CLIENT **: GUYANA ENVIRONMENTAL CAPACITY DEVELOPMENT PROJECT (GENCAPD)**

PROJECT**: CODE OF PRACTICE FOR CONTINGENCY AND RESPONSE PLANS IN GUYANA'S SMALL AND MEDIUM-SCALE MINING**

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DISCLAIMER

The primary purpose of this publication is to provide a Code of Practice for contingency and response plans in the small and medium-scale mining industry of Guyana. It expresses the professional opinion of SNC-LAVALIN INC. (SLI) regarding the matters set out herein, based on SLI's professional judgment and reasonable due diligence. It is to be read in the context of the agreement dated August 4, 2003 (the "Agreement") between SLI and Natural Resources Canada (the "Client"), and the methodology, procedures and techniques used, the assumptions SLI made, and the circumstances and constraints under which SLI carried out its mandate. This document is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context.

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1. INTRODUCTION

1.1 Why a Code of Practice for Contingency and Response Plan?

The proposed amendments to the Guyana Mining Regulations, which strongly focus on the environment, call for the publication or approval by the Guyana Geology and Mines Commission (GGMC) of a number of Codes of Best Practice for Environmental Mining within eighteen months of the enactment of these regulations. Contingency and response plan is among the topics to be addressed by these Codes.

Within the mining industry, potential for major tailings spill or other accidents (cyanide spill, explosion, etc., see table 4-1) is a reality that cannot be eluded. During the 25-years period spanning 1976 to 2001, there have been some 33 major mining accidents worldwide resulting in releases to the environment. Some of these accidents have caused fatalities in neighboring communities while others resulted in physical damage to property and farmland. Where chemicals have been released, fish and other species have been killed and human health and livelihoods threatened. These accidents had a severe financial impact on companies and damaged seriously the already negative image of the industry. One of these was the 1995 Omai tailings spill in Guyana.

The mining industry must do more to prevent accidents and to meet public and governments expectations on that regard. Any operation that has facilities which pose significant risks to nearby communities or sensitive environments should plan for emergencies. People likely to be affected by an accident need to know what they, as individuals, should know. While in small and medium-scale mining, the consequences of a mining accident may not be, at first glance, as dramatic as in a large-scale operation because of volumes of waste or hazardous materials managed, this does not preclude sound emergency and response planning. Nevertheless. It is likely that there is a certain size of mine below which a formal APELL (see definition below) process would be difficult to implement. Small scale and artisanal mining may lack organization and resources required to implement a formal APELL. Industry associations such as GGDMA must therefore take the lead with outreach and assistance programmes for small scale and artisanal miners regarding emergency preparedness.

This publication is the result of a comprehensive literature review and of a collaborative effort by the GENCAPD Mining Project stakeholders under the guidance of SNC-LAVALIN ENVIRONMENT INC. Valuable inputs from the participants at the Workshops will also be incorporated into the Code.

2. GLOSSARY OF TERMS

Acid Rock Drainage	Drainage of acid water containing dissolved metals as a result of natural oxidation of sulphides found in waste rock, ore and tailings exposed to air and water.
APELL	Awareness and Preparedness for Emergencies at Local Level.
Artisanal mine	A small, medium or even large-scale, informal, legal and illegal mining operation that use rudimentary processes to extract gold from orebodies, either primary or secondary.
Best Practice	The "best way of doing things". The objective of Best Practice is to prevent or (when that is not possible) minimize risks to human health, as well as adverse environmental, social and economic impacts.
Code of Practice	A collection of rules and ethical principles related to a specific field of activity, describing the procedures and setting forth standards considered to be Best Practice in said field of activity. The Code may be either voluntary or mandatory.
Community	The sum of all affected communities plus the immediate community, whether it is affected or not.
Effluent	A liquid, solid, or gaseous product, frequently waste, discharged or emerging from a process.
Guidelines	Non-binding document, generally designed to provide the user with information, explanations, guidance and help on a specific topic. Guidelines are a tool frequently used to enforce new regulations. The user can be either the Regulator itself or the industry.
HSE	Stands for **H**ealth, **S**afety and **E**nvironment.

