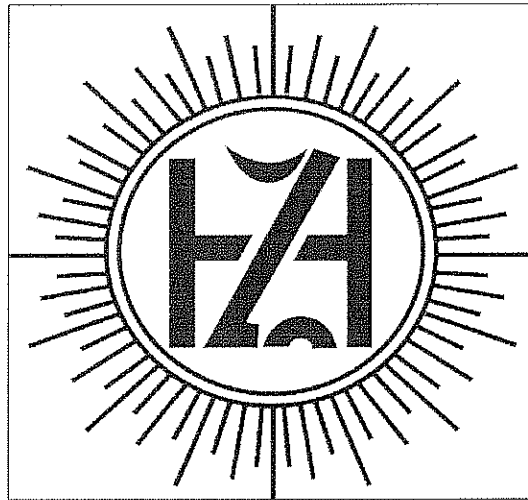




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**Hindustan Zinc Limited**

**Standard for Stockpile and Waste Dump Management**

	Issued by	Approved by
Name	Chairman, Corporate SRP Sub-committee	Chairman Corporate Safety Council
Signature		
Date	18/01/2019	

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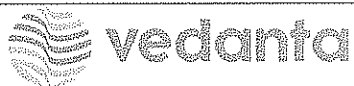
**Document Control Details:**

Document Issue	Issue Date	* Compiled By	Document Owner	Approved by
0				
<b><u>REVISION LOG</u></b>				
Document Revision No.	Revision Date	Procedure Document No.		
00	15.01.2019	New Document		
01				
02				

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## Document Issue

Standard for Stockpile and Waste Dump Management is approved by the Chairman of Corporate Safety Council, Hindustan Zinc Limited on behalf of SRP sub-committee.

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Name and Designation: Sunil Duggal, CEO and Whole Time Director HZL

Signed:

Date:

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**Abbreviations:**

<b>SBU Head</b>	<b>Department Head</b>
<b>PTW</b>	<b>Permit To Work</b>
<b>SOP</b>	<b>Standard Operating Procedure</b>
<b>HEMM</b>	<b>Heavy Earth Moving Machinery</b>
<b>SWP</b>	<b>Standard Working Procedure</b>
<b>HSE</b>	<b>Health, Safety &amp; Environment</b>
<b>SRP</b>	<b>Standard Rule and Procedure</b>
<b>CDC</b>	<b>Central Design Centre</b>
<b>LSR</b>	<b>Life Saving Rules</b>
<b>SME</b>	<b>Subject Matter Expert</b>
<b>TARP</b>	<b>Trigger Action Response Plan</b>
<b>CSC</b>	<b>Corporate Safety Council</b>
<b>UIC</b>	<b>Unit Implementation Committee</b>
<b>HIRA</b>	<b>Hazard Identification and Risk Assessment</b>
<b>JSA</b>	<b>Job safety Assessment</b>
<b>VDSS</b>	<b>Vehicle Driving Safety Standard</b>
<b>PPE</b>	<b>Personnel Protective Equipment</b>
<b>HZL</b>	<b>Hindustan Zinc Limited</b>
<b>DGMS</b>	<b>Director General of Mines Safety</b>
<b>MMR</b>	<b>Metalliferous Mines Regulation</b>
<b>MCDR</b>	<b>Mineral Conservation and Development Rule</b>
<b>CTO</b>	<b>Consent to Operate</b>
<b>CPCB</b>	<b>Central Pollution Control Board</b>
<b>MOEF</b>	<b>Ministry of Environment and Forest</b>

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## 1. Purpose

The purpose of this standard is to provide framework and specific requirements to ensure safety in Stock Pile and Waste Dump Management including all dumps on surface, landfill and in pit dumps.

