BHP Billiton Olympic Dam

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LM1 ANNUAL REPORT

August 2014

BHP Billiton Olympic Dam Corporation Pty Ltd

Registered Office: Level 16, 171 Collins Street, Melbourne Victoria 3000, Australia

OLYMPIC DAM

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August 2014

DISTRIBUTION

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THE DEPARTMENT FOR MANUFACTURING, INNOVATION, TRADE, RESOURCES, AND ENERGY (SA)	Chief Inspector of Mines
BHP BILLITON COPPER	Manager Health and Safety
BHP BILLITON OLYMPIC DAM	Head of HSE
	Head of Production
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	General Manager Smelter & Refinery
	General Manager Processing
	Senior Manager NPI
	Olympic Dam Site Managers
	Superintendent Radiation and Occupational Hygiene
	Senior Radiation Safety Officer - Mine
	Senior Radiation Safety Officer - Process
	Superintendent Ventilation
	Occupational Physician
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1 Introduction

This document is the Financial Year 2014 LM1 Annual Report for BHP Billiton Olympic Dam Corporation Pty. Ltd. (BHP Billiton Olympic Dam). As required under the terms of the Licence LM1, granted on the 28th of September 1988 under the *South Australia Radiation Protection and Control Act 1982* to mine and treat uranium bearing ores, the following information is included in this document:

- Plans of mine workings showing all existing workings and facilities for ventilation of the mine as of 30 June 2014;
- Indication of areas in which new mine development is planned and of areas from which ore extraction is planned for the period to 30 June 2015;
- Details of significant changes in processing plant layout, major equipment, or mill process during the twelve months ending 30 June 2014; and
- Estimates of quantities of radioactive wastes produced at Olympic Dam during the twelve months ending 30 June 2014.

A separate annual report containing employee radiation dose assessments, dose calculation methodologies, dose parameters and dose conversion factors for the period 1 July 2013 to 30 June 2014 will be submitted to the Radiation Protection Branch of the Environment Protection Authority South Australia (SA EPA) in October 2014.

On the 9 October 2013 Olympic Dam received approval from the SA EPA for the current Radiation Management Plan – Olympic Dam (Doc. No. 84684, V3.1). There have been no changes to the management plan as the plan was recently approved within the previous financial year.

2 Mine Workings during Financial Year 2014 (FY14)

2.1 Mining Methods

2.1.1 Current Mining Method

Sub-level open stoping has been the mining method of choice at Olympic Dam since the commencement of operations in 1988. Once the stopes are mined out they are backfilled with either unconsolidated rock fill or a mixture of aggregate and binder as Cemented Aggregate Fill (CAF). The nature of the backfill material is based on future requirements of the fill mass. Where the operation plans to expose walls or backs in the future, CAF will be selected to backfill the stope. Conversely, if the fill mass is not going to be exposed at a later date, then the stope will be filled using rock fill.

In cycle fibrecrete (shotcrete containing synthetic fibres) is a part of the mining cycle which provides a greater level of surface support for developing drives and rehabilitation sites.

2.1.2 Stope Size and Shape

The current stope design contains stopes of various shapes and sizes. Footprints vary from 20 m by 20 m to 30 m by 30 m. Stope height is designed as much as possible to encompass the full extent of the ore. Current stope heights generally vary from 1 to 5 lifts high (~60 m to ~300 m). Consequently, stope tonnages can vary from under 100,000 t to in excess of 500,000 t.

2.1.3 Extraction Sequence

The initial stope extraction sequence at Olympic Dam is defined as ‘Primary-Secondary-Tertiary’ (P/S/T). The extraction sequence was modified in 2005 to a pillarless sequence known as ‘Mining Fronts’.

The Mining Fronts extraction sequence minimises re-work caused by the need to re-access areas over time (i.e. for rehabilitation work, ventilation controls, etc.). This sequence also minimises dilution caused by CAF falling from a primary into a secondary stope and minimises ore losses caused by primary stope CAF shadowing secondary stope ore. Furthermore, the Mining Fronts sequence minimises any future impact of stress increase or decrease on the rock mass behaviour, thus maximising ore recovery. No remnant pillars need to be recovered in a Mining Front scenario and the operator retains the ability to close off areas upon completion of the stope extraction. Mining Fronts also provides the opportunity for consistent and systematic designs,

increased predictability, reliability and sustainability of the mining plan, and minimises potential for ore loss.

2.1.4 Backfill Requirements

The permanent (existing) plant produces CAF via a pug mill and utilises neutralised tailing sands, whilst the temporary plant produces CAF via a large agitator-mixing bowl and utilises quarry fines as the sand medium. Both plants are operated by BHP Billiton and a contractor delivers the CAF to surface boreholes using semi-trailer bottom dump trucks. Binders (cement, fly ash and lime) are added to the CAF mixture according to strength requirements and are sourced externally. Crushed dolomite/limestone aggregate is sourced from an onsite quarry. Water comprises both recycled process water and local saline water.

2.2 Mine Development and Production during FY14

The actual production, backfill, underground raise drilling, and raise drill site schedules for FY14 are described in Tables 1 - 4.

