Eskom	Standard	Technology

Title: **HERBICIDE USAGE IN ESKOM PROHIBITED AND RESTRICTED AREAS, LIVE CHAMBERS, TELECOMMUNICATION INFRASTRUCTURE YARDS AND SECURITY FENCES**

Unique Identifier:	**240-125477962**
Alternative Reference Number:	**<n/a>**
Area of Applicability:	**Engineering**
Documentation Type:	**Standard**
Revision:	**1**
Total Pages:	**9**
Next Review Date:	**February 2023**
Disclosure Classification:	**Controlled Disclosure**

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Date: 26 January 2018	Date: 26 January 2018	Date: 29 January 2018

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PCM Reference: **<xxxxxx>**

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Content

Tables

1. Introduction

This standard direct the selection, use and application of chemicals to control and supress the growth of grasses and weeds in Sites, restricted yards including prohibited and restricted areas, live chambers, telecommunication remote infrastructure and security fences.

2. Supporting Clauses

2.1 Scope

Selection, use and application of chemicals in Sites, prohibited and restricted areas, live chambers, telecommunication remote infrastructure and security fences is dependent on the risk of cross contamination of the chemical to environmentally sensitive areas and preservation of valued biomass in such receiving areas and waterways.

2.1.1 Purpose

Sites and restricted yards within the Generation, Transmission, Distribution and Eskom Telecommunication's network vary greatly in size and are often situated in close proximity to water courses, agriculture and urban areas. Consequently the nature of risks involved in the use of herbicides varies for each site and the selection of the type of herbicide to be used must be done responsibility. These yards are required to be cleared of all vegetation to prevent electrical contacts and optimize operations. The use of the correct herbicide and the time of application can ensure maintaining a high degree of weed control in these sites.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited Divisions.

2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

[1] ISO 9001 Quality Management Systems.

[2] ISO14001 Environmental Management Systems.

[3] Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, No 36 of 1947.

[4] Occupational Health and Safety Act 85 of 1993

[5] Eskom SHEQ Policy, EPC 32-727.

2.2.2 Informative

None

2.3 Definitions

2.3.1 General

Definition	Description
Bromacil	Is an organic compound with the chemical formula $C_9H_{13}BrN_2O_2$, commercially available as a herbicide. It is used for brush control and non-cropland areas. It works by interfering with photosynthesis by entering the plant through the root zone and moving throughout the plant. Bromacil is one of a group of compounds called substituted uracils. These materials are broad spectrum herbicides used for nonselective weed and brush control on non-croplands, as well as for selective weed control on a limited number of crops, such as citrus fruit and pineapple. The half-life of bromacil in soils is about 60 days, but as long as 8 months in some conditions.
Glyphosate	Glyphosate is a broad-spectrum systemic herbicide and crop desiccant. It is an organophosphorus compound, specifically a phosphonate. Glyphosate is absorbed through foliage, and minimally through roots, and transported to growing points. It inhibits a plant enzyme involved in the synthesis of three aromatic amino acids: tyrosine, tryptophan, and phenylalanine. Therefore, it is effective only on actively growing plants and is not effective as a pre-emergence herbicide. Glyphosate adsorbs strongly to soil, and residues are expected to generally be immobile in soil. The half-life of glyphosate in soil ranges between 2 and 197 days with typical field half-life of 47 days.
Granular Herbicide	An herbicide in the form of crystals that is applied to the general area or surface where the germination of weeds is to be controlled, that dissolves gradually in the presence of water over time.
Herbicide	Herbicides, commonly known as weed killers is a chemical substance used to control unwanted plants
Non-residual Herbicide	Non-residual herbicides do not leave an active residue in the soil and have no pre-emergence activity and will not harm nearby desirable plant material through root pickup. Non-residual herbicides are either contact or systemic herbicides. Contact herbicides affect only the treated part of the plant, while systemic herbicides are translocated within the plant and can provide complete control.
Prohibited Areas	Prohibited area means an enclosed area in which live conductors or live parts of electrical apparatus working at high-voltage are accessible, but situated in such a position that inadvertent human contact therewith is not possible from ground/floor level.
Residual Herbicide	A herbicide is described as having low residual activity if it is neutralized within a short time of application (within a few weeks or months) - typically this is due to rainfall, or by reactions in the soil. A herbicide described as having high residual activity will remains potent for a long term in the soil. For some compounds, the residual activity can leave the ground almost permanently barren. Residual herbicides provide extended control of germinating or newly emerged weeds and grass
Restricted Areas	Restricted area means an enclosed area that is neither a live chamber nor a prohibited area as defined, and that is enclosed for the purpose of power system security and the safety of personnel.
Soluable Herbicide	A substance that is dissolved in a liquid (in the case of a herbicide it is dissolved in water) to form a liquid substance to be applied as a spray that will stick to the surface of plants.