## 2. Scope and Field of Application

### 2.1. Scope

- a. This standard describes the requirements for protecting people, equipment and environment from the hazards associated with Stock Pile and Waste Dump Management in all business units managed by HZL.
- b. It provides helpful information to control hazards associated with Stock Pile and Waste Dump Management in line with Management Safety Commitment.
- c. This standard also covers the geotechnical risks associated with temporary or permanent dumps.
- d. The HZL business units managing operation must comply with prevailing mining and environment laws and government legislation in the country or state in which they operate and comply with relevant conditions mentioned in the permissions given for mining/ factory related operations. Sites should be aware that local regulations might impose conditions not reflected in this standard. In case of conflict or exclusion, the present or amended mining/factory related legislation shall supersede this standard.
- e. Tailings Storage Facility (TSF) embankments and dumps, such as dry stacks, constructed within TSF are excluded from this standard. TSF would be governed through a separate standard.

### 2.2. Field of Application

This Standard applies to all business units owned and operated by HZL and those operated by its contractors covered by appropriate contractual arrangements. This standard is applicable to all HZL business units and managed operations, including new acquisitions; during exploration, through all development phases and construction, operation to closure and - where applicable - for post closure management.

## 3. Dump and Stockpile Failure

### 3.1. Factors Responsible for Failure

- a. Non-conformance of design.
- b. Geo-mechanical properties of the dump material.
- c. Presence of clay and faults / other discontinuities in the foundation.
- d. Presence of water.
- e. Effect of blasting and other dynamic forces.

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- f. Presence of underground workings.
- g. Under-cutting / toe-cutting.
- h. Height and slope of the dumps.

### 3.2. Hazard of Stockpiling and Dumping

The hazards associated with dumping operation depend on the following:

- a. Nature of the material being stockpiled or dumped,
- b. Configuration of stockpile or dump,
- c. Mobile equipment (HEMMs) and dumpers operating on the dumps,
- d. Immediate and overhead environment,
- e. Stockpiles or dumped materials soaked in rain,
- f. Presence of undetonated explosives in raw feed stockpiles.
- g. Man Machine Interaction,
- h. Electrical contact, and
- i. Combination of the above.

## 4. References

The following have been referenced in preparing this standard.

- a. HSE Policy,
- b. HSE Principles,
- c. Related HSE Corporate Standards,
- d. Applicable statutory requirements, MMR (1961), Mines Act (1952), Mines Rule (1955), DGMS Circular, Factory Act, Mineral Conservation and Development Rules (2017), Environment related laws and clearances. Pit, Stockpile & Waste Dump Stability - Safety Performance (Vedanta Standard),
- e. HZL Corporate incident management standard and guidelines,
- f. Emergency Planning Preparedness and Response Rule (1996),
- g. First and Second Party Audit Standards, and
- h. Code of Practice for Tipping on Stockpiles or Dumping of Overburden (Annexure B).

## 5. Management Responsibilities

### 5.1. Line Management

Line management across the HZL businesses has the responsibility to implement this standard. It is the responsibility of all persons involved with dump and stockpile operation & management to adhere

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to their prescribed duties as defined in Annexure - A of this standard.

## 5.2. Subject Matter Experts (SMEs)

SMEs from Civil, Geotechnical, Mining, Process and HSE should be identified by the Business Unit. SMEs are resources recognized for their expertise in the area of Dump Management operations, in-depth knowledge of this standard and associated procedures related to mining and process operations developed at site. The SMEs should be made available to support the Dump Champion for the implementation of this standard and continuous improvement.

