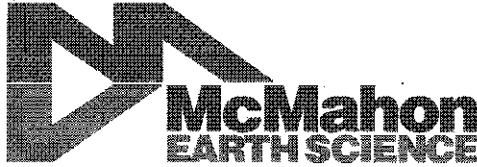


Appendix H – Riverina Wool Combing effluent ponds contamination assessment



RIVERINA WOOL COMBING SITE ASSESSMENT & "NOTICE OF CLEAN-UP ACTION" REQUIREMENTS

Riverina Wool Combing
Byrnes Road
Bomen, NSW 2650
29 September 2014

Project brief

On 4 September 2014, a site visit to Riverina Wool Combing (RWC), an industrially zoned site, at Byrnes Road, Bomen was conducted to assess and discuss issues which were outstanding from a NSW EPA "Notice of Clean-Up Action" issued on the 29 March 2011 and any other environmental issues which were of concern to the EPA regarding the site. Present for the site visit were Damian Moloney of Knight Frank Real Estate, Christopher Burton and Amanda Baldwin of NSW EPA and James Maloney of DM McMahon Pty Ltd (DMM).

The main area of concern surrounds the former wool scour waste landfill area which contains waste from the former processing of wool. Within this waste is a large amount of lanolin residues which leads to the presence of Hydrocarbons. Presently it is thought that there are 2 wool scour waste encapsulation cells on site and it is proposed to construct a third encapsulation cell from wool scour waste in the landfill area.

The waste water and sludge treatment areas raised concerns regarding the presence of persistent pesticides, heavy metals and hydrocarbons. Sludge from each of the evaporation ponds, anaerobic and aerobic ponds and terminal ponds was sampled and analysed for the above contaminants. Recommendations are contained within this report regarding disposal and/or usage of this sludge.

Samples were collected by hand auger on 8 September 2014. A number of samples were taken from each pond to form a composite sample for the respective pond. Samples were taken to a maximum depth of 1 metre where greater than 1 metre of sludge was present.

Site identification

Address: 560 Byrnes Road, Bomen, NSW 2650

Real property description: Lot 1 DP 771340

Centre co-ordinate: E539322 N6121031 - MGA 55 GDA 94

Property size:

North of Trahairs Road	Area – 184 Hectares
	Perimeter – 6.02 km
South of Trahairs Road	Area – 188 Hectares
	Perimeter – 5.63 km

Present use: Industrial land

Environment Protection Licence Number: 3914 (Surrendered)

Methodology

Work was carried out generally by reference to NSW EPA (1994, 1995 and 1997). Contamination analysis and threshold comparison was done in accordance with NEPM (2013).

Contamination assessment

The investigation area consists of the former waste water and sludge treatment area and former Wool Scour Waste landfill to the south of Trahairs road on the Riverina Wool Combing site. Sampling was carried out at the following locations:

- 1) Wool Scour waste landfill dam
- 2) Terminal Pond (3A)
- 3) Terminal Pond (3B)
- 4) Aerobic pond (2A)
- 5) Aerobic Pond (2B)
- 6) Anaerobic Pond (single sample representing 1A & 1B)
- 7) Sludge storage pit
- 8) Evaporation Basin (4A)

Sampling where possible was taken from the centre of each pond/pit, however a number of ponds still contain a large amount of water which meant sampling was carried out along the edge. Anaerobic Pond, 1B, was at capacity which meant a sample could not be obtained; as a result sample no. 6, anaerobic pond sample, is representative of sludge contained in both anaerobic ponds.

Samples were collected by hand auger on 8 September 2014. A number of samples were taken from each pond to form a composite sample for the respective pond. Samples were taken to a maximum depth of 1 metre where greater than 1 metre of sludge was present.

The samples were sent for analysis at a NATA accredited laboratory and results are compared against relevant guidelines within this report.

Characteristics of the site

A desktop review and investigation of the topography, hydrology, soil, lithology, geology and hydrogeology of the site has been undertaken and are as follows:

Topography

The Wagga Wagga 1:100 000 Topographic Map (Sheet 8327-1-N) indicates that the site is located at an elevation of approximately 225m to 235 AHD. The site landform is classed as flat with a level slope.

Location and Significance

Soil & Landform

The site lies within the soil mapping unit coded as UB39 from the Digital Atlas of Australian Soil (BRS, 1991). The map unit key UB39 is described as:

The site lies within the soil mapping unit coded as eb, East Bomen, and is found over 26.6 km² of undulating rises and long lower slopes, within the Northcote-Coolamon physiographic region. This landscape occurs more extensively on the Wagga Wagga 1:100 000 sheet from which this description is derived (Chen & McKane 1996).

eb	EAST BOMEN	Aeolian (Associated)
		
Landscape—26.6 km², undulating rises comprising broad crests and ridges, long waning slopes, and shallow drainage depressions underlain by Silurian Wantabadgery granodiorite. Local relief 15–40 m, slopes 3–10%. Almost completely cleared tall woodland. Soils—shallow to moderately deep (40–100 cm) Haplic Red Chromosols and Kandosols (Red Earths) on crests and ridges. Moderately deep (80–150 cm) Haplic Red Kandosols (Red Earths), Chromosols and Dermosols on slopes. Moderately deep (80–150 cm) Haplic Brown Kandosols (Yellow Earths) in drainage lines. Qualities and Limitations—moderate erosion hazard. Moderate acidity, shallow soils (localised).		

