Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**
Resources Safety

Surface dust management audit – guide

Approved: 29 January 2016

1 Adelaide Terrace, East Perth WA 6004
Postal address: Mineral House, 100 Plain Street, East Perth WA 6004
Telephone: (08) 9358 8002
ResourcesSafety@dmirs.wa.gov.au
www.dmirs.wa.gov.au

Table of contents

Introduction

This document was reformatted in November 2015. At this time no material changes were made to the content of the guide, which was originally published in June 2010 under the title *Guide to surface dust management HIF audit 2010*.

Note: The Safety Regulation System (SRS) has replaced the AXTAT system and all reporting is done online through SRS.

1 Ventilation Organisation

Ventilation Organisation

Point	Standard	Guideline
1.1	The manager has appointed a Surface Ventilation Officer or the mine is exempt by written directive issued by the District Inspector.	**Intent:** To verify, where required, that a person is appointed by the Manager to be the Surface Ventilation Officer. Refer to MSIR 9.3(1) and MSIA s 44. **Personnel:** Mine Manager and ventilation officer. **Method:** Verify by examination of the letter of appointment and entry in the record book or a written exemption issued by the District Inspector. The letter of appointment should include the summary of responsibilities, the area of responsibility and be signed with an acknowledgement of appointment to achieve compliance.
1.2	The District Inspector was notified in writing of the appointment.	**Intent:** To verify that the District Inspector has been informed in writing of the appointment. **Personnel:** Mine Manager and ventilation officer. **Method:** Verify by examination of the letter of appointment and cross reference with Department files. Refer to MSIR 9.3(3).
1.3	The Surface Ventilation Officer is appropriately trained and qualified.	**Intent:** To verify the ventilation officer has suitable qualifications to competently carry out his/her statutory duties. **Personnel:** Line manager. Ventilation officer. **Method:** Verify the ventilation officer's training from records and certificates held. Refer to MSIR 9.4(2).
1.4	Copies of the following reference material are readily available on site: MSI Act and Regulations WorkSafe Australia's National Exposure Standards (NOHSC:1003) AS 2985 and/or AS 3640.	**Intent:** To ensure the ventilation officer has access to, and is familiar with, relevant reference material. **Personnel:** Ventilation Officer. **Method:** Sight copies of relevant reference material to validate their availability on site.

1.5	All records required by MSIA Reg. 9.6 are entered in the Mine Ventilation Log Book.	**Intent:** To verify the ventilation officer carries out his/her statutory duties in regard to the recording of sampling and inspection results etc. **Personnel:** Ventilation Officer. **Method:** Check entries in ventilation log book. Refer to MSIR 9.6.
1.6	Water of acceptable quality is used for dust suppression.	**Intent:** To verify that any water used for dust suppression is not polluted by any noxious substance likely to affect the health of any employee at the mine. **Personnel:** Surface ventilation officer, mechanical engineer, drillers, process plant operators, operators. **Method:** Verify that water utilised for dust suppression at the mine is obtained from a good quality water source. Examine water quality records for drilling operations, loading operations, crushing operations etc. Refer to MSIR 9.18.
1.7	Work environments have been assessed to determine potential dust hazards.	**Intent:** To ensure that an exposure risk assessment has been carried out to identify potential dust hazards. **Personnel:** Ventilation officer **Method:** Examine risk assessment document. Risk assessment involves the identification of hazards, assessment of risks and control of risks either by eliminating them or if necessary applying control measures to reduce them to an acceptable level.
1.8	Employees have been educated on the hazards associated with the exposure to dust.	**Intent:** To verify there is a formal system of training employees in dust management activities on site. **Personnel:** Ventilation officer. Employees. S & H representatives. **Method:** Examine the induction manual, minutes of safety meetings or the training program for evidence of training relating to dust management activities on site. Verify by interviews - Can employees readily access information? Are they aware of the hazards with dust? Refer to MSIR 4.13.

1.9	There is a programme to assess employee exposure to dust.	**Intent:** To ensure the existence of a workplace sampling strategy which takes into account the exposure of all employees. (Note: CONTAM sampling is considered to meet only minimum requirements.) **Personnel:** Ventilation officer. **Method:** Examine sampling strategy. Sampling strategy needs to determine firstly whether an exposure problem exists. Secondly it is intended to quantify personal exposures to provide evidence of control within exposure standards and of validity of work procedures and engineering control methods. This is an on-going, routine monitoring program.
1.10	Dust samples are taken in accordance with required methods.	**Intent:** To verify the existence of a sampling procedure to ensure dust monitoring is conducted according to relevant standards. **Personnel:** Ventilation officer. **Method:** Examine documented sampling procedures to ensure dust sampling is conducted according to AS 2985 and/or AS 3640. Refer to MSIR 9.13(1).
1.11	All significantly exposed employees are monitored on a routine basis.	**Intent:** To verify the monitoring of exposed employees is carried out according to a regular program. **Personnel:** Ventilation officer. **Method:** Examine CONTAM sampling records to validate compliance with DMIRS-RSD set quotas. Also check if company has set additional samples based on risk assessment. Refer to MSIR 9.6(b).
1.12	Exposure assessment results are reported to all relevant personnel in an effective, timely and documented manner.	**Intent:** To verify there is a system of providing feedback of results to employees. **Personnel:** Ventilation officer. Employees. S & H representatives. **Method:** Examine system of providing feedback. To be effective and of real value, the method chosen needs to ensure results are presented clearly (easy to understand), provided against some measure (e.g. exposure standard) and provided ASAP after the sample has been taken. Verify by interviews. Refer to MSIA s 9.

1.13	Workplace improvements have been made in response to dust exposure assessment results.	**Intent:** To verify that management reacts to high dust concentrations by implementing workplace improvements. **Personnel:** Line manager. Ventilation officer. **Method:** Where dust concentrations are recorded there is a program which applies the hierarchy of controls (i.e. elimination, substitution, isolation, engineering controls, safe work practices and personal protective equipment). Refer to MSIR 9.8.

