



**ENVIRONMENTAL MANAGEMENT PLAN FOR THE OPERATION OF AN  
EXISTING INCINERATOR AT OGONGO CAMPUS, OMUSATI REGION,  
NAMIBIA**



**LEAD CONSULTANT**

**Mr. Gideon Kalumbu  
EnvironClim Consulting Services  
P O Box 40506  
Windhoek  
Cell: +264 81 5955643**

**PROPONENT**

**University of Namibia  
Private Bag 13301  
Windhoek  
Namibia**



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<b>CLIENT</b>	UNIVERSITY OF NAMIBIA PRIVATE BAG 13301 WINDHOEK NAMIBIA
<b>PROJECT CONSULTANT</b>	MR. GIDEON KALUMBU P O BOX 40506 AUSSPANNPLATZ WINDHOEK CELL: +264 81 595 5643
<b>LOCATION</b>	OGONGO DISTRICT, OMUSATI REGION
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## **EXECUTIVE SUMMARY**

The Ogongo Campus is among the 8th University of Namibia (UNAM) campuses in Namibia. Being an Agricultural Campus, it offers courses mainly on crop science and hand-on training experience on large and small livestock. It has an agricultural experimental farm covering an area of approximately 4 350 Hectares. Furthermore, the farms also has wildlife consisting of springbok and other small wildlife animals.

The campus's program on livestock training produces pathological waste form carcasses used for anatomy teaching purposes, natural deaths or sick animals and medical waste from treatment of animals. Thus the campus operate a small size pathological incinerator for the disposal of pathological waste.

The incinerator is located in an isolated closed off building. It is powered by electricity and backed up by a diesel-powered generator. The above ground fuel tank was found not complying with environmental compliance, because it's area is not bunded. Mitigation measure for the above fuel tank were develop and are part of this EMP. Overall, Ogongo campus indicated that there has not been complaints about the operation of the incinerator.

According to the site assessment and the developed mitigation measure, the study recommends continuous operation of the incinerator and subsequently issuance of the ECC.

## 1 INTRODUCTION

The Ogongo Campus is among the 8th University of Namibia (UNAM) campuses in Namibia. The campus is offering different courses mainly focusing on Natural Resource Management and Agricultural Science with a special focus on crop science. The campus is situated on an agricultural experimental farm covering an area of approximately 4 350 Hectares. The campus offers hand-on training experience on large and small livestock. Furthermore, the campus has wildlife farm consisting of springbok and other small wildlife animals.

The Campus's program on livestock training produces pathological waste such as animals carcasses used for anatomy teaching purposes, natural deaths or sick animals and medical waste from treatment of animals. Consequently the campus operate a small size pathological incinerator for the disposal of pathological waste (cremating sickly animals after being slaughtered as well as animal medical waste).

The incinerator is made out of carbon steel and can operate in a semi-automated mode with a burning rate of 20Kg – 1000 Kg at temperature of 850 -1300 °C. The burned ash is then stored and transported to the designated dumping site approximately 1.5 km away from the incinerator.

## 2 PROJECT OVERVIEW

### 2.1 Location

Ogongo Campus is situated in Ogongo Constituency of Omusati Region. It is approximately 55 Km West of Oshakati and 44 Km East of Outapi, in Omusati Region. The campus is accessible via the D3623 road which branch out of the C46 road which stretches from Oshakati to Outapi.

The pathological incinerator is located on the campus at coordinates -17.679481°S, 15.295385°E (**Figure 1** below). The Incinerator building cover an area of 190 square metres (m<sup>2</sup>).



**Figure 1.** The incinerator Site on Campus

## **2.2 Description and Operation of the incinerator**

Incineration differs on rated capacity, primary and secondary temperature. The incinerator at Ogongo campus is 100LA model Incinerator. It is housed in a building covering a space of 275m<sup>2</sup> which is fenced with diamond mesh wires. The building also contain a freezer room where dead carcasses are kept before incinerated. Operated by one employee, this diesel-powered incinerator is among the smallest incinerators mainly used on farms to incinerate animal carcasses and other pathological wastes. It is seldomly used, only there is a dead carcass or expired animal medicines (**Figure 2**).



