



Guide to gold room HIF audit 2008

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1. Risk assessment and work procedures

Point	Standard	Guideline
1.1	A hazard and risk assessment has been undertaken of the gold room operations.	<p>Intent: To ensure that all the activities carried out in the gold room have been subject to a risk analysis.</p> <p>Personnel: Senior metallurgist.</p> <p>Method: View the risk assessment documentation.</p>
1.2	Appropriate measures have been implemented as a result of that assessment.	<p>Intent: To ensure that the hazards, and the consequent risks identified, are being managed by applying the appropriate hierarchy of control.</p> <p>Personnel: Senior metallurgist.</p> <p>Method: View the risk assessment documentation and inspect the gold room.</p>
1.3	Written safe work procedures are available for the gold room operations.	<p>Intent: To ensure that procedures have been developed for conducting activities in the gold room safely.</p> <p>Personnel: Senior metallurgist.</p> <p>Method: View the safe work procedure documentation</p>
1.4	Those procedures include safety information relating to the hazards identified in the risk assessment.	<p>Intent: To ensure that the gold room safe work procedures include information on the identified hazards.</p> <p>Personnel: Senior metallurgist.</p> <p>Method: View the safe work procedure documentation.</p>

2. Hazardous substance management

Point	Standard	Guideline
2.1	During induction all employees are informed of the potential risk of exposure to those hazardous substances used, or produced, at the mine.	<p>Intent: To ensure that gold mine employees are advised as to the presence of any hazardous substances at the mine.</p> <p>Personnel: Senior manager, training staff.</p> <p>Method: View induction documentation. Interview employees.</p>
2.2	Specific training is provided to gold room employees on the hazards of the chemicals used in gold room work, including the applicable precautionary measures, such as safe handling procedures and the use of personal protective equipment.	<p>Intent: To ensure that gold room employees are specifically trained to use hazardous substances safely.</p> <p>Personnel: Senior metallurgist, training staff.</p> <p>Method: View training documentation. Interview gold room employees.</p>
2.3	Material safety data sheets (MSDS) are readily available for all the various fluxes, acids, cyanide, caustic and by-products (e.g. ammonia) which are encountered in the gold room.	<p>Intent: To ensure that all the requisite safety information is readily available to the gold room employees.</p> <p>Personnel: Senior metallurgist.</p> <p>Method: View the MSDS information.</p>
2.4	Employees are advised as to the location and availability of the MSDS information.	<p>Intent: To ensure that the employees know how to access the required MSDS information.</p> <p>Personnel: Gold room personnel.</p> <p>Method: Interview personnel.</p>
2.5	There is a mechanism for the regular updating of the MSDS register.	<p>Intent: To ensure that the MSDS information is current.</p> <p>Personnel: Senior metallurgist, stores personnel.</p> <p>Method: Randomly check the MSDS data base against the chemicals in the gold room. Interview personnel,</p>
2.6	Hazardous substances are appropriately stored.	<p>Intent: To ensure that hazardous substances are stored safely.</p> <p>Personnel: N/A</p> <p>Method: Inspect hazardous substance storage.</p>

Point	Standard	Guideline
2.7	Where hazardous substances are used in enclosed systems, such as tanks and pipes, there is legible signage to indicate the presence of the hazardous substance.	<p>Intent: To ensure that pipes and tanks containing hazardous substances are clearly identified as to the contents.</p> <p>Personnel: N/A</p> <p>Method: Inspect any such installation for clear, legible signs.</p>
2.8	Other hazardous substances and reagents (e.g. fluxes, acids, etc.) are appropriately packaged and labelled.	<p>Intent: To ensure that hazardous substances are safe to handle and are identified.</p> <p>Personnel: N/A</p> <p>Method: Inspect hazardous substance storage.</p>
2.9	New chemicals are assessed from a safety and health perspective before they are introduced to the gold room.	<p>Intent: To ensure that any new chemicals are fully investigated and evaluated for safety prior to use.</p> <p>Personnel: Senior metallurgist, stores personnel.</p> <p>Method: Interview personnel about the procedures for introducing new chemicals.</p>
2.10	Records are available of accidents / incidents which have occurred in the gold room, particularly those relating to hazardous substances or process safety.	<p>Intent: To verify compliance with legislated accident/incident recording requirements.</p> <p>Personnel: Senior metallurgist, gold room employees.</p> <p>Method: Interview personnel and view records.</p>