Table 1: Actual Production Schedule FY14

Stope	Mine Area	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
Brown203	F												
Blue143	DC												
Scarlet146	DSE												
Olive112	C												
Olive135	C												
Jade118	DSE												
Green109	DNW												
Scarlet129	DSE												
Scarlet163	DSE												
Amber445	FN												
Amber363	FN												
Blue150	DC												
Olive178	C												
Violet389	A												
Purple259	F												
Cyan139	FN												
Amber488	FN												
Yellow422	B												
Orange149	DCN												
Purple264	F												
Green103	DNW												
Olive105	C												
Blue108	DC												
Scarlet389	DSE												
Green123	DNW												
Purple510	F												
Orange123	DCN												
Cyan154	FN												
Scarlet166	DSE												
Cyan132	FN												
Amber489	FN												
Purple253	F												
Olive156	C												
Blue119	DC												
Orange110	DNW												
Purple655	F												
Pink389	C												
Orange155	DCN												
Blue147	DNW												
Violet447	A												
Olive103	C												
Amber305	FN												
Yellow419	B												
Green304	DNW												
Yellow436	B												
Scarlet121	DSE												
Scarlet142	DSE												
Scarlet156	DSE												
Cyan114	FN												
Blue102	DC												
Green108	DNW												
Orange147	DC												
Cyan104	FN												
Purple245	F												
Violet369	A												
Brown202	F												
Amber385	FN												
Green141	DNW												

Table 2: Actual Backfill Schedule FY14

Stope	Fill Type	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
Orange111	CAF												
Purple238	CAF												
Orange103	CAF												
Brown203	CAF												
Scarlet139	CAF												
Jade116	CAF												
Brown223	CAF												
Orange109	CAF												
Amber329	CAF												
Yellow417	CAF												
Yellow424	CAF												
Green103	CAF												
Orange151	CAF												
Scarlet145	CAF												
Olive191	CAF												
Blue118	CAF												
Olive112	CAF												
Orange104	CAF												
Blue143	CAF												
Cyan139	CAF												
Scarlet146	CAF												
Scarlet163	CAF												
Green109	CAF												
Blue150	CAF												
Amber488	CAF												
Yellow422	CAF												
Amber363	CAF												
Olive105	CAF												
Scarlet129	CAF												
Purple264	CAF												
Scarlet389	CAF												
Violet389	CAF												
Orange149	CAF												
Blue108	CAF												
Orange123	CAF												
Cyan154	CAF												
Purple510	CAF												
Scarlet166	CAF												
Purple259	CAF												
Olive178	CAF												
Orange110	CAF												
Olive156	CAF												
Cyan132	CAF												
Olive135	CAF												
Amber489	CAF												
Orange155	CAF												
Cyan156	SRF												
Green103	SRF												
Orange151	SRF												
Cyan139	SRF												
Scarlet163	SRF												
Green109	SRF												
Purple510	SRF												
Purple453	URF												
Cyan156	URF												
Green103	URF												
Orange151	URF												
Orange104	URF												
Scarlet146	URF												
Amber488	URF												
Yellow422	URF												
Purple264	URF												
Scarlet389	URF												
Orange149	URF												
Cyan154	URF												
Scarlet166	URF												

Table 3: Actual Underground Raise Drilling Schedule FY14

Description	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
39 Blue 108 Backfill Transfer												
41 Purple 259 Backfill Raise												
30 Violet 447 Slot Raise												
26 Purple 510 Slot Raise												
34 Cyan 132 Backfill Raise												
34 Amber 363 Backfill Raise												
30 Orange 155 Slot Raise												
30NH53 Raise (RB35) Ventilation Raise												
26 Pink 389 Slot Raise												
35 Brown 223 Backfill Transfer												
45 Scarlet 166 Slot Raise												
45 Cyan 114 Slot Raise												
32 Blue 119 Slot Raise												
52 Purple 655 Slot Raise												
46 Amber 305 Slot Raise												
30NC52 Ventilation Raise												
51 Orange 110 Slot Raise												
26 Blue 108 Backfill Transfer												
26 Olive 156 Slot Raise												
32 Purple 253 Slot Raise												
46 Cyan 151 Ventilation Raise												
45 Olive 103 Slot Raise												
27 Green 123 Backfill Transfer												
45 Scarlet 142 Slot Raise												
28 Amber 305 Slot Raise												
26 Orange 104 Backfill Transfer												
41 Purple 245 Slot Raise												
51 Blue 102 Slot Raise												
33 Green 304 Ventilation Raise												
45 Scarlet 121 Slot Raise												
52 Purple 245 Ventilation Raise												
46 Orange 110 Backfill Transfer												
39 Blue 102 Slot Raise												
36 Yellow 419 Slot Raise												
51 Scarlet 156 Slot Raise												
46 Orange 147 Slot Raise												
42 Orange 110 Backfill Transfer												
26 Purple 253 Slot Raise												
39 Orange 147 Backfill Transfer												
29 Yellow 436 Slot Raise												
34 Cyan 114 Slot Raise												
52 Cyan 104 Slot Raise												
31 Yellow 419 Slot Raise												
35 Orange 110 Backfill Transfer												
45 Jade 325 Slot Raise												
41 Cyan 104 Transfer Raise												
26 Green 304 Slot Raise												
46 Amber 385 Slot Raise												
RB32 - 44NF54 Ventilation Raise												
41 Brown 202 Slot Raise												
36 Violet 369 Raisebore												
35 Green 141 Slot Raise												
36 Orange 173 Ventilation Raise												
27 Amber 385 Slot Raise												
27 Green 108 Slot Raise												
46 Cyan 143 Slot Raise												
27 Green 141 Backfill Transfer												
30 Violet 549 Slot Raise												
32 Olive 110 Slot Raise												
37 Brown 202 Slot Raise												
34 Amber 385 Ventilation Raise												
26 Olive 110 Slot Raise												
27 Cyan 143 Slot Raise												
41 Purple 494 Slot Raise												
41 Scarlet 149 Slot Raise												
41 Brown 222 Slot Raise												
40 Violet 549 Slot Raise												
46 Orange 132 Slot Raise												
35 Brown 222 Ventilation Raise												
36 Purple 494 Slot Raise												
45 Blue 113 Ventilation Raise												
37 Jade 117 Slot Raise												
51 Scarlet 160 Slot Raise												
32 Olive 389 Slot Raise												
42 Orange 132 Slot Raise												
45 Olive 176 Slot Raise												