Landscape

Geology

Silurian granites, mainly Wantabadgery granodiorite and Collingullie granite. Thick (>2 m) clay sequences with significant windblown (aeolian) clay additions (parna) occur on most sideslopes and in drainage depressions.

Landform/Topography

Undulating rises and minor low hills. Slope gradients are mostly 3–10%. Local relief is 15–40 m within an elevation range of 200–280 m. Landform elements include broad (<500 m) crest and ridges, long (>400 m) waning slopes and shallow drainage lines.

Climate and Hydrology

Climatic zones 2A and 2C. Annual rainfall is 500–550mm. During winter and spring, soil is moderately moist to moist but dry during summer and early autumn. Run on is low to moderate for most slopes but moderate to high near drainage depressions.

Stormwater from the RWC site runs into an unnamed creek 1.7 km southeast from the site. This creek flows to the Kurrajong lagoon approximately 5.1 km south east of the RWC site. Dukes Creek is located approximately 0.9 km to the east and north east of the RWC site.

Vegetation

Almost completely cleared. Isolated very small areas of extensively cleared tall woodland remain in crown reserve and along a few roads. Most common tree species include *Callitris glaucophylla* (white cypress Pine), *Eucalyptus albens* (white box), *E. microcarpa* (grey box) and *E. melliodora* (yellow box). Understorey species

include *Themeda australis* (kangaroo grass), *Poa labillardierei* (tussock grass), *Austrostipa aristiglumis* (plains grass), *Austrostipa* spp. (speargrass) and *Austrodanthonia* spp. (wallaby grass).

Land Use

Predominantly cropping for wheat with minor barley and cereal rye. Minor improved pasture for dryland lucerne. Significant areas of grazing, both on stubble and improved pastures.

Land Degradation

As much as 15 cm soil can be lost to sheet erosion in intensively cultivated regions where soil structure decline also occurs, resulting in hardsetting surfaces. Minor gully erosion (usually <1 m deep, locally <2 m) occurs along a few drainage lines. Isolated salinisation in one or two drainage flats has been observed in the north-east of the Wagga soil landscape map sheet.

Urban Capability

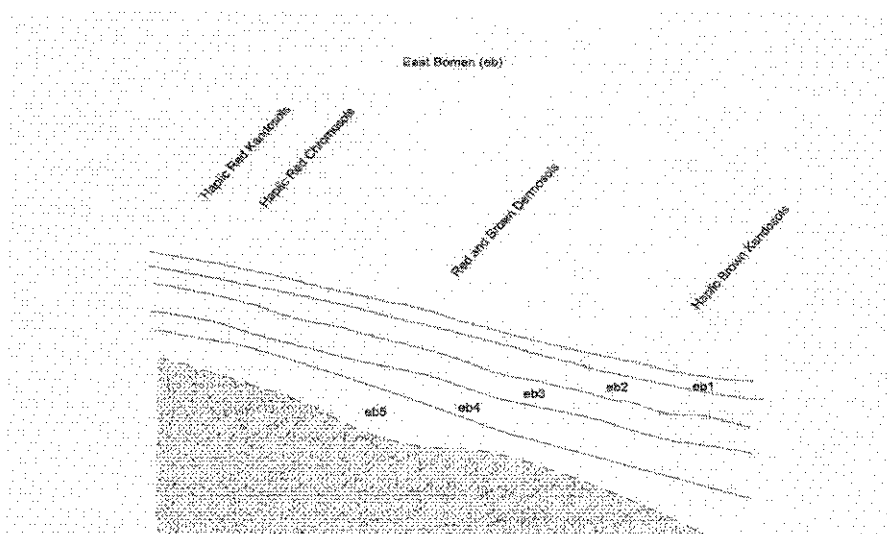
Slight to locally moderate limitations where shallow soil (<100 cm on crests and ridges) causes difficulties for excavation and underground services.

Rural Capability and Sustainable Land Use Recommendations

Slight limitations for cultivation tending to moderate on crests and major drainage depressions. Slight limitations for grazing. Areas of sheet erosion and soil structure decline restrict productivity. Eroded drainage lines should be fenced off and revegetated.

Dominant Soil Materials

- eb1:** acidic brown massive sandy loam to sandy clay loam (topsoil—A₁ horizon).
- eb2:** reddish-brown massive light clay (subsoil—B₁ horizon).
- eb3:** sodic reddish-brown massive to strongly structured light to light medium clay (subsoil—B₂ horizon).
- eb4:** yellowish-brown moderate to strongly structured light medium clay (subsoil—B₂).
- eb5:** orange moderate structured coarse sandy light clay to light clay (subsoil—BC horizon).



