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Application For The RENEWAL Of Environmental Clearance Certificate For Pathological Incinerator For University Of Namibia At Neudamm Campus And Farm, Khomas Region

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ACRONYMS

DEA	Department of Environmental Affairs
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
ECO	Environmental Compliance Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act (No. 7 of 2007)
EMP	Environmental Management Plan
FANR	Faculty of Natural Resources
MET	Ministry of Environment and Tourism
PPE	Personal Protective Equipment
RD	Red-Dune Consulting CC
SM	Site Manager
UNAM	University of Namibia

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EXECUTIVE SUMMARY

Neudamm campus, amongst other departments, has the Department of Animal science and that of School of Veterinary Medicine (SoVM). The operation of these department produce pathological waste and medical waste through dosing of animal and animal carcases from natural deaths and anatomy studies. World over, incineration is recognised as a safe and an effective way for the disposal of all kinds of pathological and medical waste due to high temperature that has the ability to kill pathogens and toxic material.

According to the National Waste Management Policy, incineration is the current practice used in Namibia for medical/clinical waste disposal. The policy indicated that if not properly managed it can cause harmful substances which may cause air pollution and other risks to human and the environment.

In compliance with the Environmental Management Act 2007 (Act No. 7 of 2007), Neudamm Campus was initially issued with an Environmental Clearance Certificate (ECC) in October 2019, **ECC 00220, Serial: GPOYSu220** to continue operating its incinerator. In accordance with EMA, the ECC is valid for a period of three years, thus it has expired, and Section 56 of EMA provides for the renewal of the ECC. This updated EMP is developed with aim of applying for the renewal of ECC.

1. Overview

This environmental management (EMP) plan is updated for the application of the RENEWAL of the an Environmental Clearance Certificate , **ECC 00220, Serial: GPOYSu220** that issued on October 2019 for the continued operation of the pathological incinerator at the University of Namibia's Neudamm Campus.

1.1. Purpose of the EMP

This Environmental Management Plan (EMP) is a risk strategy that contains logical framework, monitoring programme, mitigation measures, and management control strategies to minimize environmental impacts. It further stipulates the roles and responsibility of persons involved in the project. These strategies are developed to reduce the levels of impacts for the projects.

1.2. Compliance to the EMP

This EMP is a legally binding document as given under the provisions of the Environmental Management Act, 2007 (Act No. 7 of 2007). UNAM and its contractors must adhere to the framework of this document.

1.3. Roles and Responsibilities

1.3.1. Proponent

The proponent (UNAM), shall take overall responsibility for proper implementation of the EMP. It remains the responsibility of the proponent to appoint key personnel for the implementation of the EMP.

1.3.2. Site Manager

The Site Manager (SM) represents the proponent on site. He/she shall be responsible for daily activities in ensuring environmental protection. All communication with regard to the implementation of EMP must be channelled through the SM.

1.3.3. Employees

It shall be responsibility of employees to adhere to the provision of EMP at all times when on site

1.3.4. Environmental Compliance Officer (ECO)

Compliance to EMP is enforce by the environmental inspector as provided for under Environmental Management Act (No. 7 of 2007) (EMA).

1.4. Disciplinary Action

1.4.1. Proponent

The EMP is a legally binding document, non-compliance to the EMP is punishable upon conviction under EMA. Amongst others, legal action, fines and suspension of work or both.x

2. Project Description

2.1. Location

Neudamm Campus and Farm is situated ± 30 kilometres east of Windhoek on the B1 road to Hosea Kutako International Airport. The incinerator is located on the northern side of the campus (-22.501158°S, 17.365823°E) Figure 1.

Figure 1. Incinerator at Neudamm Campus

2.2. Description of operation

The operation of the incinerator at Neudamm started long ago when Neudamm Campus was under the Ministry of Agriculture. After taking over, UNAM has upgraded the incinerator by elongating the chimney, fitting in filter and securing the building in efforts to reduce air pollution.

