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

PROJECT**: CODE OF PRACTICE FOR TAILINGS MANAGEMENT IN GUYANA'S SMALL AND MEDIUM-SCALE MINING INDUSTRY**

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DISCLAIMER

The primary purpose of this publication is to provide a code of practice for tailings management in Guyana's small and medium-scale mining industry. 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 of August 4, 2003 (the Agreement) between SLI and Natural Resources Canada (the Client), and in accordance with the methodology, procedures and techniques that SLI 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 therefore not be read or relied upon out of context.

This document is **NOT** a design manual. Users of this document shall assume full responsibility for the design of facilities and for any action taken as a result of the information contained in this document. SLI and Natural Resources Canada (through the GENCAPD mining project) make no warranty of any kind with respect to the content and accept no liability, either incidental, consequential, financial or otherwise, arising from the use of this publication.

1. INTRODUCTION

1.1 Why a Code of Practice for Tailings Management?

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 18 months of the enactment of these Regulations. Waste disposal and management systems are among the topics to be addressed by these Codes.

Tailings management is often the most significant environmental challenge associated with mining projects. A spate of recent and well-publicized incidents involving tailings impoundments, such as the Omai spill in 1995, has placed the mining industry in general under intense scrutiny. The environmental, financial, and political consequences of well-publicized failures have made it clear to the mining industry that safe tailings management practices are in its own best interest. The main public concerns regarding tailings containment are the following:

1) Structural stability of dams and the possible release of large volumes of water and semi-fluid tailings;

2) Potential impact of tailings operations on the quality of life of people living in the immediate area; and

3) Potential pollution of ground and surface water.

Tailings are the residue remaining after metals of interest have been extracted from mined ores. Often, as in the case of large-scale lode gold mining, ores are first milled and finely ground, and then treated in a hydrometallurgical plant. In small-scale or medium-scale mining operation, precious metals are usually separated by a gravimetric method and the ore does not undergo comminution or size reduction. In both cases, since the extracted metals represent only a small percentage of the entire ore mass, a vast proportion of the mined material ends up as tailings. Most tailings that are mass-produced worldwide are dumped in large-area impoundments, usually called “tailings dams.”

Guyana’s small-scale mining industry basically generates the following two types of tailings:

1) Hydraulic tailings, which consist of a slurry containing the residual material left out after valuable minerals (mostly gold and diamonds) have been extracted by a gravimetric method (sluice boxes, jigs, etc.);

2) Amalgamation tailings, which are a concentrate of heavy minerals containing residual mercury and/or amalgam.

Both types are a major source of pollution and therefore require proper management.

In Guyana, a large volume of conventional hydraulic tailings are generated each day through the use of 4, 5 and 6-inch dredges. This process involves the slurrying of both overburden and gravel, resulting in a permanent loss of organic cover and slow re-vegetation. Estimates suggest that over 200,000,000 m^3 of tailings, comprising over 80% water, are generated each year. A large percentage, if not all, of this material flows directly into the receiving environment, causing turbidity plumes in waterways, reduced light penetration, siltation, channel alteration and changes in stream-bottom characteristics with their dramatic impacts on riverine ecosystems. Hydraulic tailings are therefore a component of the effluent from Guyana's small-scale mining industry.

Sustainable tailings management involves more than constructing and operating a tailings dam, although this is the most important aspect. Tailings management requires miners to provide some degree of stability and physical planning for the effective containment of predetermined volumes of tailings and effluent for predetermined periods of operation. Because dredges move to different locations several times a year, planning for proper tailings management becomes very difficult. Exploration and reserves estimates are therefore closely linked to a truly sustainable approach to tailings management, but they are obviously beyond the scope of this Code of Practice.

This Code is based on sound management practices exercised elsewhere and on principles and approaches from various sources. Because there is no such code for small and medium-scale mining operations anywhere else, procedures usually designed for large, high-tech operations have been adapted and streamlined to suit the purposes of this Code of Practice.

This publication is the result of a comprehensive literature review and collaborative efforts by the GENCAPD Mining Project stakeholders under the guidance of SNC-LAVALIN ENVIRONMENT INC. Valuable input from the participants in the workshops were also incorporated into the Code.