Distribution diagram of East Bomen soil landscape illustrating the occurrence and relationship of dominant soil materials.

Weather

The average rainfall is approximately 571.7 mm per annum, with the wettest months being July, August and October. Annual mean evaporation is 1861.5 mm with mean daily evaporation ranges from 1.2mm in July to 10.2mm in January. Wagga is characterised by cold wet winters and hot dry summers with mean maximum temperatures ranging from 12.7 °C in July to 31.6 °C in January and mean minimum temperatures ranging from 2.7 °C in July to 16.4 °C in February, Wagga Wagga AMO 072150 (www.bom.gov.au).

Lithology and Geology

Silurian Granites, mainly Wantabadgery Granodiorite and Collingullie Granite, with small parts of Burrandana Granite. Thick (>2m) clay sequences with significant windblown (aeolian) clay additions ("parna"), deposited on most sideslopes and in drainage depressions.

Hydrogeology

From the Geoscience Australia hydrogeology dataset the groundwater beneath the site is described as: fractured or fissured extensive aquifers of low to moderate productivity.

Physical characteristics of the site

The site forms part of the former Riverina Wool Combing facility formerly owned and managed by Chargeurs Wool who operated the site under EPL number 3914. The site consists of a mixture of agricultural pasture land, Offices, car park facilities and industrial sheds. Part of the site is currently under lease and in use to third party businesses. It should be noted that an underground Natural Gas Pipeline runs through the site, west of the Wool Processing area through lot numbers:

- a) 174 DP 751405
- b) 108 DP 751405
- c) 110 DP 751405
- d) 2 DP 590756

The site runs along Byrnes Road, to its left, and is dissected by Trahairs Road which splits the site into 2 sections.

- 1) North of Trahairs Road
- 2) South of Trahairs Road

North of Trahairs Road consists mainly of agricultural land, however it formerly accommodated three water storage and evaporation ponds which were fed by the waste water treatment ponds to the south of Trahairs road. Within this section also lies an area formerly used for stockpiling / wind rowing sludge material. To the north and west of the evaporation ponds there is approximately 110 hectares of agricultural land.

The areas of concern involve the former waste water and sludge treatment area and former Wool Scour Waste landfill to the south of Trahairs Road. There is also thought to be 2 wool scour waste encapsulation cells located to the south of the wool scour waste landfill area. Also within this section are the former offices of RWC, the processing facilities and storage sheds/warehouses for RWC and the former employee car parking facilities. There are 2 main entrances from Byrnes Road used to enter these facilities, with 3 entrances along Trahairs Road. To the rear of the

former wool processing facility there is approximately 100 hectares of agricultural land.

There are approximately 34 groundwater monitoring wells scattered around the RWC site on both sides of Trahairs road.

Site Environmental History

Riverina Wool Combing was formerly owned and operated by Chargeurs Wool. RWC was established in the 1980's and operated under EPL number 3914 since May 2000. Chargeurs then sold the RWC site in 2006/07 to RIVCO Group Pty Ltd (RIVCO), who leased the site back to RWC for a number of years until 2010. In February 2010 RWC advised the EPA that the scheduled activity would cease to be carried out at RWC premises from 31 March 2010.

On 29 March 2011 the EPA issued RWC with a "Notice of Clean-Up Action" requiring an Environmental management Plan to be put together. As RWC no longer operate the facility and RIVCO are no longer in existence, it is unclear if these issues have been addressed.

The EPA have approved the surrender of Environment Protection Licence number 3914 on 23 January 2014, notice number 1506172.

The outstanding issues remaining regarding the site are from the "Notice of Clean-Up action" discussed above, the following site assessment will also make recommendations on how to address any outstanding issues which may assist in the formulation of an Environmental Management Plan.

Potential contaminating activities

There are a number of potential contamination sources on site, such as the following:

- 1) Wool Scour Waste Landfill area which visibly leaches hydrocarbon contaminated (lanolin) to a dam at the lowest point in the landfill area.
- 2) Waste water treatment ponds which contain a large amount of sludge contaminated with hydrocarbons from lanolin.
- 3) Above ground fuel storage tank located in the waste water treatment area, contents are unknown.
- 4) Underground Natural Gas pipeline running through the site
- 5) Overhead Electricity power lines run through the site.

Further site investigation may be required surrounding the former process area, offices and the warehouses to establish if chemicals or other substances remain in storage on site. If the fuel storage tank within the waste water treatment area is to be maintained consideration should be given to installing a concrete bund for compliance with work cover and NSW EPA regulations.

Procedure of Work

By reference to Contaminated Sites, sampling design guidelines, NSW EPA (1995), a total of 8 samples were taken from between zero and one metre below ground level at various pre determined sampling points around the site where possible to investigate the extent of contamination. Sludge samples from all ponds on site were sampled and depth of sludge where possible was recorded. It was found that there was greater than one metre of sludge at the following sample locations; Anaerobic pond (*2), Sludge storage pit, and both Aerobic ponds. A minimum of 4 samples up to a maximum of 10 samples were taken at each sampling location which were composited and formed a representative sample for each sample point which was analysed by a NATA accredited laboratory.