Table 4: Actual Raise Bore Schedule FY14

Description	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
RB38												
RB40												

2.2.1 Mine Ventilation

The rate of air circulated in the mine as of the 30th June 2014 was 5,070 m^3/s, no change from the previous year. A list of the air intake and exhaust shafts is shown in Table 5.

Table 5: Intake and Exhaust Shafts

Intake Shafts	Exhaust Shafts
RB5	RB2
RB11	RB3
RB13	RB4
RB14	RB6
RB18	RB7
RB22	RB8
RB23	RB9
RB26	RB10
RB27	RB12
RB28	RB15
RB31	RB16
RB32	RB17
Robinson Shaft	RB19
Clark Shaft	RB20
Whenan Shaft	RB21
Surface Decline	RB24
A-North Decline	RB29
	RB30
	RB33
	RB34
	RB35
	RB38

2.2.2 Changes to Primary Ventilation Circuit in FY14

There have been no major changes to the primary ventilation circuit during FY14.

3 Planned Mine Development for FY15

The approximate scheduling of major mine development activities can be seen in Tables 6 - 9. Programming of the work may change with operational requirements. New stopes will be developed and brought on line as existing stopes are depleted. All stopes currently planned for FY14 are in the A, B, C, DC, DCN, DNW, DSE, F and FN mine areas.

Table 6: Planned Production Schedule FY15

Stope	Mine Area	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
Jade118	DSE												
Amber445	FN												
Green123	DNW												
Purple253	F												
Blue147	DNW												
Olive103	C												
Amber305	FN												
Yellow419	B												
Green304	DNW												
Yellow436	B												
Scarlet121	DSE												
Scarlet142	DSE												
Scarlet156	DSE												
Cyan114	FN												
Blue102	DC												
Green108	DNW												
Orange147	DC												
Cyan104	FN												
Purple245	F												
Violet369	A												
Brown202	F												
Purple494	F												
Amber385	FN												
Purple509	DNW												
Violet549	A												
Jade325	DSE												
Orange132	DCN												
Scarlet149	DSE												
Olive110	C												
Amber464	FN												
Cyan143	FN												
Olive159	C												
Scarlet160	DSE												
Olive389	C												
Green141	DNW												
Jade117	DSE												
Purple266	F												
Violet649	A												
Olive172	C												
Orange173	DCN												
Olive176	C												
Violet467	A												
Brown222	F												
Scarlet130	DSE												
Scarlet111	DSE												
Blue113	DC												
Orange156	DC												
Cyan125	FN												
Blue144	DC												
Brown226	F												
Blue141	DCN												
Purple250	F												
Pink393	C												
Orange168	DNW												
Green111	DNW												
Amber490	FN												
Purple228	F												
Violet368	A												
Yellow432	B												

