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OPERATION REVIEW FOR PAPER MILL INDUSTRY AND IMPLEMENTING ENVIRONMENTAL MANAGEMENT SYSTEM IN THE UNITED KNIGDOM

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ABSTRACT

There have been global concerns about changes in our climate and environment as a result of various anthropogenic activities carried out by mankind in order to sustain their existence on planet earth which have resulted to effluent and emission of dangerous chemicals into the atmosphere and water body. Environmental Management Systems (EMS) which have been applied in managing the environmental performance of any organisation by dealing with the most significant environmental impacts was implemented on the existing paper mill operations, thus facilitating the management of its day to day activities and the impact on the environment. These activities include: the use of electricity, water and chemicals.

The EMS option recommended for most paper mill after considering the various type of options is BS885, which is a British Standard, used in implementing an environmental management system especially for the small and medium enterprises (SMEs). This EMS option is particularly suited to the paper mill industry since most paper mills within the United Kingdom fall within the operational settings and will therefore allow paper mills to operate its EMS with time over six separate stages due to the financial constrain of the companies with variation in resource allocation during the EMS implementation. The planning stage, implementation stage will require 45% resource allocation while monitoring and audits, management review and environmental policy stage will require 30%, 45% and 25% resource allocation respectively.

Significance methodology is used to determine environmental performance for the paper mill; using ≥ 21 as the significant threshold help to determine the major activities that have higher impact on the environment. Seven (7) Significance Environmental Aspects (SEA) were identified and environmental objectives and targets is been carried out in order to comply with environmental legislations governing the whole activities.

This EMS implementation will help the paper mill industry to be conscious of the effect of their activities on the environment with continuous improvement to further reduce the impact while simultaneously getting certified for implementing a complete EMS later in the future.

Keywords- *Paper mill, EMS, SME etc.*

I. INTRODUCTION

The concern of the public about the environmental health has been increasing globally for years, which led companies to reduce the damage done on the environment, which is now protected by environmental legislation as well as any, form of pollution on the environment leading to the negative public orientation with respect to the company's product. Environmental Management Systems (EMS) is a method used and applied to manage the environmental performance of any organisation by dealing with their most significant environmental impacts and is now be adopted by many organisations globally as to manage their day to day activities during operation. Most organisations now are forced to implement it due to demand from the stakeholders and change in government regulation charging organisation to manage their day to day activities while protecting the environment for future generation.

Most if not all Paper Mill deals with different kinds of paper production with its raw material coming from recovered paper obtainedfrom the household, industrial and commercial paper waste. In the production of pulp and paper making, a huge amount of water is used with a lot of effluent generated, chemicals and high volume of electricity is also used in the production stage (UNEPIE, 1996). There are some basic steps in paper production which was identified by (Smook, 1992) used by the most paper mill in carrying out their various activities in papermaking.

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II. Major Activities by Paper Mill

The major key activities to be considered when implementing an EMS for paper mill varies with which are the important activities in the production of paper. These activities include transportation of the waste paper to site which is not considered as a major impact, the use of water, chemicals, noise pollution, energy and electricity, and solid waste disposal. Loss of chemicals used during deinking and bleaching to desired brightness with the emission of volatile organic compound, water used in pulping processes with effluent generation, noise pollution from the paper machines especially the vacuum pump and finally the electricity used to drives the pumps, conveyors, lighting and energy for heating which are from the fossil fuels. Waste from paper production if not properly disposed does have negative impact on the environment. All this activities have negative impact on the environment starting from air pollution/emissions, water emission and the depletion of non-renewable resources which leads to global warming, climate change and ozone layer depletion.

III. Implementation of Environmental Management System (EMS)

The main purpose of implementing an EMS is to reduce the negative impact of activities of a company on the environment, with different EMS options though a voluntary system with common objective but different features which makes it suitable into different organisations and countries (Wilma *et al*, 2003). It deals with analysing the major activities of the company , managing activities that have negative impacts on the environment by putting in place environmental strategy and methods in achieving the environmental targets (Philippe, 2007). Wilma *et al*, 2003 also suggested that effective used of EMS will help in reducing the amount of lethal emissions into the atmosphere.

The EMS options

The EMS options are: ISO 14001, Eco-Management and Audit Scheme (EMAS), BS8855 and In House Systems.

ISO 14001

ISO 14001 identifies the basic requirement of an EMS which encourages a continual improvement on environmental performance, it has been used as an international standard for EMS by the International Organisation for Standardisation in Geneva, seen the certification body. ISO 14001 does provide a structural design for measuring, analysing, managing and improving on the environmental performance of an organisation. It also helps in reducing waste and pollution by controlling all the activities been carried out by an organisation while also being used globally by different organisations and sector (Brady, 2005, Philippe, 2007)

Eco-Management and Audit Scheme (EMAS)

EMAS is also a voluntary activity like ISO 14001 which is been design also to improve the environmental performance of an organisation with any organisation wishing to implement EMAS required to provide the public and the stakeholders with a verifiable annual environmental statemen. (Gilmour, 2010, Rikhardsson, *et al* 2005). This system only applies to the European Union (EU) countries although different organisations from anywhere in the world can participate in EMAS since is a voluntary system and incorporates four (4) stages. (Brady, 2005)

BS8855

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BS885 is a British Standard which is seen as a guide for the phase implementation of an environmental management system especially for the small and medium enterprises (SMEs)(Gilmour, 2010, Sadgrove, 2005). It is available to any kind of businesses irrespective of location, size and growth of the business. BS8855 also allows businesses or organisations involved to operate its EMS with time over six separate stages, which must also show an improvement in the company's activities with respect to the environmental impacts (Brady, 2005).

