

**IMERY'S REFRACTORY MINERALS
SOUTH AFRICA (Pty) Ltd
t/a
CAPE BENTONITE MINE**

**BENTONITE AND ZEOLITE PROSPECTING RIGHT
CLOSURE/REHABILITATION PLAN
for
ERF 2224
HEIDELBERG**

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1. INTRODUCTION

There is growing demand throughout the world to confront the issue of prospecting/mine closure and to create successful prospecting/mine closure systems as already, according to IIED (2002), the *pollution legacy* makes the sustainability of prospecting/mining activities difficult to achieve. Ideally, appropriate planning for closure of prospecting/mining operations should be performed during the feasibility, design and permitting phases of a prospecting/mining operation, and be improved during the operational life of the prospecting/mining activities (Mudder & Harvey, 1999). This approach has become the standard and is a required practice today. According to Robertson & Shaw (2005), there has been a global trend since the 80's towards '*Designing for Closure*', with environmental protection and closure measures being designed into existing prospecting/mine operations, and being mandatory for opening new prospecting/mine operations.

The lack of a complete or revised prospecting/mine closure plan can result in severe environmental and economic consequences. Inadequate closure activities, water management, and waste rock disposal plans have prompted unexpected and, in some instances, unwarranted secondary Environmental Impact Assessments (EIAs) (Mudder & Harvey, 1999). Therefore through prior and progressive planning and implementation of measures, the costs and impacts on the environment can be minimized.

Legislation governing prospecting/mining within South Africa has been in existence for many years and periodically undergoes review and amendment. The last major change was the enactment of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) ("MPRDA"). This law has national scope for the operation, prospecting and the governance of all minerals rights and has furthermore set the requirement of a closure plan to form part of prospecting/mining operations EMPR (Section 43 (3)(d)).

Eco Impact has been appointed to draft the closure plan. The MPRDA, Mineral and Petroleum Resources Development Regulations 56 to 62, outline the entire process of this prospecting/mine closure. The prospecting/mine right/permit holder has complied with all of these requirements and prepared:

- A closure plan (Regulation 62) (this plan);
- An environmental risk report (Regulation 60); and

Annual performance reports as well as a final performance assessment report (Regulation 55(9)) will be submitted to DMR on completion of the prospecting/mine operation and all the right/permit requirements.

2. A DESCRIPTION OF THE CLOSURE OBJECTIVES AND HOW THESE RELATE TO THE PROSPECTING OPERATION AND ITS ENVIRONMENTAL AND SOCIAL SETTING

Main closure/rehabilitation objective is to rehabilitate the proposed prospecting areas as according to previous agricultural potential and ensure that the final conditions of the site is environmentally acceptable and that there will be no adverse long term effects on the surrounding environment especially the indigenous vegetation areas and water resources.

Imerys Refractory Minerals South Africa (Pty) Ltd proposes to prospect cultivated agricultural land on Erf 2224 for potential viable bentonite and zeolite resources to be mined.

The ***proposed prospecting activities*** will entail the following phases:

- ***Phase 1 – Field Mapping and Surveying***

A qualified geologist will survey/explore the transformed cultivated areas on the proposed prospecting property by foot and map potential visible bentonite and zeolite outcrops. If such visible outcrops are found on the transformed cultivated areas of property the geologist will map these areas for potential sampling during phase 3.

- ***Phase 2 – Literature Review***

A qualified geologist will research known geological literature of the property and surrounds to assist in determining approximate location of viable bentonite and zeolite deposits on the transformed cultivated areas of the property.

After the completion of phases 1 and 2 the geologist will produce potential bentonite and zeolite deposits maps for the property which will serve as guidelines for the next phase which will entail drilling and sampling.

- ***Phase 3 –Drilling and Sampling***

Direct push sampler drilling and sampling – using the maps as produced by the geologist during phases 1 and 2 the geologist will determine which orebodies must be investigated further by direct push sampler drilling. This is conducted by the mining company itself and involves the use of a direct push sampler drill rig. The drill rig will push a stainless steel tube of 50-60cm long into the ground, once full it will bring it up and the sample will be taken out. This process will be carried out until bentonite is found or reaching the depth of around 6m. The hole will then immediately be rehabilitated by backfilling and a month later the site is revisited to determine if any the holes re-opened due to decompaction. The sampler holes will have the following maximum temporary footprints – Diameter 60mm; depth 6m = 3.6m³ overburden material produced by drilling to be backfilled immediately after sample has been taken. Samples would be collected according to the geology. Approximately 1000 sampler holes are proposed for the property, but final proposed direct sampler holes's amount will be determined during the completion of phases 1 and 2 therefore proposed direct sampler holes amount might increase or decrease.