Table 7: Planned Backfill Schedule FY15

Stope	Fill Type	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
Cyan156	CAF												
Green103	CAF												
Orange104	CAF												
Blue143	CAF												
Amber488	CAF												
Scarlet129	CAF												
Purple264	CAF												
Cyan154	CAF												
Purple510	CAF												
Amber445	CAF												
Scarlet166	CAF												
Purple259	CAF												
Olive178	CAF												
Blue119	CAF												
Orange110	CAF												
Olive156	CAF												
Cyan132	CAF												
Olive135	CAF												
Jade118	CAF												
Pink389	CAF												
Yellow419	CAF												
Amber489	CAF												
Orange155	CAF												
Olive103	CAF												
Scarlet156	CAF												
Violet447	CAF												
Green304	CAF												
Purple655	CAF												
Orange147	CAF												
Amber305	CAF												
Yellow436	CAF												
Cyan104	CAF												
Scarlet121	CAF												
Blue147	CAF												
Scarlet142	CAF												
Cyan114	CAF												
Purple509	CAF												
Brown202	CAF												
Purple494	CAF												
Purple245	CAF												
Violet369	CAF												
Green141	CAF												
Olive110	CAF												
Violet549	CAF												
Brown222	CAF												
Blue102	CAF												
Olive159	CAF												
Orange132	CAF												
Scarlet149	CAF												
Orange173	CAF												
Purple266	CAF												
Olive172	CAF												
Scarlet130	CAF												
Jade117	CAF												
Violet467	CAF												
Violet649	CAF												
Cyan156	SRF												
Pink389	SRF												
Purple253	SRF												
Yellow436	SRF												
Olive110	SRF												
Orange104	URF												
Amber445	URF												
Blue119	URF												
Olive156	URF												
Pink389	URF												
Olive103	URF												
Scarlet156	URF												
Orange147	URF												
Blue147	URF												
Scarlet142	URF												
Green108	URF												
Purple245	URF												
Green141	URF												
Jade325	URF												
Scarlet149	URF												
Orange173	URF												
Jade117	URF												

Table 8: Planned Underground Raise Drilling Schedule FY15

Description	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
51 Jade 325 Slot Raise												
26 Blue 147 Transfer Raise												
45 Blue 113 Slot Raise												
45 Olive 176 Slot Raise												
32 Olive 389 Slot Raise												
51 Jade 325 Ventilation Raise												
51 Scarlet 130 Slot Raise												
41 Purple 266 Slot Raise												
32 Purple 245 Backfill Transfer Raise												
52 Scarlet 111 Slot Raise												
32 Brown 202 BF Transfer												
45 Scarlet 130 Backfill Transfer												
41 Scarlet 111 Slot Raise												
45 Olive 172 Slot Raise												
37 Scarlet 121 Backfill Transfer												
36 Violet 649 Raisebore												
45 Scarlet 160 Slot Raise												
26 Blue 119 Transfer Raise												
39 Scarlet 111 Slot Raise												
36 Violet 467 Raisebore												
39 Olive 172 Slot Raise												
34 Scarlet 130 Backfill Transfer												
32 Olive 159 Slot Raise												
41 Brown 226 Slot Raise												
37 Purple 509 Slot Raise												
29 Blue 113 Backfill Transfer Raise												
52 Cyan 125 Slot Raise												
30 Violet 467 Raisebore												
35 Purple 509 Transfer Raise												
39 Blue 113 Backfill Transfer Raise												
29 Purple 509 Transfer Raise												
32 Jade 124 Ventilation Raise												
36 Orange 168 Ventilation Raise												
51 Olive 389 Ventilation Raise												
57 Purple 700 Raisebore												
26 Orange 168 Slot Raise												
35 Brown 222 Backfill Raise												
51 Olive 389 Slot Raise												
26 Orange 156 Slot Raise												
29 Blue 141 Slot Raise												
40 Blue 144 Slot Raise												
26 Blue 141 Slot Raise												
26 Jade 325 Backfill Raise												
26 Orange 132 Backfill Raise												
41 Amber 490 Slot Raise												
34 Amber 490 Slot Raise												
29 Yellow 432 Slot Raise												
32 Purple 494 Transfer Raise												
34 Amber 464 Slot Raise												
52 Amber 325 Slot Raise												
42 Orange 152 Ventilation Raise												
26 Green 111 Slot Raise												
26 Olive 389 Slot Raise												
27 Amber 464 Slot Raise												
37 Jade 124 Slot Raise												
46 Amber 325 Slot Raise												
26 Jade 117 Tranfer Raise												
41 Purple 250 Slot Raise												
41 Purple 250 Ventilation Raise												
32 Jade 124 Slot Raise												
34 Amber 490 Ventilation Raise												
36 Violet 569 Raisebore												
39 Orange 152 Slot Raise												
26 Jade 124 TTIP Raise												
36 Orange 152 Slot Raise												
30 Purple 510 Slot Raise												
41 Cyan 119 Slot Raise												
36 Violet 368 Raisebore												
27 Amber 325 Slot Raise												
46 Cyan 146 Slot Raise												
26 Purple 510 Slot Raise												
32 Pink 393 Slot Raise												
37 Purple 206 Slot Raise												
26 Pink 393 Slot Raise												
36 Violet 428 Raisebore												
27 Green 155 Slot Raise												
34 Scarlet 134 Slot Raise												
32 Pink 393 Ventilation Raise												
30 Purple 249 Slot Raise												
41 Scarlet 123 Slot Raise												
45 Olive 165 Slot Raise												
46 Cyan 125 Backfill Transfer Raise												
29 Scarlet 134 Backfill Raise												
32 Blue 113 Backfill Transfer Raise												

Table 9: Planned Raise Drilling Schedule FY15

Description	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
RB40												
RB45												
RB44												
RB39												

3.1 Planned Additions to Primary Ventilation Circuit during FY15

The following raises are planned to be completed during FY15:

- RB40 exhaust raise to service the Lime area
- RB44 exhaust raise to service the H Block of the Southern Mine Area