3. Ventilation

Point	Standard	Guideline
3.1	There is effective ventilation of the gold room.	<p>Intent: To ensure that adequate ventilation is provided in the gold room.</p> <p>Personnel: N/A</p> <p>Method: Inspect the gold room ventilation system. Various methods could be utilised here such as: air conditioning, natural ventilation, exhaust fans (wall or roof mounted), local exhaust ventilation e.g. on electrowinning cells or where material is acid treated.</p>
3.2	There are warning alarms for the presence of hazardous gases e.g. ammonia, hydrogen cyanide.	<p>Intent: To ensure that the presence of a hazardous gas is immediately made known.</p> <p>Personnel: Senior metallurgist, ventilation officer.</p> <p>Method: Inspect the gold room.</p>
3.3	There is equipment available to test for gases and vapours, e.g. electronic testers or stain tubes.	<p>Intent: To ensure that there is a means of testing for hazardous and other gases, in the gold room.</p> <p>Personnel: Senior metallurgist, ventilation officer.</p> <p>Method: Inspect the gold room.</p>
3.4	The testing equipment is appropriate for the potential hazards, e.g. ammonia, hydrogen cyanide, mercury, oxides of nitrogen.	<p>Intent: To ensure that the testing equipment is appropriate for the hazards expected.</p> <p>Personnel: Senior metallurgist, ventilation officer.</p> <p>Method: Inspect the gold room.</p>
3.5	Atmospheric testing is undertaken for metals and other fumes, e.g. NOX, As ₂ O ₃ , Hg, and SO ₂ .	<p>Intent: To ensure that there is a regular test of the efficiency of the ventilation system.</p> <p>Personnel: Senior metallurgist, ventilation officer.</p> <p>Method: View test records.</p>
3.6	Exhaust ventilation has been designed to collect all the fumes from the melting furnace.	<p>Intent: To ensure the capture of the furnace fumes.</p> <p>Personnel: Senior metallurgist, ventilation officer.</p> <p>Method: View design documentation.</p>

Point	Standard	Guideline
3.7	There is a mechanism to collect fumes during the pouring of dore bars.	<p>Intent: To ensure the capture of general gold room fumes.</p> <p>Personnel: Senior metallurgist.</p> <p>Method: View methods to control fumes emitted during the pouring of ingots. This particularly applies where there are impurities such as arsenic, lead or mercury.</p>
3.8	Electrowinning cells are fitted with exhaust ventilation systems to remove ammonia and other fumes.	<p>Intent: To ensure the capture of electrowinning cell fumes.</p> <p>Personnel: Senior metallurgist, ventilation officer.</p> <p>Method: Inspect the installation.</p>
3.9	Electrowinning exhaust ventilation systems cannot be blocked if an electrowinning cell overfills with solution.	<p>Intent: To ensure the control of electrowinning cell fumes.</p> <p>Personnel: Senior metallurgist, ventilation officer.</p> <p>Method: Inspect the installation. Some cells, when overfilled, drain into the exhaust pipe work.</p>
3.10	There is an exhaust ventilation system to remove the fumes generated during digestion.	<p>Intent: To ensure the capture of digestion fumes.</p> <p>Personnel: Senior metallurgist, ventilation officer.</p> <p>Method: Inspect the installation.</p>
3.11	There is an exhaust ventilation system to remove the fumes from the calcine oven.	<p>Intent: To ensure the capture of calcine fumes.</p> <p>Personnel: Senior metallurgist, ventilation officer.</p> <p>Method: Inspect the installation.</p>
3.12	There is no evidence of any build up of deposits, e.g. mercury droplets, inside the calcine oven.	<p>Intent: To ensure the maintenance of a clean calcining oven.</p> <p>Personnel: N/A</p> <p>Method: Inspect the calcining oven.</p>
3.13	If mercury is present, there is a system to collect and condense any mercury vapour.	<p>Intent: To ensure that any mercury vapour is captured.</p> <p>Personnel: Senior metallurgist, ventilation officer.</p> <p>Method: Inspect the installation.</p>
3.14	Any collected mercury is suitably stored and disposed of.	<p>Intent: To ensure that mercury is completely controlled.</p> <p>Personnel: Senior metallurgist, ventilation officer.</p> <p>Method: View records.</p>

