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BMC

BMC Procedure

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Risk Management Procedure
BMC-HSEC-P0002
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Contents

1.0 Intent

The purpose of this procedure is to detail the risk management framework to be followed within all BMC operations. The process of assessing and managing risk is aimed at reducing the likelihood that negative events will occur to an acceptable level and increase the likelihood that positive outcomes will be realised.

2.0 Scope

This procedure applies to all employees, contractors and visitors at BMC operations. It provides the basic methodology and processes for risk management to be applied at all BMC operations.

3.0 Levels of Risk Management

The risk management strategy required prior to the commencement of any task or business objective should include one of the following processes depending on the complexity of the risks involved;

- **Level 1 – Informal-close** - Day to day/basic hazard management (BMC Take 5). Individual thought process to assist in the identification and review of hazards and the adequacy of immediate controls.
- **Level 2 – Formal-close** - Intermediate hazard management (JSA, Hazard/Incident Report). Documented identification of hazards and controls in a specific task or event to determine whether risks are at an acceptable level.
- **Level 3 – Formal-distant** - Complex/high level analysis of hazard management (ICAM, Team Based Risk Assessment, WRAC, SQRA, HAZOP). Documented identification of priority risk issues/events, using qualitative or semi-qualitative risk analysis methods.

4.0 Level 1 Risk Management – BMC Take 5

Individual task-based analysis used to identify hazards and determine the adequacy of immediate ***controls*** or to determine whether escalation and more rigorous assessment is required. Each individual shall ensure that all hazards are identified prior to starting work and whenever significant change occurs and shall determine whether the existing controls are adequate to manage the risks associated with the task.

The BMC Take 5 process is an informal and close method of risk management used by an individual. The process is reliant on the knowledge and experience of the individual and should be completed:

- Prior to all tasks or duties
- When there is a change in work scope or conditions
- After identification of new hazards with potential to impact outcome of activity

The process is designed to prompt the individual to:

- Stop what they are doing,
  - Consider compliance to Life Saving Rules.
  - Talk about the task steps with workmates
  - Decide if they have all the information and adequate resources to carry out the task
- Think how could they or others around them get hurt during the task,
  - What safety rules / procedures need to be followed?
  - Are tools and equipment right for the task?
  - Do they need assistance for the task?
  - Do they have the correct PPE?
- Identify all hazards and existing controls.
  - Determine what are the hazards?
  - What are the risks associated with these hazards? (what could happen?)
  - Is the procedure adequate and / or are the risks controlled?
- Determine whether existing controls are adequate.
  - What safety rules / procedures need to be followed?
  - Are tools and equipment right for the task?
  - Do I need assistance for the task?
  - Do I have the correct PPE?
  - Have I controlled all the identified hazards?

A BMC Take 5 checklist assists individuals in the identification of hazards and in the determination of control adequacy to allow a task to be completed safely. If a person conducts a BMC Take 5 and identifies that there are potential hazards associated with the task that have not been adequately controlled, or they feel that their assessment of the situation is not adequate, a Job Step Analysis should be performed.

Employees should retain a copy of the BMC Take 5 on their person at all times whilst completing the task.

A hazard report form should also be completed by the employee or their immediate supervisor for hazards that

can't be eliminated or controlled immediately.

5.0 Level 2 Risk Management – BMC Job Step Analysis

A Job Step Analysis (JSA) is a task-based analysis used to identify all hazards associated with each step of a task or event and determine whether agreed controls are adequate or whether additional controls are required to reduce the risks to an acceptable level.

A JSA should be completed when there are:

- Uncontrolled hazards identified in the BMC Take 5
- Deviations from standard work practices
- Limited knowledge of risks from task
- No existing procedures that describes all job steps, hazards and controls to perform the task safely (e.g. Safe Work Instruction, Procedure, etc.)
- There is a change to the working environment which require additional controls to be implemented
- Where any Permit is required (e.g. Confined Space, Hot Work, Working at Height)
- Where there are a number of tasks being undertaken in close proximity to each other
- Where the task is complex
- Where the task is not done frequently
- Where the task has previously resulted in a high frequency of incidents
- Based on concerns raised by Supervision or Management
- Based on concerns raised by an individual

All personnel involved in the task should be involved in the development of the JSA. The intention is that the combined knowledge of the group will help to identify all hazards and the appropriate controls required, where an individual may have missed something had they completed the assessment alone.