Medium-scale mine	Means a mine which is the subject of a Mining Permit and from which a volume in excess of 200 m^3 but less than 1000 m^3 of material, inclusive of any overburden, is excavated or processed as an aggregate in any continuous twenty-four hour period.
Mine closure	A whole of mine life process which typically culminates in tenement relinquishment. Closure includes decommissioning and rehabilitation. This term is often used interchangeably with Mine decommissioning.
Mine decommissioning	The process that begins near, or at, the cessation of mineral production. This term is often used interchangeably with Mine Closure.
NGO	Stands for **N**on-**G**overnment **O**rganization.
Overburden	Loose soil, sand, gravel, etc. that lies above the bedrock or above a deposit of useful materials, ores, or coal. Also called burden, capping, cover, drift, mantle, surface.
Reclamation (rehabilitation)	The return of the disturbed land to a stable, productive and self-sustaining condition, taking into account beneficial uses of the site and surrounding land.
Regulations	A type of “delegated legislation” promulgated by a state, federal or local administrative agency given authority to do so by the appropriate legislature. Regulations generally are very specific in nature, they are also referred to as “rules” or simply “administrative law”. Regulations are official rules and must be followed.
Risk analysis	The systematic use of available information to identify hazards and to estimate quantitatively or qualitatively, the likelihood and consequences of those hazards being realized.
Risk assessment	The evaluation of the results of risk analysis against criteria or objectives to determine acceptability or

	tolerability of residual risk levels, or to determine risk management priorities.
Small-scale mine	A mine which is the subject of a Claim Licence and from which a volume in excess of $20m^3$ but less than $200m^3$ of material, inclusive of any overburden, is excavated or processed as an aggregate in any continuous twenty-four hour period.
Stakeholders	The sum of all representative institutions of the community as well as the relevant sectoral Regulatory bodies.
Sustainable Development (SD)	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Tailings	The gangue and other refuse material resulting from the washing, concentration, or treatment of ground ore. Also, those portions of washed ore that are regarded as too poor to be treated further.
Tailings dam	Impoundment to which tailings are transported, the solids settling while the liquid may be withdrawn.

3. MISSION AND OBJECTIVES

3.1 Mission Statement

The following is the Code's mission statement:

To prevent loss of life or damage to health and social well-being, avoid property damage, and ensure environmental safety in a local community

3.2 Objectives

1) Provide information to the concerned members of a community on the hazards involved in mining operations in its neighborhood, and on the measures taken to reduce risk.

2) Increase local industry involvement in community awareness and emergency response planning.

3) Review, update, or establish emergency response plans in the local area;

4) Integrate industry emergency plans and local emergency response plans into one overall plan for the community to handle all types of emergencies.

5) Involve members of the local community in the development, testing and implementation of the overall emergency response plan.

4. SCOPE

This Code of Practice is a mandatory code that applies to alluvial gold and diamond mining operations ranging in size from small-scale to medium-scale as well as to large artisanal mines (>20 m^3 per day). It addresses all the steps leading to the development of an effective contingency and response plan.

This Code is subordinate to the Mining Regulations (that are presently being amended), made under the Mining Act of Guyana (No. 20 of 1989). The Code is intended to complement regulatory requirements, not to replace them. Compliance with the rules, regulations and laws is therefore necessary.

No guarantee is made in connection with the application of the Code to prevent hazards, accidents, incidents, or injury to workers and/or members of the public at any specific site where mine reclamation is carried out.