Each sample was analysed for moisture content, Potassium, Lead, Arsenic, Zinc, Copper, Aluminium, Iron, Organochlorine pesticides, Organophosphorus pesticides, TPH/TRH and BTEXN. Results are compared against National Environment Protection Measures (NEPM) 2013.

Developing a Decision Rule

As part of the review the analytical data was assessed against *National Environment Protection (Assessment of Site Contamination) Measure*, NEPM (2013); and the Health Investigation (HIL) level 'D' was used from the Measure which is a human exposure setting based on land that has been established as follows:

D. Commercial/Industrial: includes premises such as shops and offices as well as factories and industrial sites.

The HIL was chosen to reflect the current use of the site which is an industrial/commercial.

Specify Limits of Decision Error

This step is to establish the decision maker's tolerable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data. Data generated during this project must be appropriate to allow decisions to be made with confidence. Specific limits for this project have been adopted in accordance with the appropriate guidance from the NSW EPA (1994), NEPM (2013), ANZECC/ARMCANZ (2000), DEC (2007), appropriate indicators of data quality (DQIs used to assess quality assurance / quality control) and standard procedures for field sampling and handling.

AS4482.1-20054 nominates two types of errors that require assessment:

- Deciding that the site is acceptable when it actually is not; and
- Deciding that the site is unacceptable when actually it is.

As a result the above decision rules have been assessed using the relevant guidelines.

Contamination Assessment

As can be seen from the following tables the samples analysed are below the relevant threshold levels for commercial/industrial sites based on National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 2013.

Analyte	Wool Scour Waste landfill dam	Terminal Pond 3A	Terminal Pond 3B	Threshold
Metals/Metalloids (mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
Arsenic	6	6	7	3000
Copper	19	19	20	240,000
Lead	12	12	14	1500 ¹
Zinc	29	29	22	400,000
Iron	22100	22700	23700	no data
Aluminium	18700	17000	16800	no data
Major Cations (mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
Potassium	920	1610	1620	no data
Organochlorine Pesticides (mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
DDT+DDE+DDD	<0.05	<0.25	<0.05	3600
Aldrin & Dieldrin	<0.05	<0.25	<0.05	45

Riverina Wool Combing
Byrnes Road Bomen

Chlordane	<0.05	<0.25	<0.05	530
Endosulfan	<0.05	<0.25	<0.05	2000
Endrin	<0.05	<0.25	<0.05	100
Heptachlor	<0.05	<0.25	<0.05	50
HCB	<0.05	<0.25	<0.05	80
Methoxychlor	<0.2	<1.0	<0.2	2500
Other Pesticides (mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
Chlorpyrifos	<0.05	<0.25	<0.05	2000
Organics (mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
TPH C ₆ – C ₉	<10	<10	<10	no data
TPH C ₁₀ – C ₁₆	<50	<50	<50	no data
TPH C ₁₆ – C ₃₄	<100	2380	160	no data
TPH C ₃₄ – C ₄₀	<100	2930	<100	no data
TPH C ₁₀ – C ₄₀	<50	5310	160	no data
BTEXN (mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
Benzene	<0.2	<0.2	<0.2	no data
Toluene	<0.5	<0.5	<0.5	no data
Ethylbenzene	<0.5	<0.5	<0.5	no data
Xylenes (Total)	<0.5	<0.5	<0.5	no data
Napthalene	<1	<1	<1	no data
Other	%	%	%	%
Moisture Content (%)	23.9	30.8	9.4	no data

1. NEPM (2013)

Analyte	Aerobic Pond 2A	Aerobic Pond 2B	Anaerobic Pond 1A & 1B	Threshold
Metals/Metalloids (mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
Arsenic	<5	<5	<5	3000
Copper	16	22	19	240,000
Lead	10	12	12	1500 ¹
Zinc	94	211	220	400,000
Iron	13300	13200	12000	no data
Aluminium	15200	16300	12600	no data
Major Cations (mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
Potassium	3400	4070	2310	no data
Organochlorine Pesticides (mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
DDT+DDE+DDD	<0.25	<0.5	<2.5	3600
Aldrin & Dieldrin	<0.25	<0.5	<2.5	45
Chlordane	<0.25	<0.5	<2.5	530
Endosulfan	<0.25	<0.5	<2.5	2000
Endrin	<0.25	<0.5	<2.5	100
Heptachlor	<0.25	<0.5	<2.5	50
HCB	<0.25	<0.5	<2.5	80
Methoxychlor	<1.0	<2.0	<10	2500
Other Pesticides (mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
Chlorpyrifos	<0.25	<0.5	<2.5	2000
Organics (mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
TRH C ₆ – C ₁₀	<10	28	<10	no data
TRH C ₁₀ – C ₁₆	<170	80	<50	no data
TRH C ₁₆ – C ₃₄	25200	19600	13700	no data
TRH C ₃₄ – C ₄₀	31100	27600	16300	no data