The JSA breaks the task into steps, lists the hazards at each step and nominates the appropriate controls to allow the task to be performed safely and assesses the adequacy of the controls.

Completed JSAs are submitted for review and in the case of a frequent task are used for the development of work instructions.

The need for a JSA is negated if an approved documented procedure or system of work is implemented and known to all members of a work crew. In this case a Take 5 only is required to review the procedure or system of work to ensure that it eliminates the hazards and/or controls the risks.

5.1 Steps to complete a JSA

- Identify and review any documentation associated with the task such as procedures, job instructions, relevant permits and previous JSAs completed for the task.
- Where possible the JSA is to be developed on the job.
- Break the task into the steps required to carry out the task.
- As a group, identify through brainstorming the hazards / potential incidents associated with each step. Utilise the hazard identification prompt form on the JSA document.
- Consider possible energy sources, and potential incident/injury associated with each energy source. For example, if the work step is to drill from a ladder, the possible energy sources are electricity and gravity and the potential incident is "injury due to electric shock", or "injury due to fall from ladder".
- Record the existing controls for managing the risk and any additional controls required to avoid injury, damage and/or unwanted impacts to the environment.
- Hierarchy of controls should be applied when developing risk controls, using the highest means possible. Controls must be specific and relevant.
- All hazards shall be adequately controlled before commencing the task.

Where the hazards / risks can not be adequately controlled, the task should not commence. The supervisor shall be contacted and consideration given to a formal risk assessment to determine adequate controls for the task.

Where a task is considered to be repeatable the Task Analysis should be used to develop a procedure or job instruction.

5.2 Review of a JSA

The work team involved in the task, and the supervisor shall review and sign off on the JSA after reviewing the job location and environment.

A copy of the JSA should be available at the worksite once it has been authorised to allow any new person

joining the work team the opportunity to review the JSA and sign off to indicate their understanding of the hazards and risk controls.

5.3 Authorisation of a JSA

All JSA's are to be approved by the relevant Department Supervisor, Superintendent, Manager or their delegate. The approval level depends on the adequacy of controls identified during the completion of the JSA. Should any party have concern with regard to its application or compliance with legislation, it is to be referred to the Department Superintendent or Manager.

The content of this approved JSA is then to be communicated to all employees involved in the task, both directly and indirectly, so all parties are aware of the specific controls outlined within.

6.0 Level 3 Risk Management - BMC Risk Assessment Process

6.1 Risk Identification

Used by BMC operations to identify operational and strategic hazards and their associated material risks.

The following processes are in place to assist in the identification of these hazards:

- Team based risk assessments (ICAM, WRAC, SQRA, HAZOP)
- Technical or scientific evaluations (from external parties)
- Information gained from industry, equipment designers, manufacturers, suppliers and other parties
- Catastrophic risk management workshops

6.2 Risk Control

Risks that cannot be eliminated shall be controlled through a preferred order of control based on the hierarchy of control detailed in Table 1, which may be applied individually or in combination. The hierarchy of controls shall be used to identify the most appropriate measure(s) to ensure risk is reduced to an acceptable level.

Controls reduce the risk of an unwanted event occurring by lowering the severity or the likelihood or both. When assigning controls to a hazard, emphases should be on systematically working through each level of the hierarchy of controls from the most effective control to the least effective control. Critical controls shall be identified and monitored for all material risks.

Control		Effectiveness	Reduces	Action Required
1	ELIMINATION – Complete removal of the hazard.	Most Effective	Severity / Likelihood	Remove, redesign the process or plant so the hazard does not exist.
2	SUBSTITUTION – Replacing the material or process with a less hazardous one.		Severity / Likelihood	Hazard substituted with something of a lesser risk eg red rating chemical with amber rating chemical.
3	ENGINEERING – Redesign the equipment or the process. SEPARATION – Isolation of the hazard by guarding or enclosing it.		Severity / Likelihood	Hazard controlled through guarding or isolation of the energy using engineering measures such as machine guards.
4	ADMINISTRATION – Providing controls such as training or procedures.		Likelihood	Hazard controlled by influencing people eg procedures, job rotation, signage and training.
5	PERSONAL PROTECTIVE EQUIPMENT – Use of PPE where other controls are not practical.	Least Effective	Likelihood	Hazard shielded by the use of personal protective equipment such as hearing protection in noisy areas.

