MINING INDUSTRY
OCCUPATIONAL
SAFETY & HEALTH

MINERALS COUNCIL
SOUTH AFRICA

GUIDANCE NOTE

Sedibelo Platinum Mines – Pilansberg Platinum Mine

For the implementation of the Industry-wide Buy and Maintain Quiet Initiative (IBMQI) in the South African mining industry

MILESTONE FOR THE QUIETENING OF EQUIPMENT

By December 2024, the total operational or process noise emitted by any equipment must not exceed a milestone sound pressure level of 107dB(A). This milestone of the sound pressure levels will be verified by initiatives under the Centre of Excellence (CoE) and MOSH.

MANUFACTURER'S AND SUPPLIER'S DUTY FOR HEALTH AND SAFETY AS STIPULATED IN SECTION 21 OF THE MINE HEALTH AND SAFETY ACT

1. Any person who –
   (a) designs, manufactures, repairs, imports or supplies any article for use at a mine must ensure, as far as reasonably practicable:
      (i) that the article is safe and without risk to health and safety when used properly
      (ii) that it complies with all the requirements in terms of this Act

PURPOSE

Equipment noise emissions have been identified as a significant occupational health and safety risk within the South African mining industry. To effectively manage the noise hazard, the need was identified to develop a practical and effective Industry-wide Buy and Maintain Quiet Initiative (IBMQI) to assist the industry in their respective efforts to eliminate and/or control noise at the source. Noise emission of equipment forms the key focus of the IBMQI, with the appropriate application of incorporating noise as a parameter when procuring and maintaining any equipment used in the industry.

This document is aimed at providing guidance to the user on the process to be applied when procuring new equipment considering equipment noise milestones, including the repair and maintenance requirements to ensure that noise levels emitted by equipment used in the industry meet the noise industry milestones. It is important to emphasise that this note is only for guidance purposes. There is no obligation on any mine to apply all or any part of the guidance set out below - it is simply intended as a tool to assist the mines in their engagements with equipment manufacturers and suppliers.

The Mine Health and Safety Council (MHSC) has established milestones aimed at the reduction of equipment noise emissions and ultimately eliminating noise induced hearing loss (NIHL).

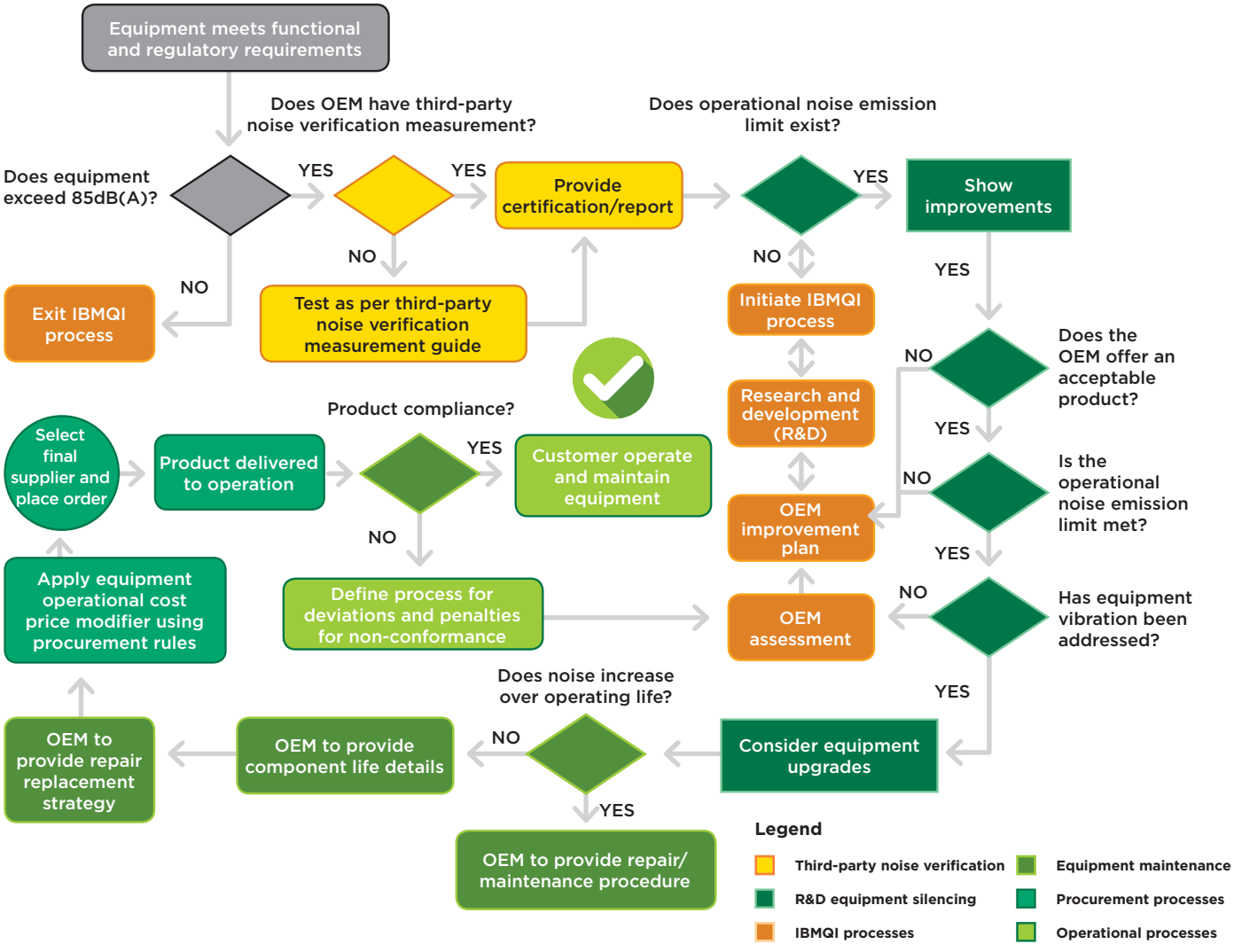
NEW EQUIPMENT PROCUREMENT CONSIDERATIONS

