

DECOMMISSIONING

A 1.1 What is it?

Decommissioning is the specific activity or process that begins after cessations of prospecting activities or mineral production and ends with tenement relinquishment. It includes issues such as the demolition of infrastructure, decontamination, make safe requirements for active mine areas making excavations, waste redepositories, safe and stable and rehabilitation. It also includes care and maintenance unto relinquishment of the tenement.

It has the broad objective of leaving the area in a safe and stable condition that is consistent with physical and social environment. Decommissioning is unique in terms of long-term effects on community and the environment.

A 1.2 Factors to be Considered

The process of decommissioning deals with a number of factors. When considering decommissioning the factors to be considered must include:

- § Resource demands and future land use
- § Community expectations
- § Corporate financial status.
- § Corporate environmental policy
- § Return of reclamation bond
- § Ecological Compatibility
- § Requirements of regulations
- § Property taxes on value of facilities
- § Potential as ongoing source of pollution
- § Due diligence protection of officers and directors
- § Public safety risks and hazards
- § Aesthetics
- § Terminate security and maintenance costs
- § Ongoing asset depreciation

A 1.3 Aspects

Aspects with respect to closure should be included in decommissioning. These aspects provide directions in decommissioning. Each part should fulfill the closure objectives.

The aspects are:

- § Rehabilitation of decommissioned sides and left in safe and stable condition.
- § Over the life of operation, review of rehabilitation and decommissioning strategies on periodic basis.
- § Determine rehabilitation and decommissioning costs and review of costs during the life of operation.
- § Review of strategies with respect to change in legislation, public expectations and environment and cultural heritage requirements.
- § Monitor and review of rehabilitation performance and progressive change in such plans according to requirement.
- § Address issues related to long-term responsibility for land management.
- § Program to identify progressive rehabilitation starting with the operation's nature and the rate of disturbance.

A 1.4 Benefits

Effective mine decommissioning can produce benefits. If proper planning and implementation are done through mine decommissioning then during and at the end of operation, the following benefits can be achieved.

- § Minimize impacts on local communities;
- § Provides basis for involvement of stakeholders;
- § Identifies area of high risk;
- § Reduces handling of waste materials;
- § Help in calculating rehabilitation costs;
- § Reduces handling of top soil;
- § Help in proper involvement of operations personnel in achieving rehabilitation outcomes;
- § Reduces ongoing responsibilities for the site;
- § Help in forming safe and stable ground;

- § Reduces liabilities through optimizing works during the productive phase of mining operations; and
- § Examine processes and design like site condition and allows scrutiny of outcomes.

A 1.5 Practice

Practice of Mine Decommissioning Principles is well described by considering six sub parts. They are: (a) Engagement of stakeholder, (b) Planning, (c) Financial provisions, (d) Implementation, (e) Standards and closure criteria and (f) Relinquishment.

A 1.5.1 Engagement of Stakeholder

For effective mine decommissioning, engagement of stakeholders is one of the most fundamental principles of decommissioning. The involvement is most effective when there is early involvement of stakeholders and it's continuation during the life of project.

Principles for engagement of stakeholder can be defined as follows (ANZMEC, 2000):

- § Stakeholder identification and the interested parties identifications is an important part of mine closure process.
- § Effective consultation encompasses all parties and should occur throughout the mine life.
- § Adequate resources should be allocated for the effectiveness of consultation process.
- § Work with communities to manage potential impact of mine closure.
- § A targeted communication strategy should reflect the needs of stakeholder groups and interested parties.

A 1.5.2 Planning

Decommissioning planning is an ongoing process throughout the life of mining operation to accommodate changes. Decommissioning planning starts as a conceptual closure plan and as the project develops more detailed plans are prepared. Principles for mine decommissioning can be defined as follows (ANZMEC, 2000):

- § Mine closure should be integral to the whole life of mine.
- § To reflect the status of project, closure plans should be prepared.
- § To ensure that closure is technically, economically and socially feasible, closure planning is required.

§ A risk-based approach of planning should reduce both cost and uncertainty.

§ To reflect changing circumstances, the dynamic nature of closure planning requires regular and critical review.

A 1.5.3 Financial Provisions

Effective decommissioning means minimizing the costs and maximizing the revenues. There should be sufficient funds available for mine closure and the closure costs should not become a burden to the mining company. For the protection of public interests and to minimize ongoing liabilities, most governments now prefer bonds. Cost related to decommissioning must be regularly reviewed to account for changes like: new research, developments, progressive rehabilitation, inflation, new approaches/ ways and social expectations.