Point	Standard	Guideline
3.15	Maintenance and testing procedures are in place for the ventilation systems.	<p>Intent: To ensure that the ventilation systems of the gold room operate as intended.</p> <p>Personnel: Ventilation officer, maintenance personnel.</p> <p>Method: View maintenance and test records. Interview personnel.</p>

4. Personal protective equipment

Point	Standard	Guideline
4.1	Appropriate protective clothing is provided.	<p>Intent: To ensure that the appropriate PPE is available, e.g. heat resistant jackets, aprons, gloves, etc., face shields.</p> <p>Personnel: Gold room employees.</p> <p>Method: Inspect the PPE available. Interview personnel.</p>
4.2	Appropriate respiratory protection is provided.	<p>Intent: To ensure that the appropriate respiratory equipment is available, e.g. filters for ammonia, acid fumes, hydrogen cyanide, particulates, etc.</p> <p>Personnel: Gold room employees.</p> <p>Method: Inspect the respiratory protection available. Interview personnel.</p>
4.3	Gold room operators have been trained in the selection and use of the appropriate PPE.	<p>Intent: To ensure that the personnel know how to use their PPE.</p> <p>Personnel: Gold room employees.</p> <p>Method: Interview personnel.</p>
4.4	Personal protective equipment is correctly maintained.	<p>Intent: To ensure that the PPE is safe for use.</p> <p>Personnel: Gold room employees.</p> <p>Method: Inspect the PPE used. Check storage methods and replacement dates on any filter respirators. Interview personnel.</p>

5. Operations

Point	Standard	Guideline
5.1	Analysis of treatment plant gravity circuit material has been undertaken to determine if hazardous substances, e.g. lead as galena, arsenic as arsenopyrite, mercury, might be present.	<p>Intent: To ensure the identification of possible hazardous substances that may be encountered in gravity circuits.</p> <p>Personnel: Senior metallurgist.</p> <p>Method: View written documentation.</p>
5.2	Appropriate control measures been implemented where hazardous substances have been identified.	<p>Intent: To ensure that where hazardous substances have been identified as being present, they are being controlled.</p> <p>Personnel: Senior metallurgist.</p> <p>Method: View written documentation.</p>
5.3	A system is in place to prevent acid from contacting caustic/cyanide in an acid wash column.	<p>Intent: To ensure the separation of all non-compatible substances.</p> <p>Personnel: N/A.</p> <p>Method: Inspect tanks, etc.</p>
5.4	Disposal of acid wash solution is appropriately managed.	<p>Intent: To ensure the separation of all non-compatible substances.</p> <p>Personnel: N/A.</p> <p>Method: Inspect the disposal system for residue. Check that there are mechanisms in place to ensure that acid is not sent to a tails hopper when cyanide is present and that the area is free of personnel in case of HCN generation.</p>
5.5	Safe work procedures are used whenever dore bars are being acidified.	<p>Intent: To minimise the risk to personnel during the acidification of dore bars.</p> <p>Personnel: Gold room employees.</p> <p>Method: View procedures. Interview personnel.</p>
5.6	The carbon regeneration kiln is an isolated area during operation to prevent contact with the hot kiln surface or hot unquenched carbon.	<p>Intent: To ensure the control of heat hazards associated with carbon regeneration.</p> <p>Personnel: Gold room employees.</p> <p>Method: Inspect the installation. Interview personnel.</p>