Table 1 - Hierarchy of Controls

Control Effectiveness	Explanation
Well controlled	**Controls**, processes and performance requirements evaluated are adequate, appropriate and effective to provide reasonable assurance that risks are being managed and business and functional effectiveness objectives should be met.
Requires some improvement	A few specific **control** or performance requirement weaknesses were noted; generally however, ***controls*** and performance requirements evaluated are adequate, appropriate and effective to provide reasonable assurance that risk are being managed and objectives should be met. Certain controls or performance requirements may require improvement to ensure that the overall environment will continue to operate effectively.
Requires significant improvement	Numerous specific **controls** or functional priority performance requirement weaknesses were noted. **Controls** or performance requirements evaluated are unlikely to provide reasonable assurance that risks are being managed and business and functional effectiveness objectives should be met. The control framework needs improvement to achieve a satisfactory level of risk mitigation.
Uncontrolled	**Controls** and performance requirements evaluated are not adequate, appropriate or effective to provide reasonable assurance that risks are being managed and objectives should be met. There is an urgent need for management to improve the **control** framework to achieve a satisfactory level of risk mitigation.

Table 2 - Control Effectiveness

6.3 Risk Analysis for Level 3 Risk Management

6.3.1 Determination of Severity

All identified hazards are assessed, based on their expected degree of maximum gain or harm assuming reasonable effectiveness of existing and tested mitigating controls. The assessment of maximum foreseeable loss (MFL) is undertaken in accordance with the criteria outlined in the Severity/Consequence Factors (refer Appendices – Table 6 Severity/Consequence Factors). MFL can be related to Health and Safety, Environment, Community, Legal Compliance or Estimated Cost of an outcome.

6.3.2 Determination of Likelihood

All identified hazards are assessed for their likelihood (or probability) of occurrence assuming reasonable effectiveness of existing and tested preventative controls in accordance with the criteria outlined in the Likelihood Factors Table (refer Appendices - Table 5 – Likelihood Factors)

6.3.3 Calculation of Risk Level / Residual Risk Ranking (RRR)

Following the determination of severity and likelihood, the RRR is calculated using the severity factor and the likelihood factor (RRR = severity factor x likelihood factor).

6.4 Risk Evaluation

Risk shall be deemed to be within acceptable limits or as low as reasonably achievable when it meets the BMC tolerability criteria. To determine whether risk is within acceptable limits and as low as reasonable achievable, regard must be had to the MFL and RRR of the risk.

Mandatory materiality criteria	Tolerability criteria
MFL of US$5 million or more, or non-financial impacts equal to, or greater than, Level 4 on the severity table or a residual risk ranking (RRR) of 90 or above.	RRR of 90 and “well controlled”. If $\geq$ 90 RRR and controls require “some improvement” then a management action plan to reduce the residual risk or improve the controls is required.

6.5 Risk Treatment

Risk control action plans should be developed for all risks deemed to be intolerable. Risk control action plans should:

- Identify responsibilities and timing for completion of the action;
- Provide a clear description of the improved control to be implemented; and include

- Mechanisms for assessing control effectiveness against control objectives.

The risk control action plan should clearly identify the priority order (based on RRR) in which individual risk treatments should be implemented.

6.6 Monitoring and Review

Monitoring of risk treatment actions must be undertaken on a regular basis (at least annually).

The site risk register review shall involve key risk owners and other stakeholders to ensure the effectiveness of controls remains assured and that the likelihood or consequence of hazards has not altered. This should include where appropriate ensuring that additional risks are captured.

Where possible, consideration shall be given to additional or more effective controls in order to continue to lower residual risk rankings.

Effectiveness of critical control measures shall also be monitored through audits, inspections and safety observation program or whenever:

- There is evidence that the risk assessment is no longer valid;
- There is a significant change associated with the content of the risk assessment;
- Loss, harm or stakeholder concern results or has the potential to result from exposure to a hazard to which the risk assessment relates; and
- Under recommendation from external expert consultants. (**Note**: If consultant recommendations are not implemented the reason must be recorded along with a risk assessment that demonstrates that the risk is as low as reasonably achievable and within acceptable limits).