Boreholes and sampling - following the results of the samples collected during the direct push sampler drilling, a qualified drilling contractor will be appointed by the mining company and under the guidance and supervision of the qualified geologist conduct the following drilling activities on the areas as identified by the geologist. Drilling involves using a rotary percussion drilling rig bringing samples to the surface in the form of chips. The drilled boreholes will have the following maximum temporary footprints - diameter 0.2m by 0.2m; depth 30m = 12 m³ maximum overburden material produced per borehole to be replaced immediately after sample has been taken. <1kg of sample material is collected by the geologist from each borehole for testing. The drilling samples collected are sent to the laboratory at the cape bentonite mine processing plant near Heidelberg and tested for specific properties to establish the quality of ore as well as determine approximate extension and volume of the available ore body. Approximately 60 drilling sections/lines with 3 boreholes each are proposed for the property = approximately 180 boreholes in total for the property, but final proposed boreholes amount will be determined during the completion of phases 1 and 2 and direct push sampler drilling results and the number of proposed drilling boreholes therefore might increase or decrease. In total only between 100- 200kg of sample material will be removed for further testing.

Rehabilitation – immediately (same day) following samples taken during drilling as described above the drilled material will be replaced and existing agricultural land contour structures will be reinstated. The disturbed prospecting areas will be monitored for signs of erosion for at least six months after sampling or until the landowner plants the lands (whichever comes first) and erosion rectification and prevention measures will be implemented as and if required. Alien invasive and weed vegetation monitoring and removal will be undertaken for at least a year after sampling on disturbed prospecting areas or until the landowner starts with the annual cultivation activities on the affected land (whichever comes first). This must be done by the applicant, landowner or their appointed contractor, using CapeNature approved methodology depending on the contract agreement that the applicant has with the landowner. Should any remaining indigenous vegetation and/or watercourse/wetland areas be impacted upon by the proposed prospecting activities a suitably qualified botanical and/or freshwater specialist must be appointed to assess the significance of the impacts and provide recommendations for rehabilitation/rectification. The specialist/s must provide a list of locally indigenous terrestrial and/or aquatic vegetation to be used during the rehabilitation of affected indigenous vegetation and/or watercourse/wetland areas as part of his/her assessment of the affected areas.

- ***Phase 4 – Sample Analysis***

<1kg of sample material is collected by the geologist from each borehole for testing. The samples collected are sent to the laboratory at the cape bentonite mine processing plant near Heidelberg and tested for specific properties to establish the quality of ore as well as determine approximate extension and volume of the available ore body.

- **Phase 5 – Maps, Reserve and Resource Modelling**

Maps will be produced showing the location, depth and extent of physical prospecting work, together with, sampling points and the lithology, mineral content and mineral distribution identified, relative to the prospecting area. Following the results of sample analysis conducted the geological reserve modelling is done by using SURPAC and AUTOCAD geological software to determine the grades and quantities of available bentonite and zeolite resources and produce the feasibility reports for the property as investigated/surveyed.

All significant environmental, cultural and socio-economic features applicable to the site were identified and informed the preferred activity, location and layout as proposed. The preferred prospecting activities, location and layout was assessed against the no go option of the site remaining as is.

3. A PLAN CONTEMPLATED SHOWING THE LAND OR AREA UNDER CLOSURE

Please refer to the maps under Appendix B of the Basic Assessment Report.

4. A SUMMARY OF THE REGULATORY REQUIREMENTS AND CONDITIONS FOR CLOSURE NEGOTIATED AND DOCUMENTED IN THE ENVIRONMENTAL MANAGEMENT PROGRAMME OR ENVIRONMENTAL MANAGEMENT PLAN

It is important to note that regulatory criteria are likely to change over time, and criteria selected for the purposes of closure planning during early operations, may not be applicable at the time of closure.

The following legislation and policies are applicable to prospecting/mining operations and final closure procedures:

- **Constitution of the Republic of South Africa (Act No.108 of 1996, Section 24)**

‘The environment must be protected for present and future generations through reasonable legislation and other measures that will prevent pollution and environmental degradation, promote conservation and will ensure ecologically sustainable development and sustainable use of natural resources while striving for justifiable economic and social development.’

- **National Water Act, 1998 (Act No. 36 of 1998): Section 19**

Section 9 of the Regulations on use of water for mining activities focuses on the temporary or permanent closure of mines or related activities. Section 9 (1) states ‘*any person in control of a mine or activity must at either temporary or permanent cessation of operations ensure that all pollution control measures have been designed, modified, constructed and maintained so as to comply with these regulations*’ and Section 9(2) states that the same mine ‘*...must ensure that the instream and riparian habitat of any water resource, which may have been affected or altered by a mine or activity, is remedied so as to comply with these regulations*’.

