



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

Tipping and dumping audit – guide

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Introduction

This document was originally published in February 2008 under the title *Guide to tipping HIF audit 2008*. Changes made in March 2017 were the inclusion of audit point 1.10 and minor typographical updates.

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

To be used for all types of stockpiles and dumps, whether permanent or temporary, e.g. waste dumps, heap leach pads, ROM pads, low grade ore stockpiles, aggregate stockpiles, concentrate stockpiles, overburden stockpiles, no matter how the material is transported and dumped, e.g. end tip dump truck, side tip dump truck, bottom tip dump truck, scraper dump truck, front end loader bucket.

Where, in the intent, the word “verify” is used, this means that it is a regulatory requirement, which is mandatory and has to be complied with. Where, in the intent, the word “ensure” is used, it is not a mandatory requirement, but it does set out a good practice.

List of abbreviations

DMP	Department of Mines and Petroleum
MSIA	<i>Mines Safety and Inspection Act 1994</i>
MSIR	Mines Safety and Inspection Regulations 1995
ROM	Run of mine
SRS	The Department of Mines and Petroleum’s online Safety Regulation System
r.	Regulation (of the MSIR)
rr.	Regulations (of the MSIR)
s.	Section (of the MSIA)
ss.	Sections (of the MSIA)

Supporting documentation

Documentation referred to in the village audits can be found via the links below:

- State Law Publisher, www.slp.wa.gov.au
 - *Mines Safety and Inspection Act 1994*
 - Mines Safety and Inspection Regulations 1995
- Department of Mines and Petroleum (DMP), mining safety publications, www.dmp.wa.gov.au/Safety/Mining-Safety-publications-16162.aspx
 - *Accident and incident reporting – guideline*
- Safe Work Australia, Publications and resources, www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/publication
- Australian and other standards, SAI Global, <http://infostore.saiglobal.com/store/>
 - AS 4801 *Occupational health and safety management systems – Specification with guidance for use*
 - AS/NZS ISO 9000 *Quality management systems – Fundamentals and vocabulary*
 - AS/NZS ISO 31000 *Risk management – Principles and guidelines*

1 Stockpile / dump design

Stockpile / dump design

Point	Standard	Guideline
1.1	The design is such that any future potential instability, due to the physical properties of the material being dumped, is minimised.	<p>Intent:</p> <p>To verify that, due to the longevity of such structures, hazards are managed from the design stage. Waste dumps and heap leach dumps etc. are likely to have a long lifespan and can constitute the greater volume of the total material excavated. The physical properties of the material should be known from mine feasibility and planning studies.</p> <p>Personnel:</p> <p>Geotechnical engineers, mine planning engineers, geologists, quarry manager.</p> <p>Method:</p> <p>View technical and design documentation. Refer to MSIR r. 13.5(1)(a).</p>
1.2	The design is such that any future potential instability in dump material compaction, due to the size and weight of the equipment used during construction, is minimised.	<p>Intent:</p> <p>To verify that, due to the longevity of such structures, hazards are managed from the design stage. The compaction results of the dumped material will relate to the type, size and weight of the equipment used in the dump construction. This should have been considered at the planning stage.</p> <p>Personnel:</p> <p>Geotechnical engineers, mine planning engineers, geologists, quarry manager.</p> <p>Method:</p> <p>View technical and design documentation and any future equipment plans. Refer to MSIR r. 13.5(1)(b).</p>
1.3	The design is such that any future potential instability, due to the natural terrain and stability of the ground under the area of dump construction, is minimised.	<p>Intent:</p> <p>To verify that, due to the longevity of such structures, hazards are managed from the design stage. Old underground workings, natural drainage channels, soft, weak soils, etc. can cause problems in dumps located over them.</p> <p>Personnel:</p> <p>Geotechnical engineers, mine planning engineers, geologists, surveyors, quarry manager.</p> <p>Method:</p> <p>View technical and design documentation and the natural surface plans. Refer to MSIR r. 13.5(1)(c).</p>