The description of the incinerator and operational manual is attached in Appendix 1 and shown in figure 2. It is located in the secure building on campus figure 3. The building further contains

a freezer room where dead carcases are kept before incinerated. The incinerator runs on diesel fuel. The entry to the incinerator is secured with high security sliding metal doors. Ash is allowed to cool down and kept in plastic bag for disposal at Windhoek's Kupferberg landfill site.

Figure 2. Pathological Incinerator

Figure 3. The incinerator building

3. Environmental Audit

An environmental audit was undertaken on 13 March 2023. The incinerator room remain same, and nothing was altered on incinerator. Consequently, no major alteration was made to the EMP.

4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

Table 1. Regulatory Framework

REGULATORY FRAMEWORK	SUMMARY	APPLICABILITY
The Namibian Constitution	The State shall actively promote and maintain the welfare of the people by adopting policies aimed at … The maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future	Protection of the environment and biodiversity
Environmental Management Act No. 7 of 2007	This act aims to promote the sustainable management of the environment and the use of natural resources and to provides for a process of assessment and control of activities which may have significant effects on the environment; and to provide for incidental matters	The acts provide a list of activities that may not be undertake without an environmental clearance certificate to prevent environmental damages
National Management Waste Policy	The policy goal aims to prevent and reduce health risks associated with exposure to healthcare substances, household, radiation and other waste from healthcare workers, waste handlers and	The campus produces pathological waste, that should be disposed of by means of incineration.

REGULATORY FRAMEWORK	SUMMARY	APPLICABILITY
	public by promoting sound environmental waste management practices.	
Draft Pollution Control and Waste Management Bill	This Bill serves to regulate and prevent the discharge of pollutants to air and water as well as providing for general waste management	Incineration produces smoke that has the potential of air pollution
National Solid Waste Strategy	The strategy to control and manage solid waste in Namibia	Solid waste such as ash will be produced.
Regulations Related to the Health and Safety of Employees at Work. Reg No. 156	Promotes the Safety and Health of employees at the work place	Employees working at the facility are prone to disease during operation
Public Health and Environmental Act No. 1 of 2015	To promote public health and wellbeing as well as prevent diseases, injures and disabilities. Protect individuals and communities from public health risks.	Air pollution from chimney may affect public health
Labour Act No. 11 of 2007	This Act outlines the labour laws which encompass protection and safety of employees at work.	Ensure that employees at work place are protected

5. The EMP table

Table 2. The Environmental and social management plan (ESMP)

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
Induction	To ensure that employees and everyone accessing the incinerator are familiar with the EMP	1. Employees, Visitors must go through an induction course for the provision of the EMP.	Induction Minutes, report and Attendance Register	Site Manager
Air Pollution	To mitigate the effect of pollution	1. The incinerator must be operated in accordance to relevant laws; 2. Areas near the incinerator should not be populated, e.g., containing housing, or areas where people congregate, especially in the western direction 3. Areas near the incinerators should not be used for agriculture purposes, e.g., leafy crops, grasses or grains for animals. 4. When prolonged poor smoke dispersion is detected, the elongation of the chimney must be considered and installation of air pollution control measure such as filters 5. Incinerator emissions should be monitored on regular intervals;	Air pollution monitoring results Public complaints	Site Manager

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
Waste Water	To prevent pollution	1. Install a drainage system leading to the disinfectant chamber for purposes of cleaning to contain waste water 2. Waste water must be chemically disinfected before being discharge into the sewerage system.	Disinfectant chamber available Record of water treatment	Site Manager
Generation of Solids	To prevent pollution	1. The generated solid waste must be segregated in accordance with the health practice and law; 2. Waste containers must be colour coded for ease segregation; 3. Solid waste must be stored in a secure place with restricted access, 4. Only authorized personnel may enter the incinerator place.	Record of waste generated and disposed of methods	Site Manager
Occupational health and safety risk		1. Adhere to relevant health and safety legal frameworks; 2. Develop a Health and Safety Plan in accordance with relevant legal framework and incinerator manual guidelines; 3. Employees must be provided with adequate Personal Protective Clothing; 4. Enforce the use of PPE; 5. Ensure that all employees undergo proper training and are orientated with associated risks;	Employee and public health Visual inspection of PPE Training records of employees Fire fighting equipment on site Drill record Visible signage	