TRH C ₁₀ – C ₄₀	56500	47300	30000	no data
BTEXN (mg/kg)	mg/kg	mg/kg	mg/kg	mg/kg
Benzene	<0.2	<0.2	<0.2	no data
Toluene	<0.5	<0.5	<0.5	no data
Ethylbenzene	<0.5	<0.5	<0.5	no data
Xylenes (Total)	<0.5	<0.5	<0.5	no data
Napthalene	<1	<1	<1	no data
Other	%			%
Moisture Content (%)	49.8	56.4	47.1	no data

1. NEPM (2013)

Analyte	Sludge Storage pit	Evaporation Basin	Threshold
Metals/Metalloids (mg/kg)	mg/kg	mg/kg	mg/kg
Arsenic	<5	6	3000
Copper	25	14	240,000
Lead	17	8	1500 ¹
Zinc	202	76	400,000
Iron	19700	11400	no data
Aluminium	21500	10800	no data
Major Cations (mg/kg)	mg/kg	mg/kg	mg/kg
Potassium	3400	8800	no data
Organochlorine Pesticides (mg/kg)	mg/kg	mg/kg	mg/kg
DDT+DDE+DDD	<5.0	<2.5	3600
Aldrin & Dieldrin	<5.0	<2.5	45
Chlordane	<5.0	<2.5	530
Endosulfan	<5.0	<2.5	2000
Endrin	<5.0	<2.5	100
Heptachlor	<5.0	<2.5	50
HCB	<5.0	<2.5	80
Methoxychlor	<20	<10	2500
Other Pesticides (mg/kg)	mg/kg	mg/kg	mg/kg
Chlorpyrifos	<0.25	<0.5	2000
Organics (mg/kg)	mg/kg	mg/kg	mg/kg
TRH C ₆ – C ₁₀	<10	<10	no data
TRH C ₁₀ – C ₁₆	90	90	no data
TRH C ₁₆ – C ₃₄	16400	17100	no data
TRH C ₃₄ – C ₄₀	24600	22400	no data
TRH C ₁₀ – C ₄₀	41100	39600	no data
BTEXN (mg/kg)	mg/kg	mg/kg	mg/kg
Benzene	<0.2	<0.2	no data
Toluene	<0.5	<0.5	no data
Ethylbenzene	<0.5	<0.5	no data
Xylenes (Total)	<0.5	<0.5	no data
Napthalene	<1	<1	no data
Other	%	%	%
Moisture Content (%)	55.1	47.1	no data

1. NEPM (2013)

The soil testing and analysis demonstrates that the soils tested were below soil threshold levels for commercial/industrial land use. The levels of contamination reported do not warrant immediate intervention and are considered acceptable for

the site's existing use as a commercial/industrial premises. Environmental risks are considered manageable at the present levels.

Health Screening Levels (HSL) fractions and corresponding equivalent carbon range

Fraction Number	Equivalent carbon number range
F1	C ₆ – C ₁₀
F2	C ₁₀ – C ₁₆
F3	C ₁₆ – C ₃₄
F4	C ₃₄ – C ₄₀

According to NEPM Guidelines on Investigation levels for Soil and Groundwater 2013, BTEX results should be subtracted from the TRH C₆ – C₁₀ analytical results for comparison with the HSL for F1. Likewise, naphthalene should be subtracted from C₁₀ – C₁₆ for comparison with the HSL for F2.

Chemicals in the **C₁₆-C₃₄ and C₃₄-C₄₀ fractions are non-volatile** and therefore not of concern for vapour intrusion, however, exposure can be via direct contact pathways (dermal contact and incidental ingestion and inhalation of soil particles). Direct contact HSLs for these fractions can be found in Friebel and Nadebaum (2011a).

It is noted by the NATA accredited laboratory who conducted the analysis that due to matrix interferences in each sample the Limits of Reporting (LoR) for pesticides in each sample required adjusting. This is stated in the attached Certificate of Analysis (CoA).

Estimated Volume of sludge

Pond size has been estimated from SIX maps for the following calculations. Where sludge depth was greater than 1 metre the minimum estimate is shown.

Pond	Area	Perimeter	Depth Sludge	Volume sludge
Terminal Pond (3A)	13350	450	0.4	5340
Anaerobic Pond (1A)	2745	218	>1	>2745
Anaerobic Pond (1B)	2745	218	>1	>2745
Sludge storage	4737	260	>1	>4737
Terminal Pond (3B)	8789	384	<0.1	<879
Aerobic pond (2A)	3924	246	>1	>3924
Aerobic pond (2B)	3924	246	>1	>3924
Evaporation Basin	6400	1470	0.4	2560
Estimated Total Sludge Volume				>26854

From the calculations shown above, there is at least 26,854 m³ of sludge material within the ponds on site. Samples from the wool scour waste landfill dam and the terminal pond 3B, consisted mainly of clay. Disregarding these samples the minimum moisture content of the sludge was >30%. A more detailed investigation regarding

depth of sludge to establish sludge volumes should be carried out once each pond has been emptied of water and dried out.

