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EMAIL TRANSMISSION

TO:	Elle Donelley	EMAIL:	elle.donnelley@planning.nsw.gov.au
ORGANISATION:	Department of Planning and Environment	DATE:	9 November 2017
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SUBJECT: Broken Hill North Mine – Consolidated Response to Agency Submissions

☐ ***Confidential*** ☐ ***Please Reply*** ☐ ***For Follow-up*** ☐ ***Urgent*** ☐ ***For your information***

MESSAGE:

Greetings Elle

This email transmission has been prepared in response to your email dated Thursday 2 November 2017, forwarded via Matt Riley. In that email you requested a response to matters raised by the EPA in their correspondence dated 29 September and 5 October 2017, as well as other matters, to enable you to finalise your assessment of the Broken Hill North Mine Project (the Proposal). For ease of reference, I have reproduced/paraphrased the relevant enquiry in *italicised* text. Our response is presented in non-italicised text.

Bulk sample - noise complaints

Works associated with the bulk sample have resulted in noise complaints from multiple complainants. … The Department and the EPA are concerned that noise may be an issue for the recommencement project - especially as the magnitude of works would increase significantly.

I note that the recommencement project includes a 4m high amenity bund and a relocated haul road. However, the EPA and complainants believe that the noise is coming from the mine portal. If that is the case, it seems that the noise bund would not offer much/if any noise mitigation.

Please detail the difference between the existing bulk sample operations and the proposed recommencement project, specifically with relation to noise emissions.

Perilya Broken Hill Limited (the Applicant) has been made aware of an issue with noise associated with the current exploration activities raised by two neighbouring residents living in the vicinity of 566 Wolfram Lane. **Figure A** presents the location of the relevant residences. Upon being advised of the issue, the Applicant immediately ceased above-ground trucking operations between 10:00pm and 6:00am. The Applicant also consulted with the residents, however, consultation broke down after the residents used social media to publish

incorrect and derogatory information in relation to the Company and its operations. The Applicant understands that the residents are continuing to liaise with the Environment Protection Authority, but no further advice has been received.

In relation to the differences between the existing exploration and the proposed activities, the Applicant notes the following.

- The Proposal would include construction of an approximately 4m high amenity bund adjacent to the section of the haul road in direct line of sight to surrounding residents. All other sections of the haul road would be located either within the Cosmopolitan Open Cut or would be shielded by existing topography.
- While acknowledging that the magnitude of the annual production rates would increase to approximately 300 000tpa, the frequency of haul truck movements would remain largely consistent with the existing exploration activities, namely approximately one return haul truck movement per 15-minute period, consistent with the assessment prepared for the EIS.
- The Applicant anticipates that a Noise Management Plan, incorporating a Monitoring Program will be required for the Proposal. The Applicant would ensure that attended monitoring would be undertaken at locations between the identified residence and the Mine Site before and after construction of the noise bund to ensure that the predictions included in the Noise Assessment presented in the EIS reflect "real word" conditions.
- The Applicant would, consistent with its current procedures, adopt an adaptive management approach to noise emissions. In particular, should the attended noise monitoring program indicate that noise emissions from the Mine Site are unacceptable, the Applicant would implement the following.
    - Consult with the affected residents, the EPA and DPE.
    - Increase the height of the proposed amenity bund.
    - Adjust the hours of operation for above ground operation of the haul truck fleet.
    - Install a real-time noise monitor with automated alarms to alert supervisory staff of potential noise-related issues.

Finally, in relation to you comment that the noise emissions may be sourced from the portal, the Applicant notes that the portal is located approximately 35m below surface, adjacent to the highwall of the Cosmopolitan Open Cut which would provide the maximum noise protection for residences located to the northwest of the Mine Site. Indeed, at a distance of approximately 1,100m from the portal and 1,500m from the section of the haul road adjacent to the proposed amenity bund, the Applicant is confident that noise emissions associated with the Proposal would not exceed the relevant criterion at the identified residence.

Blasting

The 3mm/s criteria only applies to the Rasp Mine zinc lodes.

In support of Perilya's request for 5mm/s blasting criteria at North Mine, please provide information about the geological setting of the North Mine.