Definition	Description
Tebuthiuron	Tebuthiuron is a nonselective broad spectrum herbicide of the urea class. It is absorbed by the plant root systems and interferes with the plants ability to photosynthesis and in that arrest growth. It has a great potential for groundwater contamination, due to its high water solubility, low adsorption to soil particles, and high persistence in soil (its soil half-life is 360 days)
Triazine's	Triazines are a family of herbicides that react with cellulose fibres of plant

2.3.2 Disclosure Classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

Abbreviation	Description
GR	Granular herbicide
MSDS	Material Safety Data Sheet
SC	Soluble herbicide

2.5 Roles and Responsibilities

The Vegetation Care Group of SCOT provides the governance to all Eskom Divisions for the use of herbicides on vegetation and sites in accordance with the maintenance mandate.

General Managers in Operating Units and Grids as well as the respective Powerstation Managers shall ensure that the requirements of this standard be complied with in their respective jurisdictions.

Environmental Department shall ensure that applicable herbicide selection and application rate is included in the EMP for all new site developments.

2.6 Process for monitoring

Environmental auditing and incidences of herbicide contamination to adjacent property will be investigated as anticipated by the applicable legislation, regulation and Eskom environmental standards.

2.7 Related/Supporting Documents

Not applicable

3. Selection, use and application of herbicides on land steralised of vegetation, with or without a stone layer

3.1 Vegetation Control Function of chip stone layer in Prohibited and restricted Areas and Live Chambers

The main function of the chip stone layer in Sites is to reduce step and touch potential. Chip stones are placed at a thickness of 100mm and will deprive any seeds lying on the soil surface from light which is needed for germination. Therefore, any germination which takes place is from seeds which are deposited either by wind or birds between the stones. Weed maintenance in Sites is therefore not on weeds/grasses germinating at soil level, but of seeds between the stones.

Note: Where soil particles fill up the spaces between the chip stone and ground layer, both the insulating and vegetation growth control function of the stone layer is compromised. Any weed and grass control attempt will be ineffective, continuous and extremely expensive to sustain.

3.2 Pre and post emergent weed control and risk

3.2.1 Non-residual herbicides

Non residual herbicides are considered safer to use from an environmental perspective. However, the need for repeated applications of these herbicides is time consuming and it furthermore requires physical removal of the dead weeds subsequent to application. By removing all weeds and grasses physically does negate the use of non-residual herbicides in Sites. The use of a suitable residual herbicide, applied prior to the growing season, can overcome these challenges and can provide continuous weed control for the duration of the growing season.

3.2.2 Residual or pre-emergent herbicides

Residual herbicides may be used during or just after completion of the construction phase to treat the soil to prevent germination of weeds. The herbicides to be used for this purpose are long term soil residual herbicides which suppresses seed germination for extended periods after application. Following the placement of the 100mm chip-stone layer it is only necessary to do weed control as maintenance. The stone layer will deprive any seeds at soil level from light and therefore these seeds will not germinate. Weeds that may grow are from seeds deposited between the chip-stone by wind or birds. The herbicides to be used for this purpose are those with a short to medium term residual activity.

3.3 Selecting the applicable herbicide for use in Restricted areas

Selecting the appropriate type of herbicide applicable to a substation depends on the type of weeds that need to be controlled as well as the potential chemical contamination of the receiving environment around the substation. The following factors need to be evaluated in the selection of the appropriate herbicide:

3.3.1 Average Rainfall in the catchment area

Sites situated in areas with an annual rainfall equal to or above 600mm increase the risk of herbicides leaching or being transported from the substation to adjacent properties. The use of soluble products (SC) with a short to medium term residual activity is recommended for use on these Sites.

Granules herbicides (GR) are recommended for sites in areas with an annual rainfall less than 600mm. It should be noted that granules will also become soluble during rains and can be transported of the site during heavy storms as they are meant to dissolve over time, allowing the residual characteristic of the application.

3.3.2 Sites drainage system design

Sites designed with a stormwater drainage system increases the risk of herbicides being transported with stromwater from the substation to adjacent properties. Should the site be provided with water diversion system from the predominant catchment area, this risk is reduced. Over-application (application beyond the manufacturers specification) of granules on such sites furthermore increases the risk. The use of soluble products with a short to medium term residual activity is recommended for use on these Sites.

3.3.3 Receiving environments in the proximity of restricted areas

a) Sites located in close proximity to agricultural land, crops, water sources or near waterways increase the risk of potential contamination.

b) The risk is furthermore increased if the site is located on undulating terrain with a steep slope towards these sensitive areas where contamination needs to be avoided. The use of soluble products with a short to medium term residual activity is recommended for use on these Sites

3.4 Risk Assessment that informs chemical selection

The matrix below summarise the risk criterion to be applied in each Restricted area targeted for chemical treatment and answered with a simple ‘yes’ or ‘no’ statement:

Table 1: Risk Assessment Sheet

Risk criteria	Yes	No
Does the restricted area have a drainage system without a catchment water diversion mechanism? (Mind the double negative criterion)		
Is the restricted are a built in a sloping environment?		
Is the restricted area built on sandy soils		
Does any of the following occur in the potentially receiving surrounds: • Agricultural crop • Natural or commercial forests • Wetland, natural or manmade waterway • Listed sensitive eco systems or where endangered species (plants, insects, mammals, reptiles or other) reside		

3.5 Herbicide active ingredient selection based on the response

3.5.1 Should any or combination of response be 'yes'

3.5.1.1 For existing weeds in or on the restricted area

Apply a Glyphosate that is a non-residual (non-emergent germination) contact herbicide with a weed control action described in the definition for glyphosate's above.

