

**WASTE MANAGEMENT PLAN
VALENCIA URANIUM PROJECT
JANUARY 2008**

VALENCIA URANIUM LIMITED



COMPILED BY

DIGBY WELLS & ASSOCIATES



Environmental Solutions Provider

Prepared By :
Digby Wells & Associates
Environmental Solutions Provider
Private Bag X10046,
Randburg, 2125,
South Africa
Tel : +27 (11) 789-9495
Fax : +27 (11) 789-9498
E-Mail : info@digbywells.co.za



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1 INTRODUCTION

Valencia Uranium Limited, a wholly owned subsidiary of Forsys Metals Corp, listed on both the Canadian and Namibian Stock Exchanges, is currently conducting feasibility studies for the development of the Valencia Uranium Mine in central, west Namibia. The proposed Mine Site is located in the Erongo region, east of the B2 highway between Windhoek and Swakopmund, approximately 80km inland from Swakopmund in straight-line distance.

The feasibility studies include an Environmental Impact Assessment (EIA) and associated Environmental Management Plan (EMP). In order to facilitate effective environmental management and minimise the impact of the proposed Mine, this Waste Management Plan has been developed to enhance the recommendations contained in the EIA and EMP.

This Waste Management Plan (WMP) is a working document, providing a guideline for handling waste. It will be necessary to review and revise the WMP, once the construction activities and contractors, with the respective waste streams have been determined. Similarly, a revision will be necessary for the operational phase and thereafter an annual review should be conducted. Should there be substantial process or input changes, interim reviews and revisions may be required.

2 BRIEF PROJECT OVERVIEW

Valencia Uranium is located on the privately owned Farm Valencia (No. 122), situated on the eastern side of the Khan River and about 25 km to the north-east of the Rössing Uranium Mine, Valencia is approximately 75 km south-west of the town of Usakos in central-west Namibia. The extent of the area covered by the Exclusive Prospecting Licence (EPL) 1496 is approximately 700 hectares.

According to Snowden (2007), a total mining reserve of 116.8Mt at a grade of 0.119kg/t U_3O_8 has been estimated for the Valencia deposit. Approximately 122.4Mt of waste material will be removed over the life of the mine. The final pit dimensions are estimated at 360m deep, 1,400m long and 700m wide (Snowden, 2007). As the uranium ore body is shallow and exposed at certain localities, it will be mined using open-pit methods. The run of mine (ROM) is estimated at 1,080,000t per month. The expected life of mine is 11 years.

The ore will be processed on site utilising the following processing unit operations:

- Crushing, radiometric sorting and screening
- Secondary crushing and rotary mill



- Leaching

- Vacuum filtration and washing

- Continuous ion exchange

- Solvent extraction and ammonium diuranate recovery

- Filtration

- Calcinations

Activities that will be associated with the mining and processing of ore will include the creation of a tailings and waste rock dumps, the temporary stockpiling of low grade ore, the construction of offices, the construction and operation of haul roads, the construction and operation of an acid plant, the construction of a water reservoir and the proposed development of a road and water pipeline through the Khan River. Power will be supplied by NamPower from the National grid, with emergency diesel generated power on site. As the power line will be the property of NamPower, and not Valencia Uranium Limited, waste generated from the construction and operation of these lines has not been included in this Management Plan.

3 WASTE MANAGEMENT STRATEGY AND OBJECTIVES

For the purpose of the Waste Management Plan waste can be defined according to the Namibian Environmental Management Act No. 7 of 2007, section 5 as:

any matter, whether gaseous, liquid or solid or any combination thereof, which is from time to time listed by the Minister by notice in the Gazette or by regulation as an undesirable or superfluous by-product, emission, residue or remainder of any process or activity. This may include matter:

1. Discarded by any person,

2. Accumulated and stored with the purpose of eventually discarding it, with or without prior treatment, or

3. Stored with the purpose of recycling, re-using or extracting a usable product from such matter.



The construction, operation and decommissioning of Valencia Uranium Mine will result in the generation of liquid, solid and gaseous waste streams. The WMP only addresses liquid and solid waste management. Gaseous emissions, control and monitoring will be addressed in the Air Quality Impact Assessment Report (see Appendix E).

