

ROCK DRAIN AGREEMENT

REGARDING THE JOINT ADMINISTRATION AND REGULATION OF THE MINING INDUSTRY

July 2, 1991

Ministry of Energy, Mines
and Petroleum Resources

Ministry of Environment

1. BACKGROUND

It is the Province's intention that developments should preserve natural stream courses intact. Well-designed, geotechnically stable, side-hill waste dumps, and head of hollow fills are generally preferred to valley fills as a means of disposing of waste materials from mining projects. Valley fills are viewed as the least desirable option.

In some circumstances, side-hill dumping may not be either practical for mine planning reasons or desirable where risks of failure and related impacts on the environment and worker/public safety are significant. Applications for rock drains may be entertained in such situations, subject to the stipulations in this Agreement.

2. PURPOSE

(a) To define the respective roles of the Ministry of Energy, Mines and Petroleum Resources, hereinafter "Mines" and the Ministry of Environment, hereinafter "Environment" in the regulation of rock drains in order to protect the public at large, mine operations personnel, the environment, including fish and wildlife and the users of water in any affected watershed;

(b) To establish an agreement between the two parties with respect to guiding principles governing: the acceptability of rock drain proposals; agreement on a frame work of technical criteria involved in evaluating rock drain proposals; a mechanism for the review of such proposals; and

(c) To ensure that there is no needless duplication of regulatory functions between the two parties, bearing in mind that some regulatory functions will require joint handling and that all regulatory functions will require effective inter-agency coordination.

3. DEFINITIONS

A rock drain is a valley or head of hollow fill constructed through the placement of mine waste rock in and about water courses, whether permanent or ephemeral, in such a manner that streamflow will pass through the mine waste rock.

This agreement recognizes that proposed rock drains are classified as either minor or major structures. Generally those proposed as "head of hollow fills", occurring at the headwaters of a watershed are considered minor structures. "Valley fills", downstream of the headwaters are generally recognized as major structures.

For the purposes of this Agreement, the term regulation embraces the following functions:

- o establishment of policies,
- o licensing and permitting,
- o inspection,
- o enforcement,
- o bonding, and
- o on-site and related off-site assessment and monitoring,

carried out as appropriate at each of the following development phases:

- planning (siting and design),
- construction/operation,
- closure and reclamation, and
- post-closure (for monitoring and maintenance purposes).

4. GUIDING PRINCIPLES

(a) Rock drain proposals will be considered on a site-specific basis, and adjudicated on their technical merits as outlined in **Schedule A**. Adequate guidance will be provided to proponents to ensure that rock drain designs take these factors and issues into account before applications are filed.

(b) Where major rock drains are proposed, proponents will be expected to provide an assessment of alternative waste disposal schemes, including a comparative evaluation of technical, logistical, economic and environmental factors. Detailed economic evaluations of alternative schemes will be required in critical situations where the environmental consequences of rock drain development are projected to be major, and the availability of affordable alternative options is in dispute.

(c) Proponents will be expected to submit conservatively designed rock drain proposals, since these structures will be expected to perform over very long periods of time, yet experience and observation to date are of very limited duration (approximately a decade).

(d) In recognition of the limited nature and duration of experience with rock drains, special attention will be focused on contingency planning in the review, approval and regulation of rock drains, to insure that risks related to potential for failure and the consequences of failure are adequately evaluated and managed.

(e) Proposed rock drains with political or policy implications will be subject to review under the Mine Development Review Process. Review of rock drain proposals which are technical in nature will be co-ordinated by the Reclamation Advisory Committee. The decision as to where the application will be reviewed rests with the Mine Development Steering Committee. In both instances, the Regional Mine Development Review Committee will provide technical review of rock drain proposals.

5. GENERAL RESPONSIBILITIES

Mines will act as the lead agency and the "one-window" for all mining related activities involving rock drains.

(a) Mines is responsible under provisions of the **Mines Act**: for ensuring that no part of a mine, including a waste dump built as or performing as a rock drain, represents a danger either to the health and safety of mine workers in or about a mine or to the safety of the public; and for ensuring the protection and reclamation of the surface of the land and watercourses affected by mining;

(b) Environment, is responsible under provisions of the **Waste Management Act**, for the protection of the environment associated with, and downstream of a minesite from the disposal of mine wastes (including mine waste rock placed in a rock drain) and the use of hazardous materials; and

(c) Environment, is responsible under provisions of the **Water Act**, for regulating the diversion and use of water in all streams in or about a minesite, including water which is conveyed through or passes through a rock drain constructed of mine waste rock.

(d) Environment, is responsible under provisions of the **Wildlife Act** for the protection of wildlife resources. By agreement with the Federal Government, Environment also plays a role in the safeguarding of fish habitat through the maintenance of required stream flows, protection of water quality, preservation of riparian vegetation and spawning/rearing habitat. Environment will ensure that any impacts on these resources are fully addressed through mitigation and reclamation.