The basic objective is to ensure that the cost is adequately represented in company and the community is not left with a liability through good management practice. In mine decommissioning, principles for financial provision are defined as follows (ANZMEC, 2000):

§ Real cost should be reflected through the financial provision.

§ From closure liabilities, the community should be protected through adequate securities.

§ To reflect change in circumstances, closure costs should be reviewed regularly.

§ From the closure plan, a cost estimate should be done for closure.

§ For the financial provision, accepted accounting standards should be the basis.

For maximizing revenues with respect to decommissioning, we have to conduct an assessment of the entire mine facility. This means each item should be classified through three categories. The categories are: asset, salvage material and waste. Asset items generate profit in comparison to salvage material, after the cost of recovery and reconditioning salvage material items do not justify reconditioning but have some profit. Waste materials are usually used for backfilling. Because, waste items cannot justify transport cost.

Before the end of operations, marketing program of asset should be done in order to shorten the time period after the end of operations. Reclamation work's performance can be achieved by the mine operator or third parties or contracted out wholly, the main

reasons behind performance are: the experience of operators and equipment used for a particular work.

For maximizing revenue, proper framework should be developed before commencement of work. This will also lower the reclamation cost. For cost to be lower for the mining company, some reasons are responsible. They are (Brodie, 1999):

- § Efficient use of equipment during operations can be done, if it can be rotated between mining and reclamation.
- § Mining companies have access, management infrastructure and support services in place.
- § For conducting reclamation work, mining companies does not add profit.
- § Equipment is owned and is an avail asset, which may otherwise sit idle, except for specialized equipment.
- § A mining company has experienced staff familiar with the site.

A 1.5.4 Implementation

Implementation of decommissioning plan is one of the practice principles. The main objective behind implementation is to ensure that there is adequate resources and accountability. For effective implementation of the plan the involvement of all employees, communication with all employees and work distribution are necessary things.

Successful implementation of decommission plan indicates:

- § Success of planned approach;
- § Sufficient human sources available;
- § Sufficient physical sources available;
- § Well performance achieved through employees;
- § Proper monitoring; and
- § Proper use of equipments involved.

In mine decommissioning, principles for implementation are defined as follows (ANZMEC, 2000):

- § To assure conformance with the closure plan, adequate resources must be provided.

- § For implementing the closure plan, a closure business plan including a schedule of actions, responsibilities, resources and timeframes should provide the basis.
- § The implementation of closure plan should reflect the status of operation.
- § The accountability for resourcing and implementing the closure plan should be clearly defined.
- § The ongoing management and monitoring requirements after closure should be assessed and adequately provided.

A 1.5.5 Standards and Closure Criteria

For successful completion of the closure process, a set of indicators is necessary. Main objective of standards and closure criteria is to establish the set of above indicators. Depending upon the environment and nature of operation with respect to site, standards of decommissioning should be developed. Both standards and closure criteria have flexibility towards change in circumstances. Proper standards should provide basis for measurement of performance.

For developing standards, consultation between regulatory authorities, the community and mining company should be necessary. In mine decommissioning, principles for standards and closure criteria are defined as follows (ANZMEC, 2000):

- § In making better and more informed decisions, targeted research will assist both government and industry.
- § To demonstrate successful rehabilitation of a site, an agreed set of indicators is required.
- § Legislation should provide a broad regulatory framework for the closure process.
- § Completion criteria are specific to the mine being closed and should reflect it's unique set of environmental, economic and social circumstances.
- § To develop standards that are both acceptable and transparent and achievable, it is in the interest of all stakeholders.

A 1.5.6 Relinquishment

Relinquishment indicates that stage when the company meets standards and completion criteria for mine decommissioning. It also indicates that the site is safe, stable and pose no danger to public health and allows a productive use of the land like its original use. A sufficient period should be required to demonstrate the stability of site, verification of

that for vegetation and ground water condition. To make the final decision for closure, an authority is required to be identified and held accountable.

In mine decommissioning, principles for relinquishment are defined as follows (ANZMEC, 2000):

- § To facilitate future land use planning, records of the history of closed site should be preserved.
- § Once the completion criteria have been met, the company may relinquish their tenement without further obligations.
- § To make the final decision on accepting closure, a responsible authority should be identified and held accountable.