

**ATTACHMENT 1**

**CLARIFICATION OF AIR QUALITY MODELLING**

**FOR THE TORO ENERGY PUBLIC ENVIRONMENTAL REVIEW**

**APRIL 2016**

## TABLE OF CONTENTS

1	INTRODUCTION .....	3
2	CLARIFICATIONS .....	3
2.1	Scope of Air Quality Assessment Work in PER .....	3
2.2	Processing Facility Emissions.....	3
2.3	Millipede .....	4
2.4	Lake Maitland.....	4
2.5	Cumulative Impacts from Millipede and Centipede .....	5
2.6	Gas Emissions .....	5
2.7	Providing the Model Parameter Files.....	5
2.8	Radon Emissions .....	5
2.9	Lake Bed Constituents.....	6
2.10	Incomplete Report .....	6

## TABLE OF TABLES

## 1 INTRODUCTION

This document provides clarification on the air quality modelling and assessment provided in the Toro Energy Public Environment Review (PER) (Toro Energy, 2015).

Some issues raised in government and public submissions were the result of unclear presentation of information in the PER document.

The aim of this document is to provide clarification on the broad and overarching issues in relation to air quality modelling and assessment. Specific issues are addressed elsewhere.

Reference is made to the Environmental Review and Management Programme (ERMP) for the Wiluna Uranium Project and EPA Assessment No 1819.

## 2 CLARIFICATIONS

### 2.1 Scope of Air Quality Assessment Work in PER

Note that the air quality report (PER Appendix 10.66) was only partially completed by the former owner of Lake Maitland. However, sufficient work had been done to make a judgement on the potential impacts of emissions. Further work was therefore not considered to be necessary and this position was supported with an independent peer review of the work done (PER Appendix 10.42).

It is important to note that the air quality report for the PER (Appendix 10.66) was for an entire mining and processing operation at Lake Maitland, which included mining, processing, ancillary infrastructure and tailings disposal. Toro Energy proposes to conduct only mining at Lake Maitland, with no processing and less ancillary infrastructure than originally planned by the previous owner of Lake Maitland. Therefore, the impacts modelled in the air quality assessment are an overestimate. For a mining operation only, the impacts will be less than the impacts for a full scale operation.

In the PER, the air quality modelling for Millipede and the processing facility is based on the original ERMP.

### 2.2 Processing Facility Emissions

The processing facility emissions are not expected to change because the processing rates, physical, chemical and radiological characteristics of the Centipede, Millipede and Lake Maitland ore are practically identical

The annual emission rates from processing are governed by the processing plant capacity, which is approximately 1.3 Mtpa, regardless of the source of the ore. The impacts of annual emissions from the processing plant are therefore not expected to significantly change from year to year and are as modelled in the ERMP.

From a radiological perspective, the radon and dust emission rates from processing are also not expected to change from those modelled for the ERMP. From a dust deposition perspective, the cumulative amount of dust deposited will increase because of the increase in the number of operating years. However, this has been factored into the impact assessment (and reinforced in attachment 3).

Therefore, the existing air quality modelling conducted for the ERMP for the processing plant emissions provides an adequate representation of the potential impacts.

## 2.3 Millipede

Since the Millipede mineralisation is an extension of the Centipede mineralisation, it is expected that the characteristics of emissions during mining will be identical. Therefore, it is reasonable to utilise the results of air quality modelling undertaken for Centipede to estimate the impact of mining at Millipede. This air quality modelling was outlined in the ERMP.

The mining rate from Centipede and Millipede is controlled by the processing rate, meaning that ore can only be fed to the processing plant at a certain rate, being the rate which was assessed under the ERMP.

When mining from Millipede or Centipede, it is not important whether one, the other or both areas are being mined because the mined material is essentially the same and the mining rate is governed by the processing rate. The air quality impacts were previously modelled in the ERMP and are used as the basis for the impact assessment presented in the PER.

To clarify this point, PER Table 8.13 should be labelled as follows:

*“PM<sub>10</sub> Emission Estimates (based on modelled emissions from Centipede)”*.

## 2.4 Lake Maitland

PER Section 18.2 summarises the air quality impacts for the operation of the Lake Maitland mine. The section refers to PER Appendix 10.66, which is the air quality assessment of a bigger Lake Maitland project previously proposed by the former owner, Mega Uranium Limited. The scope of the assessment in Appendix 10.66 includes the emissions from a processing plant and tailings facility. Since acquisition of Lake Maitland by Toro Energy, the processing and tailings disposal options have been removed from the Lake Maitland project configuration and the ore will be mined and trucked to a central processing facility to be located adjacent to the Centipede and Millipede deposits.