## 6. Definitions

- a. **Safety:** Safety means the absence of non-tolerable risks that may cause injury, illness, death or permanent disablement and can be physical or mental in nature.
- b. **Health:** Health means the absence of disease, illness, death or permanent disablement and can be physical or mental in nature.
- c. **Workplace:** A workplace is any place where work is, is to be, or is likely to be done by any HZL employee or any other person acting under the direction of HZL management.
- d. **Risk:** Risk is the chance of something happening that will have an impact on objectives or targets. It is measured in terms of likelihood and consequence and may arise from an event, an action or from a lack of action.
- e. **Providing Healthy and Safe Workplaces:** Providing healthy and safe workplaces involves the anticipation, recognition, analysis, evaluation and control of those hazards or factors that may cause disease, illness, injury or impaired health and well-being amongst persons at the workplace or those who are directly impacted by the workplace.
- f. **Overburden:** All overlying strata over the mineral are referred as overburden. e.g. Shale, sandstone, top soil etc.
- g. **Solid Waste:** Solid waste includes any non-soluble material such as mining residues, demolition waste, industrial waste, agricultural refuse, municipal garbage, and sewage sludge.
- h. **Ramp:** Haul road with gradient joining two levels.
- i. **Berm:** Protective wall to prevent falling of HEMM or men from upper bench to lower bench.
- j. **Heavy Earth Moving Machinery (HEMM):** Automotive or electrical machinery used in mechanized opencast mines for digging, drilling (excluding hand held drills and drill machines capable of drilling hole of a diameter up to 50 mm), dredging, hydraulicking, ripping, dozing, grading,





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excavating, loading, transporting minerals or overburden;

- k. **Light Vehicles:** Jeeps, TATA Sumo, Bolero, Scorpio and all vehicles of these class.
- l. **Dump and Stockpile Management:** Management of all operations connected with dumping of solid waste (e.g. overburden material, interburden clay, Jarofix, slag) and stockpiling of ore, coal or any other low grade ore at the mine, in a safe and environmentally acceptable manner.
- m. **Line Management:** Managers and supervisors who are in the line of command of a primary function of their organization, business, location or site such as Functional Head Mines or Manager or Sectional Head or front line supervisors at a mine site or a Manager / Engineer in the maintenance department at a mine site.

## 7. Standard Requirements

### 7.1. General Requirements

- a. For hazardous waste, the selection of site should be in line with the requirements of MOEF and CPCB guidelines.
- b. Dump Management Plan must be developed by a competent person.

### 7.2. Legal Requirements

The planning process must identify requisite approvals. This should be done as early as possible in the planning process given the potentially long lead times.

## 8. Planning and Design

### 8.1. Baseline Data

Baseline data shall be collected prior to commencement of dumping operation in any dumping location must include the annual rainfall data, geologic, geotechnical and hydrogeological data. This information is critical for designing a stable landform with effective drainage systems. Cyclonic weather systems, dominated by high intensity storms, may dictate the need for special attention to drainage and early stabilization of exposed slopes.

### 8.2. Dump Material Characterization

The planning process must include the characterization of the material prior to dump design.

- a. **Potential for Acid Mine Drainage**

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Deciding location of dump in case of possibility of Acid Mine Drainage is very critical. Therefore, waste material which are associated with sulphide mineralization and may oxidize to form acid must be identified.

**b. Salinity**

It is important to identify whether dumping materials are sodic and /or have a high electrical conductivity. These materials are very difficult to re-vegetate and therefore must not be placed on the final slopes, nor within their vicinity. Salinity generally increases with depth within the weathered rock profile but this trend can be complicated by groundwater patterns. Fresh cuttings from drilling can be used to determine salinity levels in waste rock materials. This information can then be used to develop overburden dumping sequences which minimize the amount of salt near the surface of the dump, where it could affect revegetation.

### **8.3. Site Selection**

- a. Dumping area should be selected based on long term mine plan and should have provision for expansion in future.
- b. Dump sites must be selected in such a manner that potential ore body is not sterilized.
- c. The ground should be firm and stable to hold the weight and resist the vibration due to nearby blasting and operation of heavy mobile-equipment, particularly if there is a nearby quarry face.
- d. Water courses, either natural or as a result of a torrential downpour, should not be adjacent to the stockpile or dump.
- e. The site should have adequate natural drainage to allow outward flow of water.
- f. Volume of production through-put of the mine and leaching process waste will have an influence on the siting, type, size of stockpile and approach road.

### **8.4. Dump Design**

- a. Dump or stockpile should be designed by a Competent Agency/Geotech/Civil Engineer depending on the size and complexity of dump.
- b. It is important to identify geotechnical and geochemical properties of all dump materials prior to dump design so that material can be dumped selectively within the dump. For example, high clay, sand or kaolin content materials are not suitable for final slopes. Rocky overburden which is erosion resistant can be used for armoring the more erodible materials.
- c. Dumps shall have adequate drainage system including toe-drains and garland drains to keep water away.
- d. Dumps shall be designed to not accumulate water and a slope of 1 in 100 should be maintained for drainage.