Point	Standard	Guideline
5.7	Procedures have been developed to manage hang-ups in the carbon regeneration kiln feed hopper.	<p>Intent: To ensure the control of heat hazards associated with carbon regeneration.</p> <p>Personnel: Gold room employees.</p> <p>Method: View the procedures. Interview personnel.</p>
5.8	No damp material e.g. sludge, is introduced to a furnace already containing molten material.	<p>Intent: To ensure that the risk of an explosion is minimised.</p> <p>Personnel: Gold room employees.</p> <p>Method: View procedures. Interview personnel. Refer to SIR 9.</p>
5.9	Electrowinning circuits are regularly examined for signs of short circuiting or high temperatures.	<p>Intent: To minimise the risk of fires breaking out due to overheating of electrowinning equipment.</p> <p>Personnel: Gold room employees.</p> <p>Method: View procedures. Interview personnel.</p>
5.10	Flammable sprays/liquids are not used for cleaning near hot equipment.	<p>Intent: To minimise the risk of fire breaking out when flammable material contacts hot surfaces.</p> <p>Personnel: Gold room employees.</p> <p>Method: View procedures. Interview personnel.</p>

6. Spill management

Point	Standard	Guideline
6.1	Tanks and pipes containing hot liquids are insulated.	<p>Intent: To ensure that personnel are not exposed to hot surfaces.</p> <p>Personnel: N/A.</p> <p>Method: Inspect tanks and pipes containing hot liquids.</p>
6.2	Containment is provided for tank overflow spillage by individual bunding rather than overflow into a sump.	<p>Intent: To ensure that cyanide solutions cannot come into contact with acids.</p> <p>Personnel: N/A.</p> <p>Method: Inspect tanks.</p>
6.3	Leaks from acid pipelines cannot get into tanks, bunds or sumps containing caustic or cyanide solutions.	<p>Intent: To ensure the separation of all non-compatible substances.</p> <p>Personnel: N/A.</p> <p>Method: Inspect pipelines, tanks etc.</p>
6.4	There is a means of containing any acid spillage, so that it does not enter a sump and contact caustic or cyanide solutions.	<p>Intent: To ensure the separation of all non-compatible substances.</p> <p>Personnel: N/A.</p> <p>Method: Inspect the areas where acid is present.</p>
6.5	Mechanisms are in place to prevent electrowinning cells overflowing.	<p>Intent: To ensure the provision of spill prevention controls in the design of the electrowinning cells.</p> <p>Personnel: Senior metallurgist, ventilation officer.</p> <p>Method: Inspect installation.</p>
6.6	Where electrowinning cells are on a mezzanine, or higher, floor there is flooring or other means to prevent leaks or spills falling onto people working below or making contact with electrical systems such as lighting.	<p>Intent: To ensure the provision of a spill containment method where elevated electrowinning cells are installed.</p> <p>Personnel: Senior metallurgist.</p> <p>Method: Inspect installation.</p>
6.7	Concrete floor is appropriately coated to prevent an attack on the concrete by spilt acid.	<p>Intent: To ensure the provision of anti-slip/trip flooring.</p> <p>Personnel: N/A.</p> <p>Method: Inspect the floor.</p>

Point	Standard	Guideline
6.8	Spillage containment and clean up equipment is available in the gold room.	<p>Intent: To ensure that the necessary equipment is immediately available to contain and clean up any spills.</p> <p>Personnel: N/A.</p> <p>Method: Inspect containment and clean up equipment.</p>
6.9	Spill control procedures are available in the gold room.	<p>Intent: To ensure that spill control procedures are readily available.</p> <p>Personnel: Gold room personnel.</p> <p>Method: View procedures. Interview personnel.</p>
6.10	Gold room operators are suitably trained as to how to clean up spillages.	<p>Intent: To ensure that gold room employees know how to deal immediately with spills.</p> <p>Personnel: Gold room personnel.</p> <p>Method: Interview personnel and view training records.</p>

