Banksia EOHS
Occupational, Environmental and Community Health Risk

John Holland Rail Tarago Track Rehabilitation Worksite Dust & Lead Evaluation & Recommendations.

24th October, 2019.

Prepared for:
John Holland Country Regional Network,
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Tamworth. NSW. 2340.

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24th October, 2019.

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1	**John Holland Rail: Mr. Michael Hooper,**
1	**Banksia EOHS Pty Limited**

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CONTENTS

FIGURES

TABLES

APPENDICES

1. EXECUTIVE SUMMARY

John Holland Rail is undertaking loop extension works adjacent to the Tarago siding. The proposed works include installation of signal services from approximately 261.500km and 265.200km. In addition to signal works, construction north of the Goulburn Street level crossing is understood to include excavation of the former Woodlawn siding, extension of the existing loop, construction of a drivers walkway, removal of tie-ins from the former Woodlawn siding to the existing loop, modification of tie-ins from the loop to the Goulburn to Bombala line, restoration of drainage and reconditioning of the main line rail formation.

Studies by Rambol P/L and McMahon Earth Sciences P/L identified elevated Lead contamination levels in soils and ballast at the Tarago siding where Lead concentrates were previously loaded onto trains by the now closed Woodlawn Mine. The contamination is believed to be historical spillage associated with the loading procedure.

Concern has been raised about the potential health effects of working in an environment where there are high Lead concentrations. Lead has a very low exposure standard of 0.05mg/m^3.

Air quality testing is required to establish the background airborne dust and Lead concentrations, and based on these, a review of the workplace procedures and PPE is required to ensure exposure to dust and Lead is minimised.

Results show very low levels of airborne inhalable dust and Lead, and the health risk to workers at the site if these conditions are maintained during construction is assessed to be very low.

This report details the methodology used for the assessment, presents the results obtained and addresses the issues of health risk and PPE.

The Tarago Worksite.

2. SCOPE OF WORK

The scope of work of this report was:

- to review the available documentation,
- visit the site and carry out air quality testing.
- Based on a review of the air quality test results and the contamination reports, recommend appropriate work procedures and PPE required to minimize the potential for workers to be exposed to the Lead contamination which could exceed exposure standards and injure their health.
- Assess the potential community health impacts of Lead in air on community receptors based on the air quality results obtained at the construction site.

3. SITE LOCATION

The work site is located approximately 43km south of Goulburn adjacent to the Tarago Railway Station and Tarago Goods Shed and extends over a length of about 3.7km of track. Photographs 1-10 in Appendix 1 show the worksite and the air quality sampling locations. Figure 1 shows the site location.

4. SITE HISTORY

Reviews of the history of the rail line near Tarago are provided in the McMahon (*Tarago Loop Extension Remediation Action Plan)* and Rambol (*Tarago Siding Extension Preliminary Contamination Site Assessment)* contamination assessment reports. These show that the line has been operational since the late 1800's and that one of the activities to which the Lead contamination is attributed is the loadout of Lead concentrates from the Woodlawn Mine.

5. WORKPLACE EXPOSURE STANDARDS.

In New South Wales, there are new, risk-based, workplace safety regulations. These require that any potential risk within the workplace is identified, evaluated and controlled. The potential exposure of operators to high Lead concentrations in dust generated by the earthworks associated with track works is a risk, and must be quantified and the risk managed.

The exposure of workers to physical, chemical and biological contaminants in the workplace, including airborne contaminants, is primarily regulated under the Regulations of the Work, Health and Safety Act 2017. The thrust of this Act is that employers are required to provide a safe and healthy work environment. Workers also have obligations to take reasonable steps to prevent risks to health and safety at work by notifying the employer or supervisor of any matter which may cause a risk to their health and wellbeing. They are also required to behave responsibly and to have regard to the wearing of any occupational safety equipment which is provided.

Employers must assess the risk of any hazard which may be identified in the workplace. One obligation is to ensure that no person at a place of work is exposed to an airborne concentration of an atmospheric contaminant that exceeds or breaches a standard referred to in the document NOHSC:1003 (1995 as Amendmended) published by Safe Work Australia and titled: "*Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment*".

In addition, other international standards such as those issued by the US-based American Conference Of Governmental Industrial Hygienists (ACGIH) may be used where local guidelines are unavailable.

Atmospheric contaminants are defined as any potentially harmful airborne substance listed in the Safe Work Australia document referred to above, or in other recognised international standards.