3.2 Changes to Equipment or Process in Mine Production

3.2.1 Changes to Mine Equipment

Equipment purchased during FY14 period:

- For BHP Billiton Olympic Dam, there have been no equipment changes for FY14.
- For Macmahon Underground Pty. Ltd. and Macmahon Raise Drilling Pty. Ltd., the following equipment changes occurred:
  - Trucks TD0360, TD0361, TD0362, and TD 0363 were commissioned
  - Jumbo DR0086 was commissioned
  - Raise bore rigs 73R-2 and 73R-3 were commissioned
  - Integrated Tool Carrier L0022 was commissioned
  - Surface dual cab RC631 was commissioned
  - Light vehicles LV0770, LV5686, LV5687, LV5710, LV5765 LV5766, LV5772, LV5773, LV5774, LV5776, and LV5777 were commissioned
  - Truck TD0038 was decommissioned
  - Light vehicles LV0316, LV0358, LV5551, LV5726, and LV0639 were decommissioned
- For Boart Longyear Pty. Ltd., there have been no equipment changes for FY14.
- For Heading Contractors Pty. Ltd., the following equipment changes occurred:
  - Tray top T2 was decommissioned
  - Backhoe BH5 was decommissioned

- Excavator X03 was decommissioned

- For Exact Mining Pty Ltd, the following equipment changes occurred for the CAF plant, quarry and batch plant:
  - Backhoe BH303 was commissioned
  - Dozers DZ904 and DZ908 were commissioned
  - Excavators EX416, EX423, EX425, and EX429 were commissioned
  - Truck agitator HV613 was commissioned
  - Prime movers HV627, HV628, HV714, HV722, HV729, HV749, HV753, and HV755 were commissioned
  - Truck HV910 was commissioned
  - Lightning tower LT037 was commissioned
  - Light vehicles LV422, LV440, and LV442 were commissioned
  - Motor grader MG314 was commissioned
  - Rock breaker RB004 was commissioned
  - Compressor RC057 was commissioned
  - End tipper RT002 was commissioned
  - Roller RV606 was commissioned
  - Tandem trailer SM006 was commissioned
  - Stacker ST023 and ST025 were commissioned
  - Belly dumper trailer TB009 was commissioned
  - Side tipper trailers TS603, TS604, TS605, TS615, TS616, and TS618 were commissioned
  - Wheel loaders WL008, WL011, WL014, WL024, and WL323 were commissioned
  - Dump truck DT332 was decommissioned
  - Excavator EX405 was decommissioned
  - Prime movers HV609 and HV713 were decommissioned
  - Water cart HV812 was decommissioned
  - Lighting tower LT034 was decommissioned

- Light vehicles LV337, LV347, and LV450 were decommissioned
- Mobile welders MW009, and MW013 were decommissioned
- Crusher NC001 was decommissioned
- Rock breaker RB002 was decommissioned
- Air compressor RC027 was decommissioned
- Stackers ST006 and ST010 were decommissioned
- Wheel loader WL016 was decommissioned

3.2.2 Changes to Mine Procedures

There have been no major changes to mine operating procedures.

3.2.3 Changes to Mine Processes

Mining Method

There have been no changes to the mining method in the FY14 period.

Stope size/shape

There have been no changes to the stope size/shapes in the FY14 period.

Extraction sequence

There have been no changes to the extraction sequence in the FY14 period.

Backfill Requirements

Backfill production from FY14 was 2.34 Mm^3. The current schedule for FY15 is 2.41 Mm^3. This will be achieved by fully utilising the permanent CAF plant (CAF plant 1) and using the temporary CAF plant (CAF Plant 2) on an ad-hoc basis.

Studies will continue to examine varying CAF mix designs to achieve different strengths, as required by mine design.

4 Changes to Equipment or Process in the Process Plant

4.1 Changes to Process Plant Equipment

Changes that have a bearing on environmental and radiation management in the plant are as below:

4.1.1 Concentrator

Though there were no major changes to the Concentrator plant, the noted changes or replacements were as follows:

- Preventive maintenance on ANI, Ball Mill 1, Ball Mill 2, Fuller Mill and Svedala Mill
- Stockpile feeders 8 and 9 overhaul (Svedala circuit)
- Svedala Mill rotor pole change out
- Fuller Mill discharge spools changed to be ceramic lining
- Corrective maintenance on Slag Flotation circuit. Flotation cells and discharge pumps
- Repairs in HC thickener tanks
- Cons Leach tanks repairs

4.1.2 Hydromet

Though there were no major changes to the Hydromet and Solvent Extraction (SX) Plant, the noted changes or replacements were as follows:

Hydromet Plant

- Tails Leach Tanks 7, 6 and 1 were cleaned and repaired
- Counter Current Decantation (CCD) Tank 5 was overhauled
- Clarifier 2 Launder was replaced
- Deslimes Thickener was overhauled
- Tails Disposal Tank 1981 was replaced