3.1 Waste Management Strategy

Valencia will apply the polluter pays principle where the financial burden for the management of waste is borne by the generator of that waste. The principal strategy will be to reduce waste at source; this will initially be implemented with the selection of supplied materials and subsequently with source reduction on site. Where waste generation is unavoidable, appropriate technologies will be used to recycle or reuse waste materials and where this is not possible, disposal by landfill will be necessary.

This internationally accepted principal of waste management hierarchy is illustrated in Figure 1:

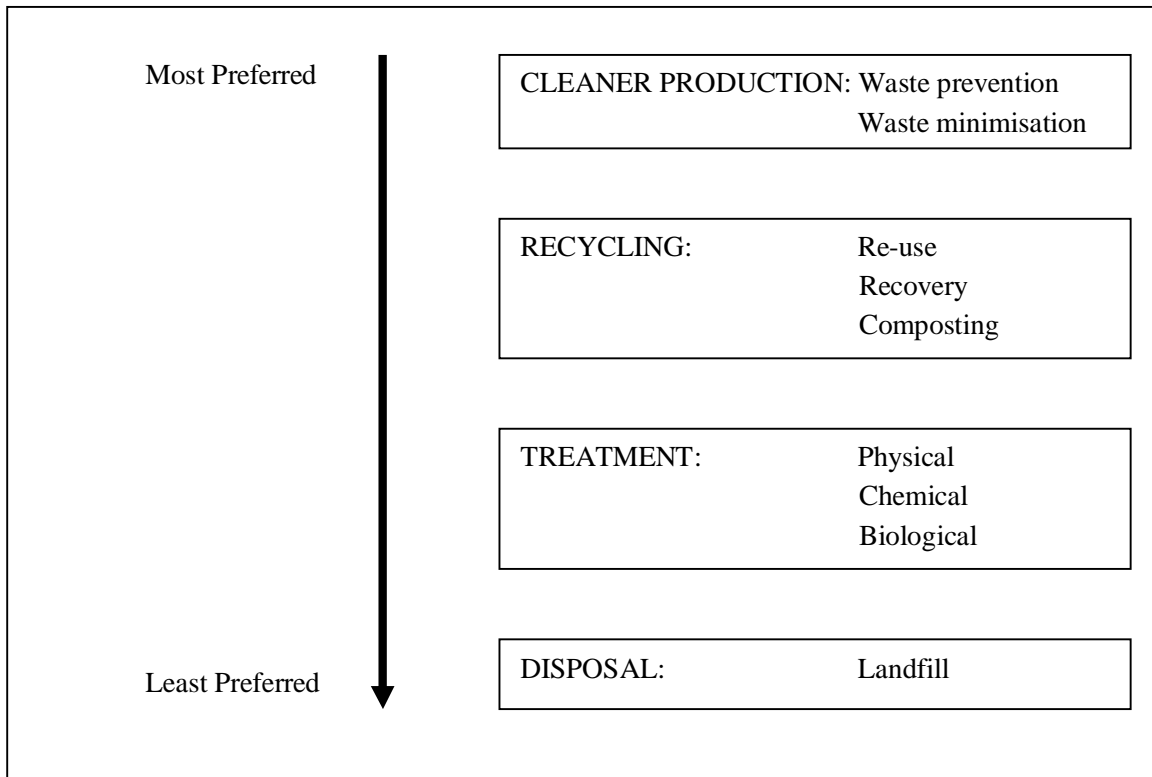


Figure 1: Hierarchy of waste management (Anon., 2004).

3.2 Waste Management Objectives

The implementation of the WMP is intended to achieve the following objectives:



- Comply with Namibian legislation (Section 3.3).
- Comply with International Best Practise.
- Identify the sources of waste associated with the various phases of the Project.
- Categorise the waste streams.
- Prevent pollution by minimising waste, substituting hazardous materials with non-hazardous materials, optimising container usage and recycling.
- Determine appropriate disposal methodologies for waste that can't be prevented or recycled.
- Ensure waste management awareness among employees and contractors.
- Assign responsibility for implementing and enforcing the WMP.
- Describe monitoring measures.