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
		6. Train employees for basic first aid, fire safety training, and Occupational Safety and Health through approved training institutions; 7. Provide firefighting equipment at the sites and the surrounding; 8. Conduct drills at reasonable intervals to test the disaster preparedness level at the workplace, using the results to improve the response mechanisms; 9. Set up emergency evacuation points and develop evacuation procedures. 10. Provide emergency showers 11. Unauthorized personnel must be restricted to enter the site 12. Use visible signage to warn staff or visitors of dangerous places. Signs must be put on doors and areas.		

6. Decommissioning Plan

It is not envisioned that the project would be decommissioned. However, the following measure must be taken when it is decided to decommission the project.

1. Hire qualified personnel to develop a decommission plan;
2. Submit the decommissioning plan to the Ministry of Health and Social Services and Environment and Tourism for approval;
3. Inform workers and the affected stakeholders (Service providers) about the project closure at least 6 months prior to the decommissioning;
4. Ensure that all contaminated material must be properly cleaned before their disposal at approved sites;
5. The work must be supervised by qualified and competed persons;
6. It is recommended that an environmental specialist be hired to monitor any possible damage to the environment;
7. Workers must be provided with all necessary PPE;

7. Study limitation

It is important to establish baseline for air quality in order to monitor the environmental performance in relation to the operation of the incineration. It is recommended for UNAM to establish air quality baseline in areas surrounding the site.

8. Conclusion and Recommendations

8.1. Conclusions

The Environmental Management Plan must be the logical framework for the project to mitigate environmental threats at all times. The operation of the incinerator facility, in its current form and with adequate implementation of this EMP, shall be environmental sustainable.

8.2. Recommendations

It is recommended to the approving authority;

- For the renewal of the environmental clearance certificate;
- UNAM must establish baseline for the air quality in the surrounding area;
- UNAM must construct a disinfectant chamber to contain waste water and treatment from cleaning of the incinerator before entering the sewerage system;
- The EMP must be implement adequately;
- An environmental audit be undertaken twice a year and bi-annual reports be submitted to MET to monitor the environmental performance.

9. References:

1. Mendelsohn, J., Jarvis, A., Roberts, C. & Robertson, T., 2009. Atlas of Namibia. 3rd ed. Cape Town: Sunbird Publishers.
2. Ming-Chien Hung, Shu-Kuang Ning*, Ya-Hsuan Chou 2011., Environmental Impact Evaluation for Various Incinerator Patterns by Life Cycle Perspective: A Case Study in Taiwan 2011 2nd International Conference on Environmental Science and Technology IPCBEE vol.6 (2011) © (2011) IACSIT Press, Singapore
3. Ministry of Health and Social Services 2010: National Waste Management Policy
4. Republic of Uzbekistan Ministry of Health Ministry of Agriculture and Water Resources 2007: Avian Influenza Control and Human Pandemic Preparedness and Response Project Environmental Assessment and Management Plan
5. World Bank 2014: Framework environmental management plan FOR Health Sector Reform – Improving Health System Quality and Efficiency Project

TO ALL
Operators

UNAM

SAFE OPERATING PROCEDURE FOR PATHOLOGICAL INCINERATOR

(Neudamm Campus)

This Safe Operating Procedure (**SOP**) provides a summary of the environmental compliance responsibilities for Neudamm Campus' Pathology incinerator operation.

To ensure maximum waste combustion efficiency, air quality monitoring as per the **Environmental Management Act** (**Act No. 7 of 2007**) the operation require that incinerators be operated and maintained in good working condition and in accordance with the manufacturer's specifications.