2. GLOSSARY OF TERMS

Acid rock drainage	Drainage of acid water containing dissolved metals as a result of the natural oxidation of sulphides found in waste rock, ore and tailings exposed to air and water.
Appurtenances	Structures and equipment within a tailings facility, other than the dam itself. They include, but are not limited to, facilities such as pipelines, spillways, drains, intake towers, tunnels, canals, low-level outlets, and water treatment, control and release facilities. They may also include mechanical equipment and electrical control and power supply equipment.
Artisanal mine	A small, medium or even large-scale, informal, legal or illegal mining operation that uses rudimentary processes (not mechanized) to extract gold from either primary or secondary ore bodies.
Best practice	The best way of doing things. The objective of best practices 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. A code of practice describes procedures and sets out standards considered to be best practices in the said field of activity. The code may be voluntary or mandatory.
Comminution	The breaking, crushing or grinding of stone, coal or ore by mechanical means for direct use or further processing.
Effluent	A liquid, solid or gaseous product, frequently waste, discharged or emerging from a process.
Grouting	The injection of grout into fissured, jointed, or permeable rocks in order to reduce their permeability or increase their strength.

Guidelines	A non-binding document, usually designed to provide users with information, explanations, guidance and help with respect to a specific topic. Guidelines are a tool frequently used to enforce new regulations. Users can be either the Regulator itself or the industry.
Hydraulicking	The excavating of alluvial or other mineral deposits by means of high-pressure water jets.
Medium-scale mine	A mine for which a mining permit has been issued and from which a volume in excess of 200 m^3, but less than 1,000 m^3, of material, including any overburden, is excavated or processed as an aggregate in any continuous 24-hour period.
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 or surface.
Regulations	A type of “delegated legislation” enacted by a state or federal or local government agency given authority to do so by the appropriate legislature. Regulations are generally very specific and are also referred to as rules or simply administrative law. Regulations are official rules and must be followed.
Risk assessment	The process of evaluating what might go wrong with a facility and its associated plans and procedures in addition to the consequences of failure. Risk assessments are the basis for developing a risk management strategy that includes communications, contingencies, mitigation measures and emergency response plans.
Slurry	A semi-fluid, slushy, murky mass of sediment resulting from the treatment of water, sewage or industrial and mining wastes. It often occurs as local bottom deposits in polluted bodies of water.
Small-scale mine	A mine for which a claim licence has been issued and from which a volume in excess of 20 m^3, but

	less than 200 m^3, of material, including any overburden, is excavated or processed as an aggregate in any continuous 24-hour period.
Stewardship	As applied to a tailing facility, is defined as proper management. A tailings facility must be properly managed throughout its useful life.
Stripping	The removal of earth or non-ore rock materials in order to gain access to desired coal, ore or mineral materials; the process of removing overburden or waste material in a surface mining operation.
Sustainable development (SD)	Development that meets present-day needs without compromising the ability of future generations to meet their needs.
Tailings	The gangue and other refuse material resulting from the washing, concentration or treatment of ground ore. Also those portions of washed ore regarded as too poor for further treatment.
Tailings dam	An impoundment to which tailings are transported and in which solids settle to make it possible for liquid to be withdrawn.
Topsoil	Dark-colored, organic, well-decomposed soil material consisting of the residues of plant and animal materials together with synthesized cell substances of soil organisms and various inorganic elements.
Turbidity	The state, condition or quality of opaqueness or reduced clarity of a fluid attributable to the presence of suspended matter.

3. MISSION AND OBJECTIVES

3.1 Mission Statement

The Code's mission statement is the following:

Promote sound tailings management practices in Guyana's small and medium-scale gold and diamond mining industries in order to minimize impacts on communities and the environment.

3.2 Objectives

1) Protect communities and the environment from adverse environmental effects caused by tailings discharges into the environment.

2) Provide and promote sustainable tailings management in Guyana's small and medium-scale gold and diamond industries.

3) Foster a holistic approach to stewardship of tailings facilities by small and medium-scale miners considering all stages in the life-cycle of a facility.

4) Promote the Code's use by small and medium-scale gold and diamond miners.