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- e. The slope of dump face shall be determined by the natural angle of repose of the material being deposited.

### 8.5. Dump Construction, Operation and Maintenance

- a. Dumps shall be constructed and maintained as per the approved design.
- b. Survey controls should be provided to ensure dumps are constructed as per design.
- c. No activity should be carried out below the tipping point. No person shall be permitted to approach the toe of an active dump site where he may be endangered from material rolling down the face.
- d. In adverse weather conditions such as fog and heavy rain, dumping operation shall be ceased. A Dump Champion/Line Manager/Geotech/Civil Engineer shall verify when work can resume.
- e. Toe of the dump should be kept away from any open excavation/edges at a distance at least equal to the dump height. Any deviation must be approved by the Location Head backed by reports from a Competent Agency.
- f. The toe of a dump or stockpile shall not be allowed to approach a railway or other public works, public road or building other permanent structure not belonging to the company, closer than a distance equal to the vertical height of the dump. A suitable fence shall be erected between any railway or public works or road or building or structure and the dump toe to prevent unauthorized persons from approaching the dump.
- g. Ravines and gullies formed by heavy rain shall be patched with suitable material approved by a Geotechnical/Civil Engineer.

#### 8.5.1 Dump Operational Parameters

- a. Lift Height  
Dumps created from the ground up should be made in lifts where the dump height exceeds 20 m. The height of a dump lift will depend upon the nature of dumped material and the slope condition of the dump floor. Lift height should be as per design. In case the condition of dump deteriorates, the lift height shall be adjusted at the discretion of the SMEs.
- b. Material Type  
Mine planning should identify areas for placing poor quality material. Poor quality materials, i.e. wet material, should not be tipped above a dump but block dumped to avoid zones of instability and differential compaction in dumps. Course rejects should not be dumped in areas
  - where a minimum of 5 m of cover will not be placed over the area,
  - outside of dumps that will be rehabilitated,
  - where future haul roads will be constructed, and
  - where it will affect the stability of the dump or create soft spots.

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c. Berm Height

The berm height in a dump should be half the wheel height of the largest dumper used in the dump. This is a guide only and consideration must be given to the material type, berm thickness and method of construction.

d. Shape of Dump

Dumps should be designed and constructed to avoid sharp corners and curves. Long and square dump faces are most productive.

e. Grade of Dump

Dumps shall be constructed with positive drainage such that water drains naturally away from the tip head wherever possible (no greater than 3% cross fall). On the occasions when this is not possible, provision must be made to drain the tip head by cutting drainage slots in non-active sections of the dump. (These areas to be delineated by marker poles). Dump planning and construction should consider the water flow pattern in the surrounding areas.

f. Lighting on Dumps

Lighting arrangements shall be provided on all active dumps where dumping over a tip head is expected to take place after sunset or dark hours. The lighting arrangements shall be placed / focused close to the edge and on the dumper operator's side when tipping to assist the dumper operator reversing to the tip head.

g. Access Control

Access to the dumps or sections of a dump which are deemed unsafe by the Dump Champion or SMEs shall be restricted by a physical barrier to avoid inadvertent dumping.

h. Running Surface on Dump

All dumps should have at least one well maintained access road. The road width shall be determined by the SME's. The road should be clearly marked to ensure a controlled traffic flow occurs on the dump to the tip head.

i. Dumpers on Dump

Material shall be dumped in places indicated by the dozer operator or the shift engineer. Dumpers will cycle clock-wise when preparing to tip and should cycle no closer than two dumper widths