2 Blast Hole Drilling

Blast Hole Drilling

Point	Standard	Guideline
2.1	Blast hole drills are fitted with a dust control device to control dust during drilling.	**Intent:** To verify each blast hole drill is fitted with a dust control appliance **Personnel:** Drill operator **Method:** Inspect the drills. (Drill must be fitted with water injection system and/or a dust extraction system suitable to control or extract the dust at the hole during drilling). Refer to MSIR 9.17(2).
2.2	Dust is effectively controlled during drilling of blast holes.	**Intent:** To ensure that dust produced during drilling is effectively controlled. **Personnel:** Drill operator. **Method:** Observe drill during drilling. Is the dust adequately controlled at the drill head/collar, sampling and disposal point? Are operators breathing the dust?
2.3	Precautions are taken to protect the drill hole grade control sampler from exposure to dust.	**Intent:** To verify the drill hole sampler is protected from breathing dust. **Personnel:** Drill operator. Sampler. **Method:** Check PPE supplied and in use by sampler. Is it suitable? Observe sampler in action. Can improvements be made to work procedure to reduce exposure to dust? (E.g. Design of sampling equipment, disposal of extra fines, ensure hose pipes etc. are not leaking). Refer to MSIR 9.12(1).
2.4	Each drill is fitted with an enclosed air-conditioned cabin to further protect the operator from dust exposure.	**Intent:** To verify the drill is fitted with an air-conditioned cabin. **Personnel:** N/A **Method:** Check to see the drill is fitted with an enclosed cabin and air conditioner is installed. Refer to MSIR 9.12 and 9.15.

2.5	Drill cabin air conditioner is operable.	**Intent:** To ensure each air conditioner fitted to a drill cabin is operating effectively enabling the drill to be operated with windows and door closed. **Personnel:** Drill operator. **Method:** Check the air conditioner is delivering cool air and the operator is satisfied with its performance.
2.6	Air conditioner dust filters are regularly cleaned.	**Intent:** To verify the filter fitted to an air conditioner is kept in a clean condition to stop the recycling of airborne contaminants. **Personnel:** Drilling equipment operators. **Method:** Check maintenance records for each category. Remove air conditioner filter from a sample of each category and check condition. Determine from operator if the filter is cleaned regularly. Refer to MSIR. 9.25(1).
2.7	The dust seals around the doors and windows of each drill cabin are in good condition.	**Intent:** To establish each drill cabin is sealed from outside dust leakage. **Personnel:** N/A **Method:** Visual inspection of the condition of the rubber seals around the doors and windows of the drill cabin.
2.8	The interior of each drill cabin is in a clean condition.	**Intent:** To ensure the inside of a drill cabin is being kept clean to reduce the risk of dust being made airborne by machine vibrations. **Personnel:** N/A **Method:** Visual inspection of the inside of the drill cabin to check that it is clean.
2.9	Dust samples taken over the last year to evaluate drill operator exposure to dust are all below the exposure standard.	**Intent:** To ensure drill operators are not being exposed to dust at a concentration over the exposure standard. **Personnel:** Ventilation officer. **Method:** Determine from CONTAM results prior to site visit.

3 Sample Preparation

Sample Preparation

Point	Standard	Guideline
3.1	Jaw crushers are connected to a dust extractor.	**Intent:** To verify that sample jaw crushers are connected to a dust extraction system. **Personnel:** Supervisor. Operators. **Method:** Check jaw crusher is connected to dust extractor. Dust extraction points are needed at the gullet of the crusher and at the sample collection box under the crusher. Refer to MSIR 9.10 and 9.12.
3.2	There is effective dust control during sample crushing.	**Intent:** To ensure there is effective dust control during the crushing of samples. **Personnel:** Supervisor. Operators. **Method:** Observe crusher in use and note where any dust is escaping. Check the extraction points have sufficient draw. Could the dust capture be improved? Check the sample collection box below the crusher is closely fitted to the outlet to minimise dust escape.
3.3	Dust is controlled during sample splitting.	**Intent:** To verify dust is controlled during sample splitting. **Personnel:** Supervisor. Operators. **Method:** Observe sample splitting and note if dust is being generated into the workplace. Riffle box splitting should be done outside in the open or within the confines of a dust capture hood connected to the dust extraction system. Note if any dust is escaping into the workplace during splitting. Note method of disposal of any split sample. Is the disposal resulting in dust being generated in the workplace? Refer to MSIR 9.10 and 9.12.

3.4	Pulverisers are connected to a dust extractor.	**Intent:** To verify each pulveriser is connected to a dust extraction system. **Personnel:** Supervisor. Operators. **Method:** Check pulverisers are connected to the dust extraction system at the feed inlet and the outlet. Not applicable to ring grinders. Ring grinders should be operated within an enclosed cover. If the pressure release on a ring grinder is set correctly i.e. when all movement has ceased, dust will not escape. Refer to MSIR 9.10 and 9.12.
3.5	There is effective dust control during sample pulverising.	**Intent:** To ensure there is effective dust control during sample pulverising. **Personnel:** Supervisor. Operators. **Method:** Observe sample pulveriser in use and note if any dust is escaping into the workplace. Check the sample collection box below the pulveriser is closely fitted to the outlet to minimise dust escape. If dust is being produced from a ring grinder then the pressure settings are out of adjustment.
3.6	Each workstation where dust is produced has a dust capture enclosure connected to a dust extractor.	**Intent:** Each workstation where dust isproduced has a dust capture enclosure connected to a dust extractor. **Personnel:** Supervisor. Operators. **Method:** Check each workstation as described is connected to the dust extraction system and has an adequate dust capture enclosure. Refer to MSIR 9.12.
3.7	At workstations where dust is produced it is effectively extracted.	**Intent:** To ensure dust is extracted effectively at each workstation where it is produced. **Personnel:** Supervisor. Operators. **Method:** Observe operator handling samples at a workstation especially during mixing or retrieving from a ring grinder. Is the dust extraction point capturing all the dust produced? Evaluation can also be done using a smoke tube.