**Figure 2.** The Pathological incinerator at UNAM Ogongo Campus

### 2.3 Wastes

Once carcasses are burnt, the ash is allowed to cool down, gets stored in plastic bags for disposal at an approved waste disposal site (**Figure 3**). Its impact on air quality is negligible.



**Figure 3.** Burnt waste before disposal



### 2.3 Fuel Supply

The incinerator is supplied with diesel storage an above ground diesel tank with the capacity of 1000L in the close proximity of the incinerator. The tank is fenced off and only accessed by the assigned worker. The diesel tank (see Figure 4) is mounted on a concrete stand approximately 200cm above the ground and connected to a diesel pump.



**Figure 4:** Shows a 1000L capacity diesel tank that feeds the incinerator

The tank installation however does not meet environmental standards because the site does not have concrete bund to hold diesel in case of spillage (Figure 5). This short-coming is addressed in the EMP.



**Figure 5.** Illustration of site construction of an above fuel storage tank

## 2.4 Electricity

The incinerator is power by grid electricity (**Figure 6**) however, in case of powere outages, the campus use a diesel powered generator (**Figure 7**).



**Figure 6:** Grid Power Line for Ogongo Campus



**Figure 7:** Back-Up Generator to the incinerator

### 3 STATUTORY REQUIREMENT

Section 27 (2) of the Environmental Management Act 2007 (Act No. 7 of 2007) (EMA) and the annexure of EIA regulation has listed activities that may not be under taken without an Environmental Clearance Certificate (ECC) (Table 1).

**Table 1.** Listed activities in relation to the operation of the waste disposal facilities

Listed Activity	Applicability to the project
2.1 The construction of facilities for waste sites, treatment of waste and disposal of waste.	The incinerator is a waste disposal facility
2.2 Any activity entailing a scheduled process referred to in the Atmospheric Pollution Prevention Ordinance.	The main impact for incinerator is air pollution.

The national management waste policy indicated that “Incineration is the current practice used in Namibia for medical/clinical waste disposal. However, if not properly managed can cause harmful substances which may cause air pollution and other risks to human and the

environment. The policy further indicated that, many of them are not of an acceptable standard, lack maintenance and lack of skilled staff among others”.

It is against this statutory requirement that UNAM appointed EnvironClim Consulting Services (ECS) to develop an operational Environmental Management Plan (EMP) for the continued operation of the pathological incinerator at Ogongo campus.

#### **4 SCOPE OF EMP**

The development of this EMP is guided by the EMA and its Environmental Impact Assessment (EIA) Regulations 2012, which aims at identifying possible impacts, assessing the impact and formulate the optimum, practical mitigation measure to minimize the impacts.

This EMP address potential impact air pollution and health & safety for human that may be caused by the operation of the incinerator. In the end, this EMP provide practical mitigation measures that ensure social and environmental sustainability.

With this report, ECS believes that, the information provided is sufficient to enable the Environmental Commissioner to approve continued operation of the incinerator as per the EMA.

## 5 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

**Table 2.** Regulatory Framework for the operation of a pathological incinerator

LEGAL INSTRUMENT	OBJECTIVE	APPLICABILITY
<b>The Namibian Constitution</b>	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
<b>Environmental Management Act No. 7 of 2007</b>	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
<b>National Management Waste Policy</b>	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 public by promoting sound environmental waste management practices.	The campus produces pathological waste, that should be disposed of by means of incineration.

<b>LEGAL INSTRUMENT</b>	<b>OBJECTIVE</b>	<b>APPLICABILITY</b>
<b>Draft Pollution Control and Waste Management Bill</b>	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
<b>National Solid Waste Strategy</b>	The strategy to control and manage solid waste in Namibia	Solid waste such as ash will be produced.
<b>Regulations Related to the Health and Safety of Employees at Work. Reg No. 156</b>	Promotes the Safety and Health of employees at the work place	Employees working at the facility are prone to disease during operation
<b>Public Health and Environmental Act No. 1 of 2015</b>	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
<b>Labour Act No. 11 of 2007</b>	This Act outlines the labour laws which encompass protection and safety of employees at work.	Ensure that employees at work place are protected

## 6 DESCRIPTION OF THE AFFECTED ENVIRONMENT

### 6.1 Ogongo Campus

The Ogongo Campus is renowned for its game reserve which was established in 1997 and covers an area of 1000 hectares. The game reserve harbours few wild animals such as; oryx, springbok, zebra, giraffe and kudus. The area is falling within the mopane savanna predominated by *Colophospermum mopane*, *Acacia (Vachellia) nilotica*, *Combretum collinum*, *Terminalia sericea*, *Commiphora africana*, *Acacia (Vachellia) siberiana*, *Acacia flecki*, and *Terminalia sericea*.