5) Raise the awareness of and educate all parties as to the importance of sound tailings management practices.

6) Ensure that tailings management practices are flexible and dynamic over time.

7) Ensure that tailings management practices are credible and verifiable.

4. SCOPE

This Code of Practice is a mandatory code that applies to small-scale and medium-scale alluvial gold and diamond mining operations as well as to large artisanal mines (>20 m^3 per day). Because artisanal and small and medium-scale mines vary considerably, requirements that apply to one type of operation may not be relevant to others. In Sections 5 and 6 of this Code of Practice, the letters **A, S** and/or **M** (standing for artisanal, small-scale and medium-scale) will be indicated after each standard of practice and requirement to let readers know for which sector the specific standard is intended.

It should be borne in mind that tailings dams are usually too much an undertaking for the capabilities of artisanal and small-scale miners. It is suggested therefore that other types of containment facilities be proposed for this scale of mining. As tailings produced by alluvial operations consist largely of water, small-scale miners might construct water containment facilities, such as settling ponds, for tailings disposal. In any case, guidelines for the management of tailings in artisanal and small-scale mining should be prepared by GGMC.

This Code of Practice addresses only environmental issues related to tailings management in the Guyana gold mining industry and does not deal with any occupational health and safety (OH&S) issues related to tailings management. Because tailings facilities are the main focus of tailings management, all stages in the life cycle of a tailings facility, i.e., site selection and design, construction, operation and decommissioning, are covered by this Code. Tailings dam reclamation will be dealt with in a specific Code of Practice for mine site reclamation.

This Code is subject to the Mining Regulations (currently being amended) of the Mining Act of Guyana (No. 20 of 1989). The Code is intended to complement the regulatory requirements, not to replace them. Compliance with the rules, regulations and statutes is therefore required.

No guarantee is made in connection with application of the Code to prevent hazards, accidents, incidents or injuries to workers and/or members of the public at any specific site where tailings are stored.

5. PRINCIPLES AND STANDARDS OF PRACTICE

The principles and standards of practice on which this Code is based (except for overburden stripping) draw upon the following simplified management framework derived and adapted from the Mining Association of Canada (MAC) *Guide to the Management of Tailings Facilities*:

1) Planning
- Roles and responsibilities
- Managing risks
- Managing change

2) Implementation
- Operational control
- Competency

3) Control, Monitoring and Corrective Measures

This is an all-encompassing framework for tailings management throughout the entire life cycle of a mine.

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

5.1 Overburden Stripping

Principle: Promote the mechanical or manual removal of overburden in order to reduce the amount of tailings generated and recover valuable topsoil.

Standards of practice

5.1.1 Promote the development of technical support programs and pilot projects aimed at helping miners use “dry methods” for overburden removal. **A, S, M**

5.1.2 Ensure that no hydraulic removal of overburden is carried out (hydraulicking).

5.1.3 Make miners more aware of the benefits in terms of tailings management that overburden stripping offers over hydraulicking. **A, S, M**

5.2 Tailings Dam Site Selection and Design

Principle: Select a site and design a tailings facility in accordance with sound engineering practice and in compliance with permits and regulations.

Standards of practice

Planning

5.2.1 Develop general site selection and design criteria for tailings facilities (Regulator's responsibility) and ensure that these criteria are disseminated to miners.

5.2.2 Develop site selection and design criteria for the tailings facility. **A, S, M**

5.2.3 Establish a process for site selection and risk assessment of design options. **A,S,M**

5.2.4 Provide training and awareness on tailings dam site selection and design criteria for Regulator and miners

Implementation

5.2.5 Select an appropriate site and design the tailings facility. **A, S, M**

5.2.6 Obtain approvals for the selected site and design from the relevant regulatory agencies. **A, S, M**

5.2.7 Use professionals with qualifications (large dams) or experience (small dams) in appropriate technical and scientific disciplines to carry out site selection and design in accordance with sound engineering practices. **S, M**

5.3 Tailings Dams Construction

Principle: Construct the tailings facility as per the design and in a safe and environmentally acceptable manner in compliance with permits and regulations.

