Introduction

The following document is intended to provide context to the results presented in the Air Dispersion Modelling Assessment Report (AECOM 2020) completed for the Scott Property Project.

Reporting and modelling guidelines for Air Quality are set out by Alberta Environment and Parks (AEP) to ensure a consistent approach when evaluating potential impacts from projects.

Scott Property Project Analysis and Results

Phase 2 of the mine plan was selected for air quality modelling as the westernmost portion of this Phase represents the closest mining will ever be to a neighbouring residence (the two residences nearest to the southwest boundary of the project were used as receptors in the model, as shown in Figure 1 attached). This represents the worst-case scenario for neighbours of the operation based on modelling assumptions. Phase 2 is anticipated to take 5-7 years to complete and only a portion of that time period will be near the western boundary. The remaining life of the operation would be at a greater distance to neighbouring residences and therefore expected to have lesser potential impacts.

Lehigh acknowledges that the results prepared for regulatory purposes in the Air Dispersion Modelling Assessment can appear to indicate that air quality may be a concern. However, the results are actually showing that the maximum predictions of changes to air quality from the Scott Pit operations (including industrial and local background estimates, i.e. cumulative effects) were predicted to occur 1 day out of 5 years.

Due to the regulatory requirements for air quality assessments, the modelling and presented results do not recognize:

- the location of operations would be changing on a weekly or monthly basis;
    - The total duration where operations are anticipated to be nearest to residences is less than one operating season or may be only a small portion of each operating season throughout Phase 2.
- the worst-case weather conditions causing high predictions (gentle wind speed, wind direction from source to receptor, low temperatures) are actually occuring late in the operating season;
    - 5 of the 7 worst prediction days are estimated to occur in November due to weather. Operations are unlikely to ever continue this late in the year as shutdown occurs in mid to late October.
    - The remaining 2 worst prediction days occur in September and October, when production volumes and dust-causing activity is often greatly reduced.
- the precipitation which would act as a natural dust suppressant.
    - This exclusion is a requirement of AEP, which means results presented in the assessment are conservative and higher than would be anticipated.

The following frequency tables were developed to help illustrate the potential effects of Scott Pit activity to air quality throughout the modelled duration, rather than only showing the worst-case result (although it should be noted, these frequencies assume operations in the closest proximity of homes for 5 years, whereas less than one operating season is expected to occur within this distance).

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Table 1: Project Contribution to $PM_{2.5}$[1] 24-Hour Average Results, 5-Year Duration

Range (µg/m^3)	Crestview No. 1 - Days	Crestview No. 1 Percentage (%)	Crestview No. 2 - Days	Crestview No. 2 Percentage (%)
< 0.1	1,362	74.6	1,411	77.3
0.1 to 0.5	264	14.5	263	14.4
0.5 to 1	109	6.0	87	4.8
1 to 5	82	4.5	57	3.1
5 to 10	9	0.49	7	0.38
10 to 15	0	0	1	0.05
15 to 25	1	0.05	0	0
Guideline (µg/m3)	**Crestview No. 1 – Days of exceedance**	**Crestview No. 1 Percentage (%) of exceedance**	**Crestview No. 2 – Days of exceedance**	**Crestview No. 2 Percentage (%) of percentage**
> 25 (WHO guideline) (without background)	0 days	0 days	0 days	0 days
> 25 (WHO guideline) (with background)	1 day	0.05 days	0 days	0 days
>29 (Alberta objective)	0 days	0 days	0 days	0 days

Table 1 demonstrates that when the operations are at the nearest point to the residences (i.e., in the western portion of Phase 2) for small particulate/dust, the Project does not contribute to baseline conditions approximately 75% of the time. When other potential emission sources are included (cumulative effects), the model predicts only one high value at one of the residences (with late season fall / winter weather conditions of light winds and low temperatures, and many hours of NE winds). All $PM_{2.5}$ predicted concentrations are below Alberta Objectives.

Additional tables for PM_{10}[2], a larger size of dust, and NO_2[3] emissions from diesel equipment on site were also prepared. These tables demonstrate that Scott Pit does not contribute to baseline conditions approximately 70% of the time for PM_{10} and 90% of the time for NO_2, respectively.

[1] Particulate matter with a diameter less than 2.5 micrometers

[2] Particulate matter with a diameter less than 10 micrometers

[3] Nitrogen dioxide

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Table 2: Frequency of PM_{10} 24-Hour Average Results Without Background, 5-Year Duration

Range (µg/m^3)	Crestview No. 1 - Days	Crestview No. 1 Percentage (%)	Crestview No. 2 - Days	Crestview No. 2 Percentage (%)
< 0.1	1,274	69.8	1,331	72.9
0.1 to 1	331	18.1	329	18.0
1 to 10	210	11.5	155	8.5
10 to 25	10	0.55	11	0.60
25 to 50	1	0.05	0	0
Guideline (µg/m3)	**Crestview No. 1 – Days of exceedance**	**Crestview No. 1 Percentage (%) of exceedance**	**Crestview No. 2 – Days of exceedance**	**Crestview No. 2 Percentage (%) of percentage**
> 50 (WHO guideline) (without background)	0 days	0 days	0 days	0 days
> 50 (WHO guideline or BC regulations) (with background)	1 day	0.05 days	0 days	0 days

Table 3: Frequency of NO_2 1-Hour Average Results Without Background, 5-Year Duration

Range (µg/m^3)	Crestview No. 1 - Hours	Crestview No. 1 Percentage (%)	Crestview No. 2 - Hours	Crestview No. 2 Percentage (%)
< 0.1	39,775	90.8	40,003	91.3
0.1 to 1	1,129	2.6	1,064	2.4
1 to 5	863	2.0	994	2.3
5 to 20	1,230	2.8	1,187	2.7
20 to 100	813	1.9	571	1.3
100 to 200	14	0.03	5	0.01
Guideline (µg/m3)	**Crestview No. 1 – Days of exceedance**	**Crestview No. 1 Percentage (%) of exceedance**	**Crestview No. 2 – Days of exceedance**	**Crestview No. 2 Percentage (%) of percentage**
>200 (WHO guideline) (without background)	0 days	0 days	0 days	0 days
>200 (WHO guideline) (with background)	0 days	0 days	0 days	0 days
>300 (Alberta objective)	0 days	0 days	0 days	0 days

Furthermore, the model predicts that concentrations of emissions decrease rapidly with increasing distance from the source, as is evident in the isopleth[4] maps in the AECOM Report (Figures C7, C8). For example, the emissions estimated can decline by up to 70% within 50 meters of the point where $PM_{2.5}$ maximum concentration was predicted. This demonstrates the potential impacts are both infrequent and very localized.

Lehigh has identified additional measures, not included in the modelling, such as shutting down operations temporarily during dry, high-wind events, or days with stagnant air characterized by low wind speeds and mixing heights, or adding misting to conveyor transfer points, that could be applied to further reduce emissions. The predictions of elevated concentrations in the community would be further reduced based on the limited duration for which operations will be nearest the residences.

It is for these reasons that the AECOM Air Dispersion Modelling Assessment report concluded that the Scott Property Project will result in negligible to low impacts to local air quality.

[4] Isopleth maps portray contours of changing air quality

References

AECOM Canada Ltd. (AECOM), 2020
Lehigh Scott Property: Air Quality Assessment Report.
Prepared for Lehigh Hanson Materials Limited. Calgary, Alberta.