**Figure 8:** Shows the surrounding environment

### 6.2 Climate

The area has an average annual rainfall of 400 mm – 450 mm. The average minimum temperatures are 4°C - 6°C, whereas the highest average maximum temperature in the area is 34°C to 36°C (Mendelsohn, 2003).

The area is characterised by flat plain, which forms part of the Etosha depression. The most prominent topographic features of the central northern regions are: the Etosha pan and its surrounding saline plains in the south, the Cuvelai delta feeding into the Etosha pan from the

north and the Kalahari sand plateau to the east and west of the Cuvelai delta. The area under interest encompasses the western part of the Owambo basin and is dominated by the young units of the Kalahari group predominantly comprising of the unconsolidated surficial sediments and the Etosha calcrete formation.

## **7 IMPACTS IDENTIFICATION AND RISK ASSESSMENT**

### **7.1 Air pollution**

The smoke released from incineration have the potential to pollute the air, and may affect public health. Best practise requires an incinerator is placed on high ground free of hill to ensure free dispersion of smokes. In cases where smoke becomes a nuisance to the surrounding, or poor dispersal, elongation of the chimney must be considered or air pollution control measure such as filters. Further, areas near the incinerator must not be used for agriculture purposes, especially leafy crops.

### **7.2 Waste water**

The cleaning of the incinerator and the surrounding generates waste water which is potentially contaminated or toxic and unfit to release in the sewerage system. Hence it important that waste water from cleaning of the incinerator is treated before discharged into the sewer system.

### **7.3 Health and Safety risks**

Employees working at the incinerator are susceptible to pathogens and toxic substances. It is thus required to implement stringent measures that shall compel employees to adhere to the health and safety plan for the operation of the incinerator. The health and safety risk are minimised through the provision of personal protective equipment to employees and training amongst others.



## **8 ENVIRONMENTAL MANAGEMENT PLAN**

### **8.1 Purpose of the EMP**

This Environmental Management Plan (EMP) is a risk strategy that contains logical framework, monitoring programs, mitigation measures, and management control strategies to minimize potential environmental impacts to insignificant level. It further stipulates the roles and responsibility of persons involved in the project.

### **8.2 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). Additionally, as new information becomes available and relevant to the EMP, it should be amended accordingly. UNAM and its contractor must therefore adhere to the framework of this document.

### **8.3 Roles & Responsibilities**

#### *8.3.1 Environmental Compliance Officer (ECO)*

This is an individual that represent the governing authority (MET). Depending on his/her work schedule, the ECO may visit the site at any time for environmental inspection and monitoring.

#### *8.3.2 The Proponent*

UNAM shall assume overall responsibility to ensure full implementation of the EMP.

Further the proponent must ensure to;

- Appoint a site Manager
- Ensuring that all workers are inducted on safety measures
- Safer working environment
- Provide workers with Personal Protective Clothing
- Monitor the employees works with regard to safety
- Ensure employees understand the guidelines of the Environmental Management Plan (EMP)

- Ensure the environment is protected and
- Maintain healthy relationship with the neighbours

#### **8.4 Site Manager (SM)**

The Site Manager will be responsible for the monitoring of daily operations and ensure adequate adherence to the EMP. The Site Manager should ensure that a copy of the EMP is available at all project premises at all times. Further, an induction should be conducted with all employees and be made understand the provision of this EMP.

#### **8.5 Employees**

- Adhere to the EMP
- Ensure to wear personal protective clothing at all time when working
- Report worn out PPE and request for replacement
- Adhere to the Company rules and policies

### **9 DISCIPLINARY ACTION**

The EMP is a legally binding document. Non-compliance to the EMP must result in punitive Legal action measure to be taken against the Proponent such as;

- Suspension of work,
- Financial penalties

The disciplinary action shall be determined according to the nature and extend of the noncompliance, and exact penalties are to be weighed against the severity of the incident.

