

**B. PERFORMANCE STANDARDS**

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**B10. OCCUPATIONAL EXPOSURE LIMITS**

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**1.0 Scope**

To protect all who work on our sites from occupational illness, workplace hazardous exposures must be controlled to below occupational exposure limit (OEL) and/or biological test limit values. The lists of substances (or agents) were derived from an assessment of business unit exposures, but do not necessarily include all hazardous exposures found within the Rio Tinto Group.

**2.0 Definitions**

- 2.1 Occupational Exposure Limits (OELs) are levels of agents in workplace air, which it is believed are low enough to protect nearly all workers from discomfort and adverse health effects over a series of eight-hour shifts for a working lifetime. Biological test limit values provide a method of determining total exposure to a chemical by measurement of a chemical, a metabolite or a biochemical change in the body. OEL and biological test limit values should be used as guidelines only, rather than *not safe / safe* limits.
- 2.2 The Rio Tinto OEL and biological test limit values will take precedence in all cases except where a lower legal limit is applicable.
- 2.3 Skin absorption may be a significant additional source of exposure for some agents. These are indicated in the list with a “**sk**” notation.

**3.0 Programme Design**

- 3.1 Each Business or site must establish or adopt an OEL for each agent for which significant worker exposure is possible. Where, in the absence of a legal or Rio Tinto OEL, a Business / site standard is developed, this OEL must be documented.
- 3.2 OEL and biological test limit values must be reviewed annually for relevance and efficacy.
- 3.3 Where workers have a working day longer than eight hours or unusual shift rotations are in effect, the TWA OEL may need to be reduced by a suitable factor to ensure adequate worker protection. Such factors require specialist consideration.
- 3.4 For some agents, the existence of an adverse carcinogenic health effect is known or suspected, but there is no internationally accepted assessment of the appropriate OEL or no agreed practical method to quantify workplace levels. In these cases, exposures to agents meeting these criteria must be reduced wherever possible.

## Rio Tinto Occupational Health Standards

### 4.0 Rio Tinto OEL Values

Agents (in air)	Rio Tinto OEL
Ammonia	25 ppm (TWA) 35 ppm (STEL)
Arsenic	0.05 mg/m <sup>3</sup>
Asbestos	0.5 f/mL (chrysotile) 0.1 f/mL (others)
Beryllium	0.002 mg/m <sup>3</sup>
Boron (as B)	1 mg/m <sup>3</sup>
Cadmium fume	0.025 mg/m <sup>3</sup>
Carbon disulphide	10 ppm <b>sk</b>
Carbon monoxide (CO)	35 ppm
Chromium	0.05 mg/m <sup>3</sup> (Cr VI) 0.5 mg/m <sup>3</sup> (Cr other)
<sup>1</sup> Coal tar pitch (CTP) volatiles	0.2 mg/m <sup>3</sup> (BSM) <b>sk</b>
Copper	1 mg/m <sup>3</sup> (dust/mist) 0.2 mg/m <sup>3</sup> (fume)
Fluorides	2.5 mg/m <sup>3</sup>
Hydrogen cyanide (HCN)	5 ppm (TWA) <b>sk</b> 10 ppm (STEL)
Hydrogen fluoride (HF)	2.5 mg/m <sup>3</sup> (ceiling)
Hydrogen sulphide (H <sub>2</sub> S)	10 ppm (TWA) 15 ppm (STEL)
Inhalable dust (total)	10 mg/m <sup>3</sup>
Ionising radiation (gamma / x-rays) – includes radon contributions	20 mSv/year
Lead	0.1 mg/m <sup>3</sup>
Mercury	0.025 mg/m <sup>3</sup> <b>sk</b>
Nickel	0.5 mg/m <sup>3</sup> (metal & insol.) 0.1 mg/m <sup>3</sup> (soluble)
Nitrogen dioxide	3 ppm (TWA) 5 ppm (ceiling)
Non-asbestos fibrous silicates (NAFS) – respirable	1.0 f/mL
NAFS – non-respirable	5 mg/m <sup>3</sup>
Noise	85 dB(A) (Leq) 140 dB (C)
Oil mist	5 mg/m <sup>3</sup> (TWA) 10 mg/m <sup>3</sup> (STEL)

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Agents (in air)	Rio Tinto OEL
Respirable crystalline silica (quartz)	0.1 mg/m <sup>3</sup>
Respirable coal dust	3 mg/m <sup>3</sup>
Respirable dust - other	5 mg/m <sup>3</sup>
Selenium	0.1 mg/m <sup>3</sup>
Silver	0.1 mg/m <sup>3</sup> (insol.) 0.01 mg/m <sup>3</sup> (soluble)
Sodium hydroxide mist (NaOH)	2.0 mg/m <sup>3</sup> (ceiling)
Sulphuric acid mist	1 mg/m <sup>3</sup> (TWA) 3 mg/m <sup>3</sup> (STEL)
Sulphur dioxide (SO <sub>2</sub> )	2 ppm (TWA) 5 ppm (STEL)
Wood dust - respirable	1 mg/m <sup>3</sup> (hardwood) 5 mg/m <sup>3</sup> (softwood)
Zinc	5 mg/m <sup>3</sup> (dust/mist) 1 mg/m <sup>3</sup> (fume)

<sup>1</sup>The BSM is accepted as the current OEL, but is recognised to need revision. It is recommended that Businesses / sites work to this and investigate reducing exposures whenever possible until agreement on a modified standard is achieved. Absorption through intact skin can be significant and must be managed actively.

### 5.0 Rio Tinto Biological Test Limit Values

Agents	Rio Tinto Biological Test Limit
Arsenic in urine (creatinine corrected)	50 µg/g CR (end work week)
Cadmium in blood	5 µg/L (any time)
Cadmium in urine (creatinine corrected)	5 µg/g CR (any time)
Carbon monoxide in end-exhaled air	30 ppm (post-shift)
Carboxyhaemoglobin in blood	5% (post-shift)
Chromium (VI) in urine (creatinine corrected)	30 µg/g CR (end work week)
Fluoride in urine (creatinine corrected)	3 mg/g CR (pre-shift) 10 mg/g CR (post-shift)
Lead in blood – male	40 µg/dL (any time)
Lead in blood – female of reproductive capacity	20 µg/dL (any time)
Mercury in urine (creatinine corrected)	40 µg/g CR (pre-shift)
Uranium in urine	40 µg/L