SX Plant

- Pregnant Liqueur Solution (PLS) Line to Copper SX (CuSX) A-Train was replaced;
- CuSX A-train and B-train units were cleaned out
- Loaded solvent and return solvent lines on A train were hydro blasted clean
- CuSX raffinate tank was cleaned
- Pulse Columns 5, 8, 13, and 14 were overhauled
- CuSX Loaded Organic Pre-Scrub tank was cleaned
- Uranium SX (USX) loaded solvent line was cleaned
- Precipitation scrub seal pot was cleaned out
- USX Scrub 3, Strip 1, Strip 2, and Strip 3 mix boxes were cleaned out

4.1.3 Smelter

The smelter has continued to closely monitor Polonium-210 (Po-210) within the process to ensure airborne radionuclide concentrations are maintained below the Derived Air Concentration (DAC). Critical streams are assayed for Po-210 on a daily basis. Routine monitoring of airborne activity exposures to the workforce and fume emission sources has remained in place.

There were no major operational changes to the Smelter. The noted changes or replacements were as follows:

- Installation and trial of hygiene hoods to improve gas capture and reduce exposure to personnel have commenced. Hygiene hoods have been installed in selected blister tapholes on the flash furnace and electric furnace bypass launder system
- Reviewed the water quality testing program for cooling tower to reduce the risk of bacterial growth
- Reviewed operating strategies to increase power efficiency and reduce coke consumption in the electric furnace

4.1.4 Refinery

No major changes occurred to the Refinery process flows, the noted changes or replacements in FY14 were as follows:

Electrorefinery:

- The anode tolerance dimension has been adjusted to reduce the production rate of scrap copper.

Electrowinning:

- No major changes instituted

Goldroom:

- Cyanide double block and bleed to improve compliance
- Cyanide local exhaust ventilation system has been upgraded
- Peroxide double block and bleed project has been executed
- Gold decantation project is approaching completion and projected to increase recovery rate by 0.97%.

4.1.5 Analytical Laboratory

No major changes occurred within the Analytical Laboratory during FY14.

4.1.6 Tailings Storage Facility

There were no changes at the Tailings Storage Facility during FY14.

4.1.7 Radioactive Waste Storage

Approval will be sought to utilize the quarry as the permanent radioactive waste storage site in FY15.

4.2 Changes to Process Plant Procedures

There were no major changes to process plant operating procedures.

5 Estimated Quantities of Radioactive Wastes

During the production of copper cathode and uranium oxide concentrate from ore mined on site, waste streams containing radioactive materials are generated. These are discussed further in the following sections.

5.1 Solid Wastes

Solid wastes from the processing of ore reach the Tailings Storage Facility (TSF) in the form of tailings slurry, deposited via spigots along the edges of any of five TSF Cells. The solids consolidate over time and the majority of the liquor either evaporates on the tailings cell, is captured then transferred to a system of evaporation ponds, or is neutralised by the limestone underneath the TSF before entering the groundwater where it is reclaimed via a number of bores.

For the period 1 July 2013 to 30 June 2014, the mass of solid tailings produced was approximately 8,924,898 tonnes. The TSF water balance indicates that a volume of approximately 8,587,459 m^3 of liquor was delivered to the TSF, of which approximately 477,893 m^3 was decanted to the evaporation ponds with the balance remaining in the tailings cells or evaporating. The data for the previous five years is shown below in Figure 1. The low levels seen in FY10 were the result of reduced production due to the Clark Shaft incident.

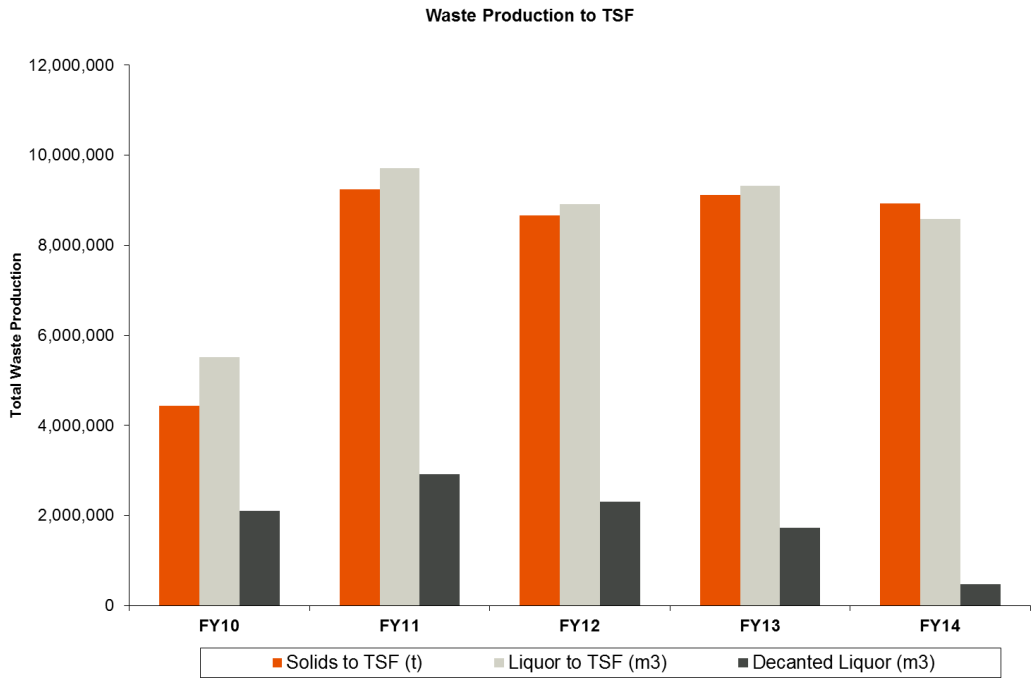

Figure 1: Wastes to the Tailings Storage Facility (TSF)