Therefore, the assessment conducted in Appendix 10.66 is for a much larger proposed operation as illustrated by the comparison in Table 1.

**Table 1: Differences Between Lake Maitland Options**

Project Component	In Original Assessment	In Toro Energy Scope
Mine	Y	Y
Stockpiles	Y	Y
Diesel Power Station	Y	Y (reduced size)
Accommodation Village	Y	Y (reduced size)
Mineral Processing Plant	Y	N
Administration	Y	Y (reduced size)
Workshops	Y	Y
Tailings Disposal	Y	N

The assessment outlined in Appendix 10.66 remains valid apart from the contribution from the processing facility and reduced size of some ancillary equipment.

Based on the reasonable assumption that the air quality modelling source terms and model itself are valid (which is reasonable given that the consultant is an expert in the air quality field and the work was peer reviewed), then the outputs would overestimate the potential impacts.

Appendix 10.66 notes that some minor contribution to emissions from point, volume and areas sources in processing occurs. The exact contribution is difficult to evaluate. However, there is high confidence that the actual impacts will be far less than the modelled impacts.

It can therefore be concluded that the air quality assessment conducted for Appendix 10.66 remains valid because it is an overestimate of the activities proposed in the PER.

## 2.5 Cumulative Impacts from Millipede and Centipede

It is possible that Millipede and Centipede will be operating at the same time. However, the extraction rate is constrained by the processing plant rate.

The total mining rate at Centipede/Millipede would be equivalent to the mining rate that was assessed in the ERMP. The original modelling was conducted at the maximum processing rate. Therefore, the modelling appears to be valid.

This is not a cumulative mining situation.

## 2.6 Gas Emissions

The assessment provided in the ERMP for the Centipede and Lake Way deposits (including the processing facility) determined that expected NO<sub>2</sub> concentration would at most be 4% of the one hour criterion. Based on this, it was concluded that additional work for such a low impact was not necessary.

It is noted that this is not made clear in the PER.

## 2.7 Providing the Model Parameter Files

The air quality modelling was undertaken by a reputable consulting firm and the final work was peer reviewed. It ought not to be necessary to provide the raw data files for further checking.

## 2.8 Radon Emissions

It is noted that there are limitations in relation to the radon modelling that was presented in Appendix 10.66, which led to confusion in the dose impact assessment. However, the conclusion of the assessment remains valid, being that there are negligible radiological impacts and risks to the public from radon emissions from the Project.

This is demonstrated for radon emissions by the following;

- The Lake Maitland mine surface area is a maximum of 567.8 ha.
- If it is assumed that the whole of the mine area is open at one time, then there will be approximately  $5.7 \times 10^6$  m<sup>2</sup> of exposed mine area.
- If it is assumed that the average grade of ore is 600 ppm uranium and that half of the exposed area is ore, then the average exposed mineralisation is 300 ppm uranium (a conservative assessment).
- Using a radon emission rate of 50 Bq/m<sup>2</sup>/s per %U, this gives approximately 1.5 Bq/m<sup>2</sup>/s.
- Therefore, the mine radon emission rate is approximately 5.7 MBq/s.

For the ERMP, Toro Energy modelled a radon emission rate of approximately 7.5 MBq/s, which is similar to the emission rate modelled for Lake Maitland. While not identical, a similar air quality impact can be expected.

## 2.9 Lake Bed Constituents

The Lake Maitland lake bed constituents are provided in the PER as follows:

- Appendix 10.15, Lake Maitland Baseline Soil Survey;
- Appendix 10.22, Characteristics of Soil and Overburden Waste Materials;
- Section 11 provides a broad overview; and
- Section 13.5.3 discusses the Lake Maitland ecology and refers to PER Table 13.9 which is a shallow sediment chemistry assessment with samples from the north end of the lake, the south end of the lake and in the middle.

Lake bed data is provided for sodium, magnesium and calcium in PER Table 13.9.

## 2.10 Incomplete Report

This is noted.

The air quality report for Lake Maitland provides sufficient information to make an assessment of the potential impacts from the proposed operations. Impacts are provided as changes in dust concentrations (for TSP, PM<sub>10</sub> and PM<sub>2.5</sub>) and dust deposition rates. For TSP and PM<sub>10</sub>, the Project impact plus the natural background concentrations give results that are at a maximum, 10% higher than the criterion. This impact is for a full scale mining and processing operation at Lake Maitland, which is no longer included in the Proposal. Therefore, the impacts will be lower than those modelled.

Toro Energy also commissioned a peer reviewer who verified the preliminary findings of the air quality report, noting that the impacts of air emissions from the Lake Maitland Project are predicted and modelled to be low.

Toro will undertake a further assessment of the potential emissions from the Project prior to the commencement of construction.