3.3 Relevant Legislation

The following Namibian policies and Acts are applicable to the handling, storage and disposal of waste:

- *Environmental Assessment Policy for Sustainable Development and Environmental Conservation, August 1994 (Cabinet Resolution 16.8.94/0021995)*. In terms of clause 3 there is an acknowledgement of the need to incorporate adequate provisions to achieve “reduction-at-source” in the areas of pollution control and waste management.
- *Environmental Management Act No. 7 of 2007, Section 5* regulates waste management by prohibiting the discard of waste in any manner other than at a disposal site declared or approved by the Minister or by means of a facility or method that may be subject to such condition as the Minister may prescribe. Any person who is convicted for not complying with these requirements may be liable for a fine not exceeding N\$500,000 or to imprisonment for a period not exceeding 25 years or to both imprisonment and fine.
- A draft Integrated Pollution Control and Waste Management Bill has also been compiled, dealing with the management, reduction and disposal of both general and hazardous waste. This bill has not yet been promulgated and as waste management is covered in the newly gazetted Environmental Management Act, there is a probability that it will not be promulgated (Envirolex Namibia, 2007).



4 ACCOUNTABILITY AND RESPONSIBILITY FOR THE PLAN

All personnel on site will be responsible for the correct disposal and handling of waste. It will also be the responsibility of all personnel to report any shortcoming in the waste handling on site in order to minimise potential impacts.

The overall responsibility for the Waste Management Plan will sit with the Engineering Manager during construction and the General Manager during operation. Implementation of the plan will be undertaken by the environmental management function within Valencia Uranium Limited. Although Valencia Uranium Limited will ultimately be responsible for waste management, it will also be the responsibility of all engineering, procurement and construction (EPC) contractors to adhere to the plan and the specific requirements, such as the return of waste oil and oil drums that will be included in their respective contracts.

Reviews of the WMP will be conducted by the Environmental Manager, or specialist consultants appointed by the Manager, with any revisions approved by the Valencia Uranium Limited Management Committee.

Records of the waste generated by Valencia Uranium Limited will be maintained, whether the waste is recycled or disposed. The volumes of tailings and waste rock will be recorded by the Mining Manager, with dump volumes and storage capacity confirmed, as required, by surveys. All other waste records will be maintained by the Environmental Manager. The maintenance of waste records will enable the assessment of the efficacy of waste minimisation strategies.

5 MATERIALS INVENTORY, CLASSIFICATION AND HANDLING

5.1 Construction Phase

5.1.1 Waste inventory

Table 1 lists the waste types expected during the construction phase, with their class and expected destination. The Material Safety Data Sheets (MSDSs) for any new substances purchased need to be supplied to the Environmental Manager to enable the waste classification of any waste that may arise from the use of the substances. This list will require revision and updating once construction contractors have been appointed and activities defined.

Table 1: Waste inventory, class and waste destination

| Description | Class | Destination |
|-----------------------|---------|--------------------------------|
| <i>Solid Waste</i> | | |
| Waste concrete | General | Rock dumps |
| Uncontaminated rubble | General | Rock dumps |
| Domestic waste | General | On site general waste landfill |
| Waste food | General | On site general waste landfill |