6. SPECIFIC RESPONSIBILITIES

(a) Mines is responsible for:

- o sponsoring and coordinating the joint reviews of applications for rock drains, and
- o for reviewing applications, issuing permits, conducting inspections, enforcing requirements and ensuring adequate monitoring of rock drains with respect to the following:
 - the waste dumping and associated rock drain construction scheme, including the sourcing and placement of drain rock;
 - overall mine planning and related cost effectiveness considerations;
 - all worker health and safety and public safety aspects of the overall mine plan, including waste dumping operations and the related operational dump monitoring activities intended to detect dump movement and stability problems;
 - geotechnical stability of waste dumps at all stages of construction and closure, including both "worst case" failure analysis prior to dump development and back analysis if and when failure occurs;
 - waste dump and rock drain closure and reclamation requirements; and
 - coal or mineral resource sterilization potential.

(b) Environment is responsible for:

- o participating in reviews of applications for rock drain approvals, as organized by Mines, and
- o reviewing applications, issuing permits, licenses and approvals, conducting inspections, enforcing requirements and ensuring adequate monitoring of rock drains with respect to the following:
 - the routing of streamflow through a rock drain, including:
 - hydrological factors and hydraulic capacity and performance of the rock drain; and
 - upstream and downstream changes in hydrological regimes, and their impacts on other water users;
 - physical and chemical testing of rock quality to determine suitability as drain rock;
 - the water quality implications and impacts of rock drain development;
 - the assessment of up and downstream impacts on fish and wildlife habitat and populations as well as recreational values; and
 - the attendant on-site and off-site impact management requirements, occasioned by the projected hydrological, water quality, fish and wildlife impacts of rock drain development.
 - reviewing contingency plans for the purpose of determining downstream risks from rock drain failure and for establishing emergency measures commensurate with the consequences of unforeseen catastrophic failure.

7. JOINT RESPONSIBILITIES

(a) The issuance of licenses, permits, approvals and requirements for rock drain development will be coordinated between the parties. These approval conditions will be based on mutual agreement and understanding so that individual licenses, permits, approvals and requirements are not at cross-purposes with one another, and do not prejudice one another.

(b) The parties shall jointly evaluate structural failure scenarios and possible environmental impacts associated with structural failure, and, in light of this evaluation and other technical merits outlined in Schedule A, shall mutually determine whether or not a proposed rock drain is acceptable, and if acceptable, what backup protection works (such as impact barriers, settling ponds and overflow channels) may be required, in the event of problems with the functioning of the rock drain, including structural failure problems.

(c) The parties shall mutually agree upon the construction standards required for the construction of a rock drain, including any drain rock quality control and placement requirements. Mines will coordinate permitting, inspection and enforcement of permit requirements for the construction of the waste dump and associated rock drain. This does not, however, preclude independent inspection by Environment.

(d) The parties shall mutually agree upon the measures which a proponent will be expected to take in the event of inadequate performance of the rock drain, for whatever reason, and Environment shall be responsible for including such mutually agreed measures in its licence or approval, issued under the Water Act.

(e) The parties shall mutually agree to the closure and reclamation plans for a waste dump and its rock drain, and Mines shall be responsible for including mutually agreed reclamation and closure requirements as conditions in its reclamation permit, issued under the Mines Act.

(f) Following concurrence, in accordance with the existing Bonding Agreement between Mines and Environment, Mines will impose bonding or security requirements on behalf of the two parties under the Mines Act.

(g) The parties are jointly responsible for encouraging, and participating in research on the performance of rock drains.

(h) Monitoring of drain and dump performance, including acceptability of monitoring standards, compliance with these standards, as well as sharing and review of this monitoring data will be a joint responsibility.

8. CONSULTATION AND COORDINATION

Each party shall consult and advise the other before issuing any order or directive respecting a rock drain which may have implications on the interests of the other party. Where an emergency situation requires action under the Mines Act or the Environment Management Act, notification of the actions taken

by one party shall be given to the other immediately, to ensure coordination of emergency measures. Copies of written orders, directives, approvals, licenses, permits and amendments thereto, where these pertain directly or indirectly to rock drains, shall be transmitted to the other parties at the time of issuance.

All joint regulatory inspections and monitoring functions relating to rock drains will be coordinated, through the Inspector of Mines and Resident Engineer. This, however, does not preclude independent inspection or monitoring by either Ministry, at any time

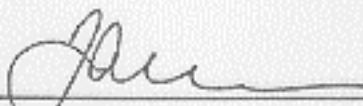
9. DISPUTE RESOLUTION

Any disputes which cannot be resolved by the Regional Mine Development Review Committee or the Mine Development Steering Committee will be raised to the Assistant Deputy Minister level for resolution.

10. LIMITS TO THIS AGREEMENT

Nothing contained in this Agreement abrogates responsibilities or duties assigned to the individual Ministries under the Mines Act, the Waste Management Act, the Water Act, the Environmental Management Act and the Wildlife Act.

This agreement may be reviewed or cancelled, at any time, by either party.