Wool Scour Waste Landfill Area

The wool scour waste landfill area covers approximately 2.5 hectares with wool scour waste mounds approximately 1 to 1.5 metres in height scattered throughout the landfill area. An approximate estimation for wool scour waste within the area is 13,500m³ of waste which requires encapsulation within a landfill cell. It should be noted this is a ballpark estimation. The waste requires encapsulation on site to prevent any hydrocarbon contamination from lanolin derivatives potentially leaching from the waste.

Recommendations

The following are assumptions based on the site remaining as industrially zoned land.

As the material tested is within threshold limit for NEPM commercial/industrial land use (HIL D) it is recommended to leave it in-situ. As the EPA have raised concerns regarding the wool scour waste present in the landfill area it is proposed that this should be encapsulated within a landfill cell similar to existing encapsulation cells present on site to prevent further hydrocarbon contamination on site.

In regard to the volume of sludge material present on site a number of options exist:

- 1) Combining the sludge with existing clay on site or VENM material for earthworks which may be required on site may be considered once further geotechnical testing on soil/sludge blends have undergone soil engineering analysis for the following at a minimum, Gradings, MDD/OMC, and PI.
- 2) Landspreading throughout the site should be considered as the sludge is likely to be rich in nutrients valuable to crops. The elevated Potassium results are an indication of this. Further analysis may be required and a detailed biosolids application strategy should be implemented. Contaminant threshold levels for biosolids application are discussed below.
- 3) The sludge material may be suitable for composting at a facility such as "Carbon Mate", which is an EPA licenced facility at Gregadoo landfill facility. Carbon Mate accept green waste and "build soil carbon" to produce a high value compost product.

It is also advised that a detailed services location be carried out prior to any earthworks beginning. Issues such as the existence of an underground gas pipeline and overhead electricity power lines should be clearly marked and identified.

Suitability for Biosolids Disposal

As the sludge material sampled is within NEPM guideline values for a Commercial / Industrial site and there are no proposals as yet to modify this, a logical recommendation for the sludge disposal is use as a biosolid and consideration toward land spreading throughout the site is a viable option. Table 3.1 from the NSW EPA Environmental Guidelines on "Use and Disposal of Biosolids Products" demonstrates the contamination acceptance concentration thresholds as shown below.

TABLE 3-1

Contaminant Acceptance Concentration Thresholds*

Contaminant	Grade A ¹ (mg/kg) ³	Grade B ² (mg/kg) ³	Grade C (mg/kg) ³	Grade D (mg/kg) ³
Arsenic	20	20	20	30
Cadmium	3	5	20	32
Chromium (total)	100	250	500	600
Copper	100	375	2,000	2,000
Lead	150	150	420	500
Mercury	1	4	15	19
Nickel	60	125	270	300
Selenium	5	8	50	90
Zinc	200	700	2,500	3,500
DDT/DDD/DDE	0.5	0.5	1.00	1.00
Aldrin	0.02	0.2	0.5	1.00
Dieldrin	0.02	0.2	0.5	1.00
Chlordane	0.02	0.2	0.5	1.00
Heptachlor	0.02	0.2	0.5	1.00
HCB	0.02	0.2	0.5	1.00
Lindane	0.02	0.2	0.5	1.00
BHC	0.02	0.2	0.5	1.00
PCBs	0.3	0.3	1.00	1.00

* Contaminant acceptance concentrations are not mean values. Refer to Schedule 2

Notes:

1. The Grade A threshold for cadmium is under review and will be revised in 2 years. Subject to the outcome of this review, the standard for cadmium would be revised and then may become the same as the maximum allowable soil concentration for agricultural land, namely 1 mg/kg.
2. The Grade B threshold levels are under review and will be revised in 2 years.
3. Values are expressed on dry weight basis.

From results shown above in the contamination assessment it has been established that there are no persistent pesticides present in any of the samples. Samples from aerobic pond 2B, anaerobic ponds, and sludge storage pond have breached the grade A concentration thresholds for Zinc slightly and sludge from these ponds should be classified as Grade B. A detailed plan should be formulated if this option is to be pursued.

Disclaimer

The information contained in this report has been extracted from field and laboratory sources believed to be reliable and accurate. DM McMahon Pty Ltd will not assume any responsibility for the misinterpretation of information supplied in this report. The accuracy and reliability of recommendations identified in this report need to be evaluated with due care according to individual circumstances.