3.8	The air pressure in hand held airguns used for cleaning is adequately reduced to prevent excessive dust generation.	**Intent:** To ensure the extent of dust generation is minimised when a handheld airgun is used to clean off dust contamination during sample processing. The air pressure should be less than 300 kPa. There is no regulatory requirement on air pressure but the usual plant air pressure of 650 kPa is too severe and causes overload of most dust extraction capture points. This results in dust escaping into the workplace. The figure of 300 kPa was deemed acceptable after trials with several laboratories. **Personnel:** Supervisor. **Method:** Check in line regulators to ensure pressure is set below 300 kPa. A separate circuit or regulators are needed as ring grinders and other equipment run at the high plant pressure of at least 650 kPa. Refer to Mines Safety Bulletin 49 and MSIR 4.12(2).
3.9	Compressed air for cleaning is used carefully within the dust capture enclosure so as not to generate dust in the workplace.	**Intent:** To ensure that, where compressed air is used for cleaning purposes, dust is extracted at the source and does not escape into the workplace. **Personnel:** Supervisor. Operators. **Method:** Observe operator using airgun to clean off dust during sample handling. Is dust being extracted at source? Is dust escaping into the workplace? Refer to MSIR 4.12(2).
3.10	Compressed air is not used for cleaning where high risk hazardous substances are added or present in the sample.	**Intent:** To verify compressed air is not used for cleaning purposes where high risk hazardous substances are handled in the workplace. **Personnel:** Laboratory Manager, Supervisor. **Method:** Check there are no airguns at the workstation where high risk hazardous substances are handled e.g. Mercury, lead, vanadium etc.

3.11	The dust extraction system is maintained in an effective operating condition.	**Intent:** To verify the dust extraction system is operating as it was designed to operate and is maintained in effective operating condition. **Personnel:** Supervisor. **Method:** Refer to MSIR 9.19. Check all extraction draw points are extracting. Check that ducting blank off points are used correctly to maximise extraction at draw points in use. Check by tapping (for sound) extraction ducting to determine if there is any dust build-up within the ducting. Observe outlet of dust extractor as noticeable dust to the atmosphere is a sign of ineffective dust collection e.g. bags in the bag house needing replacing. Check maintenance schedule or when the system was last serviced.
3.12	Dust samples taken over the last year to evaluate operator exposure to dust are all below the exposure standard.	**Intent:** To ensure operators are not being exposed to dust levels above the exposure standard **Personnel:** Ventilation officer. **Method:** Check CONTAM dust results prior to site visit. Verify with site records. Note any exceedances.

4 Loading & Haulage

Loading & Haulage

Point	Standard	Guideline
4.1	Dust is controlled during truck loading.	**Intent:** To verify there is some form of dust control during the loading of broken material into trucks. **Personnel:** Loader operator. Truck driver. **Method:** Refer to MSIR 9.12. This is dependent on the material being handled, its moisture content, availability of water, weather conditions and the ability of the material to be dampened. Is each bucket load being dropped into the truck tray causing unnecessary dust generation? Should each bucket load be placed carefully in the truck tray? Is there sufficient moisture content in the broken material being handled? Should the broken material be wet down prior to handling?
4.2	Dust is controlled on haulage roadways.	**Intent:** To verify dust is controlled on haulage roadways and is not a health or safety hazard. **Personnel:** Line manager/supervisor. Truck drivers. **Method:** Check to establish water is used on unsealed haulage roadways. Binding agents are often used to reduce water requirement. Question truck drivers. Observe any vehicle traffic on roadways including crusher and stockpile areas.
4.3	Each piece of mobile plant is fitted with an enclosed air conditioned cabin to protect the operator from dust exposure.	**Intent:** Each loader, truck or other mobile plant used for loading, haulage or road maintenance is fitted with an enclosed air conditioned cabin. **Personnel:** Operators. Supervisor. **Method:** Refer to MSIR 9.12 and 9.15. Visual check a sample of the fleet to ensure an enclosed cabin is fitted.

4.4	The air conditioner is operable.	**Intent:** To ensure each air conditioner fitted to a piece of mobile plant cabin is operating effectively enabling the equipment to be operated with windows and door closed. **Personnel:** Operators. **Method:** Canvas a sample of the operators, are they satisfied with their A/Cs performance?
4.5	Air conditioner dust filters are regularly cleaned.	**Intent:** To verify the filter fitted to an air conditioner is kept in a clean condition to stop the recycling of airborne contaminants. **Personnel:** Mobile equipment operators. **Method:** Check maintenance records for each category. Remove air conditioner filter from a sample of each category and check condition. Determine from operator if the filter is cleaned regularly. Refer to MSIR. 9.25(1).
4.6	The dust seals around the door and windows of the cabin are in good condition.	**Intent:** To ensure the cabin is sealed from outside dust leakage. **Personnel:** N/A **Method:** Visual inspection of the condition of the rubber seals around the door and windows of the cabin.
4.7	The interior of each mobile plant cabin is in a clean condition.	**Intent:** To ensure the inside of any mobile plant cabin is being kept clean to reduce the risk of dust being made airborne by machine vibrations. **Personnel:** N/A **Method:** Visual inspect a sample of a range of equipment cabins to check that dust is not accumulating inside of them.

4.8	Dust samples taken over the last year to evaluate operator exposure to dust are all below the exposure standard.	**Intent:** To ensure loading, haulage and road maintenance operators are not being exposed to dust at a concentration over the exposure standard. **Personnel:** Ventilation officer. **Method:** Check CONTAM dust results prior to site visit. Verify with site records. Note any exceedances.