Note: This treatment will have to be repeated many times in a growth season, every time an inspection reveals the need for treatment. Manual removal of individual weeds on sight is critical for areas of high risk.

3.5.1.2 To prevent weed infestation

Apply Triazines or Bromacil with a limited residual action (emergent germination control) that present the weed control mechanism described in the definition of these chemicals above.

Note: The treatment interval required should be less than for the treatment described in 3.5.1.1 and be effective for approximately 6 months (a typical growth season)

3.5.2 All the responses met with a 'no' assessment

Apply Triazines, Bromacil and Tebuthiuron mixtures in the granular form.

Note: Under normal conditions this treatment should extend beyond a growth season.

3.6 Recommended procedure to be followed to control weeds and grasses in Sites

3.6.1 Herbicide selection

Herbicide selection will be based on specifying the residual character of the product rather than the product name. Residual activity of a product is determined by the active ingredients of the products and hence suppliers must always specify the active ingredients of the product as well as the period of control it provides. The following table categorizes herbicides for use in Sites into three categories.

Herbicide Category	Residual Activity	Active ingredient
1) Non-residual herbicides: Herbicides with active ingredients which control only existing weed growth.	Nil – Non-residual:	Glyphosate
2) Residual or soil acting herbicides: Residual or soil acting herbicides which controls existing growth and provide extended control of subsequent growth.	Short term: 6-12 months	Triazines Bromacil
3) Residual or soil acting herbicides: Residual or soil acting herbicides which controls existing growth and provide extended control of subsequent growth.	Medium term: 12-18 months	Tebuthiuron

3.6.2 Prescription for herbicide application

Once the appropriate herbicide is selected for application in a specific restricted area the application is prescribed as follows:

3.6.2.1 During civil work in asset creation

On completion of earth works but prior to establishing chip-stone layer it is recommended that a Category 3 herbicide be applied directly on the soil layer.

3.6.2.2 On completion of construction and chip stone layer establishment

Application of a Category 2 herbicide is required to prevent the establishment of a seed bed and any part of the restricted area. If the site is situated in an area with an average annual rainfall above 600mm, use a soluble product and if annual rainfall is below 600mm use granules.

3.6.2.3 For existing restricted areas and security fences

a) All weeds and grasses present in the substation be physically removed by hand and shovel and disposed of prior to the application of an herbicide. Immediately thereafter:

b) A category 2 herbicide (a post emergent herbicide) to be used to treat any plants that germinated.

- Granular herbicide (GR) shall be used where no drainage system is part of the design of the substation, or in areas with an average rainfall below 600mm.
- A soluble concentrate (SC) to be used for areas where there is a high risk (e.g. Sites close to crops, water, gardens etc.) or where the average annual rainfall is above 600mm.

c) The scheduling of this activity must be one-two months prior to the rainy season of the area which will ensure that the product will provide weed control during the growing season.

3.7 General Requirements

a) The purchase, use and storage of herbicides must comply with the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, No 36 of 1947.

b) The Material Safety Data Sheet (MSDS) of the product must be supplied by suppliers and included in the safety management system (Health and Safety File) of the site.

c) All the instructions on the label of the product (especially with regards to the registered recommended rate of application per hectare per specific species) as well as the MSDS, must be followed and complied with at all times.

d) When Eskom applies herbicides on Eskom owned property (Restricted Area) then Eskom employees may do this provided they have been appropriately trained. Hence, the applicator do not have to be registered as a Pest Control Operator (PCO), or working under the supervision of a PCO.

e) When Eskom applies herbicides on its power line servitudes or rights of way, then its own employees may undertake this work under the management of a PCO.

f) When external contractors are appointed to undertake any work, this work must be undertaken by a PCO or under the direct supervision of a PCO.

g) A record of the quantities of herbicide applied shall be kept at all times and reflected on the production sheet submitted to Eskom containing at least the following data:

- Restricted area (surface in m²) treated
- Security fence area (surface in m²) treated
- Risk assessment response listed (see Table 1)
- Active Ingredient/s of the herbicide used listed
- Herbicide concentrate volume recorded
- Water volume used in the case of Category 1 (SC) herbicide

4. Authorisation

This document has been seen and accepted by:

Name and surname	Designation
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D Herbst	Eskom Environmental Manager
A Jaykaran	Maintenance SC Chairperson

5. Revisions

Date	Rev	Compiler	Remarks
Feb 2018	1	Rudi Kruger	New document drafted.

6. Development team

The following people were involved in the development of this document:

- Koos Kraftt

7. Acknowledgements

Not applicable.