| Description | Class | Destination |
|---|-----------|------------------------------------|
| Conveyor off-cuts and other rubber products | General | Recycling off site by supplier |
| Small quantities (< 1m ³) of spill absorbent | General | On site general waste landfill |
| Containers of non-hazardous materials | General | On site general waste landfill |
| Wood, particularly pallets and packaging crates | General | Sale/distribution Arandis & Usakos |
| Crystallised salts from brine ponds | General | On tailings dump |
| Concrete and rubble contaminated by hydrocarbons | Hazardous | Off site hazardous waste site |
| Concrete and rubble contaminated with radiation | Hazardous | Rock dumps |
| Empty hazardous material containers e.g. oil, grease, paint, thinners | Hazardous | Off site hazardous waste site |
| Circuit boards/electronic equipment | Hazardous | Off site hazardous waste site |
| Fluorescent light bulbs | Hazardous | Off site hazardous waste site |
| Medical waste | Hazardous | Off site hazardous waste site |
| Ni-Cd batteries | Hazardous | Recycling off site |
| Pb acid vehicle batteries | Hazardous | Recycling off site |
| Oil rags, clothes | Hazardous | Off site hazardous waste site |
| Oil Filters | Hazardous | Off site hazardous waste site |
| Large quantities (> 1m ³) of spill absorbent | Hazardous | Off site hazardous waste site |
| Aerosol cans | Hazardous | Off site hazardous waste site |
| Radioactive waste | Hazardous | Store on site |
| | | |
| <i>Liquid Waste</i> | | |
| Treated sewage effluent | General | Re used on site |
| Brine from reverse osmosis (RO) plant | General | Re used on site |
| Raw sewage | Hazardous | Wastewater treatment plant on site |
| Sewage sludge | Hazardous | On site digestion or landfill |
| Waste paint and solvent | Hazardous | Off site hazardous waste site |
| Waste oil | Hazardous | Recycling off site by supplier |

5.1.2 Potential impacts

Potential impacts due to poor waste management during the construction phase include:

- Soil contamination due to hydrocarbon or chemical spills.
- Contamination of drainage lines and water courses due to spillages.
- Degradation of biophysical environment due to uncontained general and/or hazardous waste.
- Deterioration in aesthetic quality of the area due to litter.

5.1.3 Waste handling

Waste will be characterised and sorted at source according to type, generation rate and disposal methods. Adequate receptacles will be provided at the source of generation. All waste will be handled in accordance with its class (hazardous or general) and all personnel collecting, handling,



transporting, or disposing of waste will be trained in the correct procedures for dealing with the respective waste types.

Waste will be contained in appropriately labelled containers (skips, bins, drums) that will specify the waste class. The containers will be appropriately designed to store liquid, solid, hazardous or general waste and different waste types or classes will not be mixed.

5.1.4 Waste storage and disposal

Waste will be collected from the generation source and taken to a central sorting and storage yard. Here waste will be further sorted into the respective class and type and allocated for further re-use, recycling or disposal. Should it not be possible to separate hazardous and general waste, the entire load will be classed as hazardous. The sorting and storage yard will be:

- Fenced to prevent access of livestock and wildlife,
- Suitably bunded to contain leaks and spills,
- Designed with an appropriate concrete flooring,
- Covered, where necessary, to prevent wind dispersion of waste material.

In addition to the above, hazardous waste storage areas will be clearly demarcated and marked and will have the following precautionary measures:

- Fire fighting equipment,
- Cleaning equipment and a system for flushing containers and receptacles,
- Sufficient quantities of spill absorbent to contain and collect any spilled or leaked waste.

Where necessary, hazardous waste will be kept in sealed containers; at the minimum the containers will be watertight. Hazardous waste will be removed from site and disposed of in an approved hazardous waste site in either Windhoek (Kupferberg Landfill), or Walvis Bay. The removal and disposal of hazardous waste will be contracted to a reputable waste management contractor, who will also be responsible for the on-site waste handling and the storage yard.

General waste will be disposed of in a landfill on site. The landfill will be fenced to prevent unauthorised access, suitably lined, either with clay or high density polyethylene (HDPE), and the waste regularly covered to prevent the wind dispersion of waste. Due to the arid environment and low rainfall, leaching from the site is not expected and it is, therefore, not necessary to have a leak interception layer, beneath the liner, with drains to water monitoring manholes. Sporadic storm events due however occur, causing surface run-off. A stormwater drainage system should thus be installed around the site. This will involve the design of an upslope diversion drain to



divert clean water around the landfill and into natural drainage lines. All water falling on the site will be contained, or directed to a pollution control dam.

5.1.5 Waste Transport

As stated above, waste will be transported on site as well as to the appropriate off-site disposal facilities by a reputable contractor. The following will, however, be applicable:

- The nature, composition and integrity of transport packaging and containers will be appropriate to the type and class of waste being transported.
- Transport vehicles will cater for the type, class and quantity of waste being transported in terms of composition, load capacity and covering.
- Loading and unloading procedures to avoid waste spills will be followed.
- Drivers and operators will be trained in the correct procedures to address accidents and emergencies.
- All transport vehicles will be equipped with suitable materials or equipment to contain, manage and remove accidental spills.
- Vehicles transporting hazardous waste shall be labelled appropriately.