5 Crushing & Screening

Crushing & Screening

Point	Standard	Guideline
5.1	Dust control appliances are fitted at the primary crusher feed hopper.	**Intent:** To verify that control appliances such as dust extractors or water sprays are fitted above the primary crusher feed hopper. **Personnel:** Crusher operator. **Method:** Visual check that an appliance is installed at the primary crusher feed hopper. Refer to MSIR 9.10 and 9.12(1)(a).
5.2	Dust is effectively controlled at the primary crusher feed hopper during dumping.	**Intent:** To verify dust is effectively controlled during dumping into the primary crusher feed hopper **Personnel:** Truck/loader operator. Crusher operator. **Method:** Check that all installed appliances are working. Observe material being dumped into hopper by truck or loader and determine whether dust is effectively controlled. Refer to MSIR 9.10 and 9.12(1)(a)
5.3	Primary crusher is fitted with dust control appliance.	**Intent:** To verify that a dust control appliance is fitted to the primary crusher. **Personnel:** Crusher operator. **Method:** Check if an appliance is fitted to the primary crusher. Refer to MSIR 9.10 and 9.12(1)(a).
5.4	Dust is effectively controlled at the primary crusher.	**Intent:** To verify dust is effectively controlled at the primary crusher during crushing. **Personnel:** Crusher operator. **Method:** Check all water sprays or the extraction system is operating. Observe crusher during crushing. Use personal judgement to determine if dust is controlled effectively. Check condition of any dust covers, skirting or ducting. Refer to MSIR 9.10 and 9.12(1)(a).

5.5	Secondary crusher is fitted with dust control appliance.	**Intent:** To verify that a dust control appliance is fitted to the secondary crusher. **Personnel:** Crusher Operator. **Method:** Check if an appliance is fitted to the secondary crusher. Refer to MSIR 9.10 and 9.12(1)(a).
5.6	Dust is effectively controlled at the secondary crusher.	**Intent:** To verify dust is effectively controlled at the secondary crusher during crushing. **Personnel:** Crusher operator. **Method:** Check all water sprays or the extraction system is operating. Question operator. Use personal judgement to determine if dust is controlled effectively. Check condition of any dust covers, skirting or ducting. Refer to MSIR 9.10 and 9.12(1)(a).
5.7	Tertiary crusher is fitted with dust control appliance.	**Intent:** To verify that a dust control appliance is fitted to the tertiary crusher. **Personnel:** Crusher operator. **Method:** Check if water sprays are fitted to the tertiary crusher or that it is connected to a dust extraction system. Refer to MSIR 9.10 and 9.12(1)(a).
5.8	Dust is effectively controlled at the tertiary crusher.	**Intent:** To verify dust is effectively controlled at the tertiary crusher during crushing. **Personnel:** Crusher operator. **Method:** Check all water sprays or the extraction system is operating. Question operator. Observe crusher during crushing. Use personal judgement to determine if dust is controlled effectively. Refer to MSIR 9.10 and 9.12(1)(a).

5.9	Dust is controlled at the screens.	**Intent:** To verify dust is controlled at any screen within a crushing and screening plant. **Personnel:** N/A **Method:** If screens are covered check condition of flexible seals around screen and note any sections which need repairing or replacing. Where the screen cover is connected to a dust extraction system check the system is working. If water sprays are used, check they are all working effectively. It is a requirement of Reg. 9.10 that dust control appliances are fitted to screens. Total enclosure is acceptable. Refer to MSIR 9.10 and 9.12(1)(a).
5.10	Dust is controlled at conveyor belt transfer points.	**Intent:** To verify dust is effectively controlled at all belt transfer points. **Personnel:** Crusher operator. **Method:** Check all points in the crushing and screening plant where material is transferred from one conveyor belt to another. Depending on the type of material and the moisture content, dust can be produced during the fall from one belt to another. Methods of control can be water sprays, connection to a dust extraction system and/or enclosure of transfer point. Refer to MSIR 9.10 and 9.12(1)(a).
5.11	Dust is controlled on return belts.	**Intent:** To verify dust is controlled on conveyor return belts within a crushing and screening plant. **Personnel:** N/A. **Method:** Inspect the condition of conveyor return belts and condition of belt scrapers or cleaners where they are fitted. Refer to MSIR 9.10 and 9.12(1)(a).

5.12	Inspect the condition of conveyor return belts and condition of belt scrapers or cleaners where they are fitted. Refer to MSIR 9.10 and 9.12(1)(a).	**Intent:** To verify where dust is produced or likely to be produced during the free fall from a conveyor belt discharge into a storage bin or on to a stockpile some form of dust control is used. **Personnel:** Line manager/supervisor. **Method:** Use visual assessment. Is dust a problem? Check if water sprays are installed at the conveyor discharge. Are the sprays operating? Enclosure of the top of a storage bin of a rill tower at a stockpile reduces the height of free fall resulting in less dust. Are any of these measures in place? Refer to MSIR 9.10 and 9.12(1)(a).
5.13	Dust is controlled at stockpiles.	**Intent:** To verify dust is controlled at a stockpile. **Personnel:** Line manager/supervisor. **Method:** Dust usually dependent on weather conditions. Is there evidence of the surrounding area being covered in dust? Is dust control needed? If control is needed water sprays in most cases is the easiest control method. Where water is a problem a cover over the stockpile may be needed. Refer to MSIR 9.12(1).
5.14	Dust is controlled at conveyor feed points.	**Intent:** To verify dust is adequately controlled where material is fed on to a conveyor belt from a hopper, crusher, grinder, screen, bin or draw point from a stockpile. **Personnel:** N/A. **Method:** Visual check of belt feed points. Use personal judgement to determine if dust is controlled effectively. If water sprays are used check they operate effectively. Check condition of rubber skirting between any covers and the belt. If connected to a dust extraction system make sure it is operating. Refer to MSIR 9.10 and 9.12(1)(a).