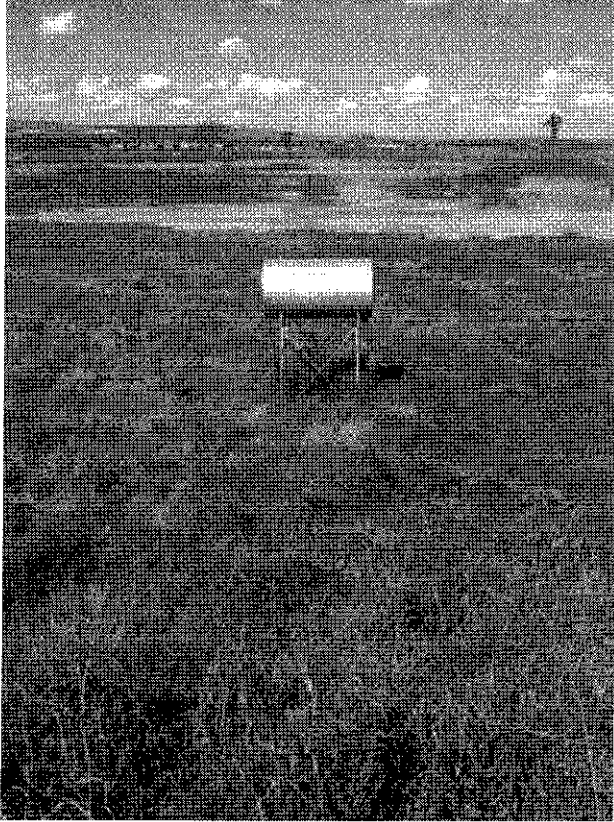
It should be noted that findings in this report are based solely upon the said site conditions at the time of testing. The results of the said investigations undertaken are an overall representation of the conditions encountered. The properties of the soil within the location may change due to variations in ground conditions outside the tested area.

The site assessment and report has been compiled by;

James Maloney
BSc (Hons), Pg Dip Chem Eng
DM McMahon Pty Ltd
PO Box 6118
Wagga Wagga NSW, 2650

Photos

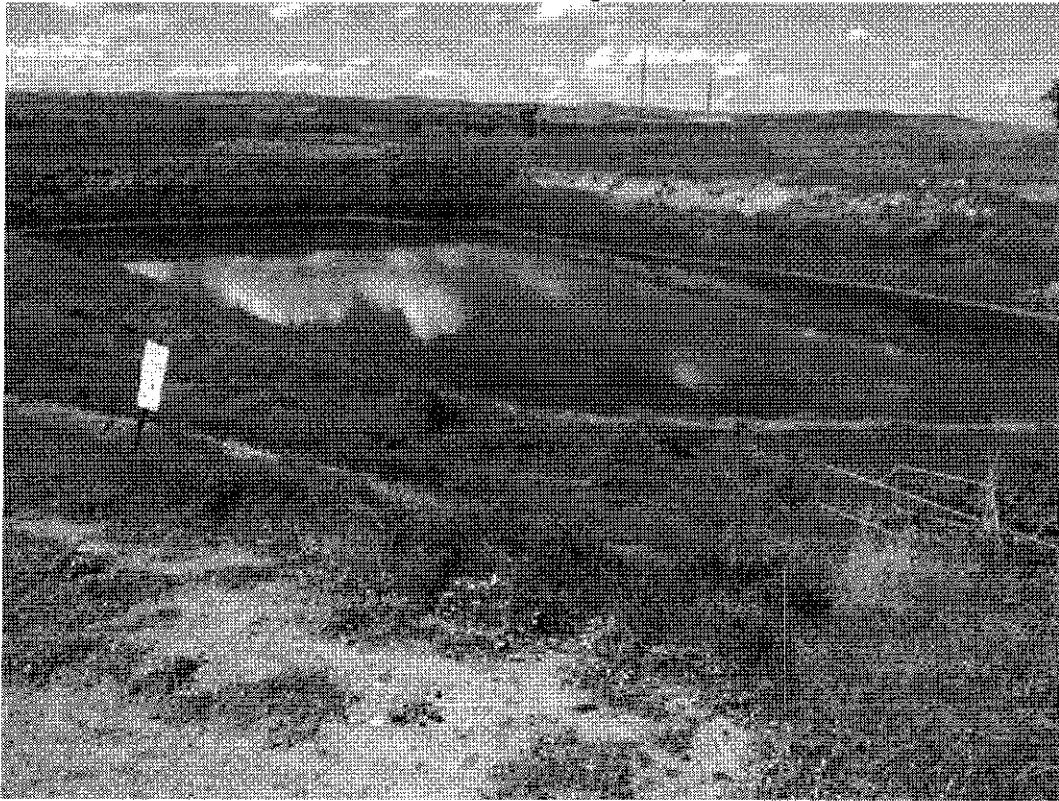
Fuel tank located within the Water and Sludge treatment area.



Anaerobic Pond 1B at capacity with water at time of sampling.



Anaerobic Pond 1A also contained Water, Sludge sampled from sides and corners.