7.0 Risk Management Tools

The risk context must firstly be established to determine the appropriate assessment methodology and, ultimately, how the risk will be managed using the appropriate risk management tool.

Examples of risk management tools used for identifying and controlling varying degrees of risk are detailed in Table 3 - Risk Management Tool.

Risk Context	BMC Take 5	Defect Report	Hazard Report	Safety Observation	JSA	WRAC/ SQRA	Incident Report
Reviewing the hazards of a simple task.	✓						
Reporting a defective piece of equipment or plant.		✓					
Reporting a hazard that has the potential to cause loss, harm or stakeholder concern.			✓				
Recording an interaction and discussion from a safety observation.				✓			
Reviewing a task with multiple steps when there is no existing procedure for the task or the task conditions are not covered by the scope of the existing procedure.					✓		
Reviewing a more complex task, procedure or broader operational process or activities for which the risks are not well understood and the hazards are not readily identifiable (e.g. pre-feasibility, feasibility, construction, commissioning of new plant / equipment, mine planning, standard operating procedure development, process / operational change, mine closure).						✓	
Reporting an unwanted event that has resulted in or has had the potential to result in loss, harm or stakeholder concern.							✓

Table 3 – Risk Management Tool

8.0 Risk Assessment Teams

Teams formed to conduct risk assessments should have a good mix of personnel that are involved in the

task/event and should have an appropriate level of experience for input into the risk assessment.

Team Members	BMC Take 5	Defect Report	Hazard Report	Safety Interaction	JSA	WRAC/ SQRA	Incident Report
Individual involved in the task	✓	✓	✓		✓	⌖	✓
Member/s of the work group				⌖	✓	✓	✓
Area supervisor		⌖	✓	⌖	✓	✓	✓
Department Superintendent/ Manager				✓	⌖	✓	⌖
Competent RA facilitator (if team leader is not trained in RA facilitation)						✓	
Content expert						⌖	⌖
Maintenance personnel		⌖			⌖	✓	⌖

Critical Team Members ✓ Optional Team Members ⌖

Table 4 – Risk Assessment Teams

9.0 Environmental Management System – Risk Aspects / Impacts

As part of ISO14001 accreditation a risk management program is required that initially identifies Environmental Aspects and develops controls that minimise the impacts that these Environmental Aspects have. Environmental Aspects are "organisation actions, products or services that interact with the environment" e.g. Exploration.

A risk assessment is conducted on Environmental Aspects and controls integrated into individual Environmental Programs (EP) to manage the impact and also set environmental objectives and targets. A Monitoring System (MRS) is implemented to ensure risk controls are being implemented and that continuous improvement opportunities are identified. The EMS also defines responsibilities for each Environmental aspect.

10.0 Records

All formal risk assessments shall be recorded on the appropriate template. All risk assessments shall be kept on site until the hazard is no longer on the mine, or the risk assessment is superseded. The completed template shall be filed within the relevant department or forwarded to the HSE Department.

11.0 Risk Registers

All hazards identified through a level 3 risk assessment process shall be recorded on the site risk register. Superseded versions of the risk register shall be retained to provide an auditable trail and to assist in learning for future risk analysis.

The following information needs to be provided for each identified risk in the site's risk register:

- Unique reference number.
- Date of last update.
- Brief title of the risk.
- Description of the risk.
- Materiality of the risk.
- Likelihood of occurrence.
- Risk rating determined from the likelihood and the highest consequence.
- Risk responses together with their current status.
- Risk owner.

All material risks associated with potential fatal risks shall be depicted in a bowtie diagram and included in the site's Principal Hazard Management Plan (PHMP).

12.0 Monitor and Review

This procedure shall be reviewed every two years or sooner if significant changes are made to the risk management processes of the company.