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from the tip head or tip edge. Dumper operators should not use berms to stop the dumper when reversing up to dump. Dumpers should not enter dumps which are closed or blocked off unless under the direct instruction of the SMEs. Dumpers must not tip loads over the edge of a dump unless the berm is constructed as per the SOP. Dumpers shall maintain a safety zone of at least one dumper width when tipping adjacent to the dozer working the dump. Dumpers should unload material using site specific SOP's or unload 20 m from the crest and then spread by dozer, if SOP is not available.

j. **Dump Signs**

All dumps shall have signs posted clearly indicating the dump name and dump status (open or closed) in a clearly visible location to all persons entering the dump. Equipment operators shall be familiar with the naming of dumps.

k. **Block Dumping**

Block dumping of overburden, inter-burden, course reject, etc. should be in areas designated by the Line Manager.

l. **Dumping Over High Walls**

No material shall be dumped over a high wall. When constructing a dump from a high wall material shall be dumped at least one dumper width from the edge and the dozer shall be utilized to push the material over the edge. Prior to the task being commenced, the dozer operator shall delineate the high wall standoff tipping line. This procedure will be followed until a stable rill angle on the dumped material is reached.

## **8.6. Dump Monitoring**

- f. Dumps shall be routinely monitored for settlement and movement by suitable instrumentation systems such as prisms, piezometers and inclinometers.
- g. The monitoring process and frequency shall be determined by a SME based on the nature of dump material, dump height, rainfall etc.
- h. Dumps witnessing tensile cracks (other than settlement cracks) shall be inspected by a Dump Champion/Line Manager/Geotech/Civil Engineer at the beginning of each shift to give clearance that work can continue.
- i. Dumps made by filling in existing pits where the height exceeds 50 m shall be monitored through a real time monitoring system such as slope stability radar.
- j. Drone survey should be carried out at periodic intervals.
- k. Dumps shall be audited through external independent agency at defined frequencies.

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### 8.7.Reclamation Plan

Reclamation of dumps shall be carried out in accordance with the Closure and Reclamation plan meeting all permit/legal/social requirements.

### 8.8.Dump Emergency Management Plan

Emergencies may include:

- a. Large and intermediate scale dump failure,
- b. Any condition which has a potential for causing bodily injury to the dump workers, and
- c. Any other condition identified in the ERP/Trigger Action Response.

Emergency response should be carried out as per the written site specific procedures so as to mitigate the consequences of emergency and further reporting should be done as per legal and company requirement.

## 9. RACI chart

The roles and responsibilities to implement this standard are outlined below:

#### R: Responsible

People who are expected to actively participate in the activity and contribute to the best of their abilities

#### A: Accountable

The person who is ultimately responsible for the results

#### C: Consulted

People who have a particular expertise and can contribute to specific decisions.

#### I: Informed

People who are affected by the activity/decision and therefore need to be kept informed, but do not participate in the effort.

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	Employee / Concerned Supervisor	Line Organizati on	Unit HSE	Corporate HSE	SME's Internal / External
Role and responsibility of every individual	R	A	I	I	
Identification of hazards in dumping & tipping operation on stockpiles and waste dumps	R	A/R	C	I	C
Identification of hazards in contractual jobs	R	A/R	C	I	C
Define safety precaution for above	R	A/R	C	I	C
Identify persons responsible for implementing safety standards	R	A/R	A	C	I
Document acceptable criteria/ reference to any document	R	A/R	C	I	I
Inspect tools and tackles	R	A/R	C/I	I	C
Audit for compliance		R	A	I	C

Note: SME's can be invited for internal and external inspections.

## 10. Management Systems

### 10.1. Training

Basic and refresher training shall be given as per Corporate Standard Training requirements.

### 10.2. Management of Change

Sites shall have procedures and practices in place to manage change that potentially affects the risks posed to people by any dumping, stockpiling or tipping operation. Management of change must be employed if changes are made to the excavation or dump geometries that depart from the design.

### 10.3. Management Review

There must be a senior management review at each site and business level on an annual basis.

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Although it is expected that Safety performance and the Safety program will be reviewed at several levels, including the Pit Safety Committee, senior management must do so, in recognition of their overall responsibility for Safety management.