Equipment procurement considerations

When the need arises to procure new or replacement equipment at mining operations, the person responsible for procurement may wish to consider the IBMQI principles listed below, with a view to making an informed decision regarding the procurement of the appropriate equipment from an IBMQI perspective:

- Confirm that where the noise levels emitted by the equipment exceed 85dB(A), a noise certificate supplied by a certified service provider is available. The noise level can be confirmed by obtaining a third-party noise verification measurement
- When the Original Equipment Manufacturer (OEM) is engaged and the parties involved agree that the equipment does not meet the set noise emission limit, consider initiating a noise reduction process (IBMQI process)
- If an industry noise emission limit does not currently exist for any given piece of equipment, or equipment population, then the operation could consider establishing its own internal limit, based on their equipment noise screening results (IBMQI process)
- Request the OEM to provide details of any alterations made to the equipment which may reduce the noise emissions from the equipment, accompanied by a third-party noise verification measurement from the OEM, or from a certified service provider
- Request the OEM to indicate other noise-related issues (i.e. vibration) that need to be considered
- Request OEM upgrades (if available) for replacement or alterations to be made to the equipment exceeding 85dB(A)
- Request the OEM to indicate the likelihood of equipment noise emission increases as a result of wear and tear
- Obtain the repair/maintenance procedure from the OEM
- Obtain an agreement on the repair/replacement strategy and frequency if an external service provider is used to service the equipment
- Apply a price modifier based on compliance or non-compliance and calculate the cost
- Select the final supplier having regard, *inter alia*, to the above parameters relating to noise emission
- Ensure that all the equipment documentation is obtained prior to equipment delivery, to enable the operation to verify compliance with the relevant aspects listed above