5.15	Dust is controlled within a stockpile tunnel.	**Intent:** To verify dust control measures or appliances are in place in the stockpile tunnel. **Personnel:** Line manager/supervisor. **Method:** Are operators required to enter the stockpile tunnel during operation? Where operators are barred from entering the tunnel during operating conditions it may be acceptable to have a less stringent requirement for dust control. If an operator is required to enter the tunnel then the dust levels should be controlled to as low as practicable. Check the tunnel is regularly cleaned or washed out. Check for ventilation. The main source of dust will be feeders on to the conveyor. Refer to MSIR 9.10 and 9.12(1)(a).
5.16	Spillage and dust build up on and around the plant and equipment is kept under control.	**Intent:** To verify the general housekeeping of the plant with regard to dust and spillage is of an acceptable standard. **Personnel:** Line manager. Supervisor. Operators **Method:** A visual inspection throughout the plant. Check for any build up of spillage. Check with operators and management to determine if a regular program for clean up exists. Is the frequency of clean up sufficient for the operation. Refer to MSIR 9.12(1).
5.17	Crusher operators are protected from dust by an enclosed airconditioned cabin.	**Intent:** To verify that crusher operators are provided with an enclosed air-conditioned cabin for protection against dust. **Personnel:** Operators. Line manager. Supervisor. **Method:** Check plant to determine if crusher operators are provided with a control cabin. Make sure the operator can operate the crusher from within the cabin and is not required to stand outside to see into the crusher. Refer to MSIR 9.12 and 9.15.

5.18	The air conditioner fitted is operable.	**Intent:** To ensure the air conditioner is operating effectively and of sufficient power to condition the cabin air to enable the door and windows to be kept shut. **Personnel:** Operators. **Method:** Check physical comfort with regard to cabin air temperature. Feel if the air coming from the air conditioner is having the desired conditioning effect. Question operator on effectiveness of air conditioner.
5.19	Air conditioner dust filters are regularly cleaned.	**Intent:** To verify the filter fitted to an air conditioner is kept in a clean condition to stop the recycling of airborne contaminants. **Personnel:** Crushing and screening plant operators, Process plant operators. **Method:** Check maintenance records for each category. Remove air conditioner filter from a sample of each category and check condition. Determine from operator if the filter is cleaned regularly. Refer to MSIR. 9.25(1).
5.20	The interior of each crusher control cabin is in a clean condition.	**Intent:** To ensure the inside of each crusher control cabin is kept in a clean condition. **Personnel:** Operators. **Method:** Check inside of each crusher control cabin. Note condition of floor. Is it clean? Check with operator on frequency of cleaning.
5.21	Crusher control cabins are effectively sealed to prevent dust entry.	**Intent:** To ensure the crusher control cabin is effectively sealed to prevent entry of dust. **Personnel:** N/A. **Method:** Check the door fits correctly and closes properly. Check condition of seal around the door. Check the windows are sealed. Check there are no open holes in the floor or walls and there is adequate seal around the air conditioner.

5.22	Dust samples taken over the last year to evaluate crusher operator exposure to dust are all below the exposure standard.	**Intent:** To ensure operators are not being exposed to dust levels above the exposure standard. **Personnel:** Ventilation officer. **Method:** Check CONTAM dust results prior to site visit. Verify with site records. Note any exceedances.

6 Stockpiling & Transport

Stockpiling & Transport

Point	Standard	Guideline
6.1	Dust is controlled on stockpile roadways.	**Intent:** To verify dust is controlled on stockpile roadways and is not a health or safety hazard. **Personnel:** N/A. **Method:** Check for methods of control, water truck, sprinklers, sweeping sealed surface. Observe vehicle traffic and decide if a problem with dust is present. Refer to MSIR 9.12.
6.2	Dust is controlled at the stockpile stacker.	**Intent:** To verify dust is controlled during the stacking of ore on the stockpile. **Personnel:** Stacker operator. **Method:** Check if stacker is fitted with water sprays to control dust. Observe stacker in operation. Is adequate dust control being achieved? Refer to MSIR 9.10 and 9.12.
6.3	There is a means available to control dust off stockpiles during strong winds.	**Intent:** To verify dust is controlled on stockpiles during adverse weather conditions. **Personnel:** Operators. **Method:** Check if a control measure is in place e.g. water sprays, sprinkler system, sealing agent, physical cover. Refer to MSIR 9.12.
6.4	Dust is controlled at the stockpile reclaimer.	**Intent:** To verify dust is controlled during stockpile reclaiming where a mechanical reclaimer is used. **Personnel:** Reclaimer operator. **Method:** Check if a control measure is in place. Observe if dust is a problem. Refer to MSIR 9.10 and 9.12.

6.5	Dust is controlled at the stockpile draw chutes in the load out tunnel.	**Intent:** To verify dust is controlled at the stockpile draw chutes. **Personnel:** N/A. **Method:** Check condition of rubber seals and skirting. If chutes are connected to a dust extraction system check the ducting is not blocked with dust. Is it practicable to improve dust control? Refer to MSIR 9.10 and 9.12.
6.6	Dust is controlled within the stockpile load out tunnel.	**Intent:** To verify dust control measures and appliances are in place in the stockpile tunnel. **Personnel:** Line manager/supervisor. **Method:** Check the tunnel is regularly cleaned or washed out. Check for ventilation. The main source of dust will be feeders on to the conveyor. Refer to MSIR 9.10 and 9.12.
6.7	Dust is controlled at conveyor belt transfer points.	**Intent:** To verify dust is effectively controlled at all belt transfer points. **Personnel:** Operators. **Method:** Check all points in the plant where material is transferred from one conveyor belt to another. Depending on the type of material and the moisture content dust can be produced during the fall from one belt to another. Methods of control can be water sprays, connection to a dust extraction system and/or enclosure of transfer point. Another source of dust can be caused by the fine particles sticking to the belt and falling off the underside of the belt return. In this case a brush or belt scraper may be needed. Refer to MSIR 9.10 and 9.12.