1.4	The design is such that any future potential instability, due to the drainage characteristics of the material being dumped, is minimised.	<p>Intent:</p> <p>To verify that, due to the longevity of such structures, hazards are managed from the design stage. Effective long term drainage of the dumped material is an essential part of dump design.</p> <p>Personnel:</p> <p>Geotechnical engineers, mine planning engineers, quarry manager.</p> <p>Method:</p> <p>View technical and design documentation. Refer to MSIR r. 13.5(1)(d).</p>
1.5	The design is such that any future potential instability, due to the probable climatic conditions of the area, is minimised.	<p>Intent:</p> <p>To verify that, due to the longevity of such structures, hazards are managed from the design stage. Material susceptible to movement from rain and/or wind erosion may require protection.</p> <p>Personnel:</p> <p>Environmental engineers, mine planning engineers, quarry manager.</p> <p>Method:</p> <p>View climate records for rain and wind (which may be in a Notice of Intent). Refer to MSIR r. 13.5(1)(e).</p>
1.6	The design is such that any future potential hazard, due to the presence of hazardous material in the dump, is minimised.	<p>Intent:</p> <p>To ensure that, due to the longevity of such structures, hazards are managed from the design stage. The hazards of radioactivity, asbestiform mineral, spontaneous combustion, toxic gas, etc. must be taken into account.</p> <p>Personnel:</p> <p>Geologists, environmental engineers, quarry manager.</p> <p>Method:</p> <p>View technical and design documentation.</p>
1.7	The design is such that the hazards of dust generation from the dump are minimised.	<p>Intent:</p> <p>To ensure that dust generation within the operation will be managed. Prevailing winds should not carry dump dust over haul roads, open pit or treatment plant operations, offices, workshops, accommodation camps, offsite buildings, public roads, etc. Material with special dust problems may require constant watering with sprays or other means of mitigation.</p> <p>Personnel:</p> <p>Geologists, mine planning engineers, environmental engineers, ventilation officer, quarry manager.</p> <p>Method:</p> <p>View technical and design documentation and plans.</p>

1.8	The design is such that the hazards of contamination from dump water drainage are minimised.	<p>Intent:</p> <p>To ensure that any potential drainage contamination will be managed. The potential for acid rock water generation must be assessed and dealt with where required. Other water borne contaminants may be carried through and then leach out.</p> <p>Personnel:</p> <p>Geologists, mine planning engineers, environmental engineers, quarry manager.</p> <p>Method:</p> <p>View technical and design documentation and plans.</p>
1.9	The design is such that any potential hazards from dump instability, which could affect other infrastructure, are minimised.	<p>Intent:</p> <p>To ensure that new structures, and/or the expansions of existing structures, are appropriately located. There must be no potential risk to personnel, offices, workshops, power lines, roads, railways, houses, magazines, etc.</p> <p>Personnel:</p> <p>Mine planning engineers, surveyors, quarry manager.</p> <p>Method:</p> <p>View plans.</p>
1.10	The design is such that any potential hazards from dump instability or tipping activity, which could affect other infrastructure, has a containment bund of sufficient design and size to contain the material via a standard, procedure or risk assessment.	<p>Intent:</p> <p>To ensure that old and new structures and/or the expansions of existing structures, are appropriately located. There must be no potential risk to personnel, offices, workshops, power lines, roads, railways, houses, magazines, etc.</p> <p>Personnel:</p> <p>Mine planning engineers, surveyors, quarry manager, geotechnical engineers.</p> <p>Method:</p> <p>View plans, standards, procedures and risk assessment documentation.</p>

2 Stockpile / dump layout

Stockpile / dump layout

Point	Standard	Guideline
2.1	Demarcated routes, for use during either/both day and night, are provided to ideally separate traffic flows for access to, and exit from, the tipping areas.	<p>Intent:</p> <p>To verify that traffic hazards are managed and traffic congestion is prevented, especially at ROM pads. One way systems are preferable and by confining movement to defined routes, grading and watering requirements are reduced.</p> <p>Personnel:</p> <p>N/A.</p> <p>Method:</p> <p>Visual inspection of tipping areas. Look for direction/no entry signs. Refer to MSIR r. 13.6(3)(a).</p>
2.2	Effective route marking, for use during either/both day and night, is provided to indicate the safe approach to, and exit from, the tipping point.	<p>Intent:</p> <p>To verify that dump truck operators are provided with adequate guidance as to the safe route to and from the tipping point. The approach should be designed such that the truck driver has the best view possible of the tipping point.</p> <p>Personnel:</p> <p>N/A.</p> <p>Method:</p> <p>Visual inspection of tipping areas. Look for route and tipping point demarcation with provision for night operation. Refer to MSIR r. 13.5(3).</p>
2.3	Turning, reversing and tipping areas are of sufficient size to permit manoeuvring by the largest equipment that is intended to be used.	<p>Intent:</p> <p>To verify that manoeuvring hazards are managed. Written operating procedures/rules are required where bulldozers and/or front end loaders will interact with dump trucks, especially at ROM pads.</p> <p>Personnel:</p> <p>Quarry manager.</p> <p>Method:</p> <p>Visual inspection of dump areas. Review of written procedures. Refer to MSIR r. 13.7(2)(b).</p>