5.1.6 Waste Treatment

The only waste treatment that will occur on site will be the treatment of sewage. A wastewater treatment works will be constructed on site. Water will be treated to a level that is suitable for non-potable re-use. Should wastewater sludge production be unavoidable, the sludge will either be used as a soil conditioner in rehabilitation programmes or disposed in the general waste landfill. Should it be disposed in the landfill, it will require drying in suitably designed drying beds before disposal. Low maintenance, biological treatment technologies exist that will greatly reduce sludge production and provide disinfected final effluent for re-use, without the use of chlorination or other typical chemical disinfection techniques. These alternatives will be investigated and a suitable treatment technology selected.

5.1.7 Recycling and Re-use

As the Project is situated in an extremely arid, water scarce area, the objective will be to have zero discharge of wastewater. All effluent water will be re-used, either with, or without treatment depending on its source. Once the process plant and tailings dump designs, as well as operation methodologies, have been finalised, a Water Management Plan will be compiled that will address the recycling of water in more detail.



Brine from the RO plant could be used for dust suppression, however, if monitoring reveals that this is causing salination of soils, the brine shall be evaporated in lined evaporation ponds and the crystallised salts disposed of on the tailings dump.

A portion of the waste generated on site will be suitable for re-use and recycling and shall be managed accordingly. This will apply to the following waste streams:

- Oil separators will be installed at all workshops and oil storage facilities to enable the recovery of oil. Recovered oil, used waste oil and empty oil drums will be returned to the suppliers for recycling.
- Plastic or glass containers will be re-used wherever possible.
- Scrap metal will be removed by the EPC contractors for recycling off site.
- Packaging timber will be sold or given away to local entrepreneurs in nearby communities, preferably Arandis or Usakos.

5.1.8 Radioactive Waste

There are currently small volumes of radioactive waste generated on site, which will continue through into the construction phase and possibly increase in volume. Decontamination facilities are unlikely to be commissioned before operations begin and, as there are no suitable hazardous waste sites in Namibia, this waste will be stored on site in the hazardous waste storage area within the central sorting yard. The waste will then be handled together with the radioactive waste generated during operation (section 5.2.3).

5.1.9 Responsibility and accountability

The EPC contractors will be responsible for source minimisation and recycling, where relevant, of materials within their control. The Engineering Manager will ultimately be responsible for the EPC contractors' compliance to their waste management commitments that will be stipulated in their contracts. Disposal on-site and removal of hazardous waste shall be the responsibility of the Environmental Manager, although specialist waste management contractors will carry out the waste handling.

5.2 Operation phase

Although the volumes and source of waste discussed under the construction phase will change during operation, the waste types should be similar and the majority of those listed in Table 1 will continue to be generated throughout the life of mine. The management measures described above for these wastes will therefore also apply for operation. Review of the Management Plan after construction may result in an amendment to the waste streams and associated management plans.



As for construction, the MSDSs for any new substances purchased needs to be supplied to the Environmental Manager to enable the waste classification of any waste that may arise from the use of the substances.

Notwithstanding the discussion above, the section below addresses the management of the additional waste, listed in Table 2, that will be generated during operation.

Table 2: Additional waste streams generated during operation, not listed in Table 1.

| Description | Class | Destination |
|--|-----------|--|
| <i>Solid Waste</i> | | |
| Radioactive scrap | Hazardous | On-site decontamination before sale |
| Radioactive rubble | Hazardous | Waste rock dump |
| Waste rock | N/A | On-site waste rock dump |
| Tailings | N/A | On-site tailings dump |
| Tyres | General | Removal from site by contractor/buried in waste rock dump. |
| Radioactive solids from decontamination facility | Hazardous | Tailings dump |

5.2.1 Waste rock and tailings

Both these waste streams will be discarded on site. The design and operation of these facilities will form separate reports compiled by the respective engineering consultants specialising in this field but should be referred to in conjunction with the WMP or incorporated into the WMP once finalised.