In order to ensure the safety and hygiene of people, animal and to prevent air pollution, the operators for the incinerator should always comply with the following:

1. Evaluate the acceptability and quantity of waste types to be incinerated, as approved by the Pathology Section's Head of Department.
2. The incinerator operators should be trained properly on how to operate the facility.
3. Do not incinerate or approve for the incineration of anything that is not a type of pathological waste without prior express approval by the permitting authority such as HoD.
4. The manufacturer's specified waste charge loading limits must not be exceeded at any time.
5. Start, load, and adjust equipment settings as specified by the manufacturer to ensure effective and efficient incineration of materials.
6. Adhere to specified manufacturer's specification on burner pre-heat and post-incineration burn-down times.
7. Monitor any malfunction on the incinerator operating systems, failures or burners failing to operate at appropriate temperatures or for appropriate time cycles and report all the above to your supervisor and Estate office to be fixed.
8. Once the incineration is done and the ash is cool, remove and transfer the ashes into metal drum/ containers and arrange with Estate office for the removal and disposal of ashes to kupferberg landfill site.
9. Clean ash and bone out of the primary burn chamber after completing each daily burn event and always maintain cleanliness in areas surrounding the incinerator.
10. Never Allow ashes to overstay in the primary burn chamber.

Approved by: Health & Safety Department

Open your mind


Primary Temperature Controller
Secondary Temperature Controller
Fan Controller
Primary Burner
Secondary Burner
Timer
Ready
Lamp Test
Central Technical Supplies (Pty) Ltd

Central Technical Supplies (Pty) Ltd.
(GEIGER Engineering)

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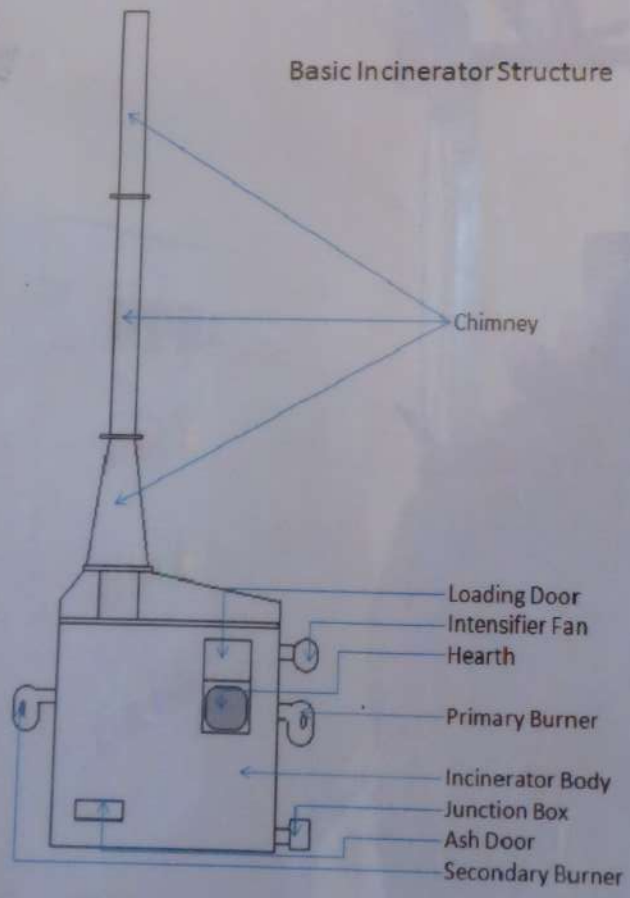
Quick Operating Guide

350LA HOSPITAL INCINERATOR

- Rated capacity: 160kg/hour
- Capacity for Animal Carcass Waste: 123kg/hour
- Primary Temperature: 900°C
- Secondary Temperature: 1000°C



1. Definitions / Glossary:

1.1. Incineration

Incineration is the process of getting rid of hazardous medical waste by burning the waste at high temperatures (1000°C) thus reducing the volumes and sterilizing product to be able to safely discard the residue. In this process the product / waste is converted into CO^2, water and ashes.

1.2. Hazardous Waste

These are leftovers of medicine, syringes, needles, etc.

1.3. Medical Waste

Contaminated wool dressings, body fluids, Amputations, parts of human body, etc.