Deputy Minister
Ministry of Energy, Mines
and Petroleum Resources



Deputy Minister
Ministry of Environment

Aug 20/91

Date

Aug 22/91

Date

SCHEDULE A

TECHNICAL CRITERIA TO BE CONSIDERED IN REVIEWING APPLICATIONS
FOR APPROVAL OF ROCK DRAIN DEVELOPMENT

July 2, 1991

- o General Setting
 - head of hollow fills
 - valley fills
- o Dimensions
 - area of drainage basin
 - upstream of inlet
 - upstream of toe
 - height of dump
 - total volume of waste
 - length of drain
 - dump/drain configuration at different development stages
- o Waste Rock Quality
 - strength/competence characteristics
 - susceptibility to physical disintegration or chemical decomposition
 - potential for undesirable leachates (e.g. acid rock drainage, heavy metals)
- o Dump Construction
 - upstream vs downstream method
- o Drain Construction
 - end dumping vs selective placement
 - procedures for selection of drain rock

- o Drain Rock Characteristics-
 - fragment gradation
 - void ratio
 - point loading
 - degree of segregation
 - degree of homogeneity
 - internal rates of weathering

- o Hydrological Factors
 - hydraulic conductivity
 - ability to safely pass Probable Maximum Flood (PMF)
 - creek gradient
 - piezometric levels in dump/drain and soil/bedrock
 - stream flow velocity vs drain flow velocity
 - projected flow attenuation

- o Dump/Drain Stability
 - design parameters
 - foundation conditions
 - operational configurations at various stages
 - closure configuration
 - height
 - slope
 - topographic breaks
 - potential for failures
 - shallow
 - deep-seated
 - effects of piezometric levels on stability

- o Inlet Design
 - upstream ponding potential
 - impacts of ice formation
 - impacts of dump failures
 - upstream sedimentation potential
 - protective measures

- o Outlet Design
 - impacts of dump failures
 - impacts of activating overflow channel
 - protective measures

- o Upstream Impacts
 - baseline conditions
 - water quantity-Q10, Q200, QPMF
 - water quality -stream chemistry
 - biological characteristics (include benthic invertebrates)
 - fisheries
 - impacts

- o Downstream Impacts
 - baseline conditions
 - water quantity -Q10, Q200, QPMF
 - water quality -stream chemistry
 - biological characteristics (include benthic invertebrates)
 - fisheries
 - morphological
 - wildlife
 - hydrological impacts
 - flow attenuation
 - increased scour potential due to loss of bedload
 - channel destabilization
 - impacts on other water users
 - land use impacts

- water quality impacts
 - increased nitrates (blasting residue)
 - increased suspended solids during construction
- other water quality degradation
- biological impacts
 - temperature changes
 - fish habitat degradation through scour or increased suspended solids
 - loss of biological productivity due to interception of organic debris by drain

o Fisheries and
Wildlife Impacts

- baseline conditions
 - fish populations/habitat
 - wildlife populations/habitat
 - both on-site and upstream/downstream
 - downstream morphology
- direct loss or reduction of fish habitat/populations
- direct loss or reduction of wildlife habitat/populations
- on-site and off-site mitigation strategies

- o Drain Failure Scenarios - potential modes of dump failure, related blockage scenarios
 - potential for drain spreading due to foundation failure, related blockage scenarios
 - reduced hydraulic capacity over time, related blockage scenarios
 - potential for additional environmental impacts due to dump failure
 - risks and consequences of catastrophic failure

- o Drain Blockage Evaluations- impact of lack of drain rock homogeneity, differential hydraulic capacities
 - reductions in drain flow velocity/capacity through time
 - effect of point loading on void ratio over time
 - impact of downward migration of fines
 - impact of foundation spreading
 - impact of dump failure during construction
 - impact of dump resloping at closure
 - impact of upstream inlet/downstream outlet blockage

- o Runout Analysis
 - impact on drain performance and stability
 - impact on downstream aquatic life
 - impact on wildlife habitat and populations

o Contingency Measures

- careful review, based on technical criteria in **Schedule A**
- "worst case" dump failure analysis
 - calculation of runout zones
 - environmental assessment in potential damage zones
 - assessment of risk to determine probability and consequences of failure.
- evaluation of role of protection structures
 - impact berms
 - settling ponds
 - other
- choice of overflow channel vs formal stream diversion where blockage occurs or may occur
- evaluation of alternative waste disposal/dump construction schemes to improve drain design
- contingency planning for rock drain abandonment and reclamation under various premature closure scenarios
- calculation of lead times available to detect/resolve failure/blockage problems
 - rate of upstream ponding
 - imminence of dump failure
 - reduction in drain capacity through time

- effective regulation during construction, closure and post-closure
 - inspection/enforcement
- bonding requirements
 - operational vs post-operational
 - funds for damage repair
 - funds for maintenance of protection structures (including post-closure maintenance)
 - funds for premature closure
 - post-closure monitoring
- monitoring to provide earliest possible notice of problems
 - dump/drain - operational
 - dump/drain - post-closure
- contingency planning in the event of a severe rock drain failure
 - notification process
 - resources available to manage an unforeseen failure
- research