Standards of practice

Planning

5.3.1 Establish criteria and procedures to ensure that construction of the tailings facility conforms to the design, meets legal requirements, performs according to specifications, provides ongoing protection of public health and safety, facilitates implementation of the closure plan, and prevents or minimizes adverse environmental impacts. **S**, **M**

5.3.2 Prepare detailed plans for building the tailings facility in order to ensure quality control throughout the construction work and ensure that environmental objectives are met. **M**

5.3.3 Prepare procedures for identifying and documenting changes made to approved plans and procedures for the construction of the tailings facility. **S,M**

5.3.4 Provide training and awareness on tailings dam construction for Regulator and miners

Implementation

5.3.5 Obtain construction approvals and permits. **M**

5.3.6 Construct the tailings facilities according to the design. Identify deviations from the design and plans. **M**

5.3.7 Assign qualified and/or experienced personnel to construct the tailings facility in accordance with sound engineering practices. **M**

Control, Monitoring and Corrective Measures

5.3.8 Establish a routine inspection program for assessing the environmental and safety performance of the construction work. **A, S, M**

5.3.9 Carry out periodic inspections and reviews of the tailings facility in addition to routine inspections. **A, S, M**

5.3.10 Develop and implement action plans and record corrective measures taken with regard to non-conforming items. **M**

5.4 Tailings Dam Operation

Principle: Operate the tailings impoundment facility in such a way that all structures are stable and all solids and water are managed within the area designated in the design in compliance with permits and regulations.

Standards of practice

Planning

5.4.1 Assign a qualified and/or experienced person responsible for the tailings facility operation and assign qualified personnel to operate the tailings facility. **S, M**

5.4.2 Develop operating plans in accordance with the design in order to meet legal requirements, achieve specified performance standards, provide ongoing protection of public health and safety, and prevent or minimize adverse environmental impacts. Include preparations for eventual decommissioning and closure in ongoing operations. **S, M**

5.4.3 Develop and test a local-level emergency awareness and preparedness (APELL) plan. **S, M**

5.4.4 Prepare procedures for identifying and documenting changes made to approved plans and procedures for operating the tailings facility. **M**

5.4.5 Provide training and awareness on tailings dam operation for Regulator and miners

Implementation

5.4.6 Obtain commissioning approvals and permits. **S, M**

5.4.7 Operate the tailings facility in accordance with design specifications, plans and legal requirements. **S, M**

5.4.8 Prepare an operating manual for the tailings facility. **M**

5.4.9 Establish a preventive maintenance schedule and reporting system. **M**

5.4.10 Implement operational procedures to manage flood control, tailings deposition, physical stability, dust, site security and wildlife protection. **S, M**

5.4.11 Implement documentation control to ensure that appropriate documents are prepared, maintained and accessible. **S, M**

Control, Monitoring and Corrective Measures

5.4.12 Establish and maintain a routine inspection program for assessing the ongoing environmental and safety performance of the impoundment and its appurtenances, including all critical structures such as dams, dikes, ditches, ponds, pipes, spillways and decant structures. **S, M**

5.4.13 Establish a Dam Monitoring Plan. **S,M**

5.4.14 In addition to the routine inspection program, arrange for an annual inspection of the tailings facility by an experienced engineer. **S**, **M**

5.4.15 Develop action plans and implement and record corrective measures taken with regard to non-conforming items identified in routine and/or periodic inspections and reviews. **S, M**

5.5 Decommissioning and Closing of a Tailings Facility

Principle: Decommission and close the tailings facility in such a way that all remaining dams and associated structures are safe and stable. All solids and water shall be managed within the area designated in the closure plan and in compliance with permits and regulations.

Standards of practice

Planning

5.5.1 Assign a qualified and/or experienced person responsible for the overall decommissioning and closure of the tailings facility operation and assign qualified personnel to decommission and close the tailings facility. **S, M**

5.5.2 Prepare detailed implementation plans for closure of the facility. **S, M**

5.5.3 Prepare procedures for identifying and documenting changes made to approved plans and procedures for decommissioning the tailings facility. **M**

5.5.4 Provide training and awareness on tailings dam decommissioning for Regulator and miners.

Implementation

5.5.5 Obtain decommissioning approvals and permits. **S, M**

5.5.6 Decommission and close the tailings facility as per the detailed closure design and plans in order to meet legal requirements and effectively facilitate surrender of the land or transfer of the land to non-mining use consistent with regional land-use objectives or approved uses; or provide for long-term care and maintenance, ensure long-term stability of dams and related tailings facilities, provide ongoing protection of public health and safety, achieve specified performance standards, and prevent or minimize adverse environmental impacts. **S, M**.