Figure 4-1
Risk management

(Modified after CSA, 1991)

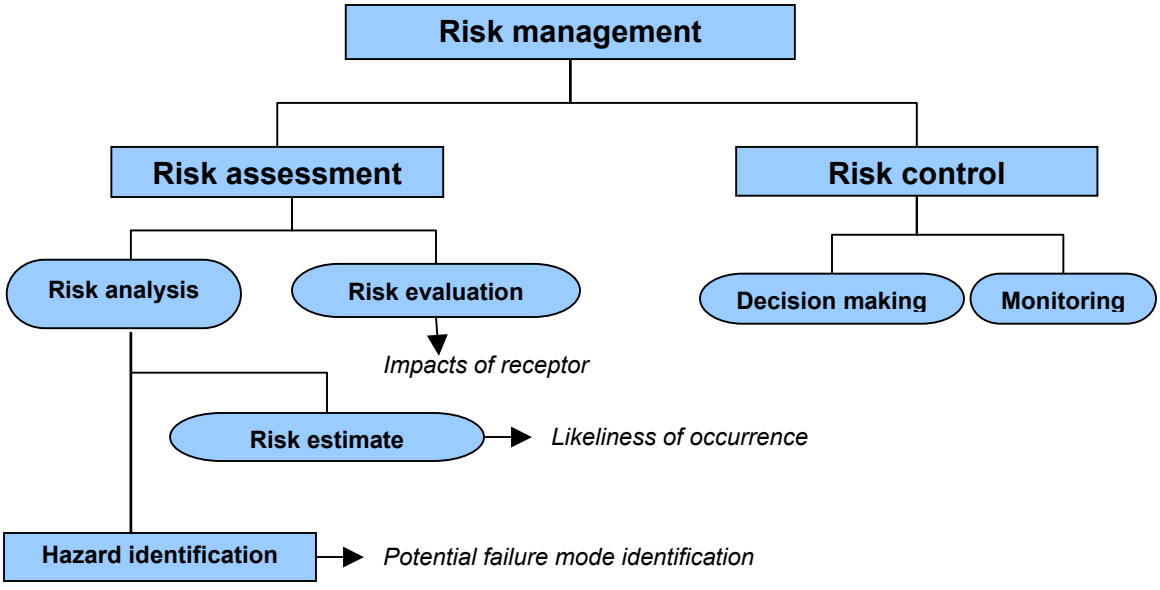

Table 4-1
Potential accidents associated with mine sites and their effects

(Modified from UNEP 2001)

Type of incident	Typical Causes	Potential Effects
Tailings dam failure	Poor water management, overtopping, foundation failure, drainage failure, piping, erosion, earthquake.	Loss of life, contamination of water supplies, destruction of aquatic habitat and loss of crops and contamination of farmland, threat to protected habitat and biodiversity and loss of livelihood.
Failure of waste rock dump	Instability often related to presence of water (springs, poor dump drainage).	Loss of life, injuries, destruction of property, damage to ecosystems and farmland.
Transport of chemicals to/from site	Inadequate transport procedures and equipment, unsafe packaging, high-risk transportation routes.	Contamination of soil, water, effects on water users, aquatic ecosystem damage, threat to human health.
Spills of chemicals at site	Poor maintenance, inadequate containment.	Contamination of soil and water. Air pollution could have health effects.
Fire	Poor design, unsafe practices in relation to flammable materials.	Property damage.
Explosion (plant)	Inadequate design, failure to follow procedures, inadequate maintenance.	Community concern, loss of life, destruction of property.
Atmospheric releases	Inadequate design, failure to follow procedures, inadequate maintenance.	Community concern, possible health effect.
Blasting and explosives accidents	Poor practice, unsafe storage and handling.	Property damage, risk to life.

5. PRINCIPLES AND STANDARDS OF PRACTICE

The development of the APELL could be seen as a communal exercise in which several miners with similar operations could participate.

(For further details on how the following principles may be implemented, the readers should refer to ***Section 6 Code Implementation***).

5.1 Defining the Local Community

Principle: Identify which communities are vulnerable to a mine accident.