6.8	Dust is controlled at screens.	**Intent:** To verify dust is controlled at any screen used at the stockpile area. **Personnel:** N/A. **Method:** If screens are covered check condition of flexible seals around screen and note any sections which need repairing or replacing. Where the screen cover is connected to a dust extraction system check the system is working. If water sprays are used check they are all working effectively. It is a requirement of Reg. 9.10 that dust control appliances are fitted to screens. Total enclosure is acceptable. Refer to MSIR 9.10 and 9.12.
6.9	Dust is controlled during train loading and unloading operations.	**Intent:** To verify dust is controlled during the loading and unloading of ore from rail cars. **Personnel:** Train unloader operator. **Method:** Check to see if a dust extraction system or water sprays are installed. Observe loading and unloading of rail cars. Decide if an adequate level of dust control is being achieved. Refer to MSIR 9.10 and 9.12.
6.10	Dust is controlled during road train loading and unloading operations.	**Intent:** To verify dust is controlled during the loading and unloading of ore from road trains. **Personnel:** Unloader operator. **Method:** Check to see if a dust extraction system or water sprays are installed. Observe loading and unloading of road trains. Decide if an adequate level of dust control is being achieved. Refer to MSIR 9.12.
6.11	Dust is controlled at the ship loader.	**Intent:** To verify dust is controlled at the ship loader. **Personnel:** Ship loader operator. **Method:** Control depends on size and moisture content of material being loaded. Material such as alumina or phosphate will require a chute with a dust extraction system. The main concern will be whether the dust is creating a health or safety hazard. Observe loading in operation and determine if control is adequate. Refer to MSIR 9.10 and 9.12.

6.12	Spillage and dust build-up on and around plant and equipment is kept under control.	**Intent:** To verify the general housekeeping of the plant with regard to dust and spillage is of an acceptable standard. **Personnel:** Line manager/supervisor. **Method:** A visual inspection throughout the plant. Check for any build-up of spillage. Check with operators and management to determine if a regular program for clean up exists. Is the frequency of clean up sufficient for the operation. Refer to MSIR 9.12.
6.13	Operators are protected from dust by an enclosed airconditioned cabin.	**Intent:** To verify both mobile plant and fixed plant operators are provided with an enclosed air conditioned cabin for protection against dust. **Personnel:** Operators. Line manager/supervisor. **Method:** Check mobile plant and fixed plant installations. Discuss with operator. Refer to MSIR 9.12 and 9.15.
6.14	Operator control cabins are effectively sealed to prevent dust entry.	**Intent:** To ensure the control cabins are effectively sealed to prevent entry of dust. **Personnel:** N/A. **Method:** Check the door fits correctly and closes properly. Check condition of seal around the door. Check the windows are sealed. Check there are no open holes in the floor or walls and there is adequate seal around the air conditioner.
6.15	The interior of each operator control cabin is in a clean condition.	**Intent:** To ensure the inside of each control cabin is kept in a clean condition. **Personnel:** Operators. **Method:** Check inside of each control cabin. Note condition of floor. Is it clean? Check with operator on frequency of cleaning.

6.16	The operator control cabin air conditioner is operable.	**Intent:** To ensure the air conditioner is operating effectively and of sufficient power to cool the cabin to enable the door and windows to be kept shut. **Personnel:** Operators. **Method:** Check physical comfort with regard to temperature within the cabin. Feel if the air coming from the air conditioner is cool. Question operator on effectiveness of air conditioner.
6.17	Air conditioner dust filters are regularly cleaned.	**Intent:** To verify the filter fitted to an air conditioner is kept in a clean condition to stop the recycling of airborne contaminants. **Personnel:** Plant operators. **Method:** Check maintenance records for each category. Remove air conditioner filter from a sample of each category and check condition. Determine from operator if the filter is cleaned regularly. Refer to MSIR. 9.25(1).
6.18	Dust samples taken over the last year to evaluate stockpile operator exposure to dust are all below the exposure standard.	**Intent:** To ensure operators are not being exposed to dust levels above the exposure standard. **Personnel:** Ventilation officer. **Method:** Check CONTAM dust results prior to site visit. Verify with site records. Note any exceedances.

7 Milling & Processing

Milling & Processing

Point	Standard	Guideline
7.1	Each crushing equipment is fitted with a dust control appliance.	**Intent:** To verify any crusher is fitted with a dust control appliance. **Personnel:** N/A. **Method:** Visual check that crusher is connected to a dust extraction system or has water sprays fitted. Refer to MSIR 9.10 and 9.12.
7.2	Dust is effectively controlled at each crusher.	**Intent:** To verify the dust control system at the crusher provides adequate dust control during crushing. **Personnel:** N/A. **Method:** Check condition of any covers, skirting and ducting. Note any poorly fitting or missing sections and any holes in the ducting or covers. Refer to MSIR 9.10 and 9.12.
7.3	Dust is effectively controlled at each mill and grinder.	**Intent:** To verify dust is effectively controlled at each grinding mill. **Personnel:** N/A. **Method:** Observe grinder during grinding. Grinder can be a sealed unit or may be fitted to a dust extraction system. Note any dust escaping. Use personal judgement to determine if the dust is effectively controlled. Refer to MSIR 9.10 and 9.12.

7.4	Dust is controlled at each screen.	**Intent:** To verify dust is controlled at any screen within the milling area. **Personnel:** N/A. **Method:** If screens are covered check condition of cover and flexible seals/skirting around screen. Note any section which needs repairing or replacing. Where the screen is connected to a dust extraction system check the system is working. Observe screen screening material. Use personal judgement to determine if the dust is effectively controlled. Refer to MSIR 9.10 and 9.12.
7.5	Dust is controlled at conveyor feed points.	**Intent:** To verify dust is adequately controlled where material is fed on to a conveyor belt from a hopper, crusher, grinder, screen, bin or draw point from a stockpile. **Personnel:** N/A. **Method:** Visual check of belt feed points. Use personal judgement to determine if dust is controlled effectively. Check condition of any dust covers and seals or skirting. Check if feed points are connected to a dust extraction system. If connected to a dust extraction system is there adequate extraction at feed point? Refer to MSIR 9.10 and 9.12.
7.6	Dust is controlled at conveyor belt transfer points.	**Intent:** To verify dust is controlled at all belt transfer points. **Personnel:** N/A. **Method:** Check all points in the mill where material is transferred from one conveyor to another. Note if transfer points are covered. Check condition of covers and any seals or skirting. Check if transfer points are connected to a dust extraction system. If connected to a dust extraction system, is there adequate extraction at each transfer point? Use personal judgement to determine if the dust is effectively controlled. Refer to MSIR 9.10 and 9.12.