A risk assessment based on a review of the McMahon and Rambol reports identified dust and Lead as a potential workplace chemical exposure hazards at the Tarago worksite.

Based on calculations using a Lead concentration of 38,000mg/kg, the highest bulk Lead result reported in the Rambol report, it is possible to calculate the maximum dust concentration to which workers may be exposed without exceeding the Lead TLV-TWA concentration of 0.05mg/m^3.

Safe Work Australia has established a number of standards for the interpretation of worker exposure to atmospheric contaminants. They use Threshold Limit Values (TLV's) which refer to atmospheric contaminants to which most workers may be repeatedly exposed, day after day, week after week, year after year, without adverse health effects. Because of the variation in susceptibility of individuals, it is probable that a small number of workers will experience discomfort when exposed to concentrations of the chemical at or below the TLV, but most will be protected.

The TLV standards are based on historic epidemiological, modelling and animal studies.

Three categories of TLV are specified:

> TLV – TWA – Threshold Limit Value Time Weighted Average – the time weighted average concentration for a conventional 8 – hr work day and a 40 hr work week to which it is believed nearly all workers may be repeatedly exposed without adverse health effects.
>
> TLV – STEL – Threshold Limit Value Short Term Exposure Standard – the concentration of an atmospheric contaminant to which it is believed that workers can be exposed for a short period of time without suffering from irritation, chronic or irreversible tissue damage or narcosis. STEL's are defined as a 15 minute TWA exposure which should not be exceeded at any time.
>
> TLV – C – Threshold Limit Value Ceiling - the concentration which should not be exceeded during any part of the working exposure.

For the Tarago monitoring program the following worksite exposure standards were used to assess the risk to workers:

Airborne inhalable particulates:	1.0mg/m^3 (1.3mg/m^{-3} calculated based on a bulk Lead concentrations of 38,000mg/kg Lead concentration of 38,000mg/kg and a TLV-TWA of 0.05mg/m^3)[a.]
Lead:	0.05mg/m^3 (Safe Work Australia and US ACGIH).

To provide an additional margin of safety, the work site exposure standard (TLV-TWA) was reduced from the calculated value of 1.3mg/m^3 to 1.0 mg/m^3. Provided the dust

exposure concentration of workers was kept below 1.0mg/m^3, they will not exceed the Lead TLV-TWA exposure standard of 0.05mg/m^3.

6. AIR QUALITY SAMPLING METHODS.

Two sampling methods were used to measure the dust concentrations within the sampling area:

- real time sampling using a Dustrak II instrument, and,
- measurement of the average concentrations of dust and Lead over an approximate 5 hour period by a standard dynamic, gravimetric method using air sampling pumps with sampling carried out in accordance with CDC Standard Method 7082.

Details of the sampling using these methods are as follow.

6.1 Real Time Sampling

Real time sampling was undertaken using a Dust Trak II dust monitoring instrument (Photograph 2). Six sample locations were established as shown in Figure 1 and measurements were made at each location at 7.30am, 8.30am, 9.30am, 10.30am and 11.30am.

6.2 Dynamic Gravimetric Sampling

Sampling was carried out in accordance with Standard Method 7082 from the US NIOSH Manual of Analytical Methods, Fifth Addition.

Filter papers - 37mm 0.8µm cellulose ester, are preweighed and placed in a sample cassette and cassette holder (Photograph 4). A calibrated sample pump was then field calibrated using a rotameter to deliver 2 L/min. The cassette holders were fitted to the pump and the sample pumps were run for about 5 hours giving a sample volume of around 600L.

Method 7082 specifies a minimum and maximum sample volume of 200L and 1500L respectively. The sample volume collected during our sampling was within this range.

Following sample collection, the filter papers were reweighed and the difference between the initial and final weights calculated. The weight difference was the total of dust collected over the sampling period. The dust concentration was then calculated using the dust weight and the sample volume.

The results obtained were then compared with the calculated inhalable dust site standard of 1.0mg/m^3 and the TLV-TWA value of 0.05mg/m^3, and assessment of the health risk made.

Laboratory weighing was carried out by the NATA registered ALS laboratory located in Newcastle.

6.3 Weather And Train Movements

During the air quality testing, the weather conditions were cool – 8^{o}C to 20^{o}C - with a wind speed of about 18km/hr. There were three train movements adjacent to the site during the sampling – the regular morning service to Canberra, a single vintage rail car travelling towards Canberra and the regular garbage train travelling from Sydney to the Woodlawn unloading site.