## 10 THE EMP TABLE

This EMP was develop in relation to the EMP that was develop for the incinerator at UNAM’s Neudamm campus.

This was done to ensure consistency for UNAM in management of incinerators.

**Table 3.** The EMP table

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
<b>Induction</b>	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
<b>Air Pollution</b>	To mitigate the effect of pollution	<ol style="list-style-type: none"> <li>1. The incinerator must be operated in accordance to relevant laws;</li> <li>2. Areas near the incinerator should not be populated, e.g., containing housing, or areas where people congregate, especially in the western direction</li> <li>3. Areas near the incinerators should not be used for agriculture purposes, e.g., leafy crops, grasses or grains for animals.</li> <li>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</li> <li>5. Incinerator emissions should be monitored on regular intervals;</li> </ol>	Air pollution monitoring results Public complaints	Site Manager

<b>Environmental / Social Impact</b>	<b>Objectives</b>	<b>Proposed Mitigation Measures</b>	<b>Monitoring Indicator</b>	<b>Party Responsible</b>
<b>Waste Water</b>	To prevent pollution	<ol style="list-style-type: none"> <li>1. Install a drainage system leading to the disinfectant chamber for purposes of cleaning to contain waste water</li> <li>2. Waste water must be chemically disinfected before being discharge into the sewerage system.</li> </ol>	<p>Disinfectant chamber available</p> <p>Record of water treatment</p>	Site Manager
<b>Generation of Solids</b>	To prevent pollution	<ol style="list-style-type: none"> <li>1. The generated solid waste must be segregated in accordance with the health practice and law;</li> <li>2. Waste containers must be colour coded for ease segregation;</li> <li>3. Solid waste must be stored in a secure place with restricted access,</li> <li>4. Only authorized personnel may enter the incinerator place.</li> </ol>	Record of waste generated and disposed of methods	Site Manager
<b>Occupational health and safety risk</b>		<ol style="list-style-type: none"> <li>1. Adhere to relevant health and safety legal frameworks;</li> <li>2. Develop a Health and Safety Plan in accordance with relevant legal framework and incinerator manual guidelines;</li> <li>3. Employees must be provided with adequate Personal Protective Clothing;</li> <li>4. Enforce the use of PPE;</li> <li>5. Ensure that all employees undergo proper training and are orientated with associated risks;</li> <li>6. Train employees for basic first aid, fire safety training, and Occupational Safety and Health through approved training institutions;</li> <li>7. Provide firefighting equipment at the sites and the surrounding;</li> </ol>	<p>Employee and public health</p> <p>Visual inspection of PPE</p> <p>Training records of employees</p> <p>Fire fighting equipment on site</p> <p>Drill record</p> <p>Visible signage</p>	

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
		<ul style="list-style-type: none"> <li>8. Conduct drills at reasonable intervals to test the disaster preparedness level at the workplace, using the results to improve the response mechanisms;</li> <li>9. Set up emergency evacuation points and develop evacuation procedures.</li> <li>10. Provide emergency showers</li> <li>11. Unauthorized personnel must be restricted to enter the site</li> <li>12. Use visible signage to warn staff or visitors of dangerous places. Signs must be put on doors and areas.</li> </ul>		

**Table 4.** EMP for above ground fuel tank

<b>Environmental / Social Impact</b>	<b>Objectives</b>	<b>Proposed Mitigation Measures</b>	<b>Monitoring Indicator</b>	<b>Party Responsible</b>
<b>Health</b>	To ensure good health and safety of the employees and public. Fuel releases pollutants such as volatile organic compounds (VOCs) which is known to be harmful on human health. A group known as BTEX (benzene, toluene, ethylbenzene and the three isomers of xylene) is hazardous to human health and the environment. The International Agency for Research on Cancer (IARC) classified benzene as “carcinogenic to humans,” as it causes acute myeloid leukaemia (AML)	<ol style="list-style-type: none"> <li>1. Abide to the Occupational Health and Safety and Labour Act of Namibia and other statutory requirements such as International Labour Practise (ILO)</li> <li>2. Train employees on the possible health hazards to avoid potential risks</li> <li>3. To reduce pressure in the fuel tank, appropriate ventilation systems must be installed and properly maintained. This significantly reduce the pressure from the pump nozzle and consequently reduces the amount inhaled;</li> <li>4. In the absence of vehicle to be refuelled, workers must not rest next to the tank, this helps in reducing long term exposure to the VOCs;</li> <li>5. Employees at the fuel tank must go for annual health checks ups.</li> </ol>	<ul style="list-style-type: none"> <li>• Training minutes</li> <li>• Complaints of health issues by employees</li> <li>• Physical inspection</li> </ul>	Site Manager