5.2 Gaseous Wastes

Fugitive radon is emitted from all areas of site; however the most significant are the mine ventilation raise bores, the ore stockpiles, milling activities, emission from the TSF and a component derived from ambient background concentrations.

Using the methodology derived from a review of radon source terms undertaken in 2002, the total site fugitive emission of radon decay products is approximately 276 TBq for the reporting period. This represents an increase over the previous reporting period's estimation of 264 TBq. The change is a result of increased production and development, which is consistent with increases seen previously where there were similar levels of mine development and process plant production. The previous five year radon emission activity is trended in Figure 2.

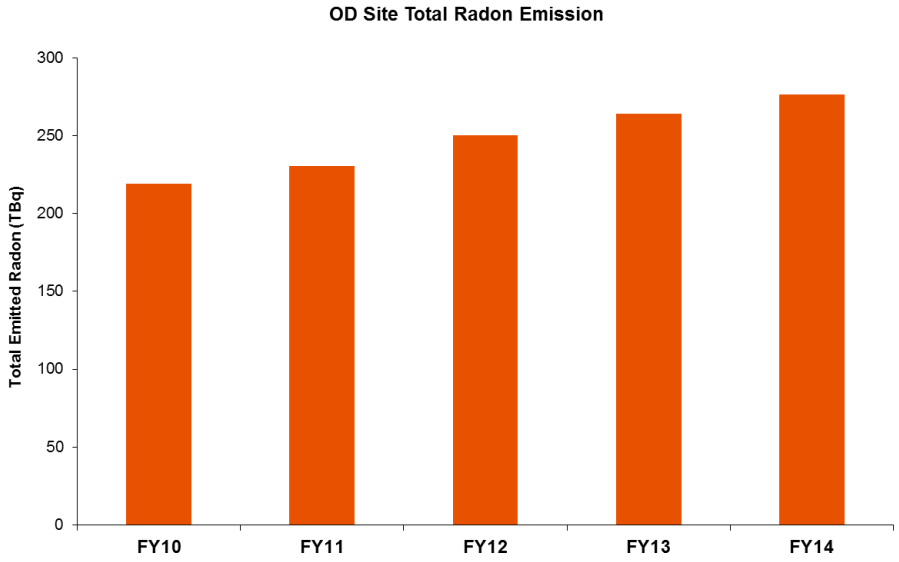

Figure 2: OD Site Total Radon Emission

5.3 Dust and Particulate Emissions

Quantities of dust and particulate are generated from point-sources during the processing of ore. The principal point-sources of dust and particulate emissions are Smelter 2 (Smelter 1 only being used for the remelting of clean refinery scrap copper), the Uranium Calcining Facility and the Slimes Treatment Plant (STP).

Smelter 2 processes copper concentrate produced during the milling, flotation, leach and feed preparation stages of the process, and consists of a Flash Furnace (FF), an Electric Slag Reduction Furnace (EF) and two Anode Furnaces. Concentrate is fed into the FF, generating slag, blister copper and off-gas containing significant quantities of

sulphur dioxide (SO_2) and dust. The dust is captured within the Waste Heat Boiler (WHB) and the Electrostatic Precipitator (ESP), and either recycled to the FF, or leached and pumped to the Hydromet Tails Leach facility.

The SO_2 goes to the Acid Plant and is converted and absorbed to produce sulphuric acid. The EF takes FF slag and further reduces it to produce blister copper, slag and off-gas containing particulate. The particulate is captured via a quench tower and venturi scrubbing system, before off-gas is emitted to atmosphere. The two Anode Furnaces undertake the final fire-refining of the copper prior to casting copper anodes for use in the refinery. The off-gas from the Anode Furnaces is treated in a gas cleaning system similar to that of the EF. All furnaces are fitted with gas cleaning system bypass stacks for use in emergency or abnormal situations.

The precipitation area of the hydrometallurgical plant includes two calcining furnaces, used to convert ammonium diuranate (ADU) to uranium oxide (U_3O_8). Each calciner has a dedicated gas cleaning system to remove particulate material prior to emission to atmosphere.

The STP (or Gold Room) treats the slimes generated during the electro-refining process to recover gold and silver. The facility includes a Roaster Scrubber designed to treat various furnace off-gas streams and a NO_x Scrubber designed to treat emissions from the aciding process.

Using process control system data in coordination with isokinetic sampling, the total site particulate emission is estimated at 135,640 kg for the period 1 July 2013 to 30 June 2014. The previous five year point source particulate emission data is shown in Figure 3.