Standards of practice

5.1.1 The "community", for the purpose of the APELL, will be the sum of all affected communities plus the immediate community, whether it is affected or not.

5.1.2 Carry out a risk analysis to identify hazards and to estimate their likelihood of being realized.

5.1.3 On the basis of the conclusions obtained by the risk analysis, identify which communities are at risk of being affected by a mine accident.

5.2 Raising Awareness

Principle: Increase awareness of the community about the mining operation and its risk through an appropriate communication and education program.

Standards of practice

5.2.1 Select appropriate methods of communication with stakeholders.

5.2.2 Develop communication and education materials and organize meetings or workshops with the stakeholders to:

- Inform stakeholders on the nature of the mining operation and associated hazards;
- Explain the APELL process;

- Identify individuals that will be part of the Coordinating Group (see 5.3 below);
- Obtain suggestions and ideas.

5.2.3 Gather information on existing emergency services and community response plans.

5.3 Forming a Coordinating Group

Principle: Build and maintain motivation, communication, commitment, cooperation and momentum by the creation of a Coordinating Group.

Standards of practice

5.3.1 Mine managers, emergency response providers, EPA officers, local GGMC representatives and community leaders from the core of the Coordinating Group.

5.3.2 The Coordinating Group should include representatives of those parties who are responsible for minimizing and for responding to emergencies, or who have a legitimate interest in the choices among planning alternatives.

5.3.3 Identify people with a wide range of relevant expertise and local knowledge.

5.3.4 Consider cultural and political diversity and gender equity when setting up the Coordinating Group (the composition of the local population may differ from formal governance structures).

5.3.5 Designate a leader for the Coordinating Group.

5.4 Developing the APELL

Principle: Ensure that members of the Coordinating Group are assigned tasks and responsibilities, that necessary resources are available, tasks and resources matched and all emergency response plans integrated.

Standards of practice

5.4.1 Identify emergency response participants and establish their roles, resources and concerns.

5.4.2 Have participating organizations review their individual emergency plan, including communications, for adequacy relative to coordinated response.

5.4.3 Review the results of the separate evaluations to determine overall strengths and weaknesses of the current status of a coordinated emergency response.

5.4.4 Identify the required response tasks not covered by existing plans.

5.4.5 Match tasks to resources available from the identified participants in the Coordinating Group.

5.4.6 Integrate individual plan into overall plan and reach agreement.

5.4.7 Draft final APELL and obtain written endorsement from participants.

5.5 Communication, Training and Testing

Principle: Ensure that the different participating groups are properly trained and that the plan is well tested.

Standards of practice

5.5.1 Communicate final version of integrated response plan to participating groups.

5.5.2 Prepare procedure manuals.

5.5.3 Complete field exercises for hands-on training in monitoring, use of communication, traffic control, etc.

5.5.4 Complete workshops on key issues related to the plan, focusing on education and communication.

5.5.5 Establish schedules and procedures for periodic testing, review and updating the plan.

5.5.6 Communicate the integrated plan to the general community.

6. CODE IMPLEMENTATION

6.1 Defining the Local Community

6.1.1 In defining what is the community potentially affected by an eventual mine accident, one must answer the following questions:

- What areas downstream of the mine site and its facilities such as tailings dams may be affected by a catastrophic spill? More than one catchment may be affected and people living many miles from the site could be affected. What is the dilution factor and the flow rate ?
- What is the prevailing wind direction and what communities lie down-wind?
- What are the chances of less frequent wind directions affecting other populations who should also be included?
- What about deliveries of hazardous materials to the site?
- Are the transporters (truck drivers) of the hazardous materials in contact with communities along the route?

6.1.2 The following may be considered in defining the community:

- Geographic or administrative boundaries;
- Catchment boundaries (airshed and watershed);
- Governing bodies affecting the operations;
- Traditional landowners;
- Influential organizations such as civic, religious, educational, etc.;
- Concerns of local residents;
- Major communication media.