The Applicant advises that the Zinc Lodes mined at the Rasp Mine occur in a different stratigraphic and structural setting to the Zinc Lodes within the North Mine (**Figures B and C**). In particular, Rasp Mine Zinc Lodes occur immediately adjacent to and above the Globe Vauxhall Shear Zone. That shear zone within the Rasp Mine dips to the southeast, and is exposed at surface in the vicinity of Argent Street in Broken Hill. The Applicant understands that the Shear Zone in the vicinity of the Rasp Mine acts to exacerbate impacts of blasting undertaken in close proximity to the zone.

By contrast, the Zinc Lodes within the North Mine Site are located at least 200m from the Globe Vauxhall Shear Zone and similar transmission of blast vibrations is not anticipated. Notwithstanding this, the Applicant has committed to implementing a program of management and mitigation measures in Section 3.5.5 of the Response to Submissions that would ensure that potential adverse blast-related impacts are detected before they become a compliance issue, enabling the Applicant to adjust its practices to ensure compliance with the standard blast criteria.

Air Quality

The revised AQIA predicts maximum 99 percentile concentrations of Hg and Ni at the site boundary of 0.205ug/m^3 and 0.293ug/m^3 respectively, which is in exceedance of the impact assessment criteria of 0.18ug/m^3 for both Hg and Ni. The revised AQIA considered the exceedances to be minor, however the exceedances are 14% and 63% above the Hg and Ni criteria respectively. Further, since the predicted 99.9%ile ambient concentrations of Hg and Ni have increased by 2-3 orders of magnitude from those predicted for the existing operations, their increase is considered substantial.

The Applicant acknowledges that the revised Air Quality Impact Assessment predicted minor exceedances of the 99.9th percentile 1-hour concentration for Mercury and Nickel. The principal source of these metals in the modelling is emissions from the ventilation rise. In undertaking the modelling, Pacific Environment relied upon three samples from the ventilation rises at the South Mine analysed by Ektimo. The resulting analytical report is attached, however, **Table A** presents a summary of the monitoring results. The Applicant contends that the modelled exceedances may be explained as follows.

- Mercury – each of the three samples collected returned a mercury concentration below the detection limit. As the modelling in these situations assumes a concentration equal to the detection limit, the modelled exceedance of the mercury is an artefact of that assumption. The Applicant does not anticipate an exceedance of the mercury criterion as a result of the Proposal.
- Nickel – the monitoring returned one result below the detection limit in Ventilation Rise 2 and 0.089mg/m^3 and 0.0049mg/m^3 in Ventilation Rises 3 and 5 respectively. As there is no nickel in the orebody, the Applicant investigated these results at the time that they were received and concluded that the source was metalwork within the ventilation rise. It is noted that this is an issue that is unique to the Southern Operations ventilation rises and the Applicant does not anticipate an exceedance of the nickel criterion as a result of the Proposal.

Table A
Ventilation Rise Monitoring Results – Southern Operations

Ventilation Rise	Mercury (mg/m^3)	Nickel (mg/m^3)
No 2	<0.00006	<0.0004
No 3	<0.0001	0.089
No 5	<0.0001	0.0049
Source: Ektimo - Report Number R003581		

Finally, the Applicant undertook multi-element analysis of samples collected on 2 October 2017 by each of the High-Volume Air Samplers (HVAS) operated by the Applicant, namely the Polo, Westside (both Southern Operations), North Mine and Potosi Mine samplers. The resulting analytical report is attached. However, in summary, each sample returned mercury and nickel concentrations that were below the detection limits of 0.0032µg/m^3 and 0.0001µg/m^3, or between 90 and 2 000 time less than the modelled concentrations.

Lead

Issue 1 – District 5a

The revised HHRA concluded that there would potentially be increased exposure to lead for children living adjacent to North Mine in district D5a. This is unacceptable to the EPA particularly as the predicted geometric mean BLLs in this area under existing conditions (Scenario 1) is already above the NHMRC investigation level of 5ug/dL. Perilya are unable to restrict people living in these properties or require that children undergo regular blood lead monitoring.

Based on these elevated BLLs Perilya must ensure that there are no predicted increase in lead emissions from the site. The applicant should consider additional dust mitigation measures to ensure that residence at 05a are not exposed to concentrations of lead above background.

The applicant must refine assumptions (with robust justification) or propose additional mitigation measures to ensure that there are no increases in exposure to lead at any locations.