References

Australian and New Zealand Environment and Conservation Council (ANZECC) and the National Health and Medical Research Council (NHMRC) Guidelines for the Assessment and Management of Contaminated Sites 1992

Chen, X.Y., and McKane, D.J. (1997) *Soil Landscapes of the Wagga Wagga 1:100 000 Sheet*, Department of Land and water Conservation, Sydney.

National Environment Protection (Assessment of Site Contamination) Measure (NEPM), 2013

NSW EPA *Contaminated Site Sampling Design Guidelines* 1995

NSW EPA *Guidelines for Consultants Reporting on Contaminated Sites* 1997

NSW EPA (DEC) *Guidelines for the NSW Site Auditor Scheme*, 2nd Edition, 2006

NSW EPA, *Environmental Guidelines, Use and Disposal of Biosolids Products*

Attachments

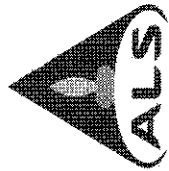
Certificate of Analysis from Analytical laboratory

Aerial Photo detailing section investigated

Investigation Logs

Notice of Licence surrender

Notice of Clean up action



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **ES1420693** Page : 1 of 9

Client : **DM MCMAHON PTY LTD** Laboratory : **Environmental Division Sydney**

Contact : **MR JAMES MALONEY** Contact : **Client Services**

Address : **james@dmcmahon.com.au** Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**

E-mail : **---** E-mail : **sydney@alsglobal.com**

Telephone : **---** Telephone : **+61-2-8784 8555**

Facsimile : **---** Facsimile : **+61-2-8784 8500**

Project : **RIVERINA WOOL COMBING** QC Level : **NEPM 2013 Schedule B(3) and ALS QCS3 requirement**

Order number : **---** Date Samples Received : **15-SEP-2014**

C-O-C number : **---** Issue Date : **22-SEP-2014**

Sampler : **---** No. of samples received : **8**

Site : **---** No. of samples analysed : **8**

Quote number : **---**

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits



NATA Accredited Laboratory 825

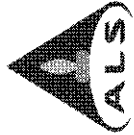
Accredited for compliance with
ISO/IEC 17025.

WORLD RECOGNISED
ACCREDITATION

Signatories

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

Signatories	Position	Accreditation Category
Pabi Subba	Senior Organic Chemist	Sydney Organics
Phalak Inthakesone	Laboratory Manager - Organics	Sydney Organics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics



Page : 2 of 9
Work Order : ES1420693
Client : DM MCMAHON PTY LTD
Project : RIVERINA WOOL COMBING

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 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.

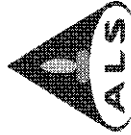
When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

^A = This result is computed from individual analyte detections at or above the level of reporting

- EP068 : Particular samples required dilution due to matrix interferences. LOR values have been adjusted accordingly. Surrogates could not be determined due to samples matrix.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID		Client sampling date / time		Client sample ID	
Compound	CAS Number	LOR	Unit	TERMINAL POND	L SHAPE EVAP BASIN	NORTH POND (ABOVE TERMINAL)	ANAEROBIC POND (REP1&2)	EVAPORATION BASIN	
EA055: Moisture Content	---	1.0	%	08-SEP-2014 15:00 ES1420693-001	08-SEP-2014 15:00 ES1420693-002	08-SEP-2014 15:00 ES1420693-003	08-SEP-2014 15:00 ES1420693-004	08-SEP-2014 15:00 ES1420693-005	
Moisture Content (dried @ 103°C)	---	---	---	30.8	9.4	55.1	47.1	28.0	
EP093S: Soluble Major Cations	---	---	---	---	---	---	---	---	
Potassium	7440-09-7	10	mg/kg	1610	1620	3400	2310	8800	
EG005T: Total Metals by ICP-AES	---	---	---	---	---	---	---	---	
Aluminium	7429-90-5	50	mg/kg	17000	16800	21500	12600	10800	
Arsenic	7440-38-2	5	mg/kg	6	7	<5	<5	6	
Copper	7440-50-8	5	mg/kg	19	20	25	19	14	
Iron	7439-89-6	50	mg/kg	22700	23700	19700	12000	11400	
Lead	7439-92-1	5	mg/kg	12	14	17	12	8	
Zinc	7440-66-6	5	mg/kg	29	22	202	220	76	
EP068A: Organochlorine Pesticides (OC)	---	---	---	---	---	---	---	---	
alpha-BHC	319-84-6	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
beta-BHC	319-85-7	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
gamma-BHC	58-89-9	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
delta-BHC	319-86-8	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
Heptachlor	76-44-8	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
Aldrin	309-00-2	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
Total Chlordane (sum)	---	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
Dieldrin	60-57-1	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
4,4'-DDE	72-55-9	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
Endrin	72-20-8	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
4,4'-DDD	72-54-8	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	
4,4'-DDT	50-29-3	0.2	mg/kg	<1.0	<0.2	<20.0	<10.0	<10.0	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.25	<0.05	<5.00	<2.50	<2.50	

Sub-Matrix: SOIL (Matrix: SOIL)

[illegible]