Control, Monitoring and Corrective Measures

5.5.7 Implement a program for monitoring physical and environmental stability during and after the closure period. **S,M**

5.5.8 Carry out comprehensive inspections and reviews in order to assess the effectiveness of the closure in relation to designed performance measurements. **M**

5.5.9 Develop action plans and implement and record corrective measures taken with regard to non-conforming items identified in routine and/or periodic inspections and reviews. **S,M**

6. CODE IMPLEMENTATION

6.1 Overburden Stripping

6.1.1 Identify (the Regulator) possible mining operations where "dry mining" pilot projects could be carried out. Obtain the Guyana Gold and Diamond Miners Association's (GGDMA) participation and find appropriate funding.

6.1.2 Carry out pilot projects (Regulator's responsibility) in various areas. Carefully review and analyze results of the projects.

6.1.3 Develop an educational program to disseminate information and results from the pilot projects.

6.2 Tailings Dam Site Selection and Design

Site selection

6.2.1 Select a preferred site. Prepare a documented rationale for selecting the site, along with a discussion of alternative sites that were studied and rejected. Compile all relevant information. **M**

6.2.2 The following four types of considerations must be taken into account when selecting a site: (a) environmental considerations; (b) planning considerations; (c) decommissioning/reclamation considerations; and (d) cost considerations. **S, M**

6.2.3 Environmental considerations include the following (at minimum):

- Effluent treatment requirements; **S, M**
- Surface water contamination; **A, S, M**
- Groundwater contamination; **A, S, M**
- Watershed use; **S, M**
- Impact on vegetation, wildlife and aquatic life; **A, S, M**
- Potential dust problems; **A, S, M**
- Water balance. **S, M**

6.2.4 Planning considerations include the following (at minimum):

- Accessibility; **S, M**
- Distance from the mine or mill; **A, S, M**
- Distance from habitation and areas of human activity; **A, S, M**

- Topography; **A, S, M**
- Land and resources use; **A, S, M**
- Property ownership and mineral rights; **A, S, M**
- Amerindian land claims; **A, S, M**
- Watershed and surface area; **A, S, M**
- Volumetric capacity; **A, S, M**
- Construction material availability; **A, S, M**
- Dam and basin foundation conditions; **S, M**
- Composition and characteristic of tailings; **M**
- Downstream hazards; **A, S, M**
- Hydrology and groundwater; **S, M**
- Contaminant seepage; **A, S, M**
- Potential impact area; **A, S, M**
- Human and environmental risks; **A, S, M**
- Water management scheme and preliminary water balance; **M**
- Operational and deposition plan; **S, M**
- Preliminary containment and water management structures; **M**
- Cost estimate; **M**
- Conceptual risk assessment. **M**

6.2.5 Decommissioning/reclamation considerations include the following (at minimum):

- Revegetation potential; **S, M**
- Long-term stability; **S, M**
- Ease of establishing permanent drainage; **M**
- Reduction and/or control of acid rock drainage and other contaminants; **S, M**
- Dust control; **A, S, M**
- Long-term maintenance, monitoring and treatment requirements. **M**

6.2.6 Cost considerations include the following (at minimum):

- Capital cost; **M**
- Cost of tailings transport; **M**
- Tailings facility operation and maintenance costs; **M**
- Closure costs; **M**
- Cost per tonne of mined ore. **M**

6.2.7 Compile information relative to the dam site from the literature survey and field/laboratory investigations; **M**

6.2.8 Tailings characterization and settleability. **M**

Design elements

6.2.9 Determine design parameters, including the following: dam classification, stability, earthquake criteria, safety factors, design permeabilities, acid rock drainage, wildlife, dust, and closure considerations; **M**