CONSIDERING NOISE DURING THE PROCUREMENT PROCESS



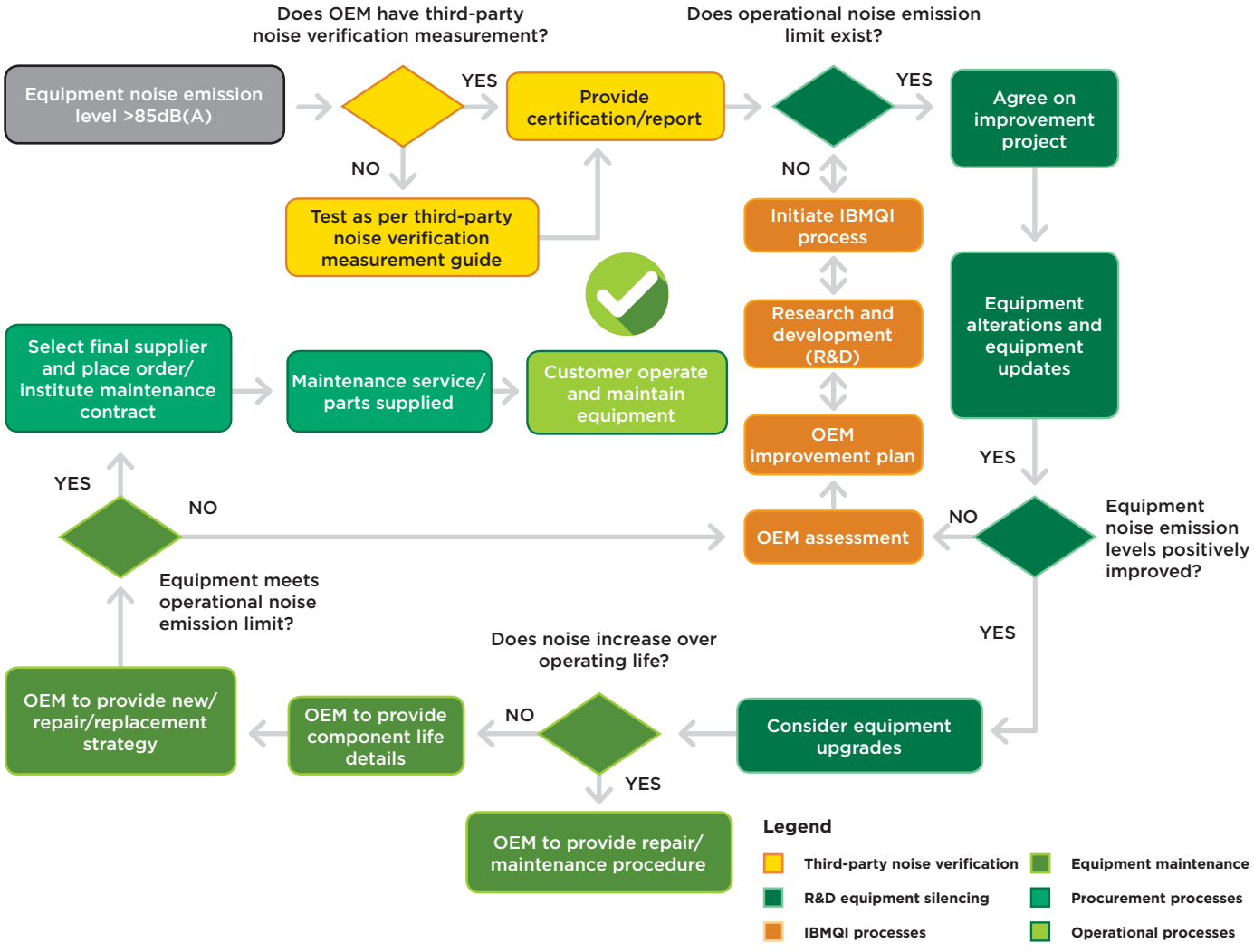
REPAIR/MAINTENANCE OF EXISTING EQUIPMENT

Considerations for the maintenance and repair of existing equipment

In most cases, an operating mine will already have numerous pieces of equipment in operation. These pieces of equipment might not all meet the industry noise milestone or the company internal noise emission limits. It is important that mines initiate processes which will enable the achievement of these limits for the IBMQI to be effective. The section below describes the process that could be considered to reduce noise levels to below the required noise emission limits:

- When the OEM is engaged and the parties involved agree that the equipment does not meet the set noise emission limit, consider initiating a noise reduction process (IBMQI process)
- Determine whether the equipment noise emission exceeds the relevant industry noise milestone or internal operational noise emission limits and confirm whether the piece of equipment was identified as a 'critical noise equipment' (IBMQI process)
- Confirm that noise certification exists when the equipment exceeds 85dB(A) and when equipment is repaired/maintained by a third party. This could be confirmed by obtaining a third-party noise verification measurement from the service provider
- If an industry noise emission limit does not currently exist for any given piece of equipment, or equipment population, then a mine could consider establishing their own internal noise emission limit, based on their equipment noise screening results (IBMQI process)
- Obtain the details of any alterations and updates made to the equipment to reduce the noise emission
- Obtain details of any other noise related issues (i.e. vibration) that need to be considered
- OEM upgrades (if available) for replacement or alterations to be made to the equipment exceeding the relevant operational noise limit of 85dB(A) if no operational limit is defined
- Establish the likelihood of equipment noise emission increases, as a result of wear and tear
- Consult the OEM on the appropriate repair/maintenance procedure and intervals and agree on a repair/maintenance/replacement strategy
- Conduct noise emission verification measurements of the equipment after onsite modifications/repairs have been completed to confirm compliance (as per the Noise Measurement Guide)

