at a minimum, NO_x, SO₂ PM apportioned as TSP, PM₁₀, and PM_{2.5} and green house gas (GHG) apportioned as carbon dioxide (CO₂) Methane (CH₄) and Nitrous Oxide (N₂O)" and Article 7.2 continues to list additional requirements required for compliance with the EA.

While the emission estimate summaries included in the 2005 annual report may be consistent with the techniques used in the EAR. Estimates alone should not be used as the project is moving from baseline and prediction to impact monitoring. We are of the opinion that while emission calculations have been and continue to be an important part of the emission summary. We feel that "real data" is required in order to support the calculations and predictions being made. Basing emission calculations on fuel consumption alone does not reflect true emissions released from the project. In addition monitoring and measuring emissions from the major point sources would allow identification of areas as potential targets for management strategies in order to reduce emissions, which is also a part of the EA.

Table 5-1 of the annual report contain the emission rates for 2005 (construction). These rates were calculated based on the fuel consumption by the individual sources, yet there is no fuel analysis data presented in the report to confirm fuel factors used in the calculations presented. Section 7.2 (a) (ii) of the EA requires confirmation of low sulphur diesel fuel. Therefore it is recommended that a fuel analysis or a fuel certification be presented in the annual report, as part of these estimates in order to demonstrate confidence in the fuel factors used. Fuel analysis should also include a discussion of the contaminants found in the fuel, highlighting contaminants of concern.

Using existing methods power generation, mine heaters as well as the fleet would produce equivalent emissions in the event that each of the facilities were to burn the same amount of fuel. However, this is should not be the case with the differences in efficiency for each facility and these differences are not reflected using existing methods. With different facilities producing varying emissions, it is recommended that stack emissions be monitored whenever possible to capture these differences and thereby provide weighted emissions for

each facility and not bases solely on the volume of fuel consumed. As previously mentioned, it will aid in management strategies to employ with efforts aimed at minimizing emissions by allowing targeting the largest emission contributors which may not be the largest fuel consumers.

Fuel use summary presented in the annual report was simply the total annual fuel used for each of the facilities. However, it is recommended that more detail be provided on fuel usage and that the table proposed in Section 3 Fuel Use Summary of the AQEMP be adopted and used as a monthly tracking for fuel use. This will allow for emission rates to be calculated on a monthly bases providing valuable information on peak emission periods. Again the information will aid in determining management strategies for targeted reduction of emissions.

It is unclear by table 5-1 or the explanation provided if the fleet calculation reported in the annual report covers vehicle traffic during the winter road haul season. In addition it does not appear to included air traffic (scheduled) and incidental air traffic for things such as helicopter use. While it is expected these values will be relatively low in comparison to the major point sources, it is recommended to include them in reporting.

General observations section 5

There is much needed improvement and thought required for this section. The annual report does not provided the detailed information that should have be included relating to project emissions. Inherently missing from the section are comparisons to the EAR, however it is understandable that with 2005 being the first year of construction and the minimal data collected for 2004, trends and comparisons from year to year would not be representative and not provide much information for this year. Future reports however are expected to include such trends, analysis and discussions.

In addition there is no information presented in the annual report documenting mitigation measures and pollution prevention strategies used which would demonstrate De Beers commitment to reduce emissions. The strategies employed should have been included in the report and should be used from the start of the project with every effort being made targeted at emission reductions.

Finally it must be noted that the section does not contain data or results regarding the fugitive dust abatement program, as outlined in the objectives of the AQEMP. Efforts aimed at reducing emissions, dust, TSP, etc. are required to be included in the annual report. In order for compliance with both Articles of the EA, De Beers should revisit the annual report and provide more detail on the dust abatement program and any and all strategies used to reduce and control dust.

Summary

To summarize SLEMA suggest the following improvements to be made to the Air Quality Monitoring and Air Quality Management Programs.

- Harmonize both annual report deliverables from the AQEMP & AQMP into one document.
- The harmonized document must comply and be consistent with all requirements outlined in the EA, Article 6 and Article 7 relating to Air Quality and monitoring programs and reporting.
- Commit to an Annual Report due date.
- Re-evaluate equipment used to monitor precipitation data that is more applicable to the conditions that exist for the conditions.
- Seek ways to improve data retrieval by utilizing supplemental data when needed, in the event that downtimes or data loss is experienced. (i.e. run ongoing comparisons with data from Hydro-Met station and Met station allowing one to provide alternate data for the other)
- Improve planning and management of monitoring locations to avoid lengthy down times to minimize data loss.
- Improve management of the monitoring locations by...if relocation of monitoring stations is unavoidable. The second monitoring station should be installed prior to decommissioning original station.
- Undertake an aggressive expansion of the Dustfall and Particulate Monitoring (TSP, PM10 & PM 2.5) to reflect activities that are ongoing outside the present camp location namely the Spur road during winter haul season and the underground exhaust vents located on the North Shore of Snap Lake.
- Characterization of Dust and Particulate Matter program.
- Implementation of a snow survey program.
- Undertake a Stack Emission Program versus the existing published emission factor method presently employed.
- Provide more detail and discussion on different emission factors used for each facility, if employed.
- Undertake a more comprehensive approach to include additional emission sources such as Air traffic and winter haul traffic to and from site.
- Provide fuel analysis and fuel certification information with discussion of contaminants of concern
- Present a monthly breakdown of emissions and more detailed analysis and discussion of the major sources and peak periods.
- Provide more detailed explanation on source of emissions (i.e. Table 5-1 of the Annual Report describe source as **Fleet**, does this include the underground fleet?)
- Include a discussion of the fugitive dust abatement program, monitoring and effectiveness
- Provide discussion of management strategies employed and the effectiveness of these strategies targeted at the reduction of emissions and minimizing effects of air quality.