2.4	There is restricted access to the toe of the tipping areas of waste / heap leach dumps.	<p>Intent:</p> <p>To ensure that the hazards of material rilling from slopes are managed. Access is required for the inspection of the tipping face, and in an emergency, but should be restricted to those purposes only due to the hazards from rocks rilling down.</p> <p>Personnel:</p> <p>Quarry manager.</p> <p>Method:</p> <p>Visual inspection of barriers/restriction signs.</p>
2.5	Traffic control measures have been devised and implemented.	<p>Intent:</p> <p>To verify that traffic hazards are managed written procedures/rules are required. Control measures may include signage, light vehicle lanes, roundabouts, traffic lights, restricted access areas, one way systems, radio communication, on foot prohibitions, etc.</p> <p>Personnel:</p> <p>Quarry manager.</p> <p>Method:</p> <p>Visual inspection of dump areas. Review of written procedures. Refer to MSIR r. 13.7(4).</p>
2.6	Overhead powerlines do not pass over areas where truck bodies may be elevated.	<p>Intent:</p> <p>To ensure that the hazards of raised truck bodies making contact with overhead energised powerlines are eliminated. Due to ongoing construction dump surfaces and exit roads can increase in height over time, and thus reduce previous clearances.</p> <p>Personnel:</p> <p>Quarry manager.</p> <p>Method:</p> <p>Visual inspection and review of plans.</p>

3 Operation

Operation

Point	Standard	Guideline
3.1	There are written procedures for dumping at all specified locations, and for the different types of equipment in use.	<p>Intent: To ensure that safe operating procedures for the different equipment and related to the specific work locations, have been devised and documented.</p> <p>Personnel: Quarry manager, training officer, supervisor, operators etc.</p> <p>Method: View procedures for dump trucks, bulldozers, front end loaders, spotters, etc. Interview personnel.</p>
3.2	Operators of equipment are tested on their knowledge of the relevant procedures before being authorised to work in a specific area.	<p>Intent: To ensure that personnel are deemed competent to work in a specific area.</p> <p>Personnel: Quarry manager, training officer, supervisor, operators etc.</p> <p>Method: View written and practical competency test sheets and results. Interview personnel.</p>
3.3	Where dumping is carried out over an edge (dump or bin), and no spotter is used, hazards are reduced by the use of engineered backstops (width v height), or eliminated by tipping short and bulldozing.	<p>Intent: To ensure that dumping over an edge, if required, is carried out with minimum risk.</p> <p>Personnel: Quarry manager.</p> <p>Method: Visually inspect for adequacy.</p>
3.4	Where dumping is carried out over an edge (dump or bin), and no spotter is used, technology is used to assist in achieving a safe operation.	<p>Intent: To ensure that the latest technology such as blind spot cameras, reversing/ proximity sensors, etc., is used to reduce the hazards of tipping over an edge.</p> <p>Personnel: Quarry manager.</p> <p>Method: Interview personnel.</p>

3.5	Where dumping is carried out over an edge (dump or bin), and no effective back stop has been provided, a spotter must be used.	<p>Intent: To verify that dumping over an edge is carried out with minimum risk. A windrow or backstop should be half the height, and preferably higher, of the largest tyre in use and the windrow should not show signs of having being used for stopping a vehicle.</p> <p>Personnel: Quarry manager.</p> <p>Method: Visually inspect for adequacy. Refer to MSIR r. 13.5(2).</p>
3.6	Where night time dumping is carried out, the work area and dump edge are illuminated by stationary lighting.	<p>Intent: To verify that work areas are effectively illuminated for safe operations at night. Lights can be permanently mounted on poles/towers or can be mobile units, etc. Vehicle headlights are not sufficient.</p> <p>Personnel: Quarry manager.</p> <p>Method: Visual inspection for the presence, or provision, of lighting. Refer to MSIR r. 13.5(4).</p>
3.7	During each working shift the dump surfaces, edges and faces are inspected by a competent person for any evidence of instability.	<p>Intent: To verify that the dumping areas remain safe for continued operations there should be inspection duties for supervisors with written records/shift logs.</p> <p>Personnel: Supervisors, operators, etc.</p> <p>Method: View procedures, records, shift log book, etc. Interview personnel. Refer to MSIR r. 13.5(5).</p>
3.8	There is a rising, or at least a flat, grade towards the dump edge.	<p>Intent: To verify that surface water does not collect along the dump edge and soften the area. This should be part of the written operating procedures for dump maintenance by bulldozers/graders.</p> <p>Personnel: Quarry manager, operators.</p> <p>Method: Visual inspection of dump surface. Interview personnel. Refer to MSIR r. 13.7(2).</p>