They should formally review the success of the program on an annual basis, in particular, a check must be made that Safety-related systems are sufficient and well managed, Document that review, and Formulate a Safety management plan for the forthcoming year.

#### **10.4. Audits**

Site Mines Management Team shall conduct First Party Audit in line with Procedure to assess a status on compliance to this Standard on Safety in Dump Management, analyze the findings and implement recommendations / gaps for continual improvement. First-party audits shall also address local laws, regulations, and situations unique to the site relative to safety. Corporate Safety team shall include the provisions of this standard in their second party safety audits protocol.

#### **10.5. Standard Renewal Process**

This standard shall be reviewed and revised as necessary and, at a minimum, not later than three years from the date of the last revision and following any accident.

#### **10.6. Deviation Process**

Deviations from this standard must be authorized by the Corporate Safety after consultation with the CSC Board. Deviations must be documented, and documentation must include the relevant facts supporting the deviation decision. Deviation authorization must be renewed periodically and no less frequently than every three years.

Emergency deviations must be authorized by the Unit Head when, as a result of an unforeseen event or situation, there is inadequate time to process a formal deviation. Emergency deviations shall be authorized only where it is not feasible to comply with a requirement in this standard. Emergency deviations shall be short in duration, not to exceed the time to perform the task at hand. Appropriate HSE resources shall be consulted. The documentation must include the relevant facts supporting the deviation decision and the interim measures to be put in place to achieve acceptable levels of HSE protection. A copy of the deviation must be sent to the Corporate Safety.

### **11. Dump-Point Safety: Best Practices**

The attached annexures on “Dump-Point Safety: Best Practices” would be useful for mines managers or mine personnel in giving training on dump-point safety or to quickly review the main safety points covered in this Standard. Annexure – C to Annexure – F describes the Dump Point Safety; Best Practices for Mine Managers, Dumper operators, Dozer operators and Pay loader operators





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respectively. Each site may use these annexures for making safety check points as well as while doing safety talk on dump safety.



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## Annexure – A

### Responsibilities

#### **HOD (Mines Operation)**

He is responsible either personally or by nomination of a **Dump Champion**, for ensuring that:

- a) Written operating instructions are prepared, and available for reference and training,
- b) Operators are trained in the procedures,
- c) Operating instructions are strictly enforced;
- d) Stockpiles and dumps are properly sited,
- e) Stockpiles and dumps are in a stable condition,
- f) Suitably qualified persons are employed or engaged to ensure that the requirements are met. Specifically, the HOD or Dump Champion will inspect all stockpiles and dumps once a week and after long periods of continuous rain or after torrential downpours of rain. The HOD will ensure that at times of instability during formation of or extraction from the stockpile or dump, there will be strict supervision of the operations.

#### **Dump Champion / Foremen / Supervisors**

The Dump Champion / Foremen / Supervisors having operational responsibilities associated with stockpiles and dumps will oversee and apply those aspects of the Code that relate to their responsibility.

#### **HEMM Operators / Contractors**

HEMM Operators / Contractors at stockpiles are responsible to comply with this standard and the written operating instructions. They must immediately report unsafe conditions at the stockpile and of HEMMs and Dumpers to the Sectional Head or foreman / supervisor.

#### **Operating instructions and training**

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- a) At all mines where tipping or dumping is a part of normal operations, there will be prepared operating instructions. These instructions will detail the procedures to be carried out during the operation.
- b) The manager is responsible for preparing the instruction and ensuring that they are applicable to the current operations.
- c) No operator will be engaged in tipping or dumping operations until he has received satisfactory training in the instructions and he has demonstrated by practical tests, his competency in tipping and his knowledge of the instructions. It is the manager's responsibility to ensure this on-site training and testing has been performed.