- **National Environmental Management Act, 1998 (Act No. 107 of 1998)**

Outlines the duty of care to prevent pollution. The polluter is liable for any rehabilitation costs and any damages caused by pollution as stated within the National Water Act, 1998.

- **Mine Health and Safety Act, 1996 (Act No. 29 of 1996)**

Section 2 (2) states that *'the owner of a mine that is not being worked, but in respect of which a closure certificate in terms of the MPRDA has not been issued, must take reasonable steps to continuously prevent injuries, ill-health, loss of life or damage of any kind from occurring at or because of the mine'*. Section 9 stipulates that a Code of Practice (CoP) is required for MRD. Provisions for rehabilitation and closure are made within these CoPs.

- **Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)**

Section 43 places an obligation on the holder of prospecting/mining related rights to apply to DMR for a closure certificate within 180 days of a prescribed event. The application must contain a risk assessment. Section 44 states that when a prospecting right, mining right, retention permit or mining permit lapses, is cancelled or is abandoned or when any prospecting or mining operation comes to an end, no buildings, structures and other objects are to be demolished or removed in terms of any other law (e.g. National Heritage Resource Act, 1999 (Act No. 25 of 1999)) or which have been identified in writing by the Minister.

- **National Environmental Management Air Quality Act, 2004 (Act 39 of 2004)**

Section 33 states that if mining operations are likely to cease within a period of five years, the owner of that mine must promptly notify the Minister in writing-

(a) of the likely cessation of those mining operations; and

(b) of any plans that are in place or in contemplation for-

(i) the rehabilitation of the area where the mining operations were

(ii) the prevention of pollution of the atmosphere by dust after those conducted after mining operations have stopped; and operations have stopped.

- **Conservation of Agriculture Resources Act, 1983 (Act No. 43 of 1983)**

In terms of the amendments to the regulations under this Act, landowners are legally responsible for the control of alien species and to handle storm water to prevent erosion on their properties and to protect agricultural resources.

- **Broad-Based Socio-Economic Empowerment Charter for The South African Mining Industry**

Section 4.1. Through the Mines Qualifications Authority (MQA), shall undertake to provide skills training opportunities to miners during their employment in order to improve their income earning capacity after mine closure.

The possible risk factors that could be considered in the risk report are the rehabilitation of the mining area and impacts on agricultural land. Therefore close attention will be paid to these factors during the operational life of the project. The Company is aware that the holder of the mining permit or right is liable for any and all environmental damage or degradation emanating

from the mining operation until a closure certificate is issued in terms of Section 43 of the MPRDA.

The principles for prospecting/mine closure in accordance with the applicable legislative requirements for prospecting/mine closure, the holder of a prospecting/mine permit/right must ensure that:

- the closure of prospecting/mining operations incorporates a process which must start at the commencement of the operation and continue throughout the life of the operation
- risks pertaining to environmental impacts must be quantified and managed pro-actively, which includes the gathering of relevant information throughout the life of a prospecting/mining operation
- the safety and health requirements in terms of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) are complied with
- residual and possible latent environmental impacts are identified and quantified
- the land is rehabilitated, as far as is practicable, to its natural state before prospecting/mining operations commenced, which conforms with the concept of sustainable development; and
- prospecting/mining operations are closed efficiently and cost effectively.

5. A SUMMARY OF THE RESULTS OF THE ENVIRONMENTAL RISK REPORT AND DETAILS OF IDENTIFIED RESIDUAL AND LATENT IMPACTS

The environmental risk report involves carrying out a screening level environmental risk assessment where all possible risks are identified and qualitatively ranked. During closure phases of the prospecting/mining operations a higher level risk assessment should be implemented on those risks identified in this process.

See Basic Assessment Report and EMPr for detailed potential impact risk assessments conducted.

Summary of Impacts Identified for the Proposed Prospecting Activities on an area of ±208ha of Cultivated Agricultural Land:

All significant environmental, cultural and socio-economic features applicable to the site were identified and informed the preferred activity, location and layout as proposed. The preferred prospecting activities, location and layout was assessed against the no go option of the site remaining as is.