1.4. Kitchen waste

Leftover foods, potato peels, packaging materials, etc.

1.5. Office Waste

Mainly cartons, papers and some plastics

1.6. Workshop Waste

Oils, filters, plastics, rubbers, etc.

1.7. Sterilizing

Is the process by adding enough heat to a product for a certain period of time, ensuring that all bacteria and viruses are destroyed.

1.8. Residue and Leftovers

This is the leftover product if the incineration process was complete and successful, i.e. ashes. NB: Not all products will burn to ashes, i.e. metals, glass, etc.

1.9. Smoke

Is the result of incomplete / poor combustion where non-burnt and non sterile matter is released into the air.

1.10. Segregation

This is the process of identifying the different waste, and by sorting / dividing / separating it into the different categories.

1.11. Ashes

This is the leftover product when combustion / incineration is complete, i.e. unburnable matter.

1.12. GRE

General Refuse Equivalent

This is a factor / multiple assigned to the different waste materials which should assist the hospital staff in the proper loading and waste feeding into the Incinerator to prevent over loading

2. Proper and Efficient and Safe Operation

The proper and efficient operation starts at Hospital Management. (Principal medical officer, health and safety officer, doctors, nursing staff, cleaning staff, kitchen personnel, maintenance personnel and last, but not least, the operators.

Note: An Incinerator must not smoke! It is thus the responsibility of the above people to prevent that.

3. Segregation

A hospital produces different kinds of waste:

- Hazardous Waste
- Medical Waste
- Kitchen Waste
- Office Waste
- Workshop Waste

NB. The Incinerator is designed to only burn Hazardous and Medical waste.

Thus it is imperative that all hospital staff are trained and involved in the segregation process, where the different waste are correctly identified and properly and safely separated.

The Ministry of Health makes provision for various colour coded waste bags to be used for the different waste matter:

- Red Bags: Only to be used for Medical and Hazardous waste.
- Green Bags: Only to be used for soiled and bloodstained linen.
- Yellow Bags: Only to be used for leftover food.
- Black Bags: Only to be used for domestic, household, office waste.

The waste must then be properly separated, packed and stored, for incineration at source, by the hospital staff.

The incinerator operator and any other staff members must not open, repack, divide etc. any waste bag once it has been closed (infection control).

The Code of Practice, SABS 0248:1993 Handling and disposal of waste materials within health care facilities, details the correct method of collection and packing of the waste bags and containers. We base the operation of our incinerators on the methods described in this Code of practice.

4. G.R.E. General Refuse Equivalent

This is a factor / multiple assigned to the different waste materials which should assist the hospital staff in the proper loading and waste feeding into the Incinerator to prevent over loading.

NB. Overloading the Incinerator will cause smoke!

It needs to be understood that different wastes will burn differently and will set different energy levels free.

Hospital waste has a GRE of 1,30
Pathological waste has a GRE of 1,66
Plastic has a GRE of 3

E.g. Your incinerator has a burning capacity of 160kg waste per hour.
Thus, when you burn Hospital waste, your output of the incinerator must be reduced 160/1,30 so that you should only burn ±123kg per hour, preventing an overload situation.
With pathological waste you burn 160/1.66 = ± 96kg per hour.
Plastic waste 160/3 = ±53kg per hour.

- The incinerator operator must load the incinerator at the rate and weight according to the type of waste in each container (bag).
- The containers should be identified.
- Waste of GRE 3.0 should be loaded at a rate of less than 3 kgs. at a time.
- We suggest that SABS 0248 of 1993 Code of practice "Handling and disposal of waste materials within health care facilities." be read and adhered to. See table 1-Summary of colour coding/labelling requirements.
- The standard municipal polythene bag weighs about 15 kgs. when full. Normally the bag is only half full and weighs about 7.5 kgs. Make sure that the bags are standard. Weigh the half full bags. They must be loaded correctly in the wards. Theatre or laboratory waste cannot be transferred to another container or bag later. Safety containers have a general refuse equivalent (GRE) of 3.00.