As previously discussed via telephone on 24 October 2017, the Applicant notes that the Blood Lead Level modelling is inherently conservative. Throughout the HHRA and in the uncertainty analysis in Section 3.11 of that document, it is reiterated that conservative modelling parameter values (e.g. for bioaccessibility, modelled air concentration, and deposited lead) have been chosen and that the modelling is more likely to over predict blood lead concentrations rather than under predict.

In addition, the Applicant notes that it has blood lead level data for 11 children under the age of 12 years living within the Mine Site. While there are a number of factors that make direct comparison of the measured blood lead levels of these children and the results of the modelling, the comparison is informative. The modelling is predicting an existing mean blood lead level of 6.021ug/dL (Scenario 1 – existing conditions), the actual mean blood lead level of the monitored children is 3.0ug/dL. Similarly, where the modelling is predicting 65.4% of children would exceed the 5ug/dL criterion, the actual number of children that exceed this level is two, or 18%, with both whom are being actively managed by the Applicant.

The Applicant notes the Department's request to offer the same management measures for residents of District 5a as it offers for those living in Mine-owned residences. It is noted that the Applicant has far more control over the activities that are undertaken within its own residences, including the ability to relocate families if required. Notwithstanding this, the Applicant would, at the request of a resident of District 5a, to the extent reasonable and practicable, provide the following assistance.

- Provide education in relation to the management of lead.
- Facilitate blood lead level testing of all children under the age of 18 years.
- Offer to facilitate an investigation in the event that a child returns a blood lead level in excess of 5.0µg/dL, including an assessment of the home environment.
- Provide advice in relation to remedial action should the above investigation identify measures that could be measured to manage blood lead levels of those living at the residence.

Issue 2 – Provision of data

The revised HHRA refers regularly to data from spreadsheets provided to ToxConsult by PEL… The applicant must provide all data used in the HHRA, including the spreadsheets provided to ToxConsult by PEL.

This data was provided to Department of Planning and Environment as requested on 13 October 2017.

Issue 3 – Failure to consider ingestion of home-grown produce

The applicant must include ingestion of homegrown vegetables and fruit in the HHRA or provide sufficient justification for the exclusion of this pathway.

As noted in the Human Health Risk Assessment, the environment surrounding the Mine Site is largely unsuitable for growing produce for human consumption. In addition, any produce that would be grown would be a negligible component of an individual's diet or lead intake compared with other sources, especially since the local government authorities have undertaken an education campaign alerting residents to the risks of consuming unwashed fruit and vegetables, and advise produce should always be well washed before consumption.

As a result, the Applicant contends that inclusion of ingestion of home-grown produce is a negligible source of lead and does not propose to model it.

Issue 4 – Increase in emissions from the Southern Operations

It is unclear if the additional emissions from the Southern Operations due to an increase in activity directly from the Proposal have been considered in Scenario 3. … The applicant must justify why unloading, stockpiling and milling activities of ore from the North Mine at the Southern Operations will not increase emissions from the Southern Operations existing mining and processing activities.

The Applicant notes that output from Southern Operations is proposed to decrease from 1.5Mtpa to 1.02Mtpa during 2018. In addition, the Potosi Mine is expected to cease operations in 2020. As a result, ore from the North Mine would replace some of the ore from the Southern Operations and Potosi Mine and would not be additional to it. As a result, the Proposal would not result in additional emissions of lead from the Southern Operations Mine Site.

Issue 5 – Decrease in Blood Lead levels

Table 3.10.2 summarises the modelled geometric mean blood lead concentrations for Scenario 1 (existing North Mine) and Scenario 3 (proposed North Mine). These data show that in some cases there is a predicted decrease in the geometric means of the blood lead concentration with the proposed North Mine in operation compared to the current situation (ie not in operation).

The applicant must clarify how the modelling predicts that there will be a decrease in the geometric mean of blood lead concentrations at some receptors, despite notable impacts on airborne and deposited lead being predicted for the Proposal.

The Applicant notes that very minor increases in dust levels may arise from the Proposal (see for example Table 3.10.2 of the *Response to Submissions*). However, the source of that dust would be slightly different under the Proposal than for the existing conditions. As a result, the metal content of the emitted dust would be slightly different, resulting in minor decreases in predicted lead deposition and resulting modelled blood lead levels.