7.7	Dust is controlled at bucket elevators.	**Intent:** To verify dust is controlled at any bucket elevator. **Personnel:** N/A. **Method:** Check for any holes or poor seals on the bucket elevator cover. Check if elevator is connected to a dust extraction system. Is there adequate extraction from the dust extraction system? Observe any leakage of dust from the bucket elevator. Refer to MSIR 9.10 and 9.12.
7.8	Bagging and packaging machines are connected to a dust extraction system.	**Intent:** To verify each bagging or packing machine is connected to a dust extraction system. **Personnel:** N/A. **Method:** Check that any bagging or packaging machine is connected to a dust extraction system. Refer to MSIR 9.10 and 9.12.
7.9	Dust is effectively controlled at each bagging machine.	**Intent:** To verify dust is effectively controlled at each bagging machine (bagging refers to bulk bagging). **Personnel:** Machine operator. **Method:** Observe bagging machine in operation. Use personal judgement to determine if dust is controlled effectively. Check post dust-sampling results. Are there different grades/types of material bagged? What grade/type is being bagged during observation? Are other grades/types likely to be a greater dust problem? Is there adequate seal between bag and feeder tube? Is there adequate dust extraction? Check for leaks at bagging machine. Refer to MSIR 9.10 and 9.12.

7.10	Dust is effectively controlled at each packaging machine.	**Intent:** To verify dust is effectively controlled at each packaging machine (packaging refers to paper or plastic bags which are small enough to be handled, e.g. 25 kg, 10 kg, 2 kg). **Personnel:** Machine operator. **Method:** Observe packing machine in operation. Use personal judgement to determine if dust is controlled effectively. Check past dust sampling results. Are there different grades/types of material packaged? What grade/type is being packaged during observation? Are other grades/types likely to be a greater dust problem? Is there adequate seal between bag and feeder tube? If there is a rubber expander seal on the feeder tube is it expanded during filling? Is there a dust extraction inlet behind the feeder tube? Is the dust extraction inlet connected to the dust extraction system? Is there adequate dust extraction draw at the feeder tube? Is the feeder setting synchronised to stop in sufficient time before the bag is released? Are the holes in the bag to let the air out too large for the size of the material being bagged? Refer to MSIR 9.10 and 9.12.
7.11	Dust build up on internal building structures is kept under control.	**Intent:** To verify that as far practicable dust build up on the internal building structures is kept to a minimum. This reduces the possibility of dust becoming airborne as it is shaken or falls from the structure. **Personnel:** N/A. **Method:** Observe amount of dust built up on handrails and internal building structures. Is it excessive? When was it last cleaned down? Check if it is regularly cleaned down? Use personal judgement. Refer to MSIR 9.12.
7.12	Spillage and dust build-up on and around plant and equipment is kept under control.	**Intent:** To verify spillage and dust build-up on and around plant and equipment is regularly cleaned up and kept under control as operating conditions may require. **Personnel:** N/A. **Method:** Observe conditions throughout mill. Note any spillage or excessive dust- build up on or around any plant and equipment. Use personal judgement to determine if conditions are acceptable. Refer to MSIR 9.12.

7.13	Dust samples taken over the last year to evaluate plant operator exposure to dust are all below the exposure standard.	**Intent:** To ensure operators are not being exposed to dust levels above the exposure standard. **Personnel:** Ventilation officer. **Method:** Check CONTAM dust results prior to site visit. Verify with site records. Note any exceedances.
7.14	A site wide risk assessment has established the tasks which require respiratory protection devices to be used.	**Intent:** To verify that employees exposed to dusty conditions have been identified. **Personnel:** Employees. **Method:** Refer to MSIA s 9(1)(d). Inspect location where respiratory equipment is used. Verify by interviews.

8 Personal Protective Equipment

Personal Protective Equipment

Point	Standard	Guideline
8.1	A site wide risk assessment has established the tasks which require respiratory protection devices to be used.	**Intent:** To verify that employees exposed to dusty conditions have been identified. **Personnel:** Employees. **Method:** Refer to MSIA s 9(1)(d). Inspect location where respiratory equipment is used. Verify by interviews.
8.2	There is a programme to select the appropriate respiratory protection for a person.	**Intent:** To verify the existence of a standard operating procedure which provides for the selection of respirators in accordance with AS 1715 and AS 1716. **Personnel:** Surface ventilation officer, safety officer, employees. **Method:** Confirm by examining operating procedures or equivalent document. All respirators must conform to AS 1716. Respirator selection should be based on recommendations and limitations available from relevant recognised standards. Selection process needs to consider the contaminant, the task and the operator. Where practicable, there should be provision for respirators to be issued on a personal basis. Refer to MSIR 4.1 and 9.12(1)(b).
8.3	Respiratory protection devices are freely available and employees are aware of where and how to obtain the correct device.	**Intent:** To ensure employees have been instructed on the method of acquiring respiratory protection. **Personnel:** Employees. **Method:** Inspect workplaces for respirator availability. Verify by interviews.
8.4	Employees are fit tested for the type of respirator issued to them.	**Intent:** To verify the respirator is properly fitted to the individual to whom it is assigned. **Personnel:** Ventilation officer. Safety officer. Employees. **Method:** Examine records of fit tests carried out. Verify by interviews. Refer to MSIR 4.1(1)(b), 4.13 and AS 1715.

8.5	Employees are required to be clean shaven where required to wear a half, full or disposable face piece respiratory protection.	**Intent:** To ensure personnel have an adequate facial seal with the respirator to prevent ingress of contaminants. **Personnel:** Ventilation officer. Safety officer. Employees. **Method:** Examine procedures, training records or any written instructions confirming compliance with this requirement. Inspect work areas for compliance. Verify by interviews.
8.6	Employees are trained in the use of the respirator provided.	**Intent:** To verify the existence of a training program in which employees can become familiar with the respirator. **Personnel:** Ventilation officer. Safety officer. Employees. **Method:** Examine training program. Program should include the proper use, cleaning and maintenance, and the limitations of the equipment. Training should occur at the commencement of employment and at routine intervals thereafter (i.e. at least annually). Verify by interviews. Refer to MSIR 4.1(1)(b), 4.13 and AS 1715.
8.7	There is a maintenance programme for non disposable respiratory protection.	**Intent:** To ensure there is a maintenance program in existence which ensures a readily available supply of clean functional respirators. **Personnel:** Ventilation officer. Safety officer. Employees. **Method:** Examine the maintenance program. Program should follow the manufacturer's instructions and provisions for the storage, inspection, repair, cleaning and disinfection of the respiratory equipment. These aspects are particularly important for non-disposable respirators. Verify by interview and inspection of equipment. Refer to MSIR. 4.1(2) and AS 1715.