Figure 1.
Sampling Locations.
1
2
3
GOODS SHED
GOODS SHED
4
5

7. TEST RESULTS

7.1 Real Time Sampling Results

Real time sampling results are shown in Table 1.

Table 1.

Sample Location (Refer to Figure 1)	7.30am Sample Result (mg/m^3 Total Dust)	8.30am Sample Result (mg/m^3 Total Dust)	9.30am Sample Result (mg/m^3 Total Dust)	10.30am Sample Result (mg/m^3 Total Dust)	11.30am Sample Result (mg/m^3 Total Dust)
1	0.015	0.018	0.013	0.011	0.009
2	0.009	0.004	0.008	0.014	0.010
3	0.012	0.011	0.011	0.009	0.024
4	0.013	0.009	0.011	0.025	0.002
5	0.011	0.010	0.011	0.011	0.009
Mean	0.01	0.01	0.01	0.01	0.01
Calculated Site Objective (mg/m^3 Total Dust)	1.0	1.0	1.0	1.0	1.0

7.2 Dynamic, Gravimetric Sampling Results

Dynamic, gravimetric results are shown in Table 2.

Table 2.

Sample Location (Refer to Figure 1)	Pump Number	Sample Volume (L)	Dust Concentration mg/m3	Estimated Lead Concentration mg/m3	Dust Site Objective mg/m^3	Lead TLV-TWA mg/m^3
1	#83318	348	<0.01	<0.01	1	0.05
2	#83338	430	<0.01	<0.01	1	0.05
3	#83696	236	<0.01	<0.01	1	0.05
4	#83698	412	<0.01	<0.01	1	0.05
5	#83692	360	<0.01	<0.01	1	0.05

8 HEALTH RISK ASSESSMENT

8.1 Workplace Health Risk

The health risk may be assessed by comparing the measured total inhalable dust results obtained using the two sampling methods against exposure standards.

There was good agreement between the two sampling methods, with both returning results of <0.01mg/m^3 of inhalable particulates being measured.

If the inhalable dust collected during the testing was 100% Lead, worker exposure would be about 20% of the allowable exposure standard. This is an overestimation of the exposure because the concentrations are likely to be about 10%, meaning the exposure would be much lower, and only a fraction of the TLV-TWA.

The conclusion is that based on the air monitoring results, there is a low risk to the health and wellbeing of workers at the current work site.

8.2 Community Health Risk

People surrounding the site, in the township or using facilities such as the railway station which is located to the north could be expect to receive a lower concentration of dust in their breathing zone than at the location where monitoring was undertaken.

In moving from the construction site to receptors in the town or station – a distance in most cases of some hundreds of meters, any Lead dust would be dispersed by wind. Dispersal causes the concentration of Lead to decrease and as a result, the concentration of Lead in air at the community receptor locations would be less than that measured in the work site.

9 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of visual assessments, sampling and testing, the following conclusions and recommendations have been reached:

- There was good agreement between the real time air quality monitor and the gravimetric monitor. Both returned inhalable particulate results of <0.01mg/m^3.
- The results obtained, when compared with the ACGIH and Safe Work Australia Exposure Standards show that there is a low health risk from Lead for workers on the Tarago site.
- Based on the results measured in the work site during this assessment, and the conclusion that there would be a low health risk for workers, the lower air concentration of Lead in more distant community receptors would result in a lesser health risk in those locations than at the work site.
- The key to ensuring workers are not exposed to health risk from Lead in soil is to minimize the dust concentrations to which they are exposed. This can be achieved by:
- Keeping the work area damp,
- Ensuring that work practices do not generate dust,
- Wearing a P2 disposable respirator to ensure that inhalation of Lead dust is minimized,
- Carrying out regular air monitoring to ensure dust levels are less than the site dust exposure standard.
- Wearing of Type 5 or 6 disposable suits during work,
- Ensuring that workers change and wash before meals and before they leave site,
- Establishing a decontamination area where they can change and wash,
- Establish an exclusion zone around the work site and one access/egress point,
- Ensure all mobile equipment leaving the site is cleaned and independently approved as being decontaminated,
- Ensure that mobile equipment personnel stay in their cab with the door closed and the air conditioner on recycle. It may also be appropriate to fit the air conditioner with a HEPA filter
- Further testing is carried out on the high Lead material to assess if it is water soluble. If it is not, the health risk is reduced.

Appendix 1: Photographs

Photo 1: Track Adjacent Work Site.