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### **Annexure – B**

#### **Code of Practice for Tipping on Stockpiles or Dumping of Overburden:**

1. All overburden removed by shovel-dumper combination shall be dumped only in the specified dump yards maintained for the purpose and in a stable condition.
2. No person shall dump any overburden material in the mineral dump yard or on the haul road.
3. While turning the dumper for going to the dump yard from main haul road, dumper operator shall not run the dumper, at speed more than 30 km per hour. He shall blow the horn. Same procedure shall be followed by the dumper operator while coming from the dump yard to the main haul road.
4. In the dump yard no dumping shall be made near/directly beneath an electric overhead line / lighting tower. A minimum horizontal distance of 7 meters shall be kept from beneath power lines to the toe of any stockpile or dump.
5. At the edge of the dump, a safety berm shall be left by the dozer operator. This berm shall be formed by the tipping material and have a height equivalent to half the wheel diameter of the dumper dumping. In any event this berm shall not be less than one meter in height and one meter in width.
6. Dumpers dumping over the berm shall back up squarely to the berm.
7. Dumper operator shall, while reversing the dumper for final dumping, not go at more than 10 km per hour speed. The operator shall adjust the position of the dumper in such a way that rear tyre of the dumper just touches the protection berm. The dumper operator shall not back up to an area which has not been visually inspected by him.
8. While moving the dumper in reverse direction, dumper operator shall ensure the audio visual reverse horn is in operation.
9. Dumpers shall be fitted with a rear flood light of sufficient illumination capacity to provide clear vision to a distance of not less than 10 meters during night hours.

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10. Shift engineer shall inspect the dump yard at least twice i.e. at the beginning of the shift and at the end of the shift apart from any emergency inspection of the dump yard after rains etc. The Shift-in-charge shall inspect the dump yard at least thrice a week. The Sectional Head (Operations) shall inspect the dump yard atleast once during the shift. The HOD (Mines Operations) shall inspect the dump atleast once a week.
11. Proper lighting arrangements shall be provided in the dump yard.
12. Proper arrangements for dust suppression shall be done in the dump yard.
13. Dump yard shall be maintained as level as possible. Gradient at entry to the main dump yard shall not exceed 1 in 16.
14. Water courses, either natural or formed as a result of a torrential downpour, shall not be adjacent to stockpile or dump. Adequate drainage shall be provided.
15. Non-operational areas shall be designated by a berm of atleast two meters in height.
16. Unstable surfaces or edges shall be designated by flag posts, signs or any other suitable material and shall be so located as to warn operators not to operate any equipment or vehicle on these surfaces.
17. When there is a possibility that the ground at dumping place may fail to support the weight of the dumper, loads shall be dumped their back from the edge of the dump.

**Implementation:**

1. A copy of the CODE shall be given to each dumper / dozer operator and to the concerned officials and explained to them.
2. Employees / Operators / Officials at stockpiles / dumps shall be responsible to comply with this code.
3. Employees / Operators / Officials at stockpiles / dumps shall immediately report Unsafe Conditions at the stockpiles / dumps through Safety Observation rounds and shall stop the dumping operations until the unsafe condition is rectified at site.

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### Annexure – C

#### **Dump Point Safety; Best Practices for Mine Managers:**

Best Practices for *mine managers* at dump points are to:

- Provide training to dump-point workers on recognizing dump-point hazards, taking appropriate corrective measures and using safe dumping procedures
- Supervise dumping operations regularly to ensure that unsafe conditions are being corrected and safe practices are being followed.
- Instruct dozer operators to maintain adequate berms, keep the dump properly graded, and correct or barricade unsafe dump areas.
- Avoid the hazards associated with dumping near the edge of a pile by routinely dumping away from the edge and pushing the material over, preferably with a track-dozer.
- Instruct dumper operators to always dump a dumper-length away from the edge in areas where the berm is inadequate or where the dump area is cracked, settled, or too soft.
- Instruct dumper operators to always dump a dumper-length back from the edge if the pile below the dump point has been loaded-out and over-steepened.
- Route dumper traffic so that operators have the best opportunity to routinely observe the condition of the dump area, both above and below the dump point, on their approach.
- Consider the practice of “driving left” on the dump to allow operators a better opportunity to observe the dump area on the approach.
- Instruct dump-point workers to examine both the top of the pile and the area below the dump point for signs of instability.
- Provide for communication between dump-point workers.
- Provide adequate illumination of the dump-point area for night operations.
- Ensure that the location of overhead power lines does not present a hazard for the dumpers. Be especially alert to this problem as the size of stockpiles increases.
- Provide training to dumper operators on safe driving procedures, specifically the proper use of the transmission and brakes while backing and dumping the dumper.
- Ensure that equipment is properly maintained and that safety features are operational.
- Require contractor dumper operators to stay in their cab while being loaded at a stockpile.
- Make use of new technologies such as the use of vehicle-mounted cameras that can improve both dump-point safety and efficiency. A rearward-looking camera, for example, can assist a dumper