Prospecting Drilling and Borehole Phase

The potential impacts rated as medium negative before mitigation measures are implemented and as low negative after mitigation measures are implemented include potential impacts of/on – Increased dust levels; Potential erosion of the site and surrounds due to proposed prospecting activities along steep slopes; Prospecting activities can result in increased sediment

loads in water resources; Impact of proposed prospecting activities on terrestrial indigenous vegetation areas as associated with mapped terrestrial CBAs and ESAs; Impact of proposed prospecting activities on secondary-, primary drainage lines and man-made dams with associated wetland characteristics and aquatic vegetation as associated with mapped NFEPA's and aquatic CBAs and ESAs; Waste from chemical toilets and litter; Hydrocarbon spill; Fire; Increased traffic due to the prospecting activities requiring various vehicles to come onto and leave the site; Prospecting on agricultural land.

The potential impacts rated as low negative before and after mitigation measures are implemented include potential impacts of/on – Emissions; Impact on the naturally occurring fauna and avifauna present in the area; The potential impact of the proposed prospecting activities on archaeological, paleontological and heritage remains; Noise due to machinery and people on site; A negative visual impact due to the creation of excavation pits/trenches.

Potential positive impacts during this phase include – Discovering and confirmation of viable bentonite and zeolite deposits on transformed cultivated agricultural land which may in turn lead to sustained jobs and other socio-economic benefits to the local landowners and communities if mining rights for the discovered deposits are obtained.

All the potential impacts can be mitigated to a potential low negative significance by implementing the mitigation measures as included and described in the EMP and specialist report.

Closure/Rehabilitation Phase

The potential impacts rated as medium negative before mitigation measures are implemented and as low negative after mitigation measures are implemented include potential impacts of/on – Potential erosion of the site and surrounds during rehabilitation phase; Introduction of alien and weed plant species during rehabilitation.

Potential positive impacts during this phase include – Rehabilitation of agricultural land to be used for agricultural cultivation and livestock grazing as per previous land use.

It was concluded by the EAP that the proposed development will not have a significant negative environmental impact if proposed mitigation measures are implemented and it was recommended that the Environmental Management Programme be adhered to accordingly.

6. A SUMMARY OF THE RESULTS OF PROGRESSIVE REHABILITATION TO BE UNDERTAKEN

There are three main categories of rehabilitation for the *after-use* of land that will be sustainable in the long term (Robinson & Shaw, 2005):

Walk-away status: there are no remaining residual constraints on the future land use after rehabilitation has been performed and no additional monitoring or maintenance requirements.

Passive care: there is minimal need for monitoring and infrequent maintenance of noncritical structures.

Active care: requires regular operations, monitoring and maintenance of the site that is not typical of normal land management practices. There may be permanent constraints on the beneficial use of the land, such as high metal concentrations.

Rehabilitation for the specific site will occur by means of passive care. However the ultimate objective would be to reach *walk-away status* after a closure certificate has been issued.

The prospecting operator is responsible to rehabilitate the prospecting area in terms of the contract entered into with the landowner. The contract entails removal of all manmade structures and equipment, with the entire area then to be rehabilitated to be used for agricultural activities such as cultivation and livestock grazing as per previous land use.

7. A DESCRIPTION OF THE METHODS TO DECOMMISSION EACH PROSPECTING COMPONENT AND THE MITIGATION OR MANAGEMENT STRATEGY PROPOSED TO AVOID, MINIMIZE AND MANAGE RESIDUAL OR LATENT IMPACTS

During the decommissioning and closure phases consideration of the following is essential (Robertson & Shaw, 2005):

- Physical stability – prospecting area and access road must be stable so as to eliminate any hazard to the public health and safety or material erosion to the terrestrial or aquatic receiving environment at concentrations that are harmful. Engineered structures must not deteriorate and fail.
- Surface waters and groundwater must be protected against adverse environmental impacts resulting from prospecting activities.
- Land use - the closed prospecting site should be rehabilitated to pre-prospecting conditions or conditions that are compatible with the surrounding lands.

Main closure/rehabilitation objective is to rehabilitate the proposed prospecting areas as according to previous agricultural potential and ensure that the final conditions of the site is environmentally acceptable and that there will be no adverse long term effects on the surrounding environment especially the indigenous vegetation areas and water resources.

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- **Phase 2 – Literature Review**

A qualified geologist will research known geological literature of the property and surrounds to assist in determining approximate location of viable bentonite and zeolite deposits on the transformed cultivated areas of the property.

After the completion of phases 1 and 2 the geologist will produce potential bentonite and zeolite deposits maps for the property which will serve as guidelines for the next phase which will entail drilling and sampling.