6.2 Raising Awareness

6.2.1 Define the local community concerned (see Defining the Local Community above).

6.2.2 List existing local community contacts.

6.2.3 Identify other mines or industrial facilities to be involved (e.g. forestry operations).

6.2.4 Gather information on existing emergency services and community response plans;

6.2.5 Prepare presentation materials on the mining operation, its hazards and existing emergency response plans;

6.2.6 Develop an introductory presentation on APELL, its benefits and requirements.

6.2.7 Form an informal Coordinating Group to plan the initial consultation processes, including possibly a community meeting, a seminar, etc.

6.3 Forming a Coordinating Group

6.3.1 For the sake of efficiency, the Coordinating Group cannot include everybody and should not be allowed to expand too much.

6.3.2 Select people that will be committed to the process and who can cooperate with one another during development of the plan and after it has been developed to ensure that there is no loss of preparedness when changes occur.

6.3.3 Individuals for the Coordinating Group could come from a wide range of organizations:

- Mine managers, HSE, communications staff,;
- Local GGMC representatives;
- EPA officers;
- Chemical suppliers;
- Transport operators;
- Members of NGOs (e.g. WWF);
- GGDMA representatives;
- Member of local planning authority (e.g. Regional Democratic Council);
- Representatives of agencies with responsibility for fire, health, water quality, air quality,
- Emergency response planning (e.g. Civil Defence Commission);
- Local hospital/medical representatives;

- Representatives of private sector;
- Representatives from local community;
- Representatives of labour organizations;
- Translators (if more than one language is involved);
- etc.

6.4 Developing the APELL

6.4.1 Before assigning a specific task to a participant, determine his/her willingness to undertake it and his/her resources and experience.

Integration of individual plans

6.4.2 Prepare a draft integrated response plan.

6.4.3 Ensure that the newly developed plan is consistent with any regional disaster plans and with legislation.

6.4.4 Check that the plan is robust in relation to all previously identified risks and emergency scenarios and in relation to response tasks.

6.4.5 Conduct a role-playing exercise to test the plan with key participants.

6.4.6 As much as possible, keep the plan simple. Plans that fill thick files are unwieldy and likely to be ignored.

6.4.7 Include post-accident clean-up in the plan. However, details about clean-up operations should of course be prepared after the accident.

Endorsement

6.4.8 Use a small group to write the plan in its final format.

6.4.9 Prepare a standard presentation to be given to the community.

6.4.10 Prepare notices, instructions, posters, etc. for use at the site and by other organizations and individuals.

6.4.11 Make presentations, hold meetings and review sessions and obtain endorsement of community leaders and relevant officials.

6.5 Communication, Training and Testing

Training

6.5.1 Once the plan has been endorsed, the details of it need to be communicated to the members of the emergency provider groups so that they are aware of the format of the plan, of their collective and individual responsibilities and of any training they might require.

6.5.2 Identify those who must be trained; develop and carry out training sessions and periodic refresher training where necessary.

6.5.3 Training should include such issues as:

- Roles and responsibilities of responders;
- How to use the resources available for a mine related emergency;
- Procedures for contacting relevant people for information or assistance;
- Emergency cards and response guides;
- Contact with the media (if necessary) and with other key audiences.

Testing

6.5.4 Initial testing of the plan should take place without involving the public, to uncover deficiencies in coordination among groups and in the training that has taken place so far.

6.5.5 Prepare a test drill scenario that identifies the objectives of the drill, components of the plan to be tested and simulated hazards levels.

6.5.6 Designate a group of non-participating observers to evaluate the test drill using prepared evaluation checklists.

6.5.7 After the test, evaluate the results and revise the plan accordingly in order to correct deficiencies.

6.5.8 Organize periodic testing and revision of the plan and its different components.

7. REFERENCES

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Web site

http://xmlwords.infomine.com/xmlwords.htm (on-line dictionary of mining terms).