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
<b>Safety, Fire and explosion risk</b>	Hydrocarbons are highly flammable, hence the risk of fire and explosion.	<ol style="list-style-type: none"> <li>1. Provide appropriate Personal Protective Equipment (PPE) to employee which includes helmets, overalls, safety shoes, etc</li> <li>2. Ensure that every employee goes through an induction course about safety</li> <li>3. Staff must be properly trained on how to react and handle fire</li> <li>4. Install an automatic fire alarm system</li> <li>5. Firefighting equipment must be on site 24hours and regularly inspected to ensure that they are working</li> <li>6. Emergency response numbers must be on clear and visible space</li> <li>7. Tanks must clearly be labelled</li> <li>8. The surrounding must have clear hazard signs “NO OPEN FIRE” “NO SMOKING” “SWITCH ENGINE OFF”</li> <li>9. There must be drills to test staff about their readiness to fight the fire</li> </ol>	<ul style="list-style-type: none"> <li>• PPE for all employees</li> <li>• Safety signs on site</li> <li>• Clear emergency toll free numbers (i.e. Police, Fire brigade )</li> </ul>	Site Manager
<b>Wind risk</b>	To prevent to the tank from being blown by the wind	<ol style="list-style-type: none"> <li>1. Ensure proper tank installation with good quality materials</li> </ol>	<ul style="list-style-type: none"> <li>• Physical inspection</li> </ul>	Site Manager

Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
<b>Lightning risk</b>	To prevent the tank from being struck by a lightning	1. Ensure a competent electrician install an anti-lighting material	<ul style="list-style-type: none"> <li>• Physical inspection</li> </ul>	
<b>Oil spills</b>	To prevent oil spill which may result in soil and water pollution	<ol style="list-style-type: none"> <li>1. Staff must be properly trained to fuel vehicles and handle fuel</li> <li>2. The fuelling pipes nozzle must be fitted with a spill detector</li> <li>3. The fuelling tanks must be installed on concrete or metal bund</li> <li>4. The concrete / metal containment must be designed to hold 110 percent of the tank liquid volume</li> <li>5. Waste water from the cleaning the surface must be disposed of at appropriated site,</li> <li>6. Provide an oil spill kit on site and train employees on oil spill emergency response such as, oil spill absorbent booms and pads.</li> </ol>	<ul style="list-style-type: none"> <li>• Physical inspections</li> </ul>	Site Manager
<b>Fuel tanks oil leakage</b>	To prevent fuel leakages from the tank	1. It is recommended to acquire a double	<ul style="list-style-type: none"> <li>• Physical inspection</li> </ul>	Site Manager



Environmental / Social Impact	Objectives	Proposed Mitigation Measures	Monitoring Indicator	Party Responsible
		<ul style="list-style-type: none"> <li>walled tank</li> <li>2. Tanks must have leak detection system</li> <li>3. Ensure the acquired tank has a lead detection</li> </ul>		
<b>Storm water contamination</b>	To prevent surface water contamination.	<ul style="list-style-type: none"> <li>1. The 110 % concrete / metal containment shall collect water during rain.</li> <li>2. The water must be disposed of at an appropriate place</li> </ul>	Visible concrete containment	Site Manager

## **11 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;

### **11.1 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. This was a limitation to this study. It is therefore recommended that, the environmental clearance certificate be issued with condition, for UNAM to establish air quality baseline in areas surrounding the site.

## **12 CONCLUSION AND RECOMMENDATIONS**

### **12.1 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 environmentally sustainable. The impact of the air quality was not tested; hence the air quality baselines were not established.

## **12.2 Recommendations**

It is recommended that;

- The project is approved to continue to operate and be issued with an environmental clearance certificate;
- The ECC must be issued with condition that, UNAM must establish baseline for the air quality in the surrounding area;
- The EMP must be implement adequately;
- An environmental audit be undertaken twice a year and bi-annual reports be submitted to MEFT to monitor the environmental performance.

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