- **Phase 3 –Drilling and Sampling**

Direct push sampler drilling and sampling – using the maps as produced by the geologist during phases 1 and 2 the geologist will determine which orebodies must be investigated further by direct push sampler drilling. This is conducted by the mining company itself and involves the use of a direct push sampler drill rig. The drill rig will push a stainless steel tube of 50-60cm long into the ground, once full it will bring it up and the sample will be taken out. This process will be carried out until bentonite is found or reaching the depth of around 6m. The hole will then immediately be rehabilitated by backfilling and a month later the site is revisited to determine if any the holes re-opened due to decompaction. The sampler holes will have the following maximum temporary footprints – Diameter 60mm; depth 6m = 3.6m³ overburden material produced by drilling to be backfilled immediately after sample has been taken. Samples would be collected according to the geology. Approximately 1000 sampler holes are proposed for the property, but final proposed direct sampler holes's amount will be determined during the completion of phases 1 and 2 therefore proposed direct sampler holes amount might increase or decrease.

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- ***Phase 4 – Sample Analysis***

<1kg of sample material is collected by the geologist from each borehole for testing. The samples collected are sent to the laboratory at the cape bentonite mine processing plant near Heidelberg and tested for specific properties to establish the quality of ore as well as determine approximate extension and volume of the available ore body.

- ***Phase 5 – Maps, Reserve and Resource Modelling***

Maps will be produced showing the location, depth and extent of physical prospecting work, together with, sampling points and the lithology, mineral content and mineral distribution identified, relative to the prospecting area. Following the results of sample analysis conducted the geological reserve modelling is done by using SURPAC and AUTOCAD geological software to determine the grades and quantities of available bentonite and zeolite resources and produce the feasibility reports for the property as investigated/surveyed.

All significant environmental, cultural and socio-economic features applicable to the site were identified and informed the preferred activity, location and layout as proposed. The preferred prospecting activities, location and layout was assessed against the no go option of the site remaining as is.

It was concluded by the EAP that the proposed development will not have a significant negative environmental impact if proposed mitigation measures are implemented and it was recommended that the Environmental Management Programme be adhered to accordingly.

8. DETAILS OF ANY LONG-TERM MANAGEMENT AND MAINTENANCE EXPECTED

Ideally, a properly designed and executed rehabilitation plan will leave the prospecting area in a condition requiring no continuing, long-term maintenance to achieve an enduring, high quality environment. The prospecting right holder commits to post-closure maintenance during rehabilitation of the site and until the time of receipt of a closure certificate for all or parts of the prospecting area. Long-term care will include maintenance of all storm water contour infrastructures and clearing of weed and alien vegetation species until the next ploughing/cultivation season. Thereafter, the responsibility for the ongoing maintenance and monitoring of the site will rest with the landowner.

Management and maintenance is expected to continue until the next ploughing/cultivation season after the closure certificate is issued. Maintenance will be focused on erosion prevention and removal of weed and alien vegetation species on the prospecting area.

Monitoring should be undertaken for duration of the excavation/drilling/trenching phase. Internal audits and inspections should be undertaken at least monthly. External audits by a qualified ECO should be undertaken on a 3 monthly basis during excavation/drilling/trenching phase and 6 monthly during rehabilitation phase until successful rehabilitation has been achieved or until the impacted areas are ploughed/cultivated for the next crop planting season (whichever comes first). Reports should be made available to the Competent Authority if required in the form of an annual performance report.

9. DETAILS OF A PROPOSED CLOSURE COST AND FINANCIAL PROVISION FOR MONITORING, MAINTENANCE AND POST CLOSURE MANAGEMENT

Refer to Prospecting Work Programme under Appendix D of the Basic Assessment Report for a summary of proposed financial rehabilitation provisions.

10. A SKETCH PLAN DRAWN ON AN APPROPRIATE SCALE DESCRIBING THE FINAL AND FUTURE LAND USE PROPOSAL AND ARRANGEMENTS FOR THE SITE

Refer to Appendix B of the Basic Assessment Report for detailed maps of the proposed prospecting areas to be rehabilitated.

11. A RECORD OF INTERESTED AND AFFECTED PERSONS CONSULTED

Registered Interested and Affected Parties and key departments will be afforded a 30 day comment period on the Draft Basic Assessment Report, EMP and Closure/Rehabilitation Plan. The comments are recorded and the EAP (specialists) respond to the comments and compile the comments and response report where after it is submitted to DMR for a decision.

12. REFERENCES

IIED (2002). *Research on Mine Closure Policy*. Mining, Minerals and Sustainable Development Project. Report Number 44. International Institute for Environment and Development (IIED).

Mudder, T & Harvey, K (1999). *Closure Concepts*. Mineral Resources forum. UNEP, 1999.

Robertson & Shaw (2005). *Mine Closure*. Robertson GeoConsultants Inc. www.infomine.com. Date Accessed 2005.