13.0 Definitions

Word/Acronym	Explanation
ALARA	As Low As Reasonably Achievable - A level of risk that is tolerable, and cannot be reduced further without the expenditure of costs that are grossly disproportionate in relation to the benefit gained.
Consequences	Consequences (immediately after or over an extended period) can result from the development of an incident over time or from a prolonged activity/process. The concept of consequence includes, within its scope, the potential adverse impacts, effects on people, the environment, plant or property, or a combination of these. It is important to remember that a single hazard may be the cause for multiple incidents and in turn, any one incident can have multiple consequences.
Critical Control	Controls, which if compromised are likely to lead to, or contribute substantially to the development of the material risk event.
EP	Environmental Programs
FRCP	Fatal Risk Control Protocol Mandatory to all BHP Billiton sites and operations, this document addresses specific areas (e.g. hazardous materials management, surface mobile equipment, etc) where it is important that activities are carried out consistently across BHP Billiton.
Hazard	A Hazard is the intrinsic potential for an agent, activity or process to lead to harm and or an incident.
HAZOP	Hazard and Operability (Study)
ICAM	Incident Cause Analysis Method
Latent Risk Management	Latent – hidden, concealed, present but not visible, risks that need to be considered in every Risk Management process, to ensure potential human factors and behaviours are identified and effectively managed.
Likelihood	A qualitative description of probability or frequency, in relation to the chance that something will occur.
Materiality	Clearly defines risk acceptance criteria required to determine what risks can be tolerated, and what risks are material or significant to the operation, its people, the environment and to the community and, therefore, need to be managed.
Operational Risks	Risks affecting more systematic aspects of a process or operation. They are those risks that can be readily identified as having one or more types of impact and which affect an expected outcome.
Residual Risk	The remaining level of risk (typically used to describe the risk left after risk treatment Controls have been implemented).
Risk	The risk of an activity/product/service is the product of likelihood of an impact on the health and safety of people, the environment, the community or property, and the severity of that impact.
Risk Assessment	The systematic evaluation of the degree of risk posed by an activity or operation. The process of using the results of risk analysis to rank and/or compare them with acceptable risk criteria or goals
Risk Register	A register developed to record all identified hazards with a final risk ranking of high or extreme at South Walker Creek.
Shall	The word ‘shall’ is to be understood as mandatory
Should	The word ‘should’ as non mandatory, advising or recommended.
SQRA	Semi-quantitative risk assessment.
Strategic Risks	Risks which affect business survival, strategic goals or the long-term sustainability of an operation. Strategic risks also relate to the interdependencies between an operation’s activities and the broader business environment.
Team Based Risk Assessment	Facilitated risk assessment process involving a team of key stakeholders.
WRAC	Workplace Risk Assessment and Control

14.0 Key Accountabilities and Responsibilities

Role	Responsibility
Site Senior Executive	Provide adequate resources to ensure effective risk management processes are used and all identified hazards and risks are controlled to an acceptable level.
Department Managers/ Superintendents	Implement risk management processes and strategic plans, and ensure ongoing management of hazards to control risks. Regularly review relevant sections of the Site Risk Register to ascertain the currency and relevance of the hazards and controls listed. Ensure Department personnel have the necessary skills and knowledge to assess and manage risks within their areas.
All Personnel	Utilise site risk management processes for the identification of hazards and risk mitigation. Participate in risk assessment and risk management processes.

15.0 References

Reference Document Number and Document Name
GLD.017 Risk Management
ISO31000:2009 Risk Management – Principles and Guidelines
Risk and Assessment and Management – Leading Practice Sustainable Development Program for the Mining Industry (Australian Government – Department of Resources, Energy and Tourism)
National Mineral Industry Safety and Health Risk Assessment Guideline v6 (Minerals Industry Safety and Health Centre)

Appendices

Appendix 1

Table 5 – Likelihood Factors

Operations **Given the site, BHP Billiton and industry experience, it:**	**Uncertainty description**	**Projects** **Based on BHP Billiton and industry experience with similar studies or projects, the *risk event*:**	***Likelihood factor***
could be incurred more than once in a year	Almost certain	could be expected to occur more than once during the study or project delivery	10
could be incurred over a one to two year budget period	Likely	could easily be incurred and has generally occurred in similar studies or projects	3
could be incurred within a five year strategic planning period	Possible	incurred in a minority of similar studies or projects	1
could be incurred within a five to ten year time frame	Unlikely	known to happen, but only rarely	0.3
could be incurred in a 20 to 30 year timeframe	Rare	Has not occurred in similar studies or projects, but could	0.1
For a system failure: This consequence has not happened in the industry in the last 50 years. *For a natural hazard:* The predicted return period for a ***risk event*** of this strength/magnitude is one in 100 years or longer.	Very rare	conceivable, but only in extreme circumstances	0.03