Each full safety container weighs:

- 2.5 Litre capacity container weighs about 1.25 kg.
- A 5 Litre about 2.5 kg.
- A 10 Litre about 5 kg.
- A 20 Litre about 10 kg.
- A 25 Litre about 12.5 kg.

NB: "Sharp Safe" containers are made of high calorific value plastic which provides enough heat to incinerate the contents of the container.

5. Loading Procedure of Hospital waste.

Hospital waste burns quite quickly, therefore small amounts must be loaded many times.

"SHARP SAFE" containers burn quicker and smaller amounts must be loaded through the hour. If large amounts of either are loaded at one time, the incinerator will immediately be overloaded, with the resultant blow backs and smoke. In other words, the quicker the waste burns the smaller each load must be. **The capacity of the incinerator must never be exceeded.**

The 350LA can be loaded with one 7 kg plastic bag full every 5 minutes, or, preferably, half a bag every 3 minutes.

All of these weights are estimates and can vary from bag to bag and container to container. The operator must learn the best loading pattern by trial and error:

- **HE MUST NOT OVERLOAD.**
- **HE MUST NOT TURN THE FIRE BED.**
- **PVC SHOULD NOT BE INCINERATED AT LOW TEMPERATURES.**
- **THERE SHOULD BE NO SMOKE!** (This is a good way to see if the incinerator is being loaded correctly).

6. Operating Instructions

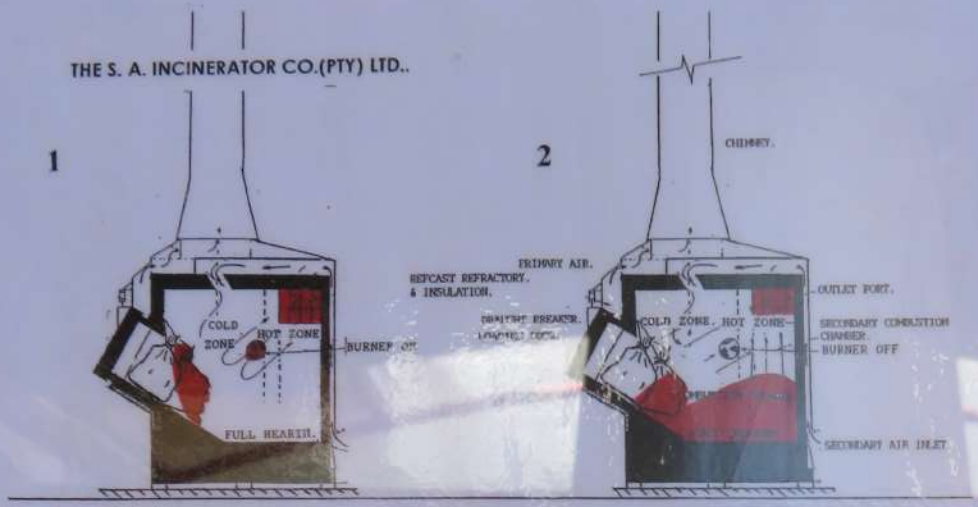
6.1. Operating instructions (daily sequence):

- Before startup, inspect the Incinerator hearth.

  N.B. If there is unburned matter, do not remove. This must be incinerated properly!
- When incinerator process is complete, preferably the next morning, remove all ashes from the hearth.
- Remove ashes from Ash door.
- Remove residue from chimney grid
- Check the loading door. Make sure it slides properly and can also close properly.
- Check that there is enough fuel. Open fuel taps.
- On control panel, turn switch to "ON" position.
- Set mechanical timer to 60 min by turning. Both burners should start the priming, purge and ignition process. Put on safety clothing!
- The burners will ignite. (The timer must be on during incineration. The timer is there to prevent the continuous operation of the burners through the night should the operator forget to switch them off)
- Preheat Incinerator for 30 min or until proper temperature is reached.
- Open door and load 'Sharps' into hearth and push close to the flame. (max 2 cartons at a time.)