CONSIDERING NOISE DURING THE REPAIR/MAINTENANCE OF EXISTING EQUIPMENT PROCESS



DETAILED DISCUSSION WITH OEM

One of the fundamental processes in the application of the IBMQI principles within the procurement of equipment is the engagement with the OEM to determine the extent to which previous equipment silencing developments were considered/utilised/effected/introduced as part of ensuring compliance with the requirements of Section 21 of the MHSA.

The outcomes of the procurement processes referred to above, together with the results of any critical noise equipment screening process, would provide the procurement team, led by the most senior engineer, with the basis for the establishment of a comprehensive equipment silencing and development plan for engagement with the relevant OEM.

The table herewith reflects examples of issues which may be discussed during engagements with OEMs on equipment improvement initiatives. It may also provide guidance on potential focus areas for the identification of noise risk reduction options in respect of a piece of equipment. This may provide useful guidance to the procurement team as it incorporates technological, energy conversion and mechanical design considerations towards meaningful engagements with the OEM on the reduction of the noise emission levels of equipment.

IBMQI OEM process engagement form example

<table>
<tr><th colspan="4">IBMQI PROCESS</th></tr>
<tr><th colspan="3">GENERAL INFO</th><th>OEM DISCUSSION AND TARGET SETTING</th></tr>
<tr><td colspan="2">Mining company</td><td>ABC Mining</td><td rowspan="2">1. Independent third-party equipment noise verification measurements conducted? Please provide details.</td></tr>
<tr><td colspan="2">Commodity</td><td>Platinum</td><td>2. How do you plan to meet the set industry noise emission targets? Please provide details.</td></tr>
<tr><td colspan="2">Mining method/type</td><td>UG Conventional</td><td>3. What type of muffler/silencing device do you make use of? Please provide details.</td></tr>
<tr><td colspan="2">Activity area</td><td>Stoping</td><td>4. Do you have a R&D plan? Please provide details.</td></tr>
<tr><td colspan="2">Equipment/process category</td><td>Rock drill</td><td>5. What type of equipment development have you done? Please provide details.</td></tr>
<tr><td colspan="2">Noise emission level in dB(A)</td><td>103dB(A)</td><td>6. Have your equipment developments been successful? Please provide details.</td></tr>
<tr><td colspan="2">Industry target for 2020</td><td>105dB(A)</td><td>7. Are the outcomes of the equipment developments available? Please provide details.</td></tr>
<tr><td colspan="2">Power source (pneumatic/hydro/ electric, etc.)</td><td>Pneumatic</td><td>8. When do you plan to have the equipment developments available in the market? Please provide details.</td></tr>
<tr><td colspan="2">Manufacturer/supplier</td><td>Victoria Engineering</td><td>9. Who do you utilise for equipment R&D? Please provide details.</td></tr>
<tr><td colspan="2">Equipment and/or process type</td><td>SECO</td><td>10. Do you have a project plan available? Please provide details.</td></tr>
<tr><td colspan="2">Model</td><td>SE26</td><td>11. Please provide details on your next planned equipment R&D? Please provide details.</td></tr>
<tr><td colspan="2">Supply of complete units/components/ repairs</td><td>Complete units and components</td><td>12. Please provide details on the equipment R&D cost impacts? Please provide details.</td></tr>
<tr><td colspan="2">Sub-component supplier (e.g. CAT)</td><td>N/A</td><td>13. Have you considered measures to reduce the equipment vibration? Please provide details.</td></tr>
<tr><td colspan="2">Sub-component (e.g. CAT C15 engine)</td><td>N/A</td><td>14. Have you conducted noise frequency analysis? Please provide details.</td></tr>
<tr><td colspan="3">CRITICAL NOISE EQUIPMENT SCREENING RESULTS</td><td>15. Have you considered the increase in noise emissions as a result of wear? Please provide details.</td></tr>
<tr><td>Noise measurement result in dB(A)</td><td>106</td><td>9</td><td>16. Have you quantified the equipment deterioration as a result of equipment wear? Please provide details.</td></tr>
<tr><td>No. of persons exposed/affected</td><td>10</td><td>9</td><td rowspan="2">17. Please provide the results of the equipment lifecycle analysis.</td></tr>
<tr><td>No. of machines at workplace/site</td><td>394</td><td>10</td></tr>
<tr><td>Exposure duration/time</td><td>5hrs</td><td>8</td><td rowspan="2">18. Do you have an equipment/component maintenance procedure?</td></tr>
<tr><td>Confined work space/environment</td><td>Yes</td><td>10</td></tr>
<tr><td>Machine vibration</td><td>Yes</td><td>10</td><td rowspan="2">19. Please provide details on the equipment/component maintenance procedure.</td></tr>
<tr><td>Maintenance impact</td><td>Yes</td><td>6</td></tr>
<tr><td>Equipment improvements, silencing solutions</td><td>Yes</td><td>7</td><td rowspan="2">20. How do you address deviances from the equipment/component maintenance procedure? Please provide details.</td></tr>
<tr><td>Hearing protection</td><td>Noise clipper</td><td>8</td></tr>
<tr><td>Critical frequency range</td><td>4kHz</td><td>9</td><td rowspan="2">21. What do you do in case of non-compliance with the equipment/component maintenance procedure? Please provide details.</td></tr>
<tr><td>Equipment noise screening risk ranking</td><td>High</td><td>8.77</td></tr>
</table>