Appendix 2

Table 6 – Severity/Consequence Factors

Severity level	Impact types						
	Health and safety	Environment	Social and cultural	Reputation	Legal	Financial	Severity factor
7	>50 fatalities. Very serious irreversible injury to >500 persons.	Unplanned permanent environmental impact over extensive area. Permanent loss of ecosystem or extinction of species.	Complete breakdown of social order. Widespread desecration of items of global cultural significance. Company directly responsible or complicit in severe, and widespread long term impacts on human rights.	Prolonged (>2 months) international multi-NGO and media condemnation.	Hostile takeover, public shareholder discontent resulting in loss of Chairman/CEO/Board, bankruptcy, closure of operations on multiple sites or BHP Billiton.	>US$2.5 billion	1000
6	>20 fatalities. Very serious irreversible injury to >100 persons.	Unplanned severe impact (>20 years) on ecosystem or Threatened Species.	A breakdown of social order. Widespread damage to items of global cultural significance. Highly offensive infringements of cultural heritage. Company directly responsible or complicit in severe, long-term impacts on human rights	International multi-NGO and media condemnation. BHPB direct action (includes partner/contractor action) results in reputation issue. Large violent protest (>100 people) resulting in fatal injuries.	Lack of valid operating title, forced closure of an operation, Anti-trust or Foreign Corrupt Practices inquiry.	US$250 million – US$2.5 billion	300
5	2 -20 fatalities. Short or long term health exposures leading to significant irreversible human health effects to >50 persons.	Unplanned serious or extensive impact (<20 years) on ecosystem or Threatened Species.	Extensive long-term social impacts. Widespread damage to structures/items/ locations of national cultural significance. Serious infringements of cultural heritage. Company directly responsible or complicit in multiple aggravated impacts on human rights.	Serious public or national media outcry (international coverage). Damaging NGO campaign. BHP Billiton reputation severely tarnished. Third party actions (where BHPB is one of many in a group) result in reputation impact. Large protest (>100 people) with significant violence & serious, multiple injuries	Fines and prosecutions relating to criminal breaches including jail terms and being the subject of a royal commission.	US$50 million – US$250 million	100
4	Single fatality. Severe irreversible disability or impairment (>30% of body) to one or more persons.	Unplanned major impact (<5 years) on ecosystem or Threatened Species.	Major long-term social impacts or on-going social issues. Damage to structures/ items of national cultural significance. Major infringement and disregard of cultural heritage. Company directly responsible or complicit in major human rights impacts.	Major adverse national media/ public/ NGO attention. 20- 100 people protest, people restrained with force, arrests and injuries. Asset/CSG reputation majorly impacted.	Major civil litigation including class actions.	US$5million – US$50 million	30
3	Moderate irreversible disability or impairment (<30% of body) to one or more persons. Days lost due to injury.	Unplanned moderate impact (< 1 year) to ecosystem or non-threatened species.	Moderate medium-term social impacts or frequent social issues. Moderate damage to structures/ items of local cultural significance. Moderate infringement of cultural heritage/ sacred locations. Moderate, temporary human rights impacts.	Attention from regional media and/or heightened concern by local community. Criticism by community, NGOs or activists. Asset reputation adversely affected.	Breach of regulation, Lack of valid exploration title.	US$500,000 – US$5 million	10
2	Objective but reversible disability/impairment Medical treatment injury.	Unplanned minor impact (< 3 months) to non-threatened species or their habitat.	Minor medium-term social impacts on small number of people. Minor repairable damage or disturbance to property, structures, or items. Minor infringement of cultural heritage. Minor, temporary human rights impacts.	Adverse local public or media attention and complaints. Heightened scrutiny from regulator. Asset reputation is adversely affected with a small number of people.	Minor legal issues, non-compliances and breaches of regulation.	US$50,000 – US$ 500,000	3
1	Low level short-term subjective inconvenience or symptoms. No medical treatment.	Unplanned low level environmental impact	Low-level social impacts. Low-level infringement of cultural heritage or minimal disturbance to heritage structures. Minimal impact on human rights.	Public concern restricted to local complaints. Low level interest from local media and/or regulator.	Low-level legal issue.	<US$50,000	1