6.2. Loading Instructions

- After 10min, start loading the red waste bags per following procedures:
  Load 1 full bag (± 7,5kg) as per sketch every 5 minutes.
  Or load ½ bag (± 4kg) as per sketch every 3 minutes.



N.B. Loading more bags or loading bags at a faster rate will cause smoking!

- Do not throw the bags into the hearth in front of the burner. You will cause damage to the burner!
- Always wear safety clothing when feeding the incinerator.
- After 5 minutes for big bags, or 3 minutes for small bags, open door and inspect if waste has burnt down.
- Push waste to back of incinerator and load next bag into mouth of Incinerator as per sketch.
- Continue this procedure until bags are finished or until 1 hour before knock-off time.

6.3. Shutting down instructions

After the last load of waste has been loaded or until 1 hour before knock-off time, i.e. 16h00.

- Set the timer for one hour / 60 minutes so that the waste can be burnt out completely.
- After one hour (at 17:00 / knock-off time), inspect if everything is burnt completely. If the waste is not completely burnt out, set the timer for another period of time, and repeat. If the process is complete, turn the on/off switch to the off position. **Note:** the fans will continue running until the incinerator is cool. This is called the cool down process.
- Never switch off the fans when the incinerator is operating or hot. Once the cool down process is complete, i.e. the temperature inside the incinerator is less than 70°C, a temperature controller will automatically switch off the intensifier fan and the fans on the burner.

7. Problems & Remedies

7.1. Do not switch off the burner fans or mains.
The fans are operated by the temperature controller which will switch them off when the residual temperature in the incinerator has dropped to about 70°C. This is to prevent damage to burners.

7.2. Power failure:
If the power supply to the incinerator is interrupted, close the loading door and cease operation until the power is restored.

7.3. Burner failure:
Stop loading until burners have been restarted.

7.4. Lockout

- Wait 2 minutes and press reset button on the controller of the burner. Restart.
- If a burner won't restart, clean photocell and check fuel supply to the burner. Check the filter, fusible link fire valve and gate valve on tank.
- If it still goes to lock out, call the service agent: 061 224 238.

7.5. Smoke in room is caused by:

- Overloading or
- Blocked chimney or
- A blocked stainless steel basket - clean it
- If none of these, call the service agent: 061 224 238.
- Loading past the primary burner position or
- Burners switching off at too low a temperature.
- Not cleaning incinerator combustion chambers or
- Burner service required - call the service agent - 061 224 238.

7.6. Blow back into the room. Air starvation, is caused by:

- Overloading. (e.g. After loading too much plastic.)
- Insufficient draught.

7.7. Smoke from a burner:

- White smoke means too much air. Black smoke means too little air. Remember, the pump pressure is 140 p.s.i (10Bar). The pressure is controllable, it may have been wrongly adjusted. (alan key.)
- An oil burner flame should be white-yellow.
- An orange flame will smoke & deposit specs of carbon on the wall opposite the burner.
- Add air by opening air vent on the burner.

7.8. Fly ash from stack is caused by:

- The operator turning or poking the burning waste. Never turn or poke the fire.
- Overloading or
- Stainless steel basket clogged or
- Air vent on ash door on the secondary chamber open, or ash door open.
- The incinerator must be loaded steadily throughout the daily operating period.
- If none of these - call the service agent - 061 224 238.

8. Maintenance

- Attend to fuel leaks immediately.
- Never overload and never disturb / poke the fire.
- The incinerator should be serviced in 6-months intervals.
- Call your service agent to do a thorough service.

Central Technical Supplies (Pty) Ltd
(Geiger Engineering)
Tel: 061 224 238
Fax: 061 233 254

Waste Segregation According to Different Colour Bags

Dispose of waste properly to protect yourself and those around you from infection, disease, and injury.

Please collect and store waste in the allocated colour coded bags for infection control purposes and cost effective waste removal and final disposal.

Soiled and Blood Stained Linen Only

Domestic/ Household Waste Only

Left Over Food Only

Infectious Waste Only

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