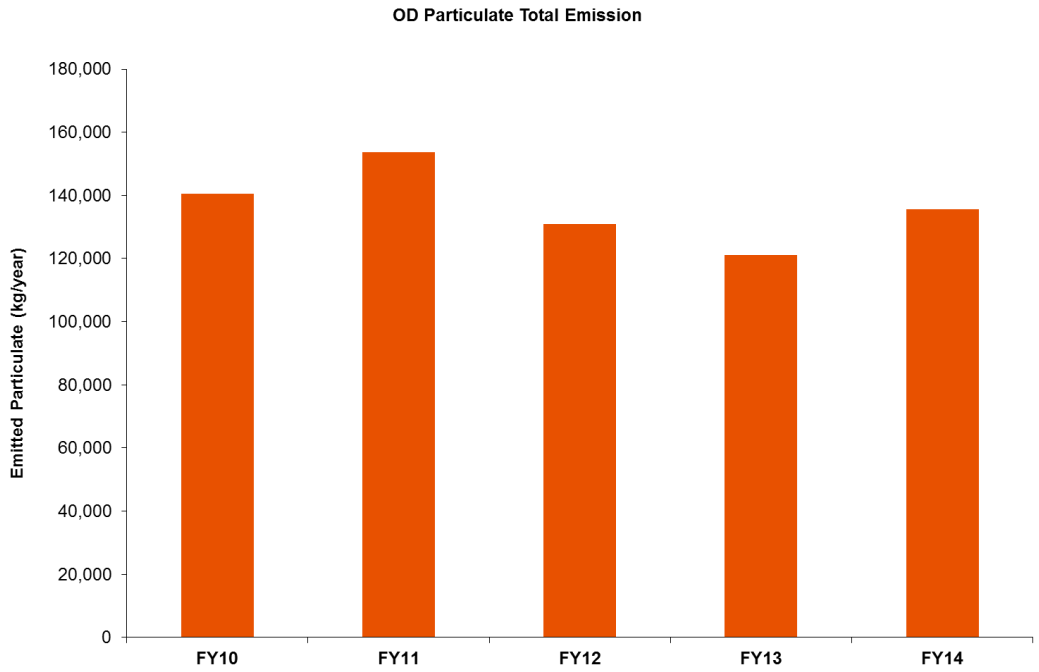

Figure 3: Point Source Particulate Total Emission

Uranium oxide emissions from the calciner are shown in Figure 4. The uranium oxide emissions were determined from radionuclide analysis of samples collected during FY14 stack testing. The uranium oxide component of calciner stack emissions was calculated to be 39 kg for FY14, an increase from 15 kg in FY13 which is within historical variations. This is due to an increase in U_{238} content of emitted particles.

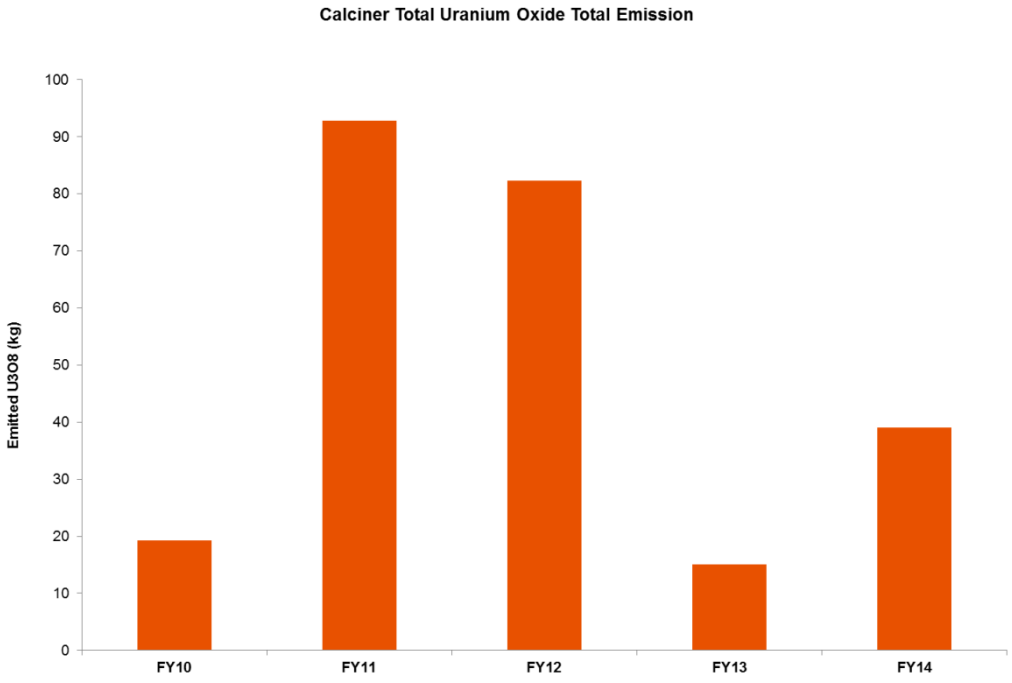

Figure 4: Calciner Facilities Total Uranium Oxide (U_3O_8) Emission

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