7. Emergency response

Point	Standard	Guideline
7.1	There is a safety shower and eyewash in the gold room.	<p>Intent: To ensure that emergency water deluge facilities are immediately available in the event of a person being splashed with a hazardous substance.</p> <p>Personnel: N/A</p> <p>Method: Inspect the gold room.</p>
7.2	The safety shower and eyewash are readily accessible in the event of an emergency.	<p>Intent: To ensure that there is minimum delay in accessing the emergency facilities.</p> <p>Personnel: N/A</p> <p>Method: Inspect the gold room.</p>
7.3	The safety shower and eyewash will activate an alarm when operated.	<p>Intent: To ensure that the attention of personnel will be drawn whenever the emergency facilities are utilised.</p> <p>Personnel: N/A</p> <p>Method: Inspect the gold room.</p>
7.4	The safety shower and eyewash are correctly maintained.	<p>Intent: To ensure that the emergency facilities will operate as designed.</p> <p>Personnel: N/A</p> <p>Method: Inspect the gold room.</p>
7.5	Fixed fire suppression systems are automatically activated.	<p>Intent: To ensure that fixed fire suppression systems will activate without the intervention of personnel.</p> <p>Personnel: N/A</p> <p>Method: Inspect any fixed fire suppression system.</p>
7.6	Fire fighting equipment is provided in the gold room.	<p>Intent: To ensure that any outbreak of fire can be immediately dealt with.</p> <p>Personnel: N/A</p> <p>Method: Inspect the gold room for fire extinguishers, fixed fire suppression systems, etc.</p>
7.7	The fire fighting equipment is appropriate for the hazards present.	<p>Intent: To ensure that the fire fighting equipment provided is capable of dealing with the hazards present.</p> <p>Personnel: N/A</p> <p>Method: Inspect the fire extinguishers for types, ratings, etc.</p>

Point	Standard	Guideline
7.8	The fire fighting equipment is correctly located and easily accessed.	<p>Intent: To ensure that the fire fighting equipment provided is readily available for immediate use.</p> <p>Personnel: N/A</p> <p>Method: Inspect the gold room for the siting of the fire extinguishers.</p>
7.9	The fire fighting equipment is regularly inspected and maintained.	<p>Intent: To ensure that the fire fighting equipment provided will operate as designed.</p> <p>Personnel: N/A</p> <p>Method: Inspect the fire fighting equipment inspection and maintenance records.</p>
7.10	There is an unobstructed second means of egress from the gold room in the event of an emergency.	<p>Intent: To ensure that the risk of being trapped inside the gold room is minimised.</p> <p>Personnel: N/A.</p> <p>Method: Inspect the gold room for a clear emergency exit both inside and outside. Refer to MSIR 4.31.</p>
7.11	When there is a single operator working in the gold room there is a system in place to raise the alarm should there be an emergency.	<p>Intent: To ensure that assistance can be immediately rendered to a sole employee working in the gold room. Surveillance cameras alone cannot be relied upon.</p> <p>Personnel: Gold room employees.</p> <p>Method: Interview personnel.</p>
7.12	The emergency plan allows appropriately trained personnel ready access to the gold room.	<p>Intent: To ensure that an emergency in the gold room can be responded to by the appropriate personnel.</p> <p>Personnel: Senior metallurgist.</p> <p>Method: View the emergency plan.</p>

8. Health surveillance

Point	Standard	Guideline
8.1	Biological monitoring of personnel is undertaken where applicable, e.g. urinary mercury tests.	<p>Intent: To ensure that the health of employees is being monitored.</p> <p>Personnel: Senior OH&S staff.</p> <p>Method: Inspect medical records.</p>
8.2	Exposure/health assessment results are reported to all relevant personnel in an effective, timely and documented manner, e.g. explanation of results.	<p>Intent: To ensure that personnel are fully apprised of any deviation from the normal.</p> <p>Personnel: Gold room employees.</p> <p>Method: Interview personnel.</p>
8.3	Appropriate records are kept of the results of exposure/health assessments.	<p>Intent: To ensure that medical surveillance test results are available for future perusal.</p> <p>Personnel: Senior OH&S staff.</p> <p>Method: Inspect medical records.</p>