8.8	Respirators are cleaned, maintained and stored as specified in the maintenance program.	**Intent:** To ensure there is a maintenance program in existence which ensures a readily available supply of clean functional respirators. **Personnel:** Ventilation officer. Safety officer. Employees. **Method:** Examine the maintenance program. Program should follow the manufacturer's instructions and provisions for the storage, inspection, repair, cleaning and disinfection of the respiratory equipment. These aspects are particularly important for non-disposable respirators. Verify by interview and inspection of equipment. Refer to MSIR. 4.1(2) and AS 1715.

9 Exploration Drilling

Exploration Drilling

Point	Standard	Guideline
9.1	Each drill is fitted with a dust control appliance.	**Intent:** To verify each exploration drill is fitted with a dust control appliance. **Personnel:** Drill operator. **Method:** Check if a dust control appliance is fitted. Refer to MSIR 9.17(2).
9.2	Dust is effectively controlled during drilling.	**Intent:** To verify that dust produced during drilling is effectively controlled and operators are not breathing the dust. **Personnel:** Drill operator. **Method:** Observe drill during drilling. Is the dust adequately controlled? Are the operators breathing the dust? If the dust is being discharged through ducting, is it positioned so it will not blow back on the operators?Refer to MSIR 9.17(2).
9.3	Dust is controlled during sample collection.	**Intent:** To verify there is adequate dust control at the cyclone sample collector. **Personnel:** Drill operator. Sampler. **Method:** Observe drilling and sample collection unit in operation. Is there adequate dust control? Use personal judgement. Refer to MSIR 9.17(2).
9.4	Drill hole samplers are protected from exposure to dust during collection of samples.	**Intent:** To verify drill hole samplers are protected from breathing dust during sample collection and bagging. **Personnel:** Drill operator. Sampler. **Method:** Check PPE supplied and in use by sampler. Is it suitable? Observe sampler in action. Can improvements be made to work procedure to reduce exposure to dust? Refer to MSIR 4.1 and 9.12.

9.5	Dust samples taken over the last year to evaluate operator exposure to dust are all below the exposure standard.	**Intent:** To ensure operators are not being exposed to dust levels above the exposure standard. **Personnel:** Ventilation officer. **Method:** Check CONTAM dust results prior to site visit. Verify with site records. Note any exceedances.

10 Abrasive Blasting

Abrasive Blasting

Point	Standard	Guideline
10.1	Material used for abrasive blasting contains less than 5% silica by weight.	**Intent:** To verify material used for abrasive blasting contains no more than 5% silica by mass **Personnel:** Supervisor. Operator **Method:** Examine abrasive blasting procedures to ensure it specifies that materials used must not contain more than 5% silica by mass. Also check records of previous work done to verify that this is actually the case. Verify by interviews with supervisors. Refer to MSIR 9.9(2)(a)
10.2	Material used for abrasive blasting contains less than 1% of any one of the following - arsenic, beryllium, lead, cadmium, nickel, antimony, cobalt, chromium or tin.	**Intent:** To verify material used for abrasive blasting contains no more than 1% of any one of the listed materials. **Personnel:** Supervisor. Operator. **Method:** Examine abrasive blasting procedures to ensure it specifies that materials used must not contain more than 1% of any of the materials listed. Also check records of previous work done to verify that this is actually the case. Verify by interviews with supervisors. Refer to MSIR 9.9(2)(b).
10.3	Material used for abrasive blasting contains no radioactive substance as defined in the Radiation Safety Act 1975.	**Intent:** To verify material used for abrasive blasting contains no radioactive substance. **Personnel:** Supervisor. Operator. **Method:** Examine abrasive blasting procedures to ensure it specifies that materials used must not contain any radioactive substance. Also check records of previous work done to verify that this is actually the case. Verify by interviews with supervisors. Refer to MSIR 9.9(2)(c).

10.4	Recycled dry abrasive blasting material is treated to remove respirable dust or other adverse material.	**Intent:** To verify respirable dust or other adverse material is removed from recycled dry abrasive blasting material. **Personnel:** Supervisor and Operator(s). **Method:** Examine abrasive blasting procedures to ensure it specifies that recycled dry abrasive blasting material is treated to remove respirable dust. Refer to MSIR 9.9(d).
10.5	The person operating the abrasive blasting machine wears an airline respirator of the hood or helmet type and the appropriate PPE.	**Intent:** To verify the operator of an abrasive blasting machine wears suitable respiratory equipment and PPE to undertake the work safely. **Personnel:** Supervisor. Operator(s). **Method:** Carry out a visual check of respirator to verify operator using abrasive blasting equipment wears a properly maintained air-fed helmet conforming to AS 1716. Check that the respirator is fitted with an inner bib and shoulder cape, jacket or protective suit. Examine the adequacy of skin and foot protection. Refer to MSIR. 9.9(3).
10.6	The air supply to the airline respirator is of acceptable breathable quality, pressure and temperature.	**Intent:** To ensure the operator is being supplied with safe breathable air when wearing an airline respirator. **Personnel:** Supervisor, operator, contractor. **Method:** Inspect air quality documentation or air analysis measurements. Refer to WorkSafe Code of Practice – Abrasive Blasting. Part 3.4.
10.7	The abrasive blasting machine is fitted with an automatic cut-off device.	**Intent:** To ensure the machine stops blasting if the operator drops or loses control of the blast nozzle. **Personnel:** Operator, contractor, supervisor. **Method:** Check cut-off device is fitted and it operates.