6.2.10 Analyze the stability of the foundation, dam and appurtenances under static and dynamic conditions; **M**

6.2.11 Determine the requirements for preparation of the dam and pond foundations, including considerations of vegetation removal, excavation of organic soils, cut-off walls, bedrock cleaning, groundwater control and containment, dewatering requirements and diversion channels; **M**

6.2.12 Assess the requirement for seepage control, including seepage into groundwater, **S, M**

6.2.13 Compile information relative to the dam site from the literature survey and field/laboratory investigations; **M**

6.2.14 Carry out a qualitative risk assessment; **S, M**

6.3 Tailings Dam Construction

6.3.1 Develop a plan for carrying out initial dam construction and subsequent lifts, including sequencing and requirements for stability monitoring. Establish a construction methodology, schedule and anticipated costs. **S, M**

6.3.2 Typical components of a construction management system include the following: planning and scheduling; survey control (layout, as-built records); grouting monitoring; foundation preparation monitoring; material quality control; compaction control; instrumentation monitoring and data synthesis; record-keeping; and construction safety. **S, M**

6.3.3 Determine potential environmental impacts of construction based on the proposed design. **S,M**

6.4 Tailings Dam Operation

6.4.1 The site's Awareness and Preparedness Emergency at Local-Level (APELL) Plan should include tailings facility aspects in the overall site emergency preparedness plan. **S, M**

6.4.2 A tailings basin deposition plan must be developed for the mine's projected life cycle. The plan ensures efficient use of tailings capacity, provides for long and short-term scheduling of dam lifts and ensures effective closure of the facility. **S, M**

6.4.3 To develop a deposition plan, it is necessary to have information on tailings slurry quantity, density and production estimated from the process/mill water balance, and to include provisions for estimating uncertainty and contingencies. The basic parameters should be validated and updated on a periodic or regular basis. **S, M**

6.4.4 Minimize dust releases from the tailings facility. This may include keeping the tailings wet and/or using short or long-term chemical or organic covers. **S, M**

Control, Monitoring and Corrective Measures

6.4.5 Performance monitoring and visual inspections shall be carried out very frequently and include the following: groundwater pressure (level), seepage, deformation (settlement and stability), weather influence, seismic events (after the fact), and special inspection programs after major events (earthquakes or floods). **S, M**

6.4.6 The following are indicators of instability: soft zones and boils along the toe; dirty sediments in seepage; increased seepage rates; new areas of seepage; longitudinal and transverse cracking; and settlement. **S, M**

6.4.7 The following are areas requiring special attention: spillways, decant structures, drain and pressure relief wells, concrete structures, pipes and conduits through dams, riprap areas, siphons, weirs, trees and animal holes. **S, M**

6.4.8 Stability monitoring program plans include the following: locations of control stations; schedule; type of monitoring (visual, measurements of parameters); appropriate level of instrumentation (eg, piezometers); inspection methods; data compilation and evaluation; persons responsible for monitoring; data storage and reporting systems. **M**

6.5 Decommissioning and Closure of a Tailings Facility

6.5.1 Closure plans and performance criteria must be developed in the early stages of facility design, and then verified and updated periodically through the operating life of the facility in preparation for decommissioning and closure. **S, M**

6.5.2 A closure plan includes the following background data: **S, M**

- History of the site
- Infrastructure
- Process flow controls
- System operations, mineralogy and topography
- Hydrology/water management
- Hydrogeology
- Soil capability
- Revegetation
- Impact assessment
- Long-term maintenance
- Geotechnics
- Chemistry and geochemistry
- Monitoring program
- Communications
- Financial assurance
- Stakeholder consultation
- Potential end land use
- Closure technology (eg, dry cover, flooded, wetlands, perpetual treatment, or vegetative cover)

6.5.3 Closure plans require a thorough re-assessment of the facility and of dam stability under closure conditions. All aspects of the facility and dam stability must be reviewed. **S, M**

6.5.4 Structural monitoring and inspections should be continued for all facilities and dams until they are decommissioned, and continued thereafter as appropriate. **S, M**

6.5.5 Prepare action plans to deal with shortcomings in closure quality and/or difficulties in complying with closure specifications. **M**