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operator in backing up square to the berm and in knowing how close to the berm the vehicle is positioned.

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### Annexure – D

#### **Dump Point Safety; Best Practices for Dumper Operators:**

Best Practices for *dumper operators* at dump points are:

- Check the dump area for unsafe conditions on their approach, staying a dumper length away from the edge.
- Dump away from the edge if:
  - a) The berm is inadequate (for example, the berm is not at least mid-axle height, the berm has been partially undercut, etc.).
  - b) The area below the dump point has been loaded-out and over-steepened.
  - c) There are cracks near the edge of a pile.
  - d) The edge area is soft and the tires sink in.
  - e) There are signs that the slope below the dump point is unstable.
  - f) Visibility is poor.
- Dump a dumper-length away from the edge anytime there is uncertainty about the safety of the dump area.
- Back up perpendicular to the edge or with the operator's-side rear tires leading just slightly.
- Back up slowly and come to a gradual stop at the dumping point.
- Use the berm as a visual guide only. Do not use it routinely to help stop the dumper.
- Avoid running the rear tyres up on the berm.
- Maintain spacing from other dumpers while dumping.
- Do not attempt to dump the material if it sticks in the dump body, especially if it sticks after the dump body is raised about two-thirds of the way.
- Communicate dump-point conditions to the dump supervisor, the dozer and front-end-loader operators, as well as other operators.
- Be aware of the proximity of overhead power lines.



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- Be sure to lower the dump body after dumping.
- Wear your seatbelt.
- Get proper training on safe dumping procedures.

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### Annexure – E

#### **Dump Point Safety; Best Practices for Dozer Operators**

Best Practices for *dozer operators* at dump points are to:

- Maintain adequate berms at the dump points.
- Grade the top of the pile so that dumpers are going up a slight grade as they back up to dump and the dump area is kept well-drained.
- Keep the dump area graded so that dumpers are not tilting to one side as they back up to dump.
- Keep alert throughout the shift for the development of potentially unsafe conditions such as cracks, settling, or soft areas.
- Correct or barricade potentially unstable areas.
- Remedy steep or overhanging pile slopes by carefully pushing material down from the top of the pile.
- Re-grade soft spots with better material and smooth out rough areas on the dump.
- Act as a spotter for the trucks and keep them away from the edge when conditions warrant.
- Communicate dump conditions to the dump supervisor and the dumper operators.

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### Annexure – F

#### **Dump Point Safety; Best Practices for Payloader Operators**

Best Practices for *Payloader operators* working at stockpiles are to:

- Recognize that loading-out material at the toe of a pile affects the safety of the dump point above the load-out area.
- Communicate to dumper operators and the dump supervisor any questionable dump-point conditions.
- Block off the pile access ramp or barricade the area when dumpers would be exposed to dangerous or questionable conditions on the top of the pile.
- Limit the height of the loaded-out and over-steepened portion of the pile to about the reach of their equipment.
- Remedy steep slopes or overhangs before such conditions get high enough to pose a hazard. If necessary, correct such conditions by carefully pushing or dumping material from the top of the pile - preferably using a track-mounted piece of equipment.
- Wear seatbelts.
- Be alert to the dangers of blind spots around their equipment.
- Remind dumper operators that they need to stay in their cabin while parked near, or being loaded at, a stockpile.