3.9	The dump tipping edges in use are straight with no curves and the windrows/backstops are maintained in height and profile.	<p>Intent:</p> <p>To verify that the risk of a truck breaking through a windrow is minimised. This should be part of the written operating procedures for dump maintenance by bulldozers / graders.</p> <p>Personnel:</p> <p>Quarry manager, operators.</p> <p>Method:</p> <p>Visual inspection of dump tipping edges. Interview personnel. Refer to MSIR r. 13.7(3).</p>
3.10	There is regular maintenance of dump surfaces as well as the access and exit routes.	<p>Intent:</p> <p>To verify that traffic hazards due to spillage, wheel ruts, potholes, water ponding, etc. are minimised.</p> <p>Personnel:</p> <p>Quarry manager, operators.</p> <p>Method:</p> <p>Visual inspection of access roads and dumps. Interview personnel. Refer to MSIR r. 13.7(3).</p>
3.11	There is control of dust generation by the use of water trucks, spray systems, etc.	<p>Intent:</p> <p>To verify that the hazards from dust generation are minimised. To reduce nuisance dust and poor visibility hazards. Dust control in truck tipping areas should be at least equal to that in truck loading areas.</p> <p>Personnel:</p> <p>Quarry manager, ventilation officer, supervisors, operators.</p> <p>Method:</p> <p>Visual inspection of dumps. Interview personnel. Refer to MSIR r. 13.7(3).</p>
3.12	There is restricted access to tipping areas for light vehicles and personnel on foot.	<p>Intent:</p> <p>To ensure that no additional traffic hazards are introduced. This should be part of the written operating procedures for the drivers of all light vehicles.</p> <p>Personnel:</p> <p>Quarry manager, operators.</p> <p>Method:</p> <p>View written procedures (perhaps in pit driving permit). Visual inspection for restriction signs, barriers. Interview personnel.</p>

3.13	Simultaneous dumping over the edge of a stockpile and loading out from its base is only carried out where there is sufficient separation between the work locations such that undermining of the dumping location is not possible.	<p>Intent:</p> <p>To verify that the hazards of such operations are minimised. There should be written procedures, with signs, or preferably barriers present, for such operations.</p> <p>Personnel:</p> <p>Quarry manager, supervisors, operators.</p> <p>Method:</p> <p>Visual inspection if this is carried out. Review written procedures. Interview personnel. Refer to MSIR r. 13.5(6).</p>
3.14	No dumping directly into bodies of water is carried out.	<p>Intent:</p> <p>To ensure that the hazards of a truck going into water are eliminated. Backfilling of water filled areas should only be done by bulldozing of material.</p> <p>Personnel:</p> <p>Quarry manager, operators.</p> <p>Method:</p> <p>Visual inspection if relevant. View procedures. Interview personnel.</p>
3.15	Hazardous conditions are reported when observed and remedial action is taken.	<p>Intent:</p> <p>To ensure that any observed hazardous condition on a dump / stockpile is not allowed to remain. Procedures must exist for immediate action if necessary e.g. dump short of edge, barricade / flag off area, etc.</p> <p>Personnel:</p> <p>Quarry manager, supervisors, operators.</p> <p>Method:</p> <p>Review procedures. Interview personnel.</p>
3.16	Spotters, if used, are required to be stationed in a safe location.	<p>Intent:</p> <p>To ensure that personnel are not exposed to the hazards of manoeuvring heavy mobile equipment.</p> <p>Personnel:</p> <p>Spotters.</p> <p>Method:</p> <p>Visual inspection of spotter stations. Review written procedures. Interview personnel.</p>

3.17	Spotters, if used, are provided with weather protection.	<p>Intent: To ensure that personnel have access to protection from climatic hazards.</p> <p>Personnel: Spotters.</p> <p>Method: Visual inspection for protection from sun, wind, rain. Interview personnel.</p>
3.18	Spotters, if used, are protected from dust.	<p>Intent: To ensure that personnel are not exposed to the hazards of dust generation. Spotters should be located up wind from tipping areas. Spotters could be in a vehicle. Watering when requested. PPE.</p> <p>Personnel: Spotters.</p> <p>Method: Review written procedures. Interview personnel.</p>
3.19	Spotters, if used, wear reflective clothing.	<p>Intent: To ensure that personnel are clearly visible to equipment operators during both day and night.</p> <p>Personnel: Spotters</p> <p>Method: Visual inspection. Interview personnel.</p>
3.20	There is a standard code of signals for use between spotters and truck operators.	<p>Intent: To ensure that there is a failsafe, clearly understood method of communication between equipment operators and spotters.</p> <p>Personnel: Spotters, truck operators.</p> <p>Method: Review written procedures. Interview personnel.</p>