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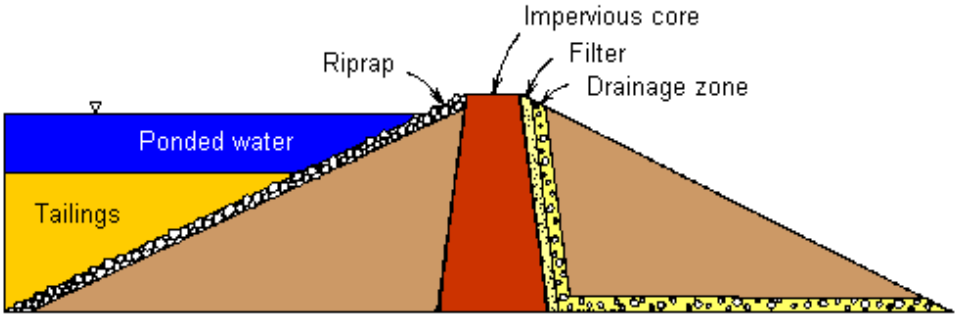
Web sites

http://www.antenna.nl/wise/uranium/mdap.html
http://www.wmc.com/sustain/environ/tailings/tailings_guideline_g70.html
http://xmlwords.infomine.com/xmlwords.htm (on-line dictionary of mining terms)

APPENDIX A

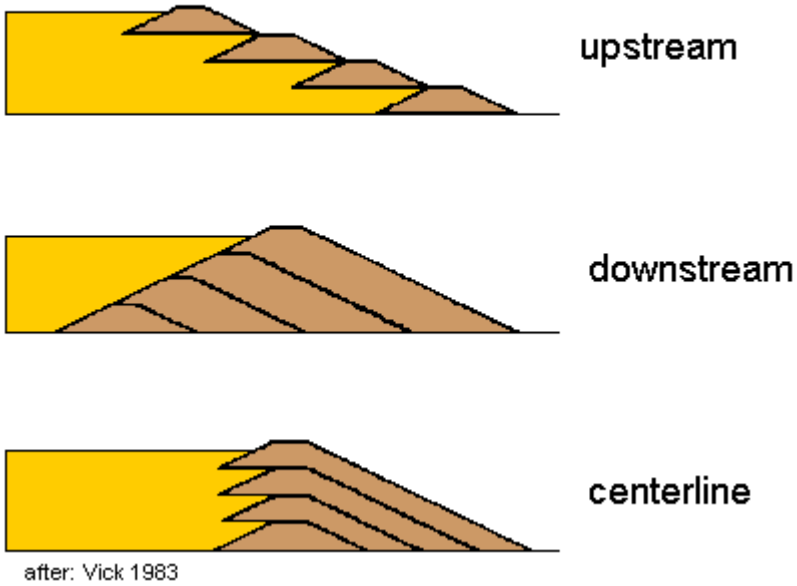
Main Types of Tailings Impoundments

Water-retention type dam for tailings storage



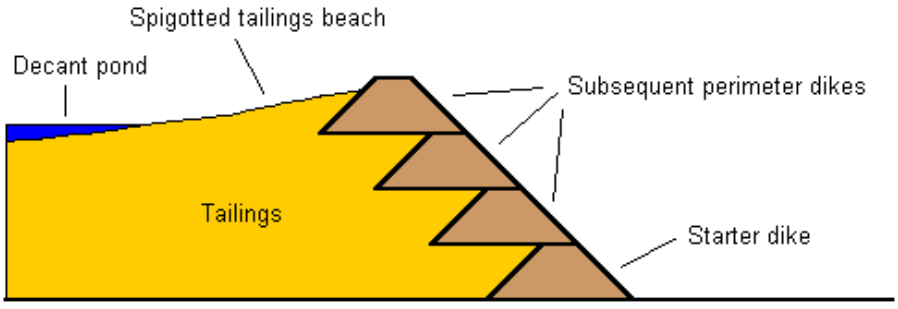
after: Vick 1983

Types of sequentially raised tailings dams



after: Vick 1983

Upstream tailings dam



Figures from Vick (1983) taken from http://www.antenna.nl/wise/uranium/mdap.html