Should used tyres not be removed by the suppliers for recycling off site, these will be buried within the waste rock dump.

5.2.2 Recycling and re-use

As for the construction phase, all recyclable material will be removed from site by the respective supplier for recycling or sold directly by Valencia Uranium Limited. Caution is, however, required, for the handling of scrap that may be contaminated by radiation (section 5.2.3).

5.2.3 Radioactive Waste

In the absence of any radioactive waste management policy for Namibia, the South African Department of Minerals and Energy's (DME) Radioactive Waste Management Policy and Strategy for the Republic of South Africa (2005) should be referred to for guidelines on the handling of radioactive material.

The following IAEA safety series standards should also be consulted:

- The Principles of Radioactive Waste Management (IAEA, 1995).



- Management of Radioactive Waste from the Mining and Milling of Ores (IAEA, 2002).
- Storage of Radioactive Waste, Safety Guide No. WS-G-6.1 (IAEA, 2006).

The DME follows the guidelines of the International Atomic Energy Agency (IAEA) for the classification and definition of radioactive waste. According to this definition (DME, 2005):

Radioactive waste for legal and regulatory purposes may be defined as material that contains or is contaminated with radio-nuclides at concentrations or activities greater than clearance levels as established by the regulatory body and for which no purpose is foreseen. (It should be recognised that this definition is purely for regulatory purposes and that material with activity concentrations equal to or less than clearance levels is radioactive from a physical viewpoint, although the associated radiological hazards are negligible).

5.2.3.1 Radioactive Waste Management Principles

The IAEA (1995) outlines nine principles of radioactive waste management:

1. Protection of human health.
2. Protection of the environment.
3. Protection beyond national borders.
4. Protection of future generations.
5. Burdens of future generations.
6. National legal framework.
7. Control of radioactive waste generation.
8. Radioactive waste generation and interdependencies.
9. Safety of facilities.

Valencia Uranium Limited will not be directly accountable for two of these nine principles i.e. protection beyond National borders and National legal framework. These will be the responsibility of the Namibian authorities. The proposed Development will, however, be required to comply with any regulation imposed by the Authority. The remaining seven principles will all be applicable to the management of radioactive waste on site.

There are a number of radioactive waste management options; those relative to mining include (DME 2005):



- Regulated disposal.
- Authorised disposal/discharge.
- Authorised re-use/recycling.
- Regulated storage.
- Clearance.

Many of the radioactive waste management guidelines are consistent with general waste management strategies such as the waste management hierarchy and the polluter pays principle. There are, however, a number of aspects that are considered by both the IAEA and the DME that are more specific to radioactive waste. One of which is that the waste management options of future generations should not be limited by current actions. Radioactive waste disposal should therefore provide for a defined period during which the retrieval of material is possible (IAEA, 2002; DME, 2005). Measures aimed at achieving retrieval should not, however, compromise the operation and long-term safety of disposal (DME, 2005).

5.2.3.2 *Radioactive storage and disposal*

Any scrap that may be identified for recycling will require decontamination by high pressure washing in specially constructed wash bays where the water is recycled and the radioactive solids are trapped and retained. The radioactive solids will be disposed of in the tailings dump. Should chemical decontamination baths be used, the waste chemicals will need to be contained in suitable drums for safe disposal at an approved site. The only contaminated items that will resist decontamination are likely to be rubber and plastic items which will have to be disposed of as radioactive wastes.

The waste generated during mining is considered low activity by the DME (2005) and may be disposed of in a sufficiently confined area such as a tailings or waste rock dump.

As no radioactive waste site currently exists in Namibia, material that cannot be decontaminated will have to be stored indefinitely on site or disposed of in the waste rock or tailings dumps. The radioactive storage area will have to comply with the requirements of a hazardous waste site as outlined in section 5.1.4.

A radioactive waste inventory will be maintained and regular reports sent to the National Regulatory Authority.