CRITICAL NOISE EQUIPMENT TARGET SETTING

A non-compulsory critical noise equipment target setting process was developed to assist the mining industry in applying appropriate noise target reduction principles as part of the quantification of the noise risk associated with equipment. The framework considers the appropriate factors which may form part of control evaluation and further outline the processes that may be followed for the reduction of equipment noise risk, in consultation with OEMs. The critical noise equipment target setting process developed consists of 10 key steps, which the individual mining operations may consider.

CRITICAL NOISE EQUIPMENT TARGET SETTING PROCESS

1. Establish an equipment noise inventory
2. Conduct noise measurements on the critical noise equipment
3. Identify the critical noise equipment for the company/operation, as defined within the company/operation's risk management programmes
4. Screen critical noise equipment by means of the online critical noise equipment screening tool
5. Prioritise the critical noise equipment within the equipment noise inventory according to the equipment noise screening risk ranking result of the online critical noise equipment screening tool
6. Identify the equipment to be prioritised for equipment noise target setting, by selecting all equipment with a high (risk ranking of seven and above) critical noise equipment screening result
7. Collate and capture equipment and supplier information into the IBMQI OEM Engagement Form contained within the Guidance note for the IBMQI in the South African mining industry
8. Identify potential additional critical controls for consideration, in order to reduce the noise risk of the identified high risk critical noise equipment
9. Where applicable, Initiate the OEM engagement process for those identified critical controls requiring OEM input by setting-up engagement sessions with the OEMs of the high risk critical noise equipment and discuss the 21 aspects outlined within the IBMQI OEM process engagement form with the OEM, highlighting the factors screened with a high risk result
10. Development of company/operational targets for the factors screened with a high risk result and agreement with OEMs (where applicable) on the targets and timeframe for achievement

ABBREVIATIONS

dB(A) – Decibels measured on the A-weighting scale

CoE – Centre of Excellence

IBMQI – Industry-wide Buy and Maintain Quiet Initiative

MHSA – Mine Health and Safety Act (Act 29 of 1996), as amended

MHSC – Mine Health and Safety Council

NIHL – Noise induced hearing loss

OEM – Original Equipment Manufacturer

REFERENCES

- Guidance Note for Noise Measurement of Equipment to Ensure Conformance with MHSC Milestones (Version 2)
- Guidance Note for 3RD Party equipment noise verification Measurement (Version 1)
- IBMQI Online Critical Noise Equipment Screening Tool: https://www.mosh.co.za/tools/noise/screening/
- MOSH Noise webpage: https://www.mosh.co.za/noise/summary

Ivanplats – Ivanhoe Mines