Issue 6 – Consideration of dermal and ingestion risks for metals other than lead

Section 4.1 of the HHRA outlines that for the chronic assessment of the metals other than lead, exposure pathways of inhalation and ingestion were considered for threshold risks (non-cancer) and inhalation was considered for non-threshold risks (cancer). It is unclear from the revised HHRA why dermal contact was not also considered for threshold risks and ingestion and dermal were not considered for non-threshold risks.

The applicant must outline clearly and justify why all potential exposure pathways (inhalation, ingestion and dermal) were not considered in the assessment of the metals others than lead for threshold and non-threshold risks.

The Applicant notes that these potential exposure pathways were not assessed because they were not requested by the Environment Protection Authority during or following the scoping meeting held in relation to the revised Human Health Risk Assessment on 10 April 2017. To request them now would be both unreasonable and unconscionable.

Furthermore, the Applicant notes that the assessment determined that 99th percentile 1-hour concentrations for metals other than lead would not exceed the criterion at any residence surrounding the Mine Site. As the risks associated with these metals are negligible, further assessment would not be warranted.

Notwithstanding the above, ToxConsult note that as shown in Figure 3.2.2 of the revised HHRA, dermal absorption of inorganic metals is considered to be a minor route of entry into the body (ATSDR 2007a, US EPA 2006a, RIVM 2007, UK EA 2009a), therefore this exposure pathway was not considered in their report. enHealth (2012b) also indicates inorganic compounds have negligible absorption through intact skin. Consequently, it is considered inclusion of this exposure pathway in the report would unnecessarily complicate/obfuscate the assessment, and would make no difference to the overall conclusions.

Consistent with Australian risk assessment guidance (enHealth 2012a), non-threshold (i.e. cancer) risks were estimated for metals considered to induce cancer via a genotoxic mode of action. The two metals that met this criterion are cadmium and nickel. Exposures to these metals via inhalation in occupational environments have been shown to be associated with development of lung cancer in workers, and animal studies have shown evidence of lung carcinogenicity by inhalation, but not via oral exposure (IARC 2012, WHO 2000, US EPA 1987). Thus, inhalation exposure is considered to be the exposure pathway of potential concern for evaluation of non-threshold risks (i.e. cancer). It is noted the unit risk estimates used in the revised HHRA were derived by international authorities using data for lung cancer incidence in workers exposed to cadmium or nickel, in these studies exposure estimates were based on measured concentrations in workplace air. It is also noted that both the ingestion and inhalation pathways have been included in assessment of threshold risks.

Issue 7 – Bioaccessibility of Arsenic

The applicant must provide justification for use of 4% bioavailability for arsenic or consider a more suitable and conservative assumption for this parameter.

The Applicant notes that as arsenic does not form a component of the ore body and monitoring of the ventilation rises and HVAS samples described previously each returned arsenic values below detection levels, the bioaccessibility of arsenic is not a matter that is relevant to this application.

Notwithstanding the above, ToxConsult state that enHealth (2012a, b) guidance indicates the risk assessor should use the best available information to allow meaningful consideration of bioaccessibility/bioavailability in risk assessment. For lead, there were data available for Broken Hill soil from two publications by different investigators, using two different methods. In Section 3.6 of the revised HHRA it was stated that the PBET test (which incorporates the milieu of the portion of small intestine from which lead is absorbed) is arguably more representative of physiological conditions than bioaccessibility estimates based only on dissolution in a solution at stomach pH. However, in the absence of additional *in vivo* validation for the soils from the North Mine, it was difficult to favour one technique over the other. Thus, the more conservative bioaccessibility was used in the lead assessment noting this was likely to over-estimate the blood lead modelling results.

For arsenic, bioaccessibility data were only publicly available from one source using the PBET test. The data have been described in a publicly available risk assessment for the Rasp Mine in Broken Hill (Toxikos 2010). In the absence of other information, the data are considered to be the best available and the most appropriate to use in the risk assessment. In the HRA the highest hazard quotient for arsenic exposure for any location or modelled health risk scenario is 0.0002 (at Perilya residences H & I, Scenario 2). If it was assumed the bioavailability of arsenic was 100% instead of 4%, the hazard quotient for arsenic exposure would increase to 0.005. This still signifies negligible risk of exceeding the tolerable daily intake for arsenic and has no impact on the conclusions of the HRA.

I trust that this provides the information that you require at this stage. Please do not hesitate to contact me should you require further information.

Regards

Mitchell Bland
Principal Environmental Consultant/Director

Attached: 3 x figures
2 x analytical reports