5.2.4 *Centralised Waste Storage and Disposal*

The IAEA (2006) recommends that centralised radioactive waste storage facilities be considered as this prevents many small scattered facilities that are difficult to control. It also has advantages



of economy of scale. This point also applies to general wastes sites and an opportunity exists for Valencia Uranium Limited to collaborate with the other mining projects in the region to establish centralised waste facilities. This will not only allow for more stringent waste management control, with reduced cumulative effects, but could also provide business and employment opportunities in a town such as Arandis, where unemployment is high.

5.2.5 Accountability and responsibility

Ultimate accountability for any non-compliance with the WMP will rest with the General Manager, although the implementation will be performed by the Environmental Manager. The Mining and Metallurgical Managers will be responsible for the operation of the waste rock dumps and tailings dump, respectively.

5.3 Closure phase

The closure phase should not generate any additional waste types, not covered in the sections above, although the volumes of the various waste streams will change dramatically, e.g. tailings generation will cease, but there will be large volumes of contaminated rubble and scrap resulting from the dismantling and stripping of the process facilities.

5.3.1 Recycling and re-use

As for the earlier phases of the Project all uncontaminated scrap metal, wood, plastics, paper, waste oil and re-usable containers shall be returned to the supplier for re-use, sold to scrap dealers, or provided free of charge to local communities. All material leaving the site will require radiation clearance and if radiation levels are too high, decontamination will be necessary.

5.3.2 Radioactive Waste

As stated above, there is no radioactive waste site in Namibia and therefore all material that cannot be decontaminated will either be stored on site or disposed of in the waste rock dumps.

5.3.3 Accountability and responsibility

Any EPC contractors remaining on site or contracted for closure activities will be responsible for their area of control. The Environmental Manager will be retained during decommissioning to ensure that closure objectives, detailed in the Closure Plan, are achieved. Ultimate responsibility for waste management during closure will rest with the Valencia Uranium Limited Board.



6 MONITORING

The main objective of the monitoring programme is to assess the efficacy of the Waste Management Plan, specifically to:

- Verify that the plan is implemented.
- Verify the performance of the personnel in implementing the plan.
- Evaluate the need for corrective action to:
 - Improve performance or personnel.
 - Introduce new measures to address existing or new waste related impacts. This would then require a revision of the WMP.

It is difficult to apply quantitative standards to monitor waste management compliance, however based on specified objectives and targets, key performance indicators (KPIs) will be developed for the various waste streams. Internal audits by the Environmental Manager, as well as external audits, will then assess waste management performance according to the KPIs. *Ad-hoc* site inspections to ensure good housekeeping will be conducted by the Environmental Manager and any non-conformance reported as per section 7.

The aspects to be assessed during the audits will include the following:

- Is adequate waste sorting occurring?
- Are waste receptacles adequately labelled according to the waste type contained?
- Are skips, bins and drums, utilised for waste, well maintained and watertight or covered if necessary?
- Is material identified for recycling by suppliers regularly removed from site?
- Are transport vehicles well maintained and suitable for the waste type transported?
- What is the condition of the central sorting yard?
 - Is hazardous and general waste adequately separated?
 - Is the hazardous waste site suitably demarcated and marked?
 - Are hazardous waste containers sealed and stored in the correct area?



- Are the bund walls and drainage channels in good condition and free of blockages?
- Is the landfill site fencing in good condition?
- Is the general waste in the landfill regularly buried?
- Are there safe disposal certificates for every load disposed of at the hazardous waste site?
- Are employees appropriately trained and aware of the need for correct waste management?
- What is the level of general litter on site?

7 REPORTING

7.1 Government/Authority reporting

Valencia Uranium Limited will comply with any requirements expected by the authorities in terms of any Record of Decision (RoD) that may be issued for the EIA or permits that may be issued for the operation of waste disposal sites, including the waste rock and tailings dump as well as the general waste landfill. Radiation reports, submitted to the National Authority will include the radioactive waste inventory.

7.2 Internal reporting

In addition to any incident reporting that may be necessary during *ad-hoc* inspections, a quarterly audit will be conducted and a report on the audit shall be compiled by the Environmental Manager.

The report shall contain the following:

- Major non-conformances.
- Minor non-conformances.
- Recommendations.

The reporting will include the management review and, if necessary, revision of the WMP to ensure its continued applicability.



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