Photo 2: Sample Site 5.

Photo 3: Sample Site 4.

Photo 4: Sample Site 3 And Two Dynamic Samplers.

Photo 5: Sample Site 2.

Photo 6: Sample Site 1.

Appendix 2: Laboratory Reports

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EN1907362**	Page	: 1 of 4
Client	: **BANKSIA EOHS**	Laboratory	: Environmental Division Newcastle
Contact	: MR JIM ORR	Contact	:
Address	:	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
Telephone	: 02 49380044	Telephone	: +61 2 4014 2500
Project	: JHR Tarago	Date Samples Received	: 18-Oct-2019 15:28
Order number	: ----	Date Analysis Commenced	: 23-Oct-2019
C-O-C number	: ----	Issue Date	: 24-Oct-2019 19:01
Sampler	: JIM ORR		
Site	: ----		
Quote number	: EN/333		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dianne Blane	Laboratory Coordinator (2IC)	Newcastle - Inorganics, Mayfield West, NSW

RIGHT SOLUTIONS | RIGHT PARTNER

Page	: 2 of 4
Work Order	: EN1907362
Client	: BANKSIA EOHS
Project	: JHR Tarago

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Inhalable Dust and Respirable Dust analysed and reported in accordance with Airborne Dust Licence no. MLA 201800893 under the NSW Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 where applicable.
- EA143-OC: Sampling was not conducted by ALS and may not fall under accredited methods for sampling of inhalable and respirable dusts. Particulates outside the inhalable and respirable dust definitions under AS3640 and AS2985 respectively have the potential to introduce a bias. Results should be scrutinised accordingly.

Page	: 3 of 4
Work Order	: EN1907362
Client	: BANKSIA EOHS
Project	: JHR Tarago

Analytical Results

Sub-Matrix: FILTER (Matrix: AIR)			Client sample ID	PVC372526 PVC372526	PVC372527 PVC372527	PVC372528 PVC372528	PVC372529 PVC372529	PVC372530 PVC372530
			Client sampling date / time	[18-Oct-2019]	[18-Oct-2019]	[18-Oct-2019]	[18-Oct-2019]	[18-Oct-2019]
Compound	CAS Number	LOR	Unit	EN1907362-001	EN1907362-002	EN1907362-003	EN1907362-004	EN1907362-005
				Result	Result	Result	Result	Result
EA143: Particulates in Air								
Inhalable Dust	----	100	µg/filter	<100	<100	<100	<100	<100

Page : 4 of 4
Work Order : EN1907362
Client : BANKSIA EOHS
Project : JHR Tarago

ALS

Analytical Results

Sub-Matrix: FILTER (Matrix: AIR)				Client sample ID	PVC372531 PVC372531	----	----	----	----
				Client sampling date / time	[18-Oct-2019]	----	----	----	----
Compound	CAS Number	LOR	Unit		EN1907362-006	--------	--------	--------	--------
					Result	----	----	----	----
EA143: Particulates in Air									
Inhalable Dust	----	100	µg/filter		<100	----	----	----	----

Appendix 3: References

1. NIOSH Manual Of Analytical Methods Fifth Edition, Standard Method 7082,

2. Adopted National Exposure Standards For Atmospheric Contaminats In The Occupational Environment.

3. Rambol P/L Tarago Loop Extension Remediation Action Plan,

4. Rambol P/L Tarago Loop Extension Further Intrusive Assessment And Lead Management Plan,

5. McMahon Earth Sciences Tarago Rail Siding Extension, Preliminary Contaminated Site Assessment.

6. Work, Health & Safety Regulations 2017, Chapter 7 Part 7.2, Lead,

7. American Conference of Governmental Industrial Hygienists 2019, Threshold Limit Values and Biological Exposure Indicies.

8. Guidelines for consultants reporting on contaminated sites. NSW Office of Environment and Heritage. September 2000.

9. Waste Classification Guidelines, Part 1, Classifying Waste. July 2009.

10. WA Health: Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites. May 2009.

11. Schedule B (1) Guideline on the Investigation Levels for Soil and Groundwater which are part of the National Environment Protection (Assessment of Site Contamination) Measure, 1999.

12. “Model Code of Practice – How to Safely Remove Asbestos”, Safe Work Australia 2011.

13. “Model Code of Practice – How to Manage and Control Asbestos in the Workplace”. Safe Work Australia 2011.

14. NSW Work, Health & Safety Act & Regulations 2017.