In House

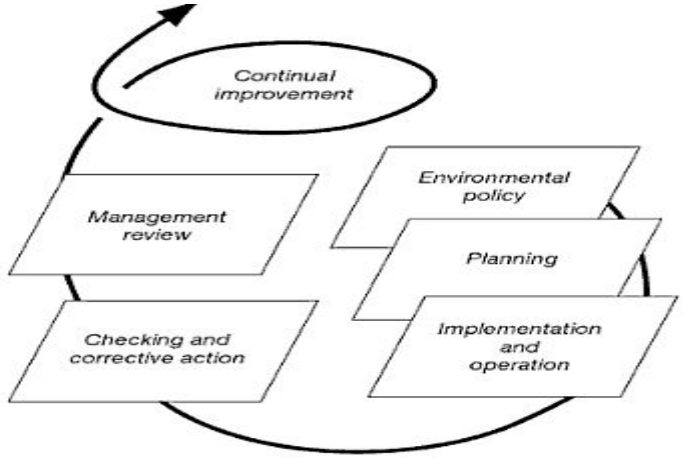
Is used in small micro-business that involve no EMS of the establishment. It involves activities, which are normally carried out by a standard, which is documented usually in form of a work manual. In operating in-house, the organisation must fulfil all ISO14001 standard. (Gilmour, 2010).

Selected EMS option for Paper Mill

The selected EMS option for the paper mill is the BS8855 which will allow most of the company to implement his EMS in stages due to inadequate funds for complete EMS (ISO 14001) and maintain the EMS . This selection is valid more so since most of the paper mills within the UK paper only supply their products within the UK States.

IV. STAGES IN ENVIRONMENTAL MANAGEMENT SYSTEM

EMS always ensure that an organisation environmental objectives as stated in the environmental policy are fully implemented provided that everybody knew their roles and responsibility in achieving the company's target which is done by constant checks and monitoring.



Source: ISO, 1996

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Environmental Policy

This is the organisation's objectives with regards to the environment which has been identified and endorsed by senior management and must include a continuous improvement and reduction in pollution, obey the environmental legislation and laws while the policy must be made available for the public (Brady, 2005)

Planning

In the planning stage, environmental impacts and activities of an organisation are identified with the significant environmental aspect and the environmental legislation and laws governing the impacts and how these impacts can be controlled, established (Brady, 2005)

Implementation and Operation

It involves writing and documentation of the procedure of operations, establishing a good communication with the staff about the implementation and assigning duties to facilitate improvement via monitoring the impacts and giving training on the environmental programme when necessary. (Brady, 2005)

Checking and Corrective Action

This is undertaken to check on the significant environmental impacts and to known if the plan EMS is implemented and working as planned. It provides information to the management about the environmental performance of the organisation.(Brady, 2005)

Management Review

The management review is carried out by senior management to ensure that the EMS is achieving its purpose of implementation and to know if the environmental performance of the organisation has improved. (Brady, 2005 and Gilmour, 2010)

Continuous Improvement

This is undertaken to further limit the impact of other activities and to improve on the environmental performance of the organisation. All the stages are repeated for continual improvement.

V. RESOURCES ALLOCATION FOR EMS IMPLEMENTATION

The resource allocation for implementing an EMS varies from one stage to another and it involves 3 stages:

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Planning Stage: 30% of the resource will be required because conducting environmental review involves efforts to determine all the significant environmental aspect of the paper mill and is done by professional in that field of operation.

Implementing and Operating Stage: 45% of the resource is needed because it involves writing and documentation, which is time consuming, training of staffs and effective communication among the workers.

The remaining stages of the EMS, monitor & audit, management review and environmental policy takes up the remaining 25% of the resource since it requires little effort compare to the planning stage. (Gilmour, 2010)

The Initial Environmental Review for Paper Mill

In order to determine the environmental performance of an organisation, the three basic and important drivers of environmental management should known which are: environmental impacts, stakeholder values, and environmental legislation. The initial Environmental Review the paper mill is shown in appendix Table 1

Significance Methodology

The methodology used is the "significant methodology" with a ranking scale from 1 to 5 for each of the key activities using the entry from the paper mill shown in the appendix table 1 below. Each of the ranking is highlighted below:

The significant methodology used is been design by the Urban Water Technology Centre, University of Abertay

Frequency used	**Volume used**
1 = frequency used – every 3years/2years	1 = volume used – not used
2 = frequency used – every year	2 = volume used – minimal
3 = frequency used – every month	3 = volume used – average
4 = frequency used – every week	4 = volume used – high
5 = frequency used – everyday	5 = volume used – very high
Long or short term pollution	**Stakeholder concerned**

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1 = no pollution

2 = minimal term pollution

3 = average term pollution

4 = high term pollution

5 = very high impact of pollution

1 = show no concerned

2 = little concerned

3 = averagely concerned

4 = highly concerned

5 = importantly concerned

Environmental legislation and law

1 = no legislation

2 = planning of economic instrument

3 = economic instrument is existing

4 = future plan for environmental legislation

5 = legislation is existing

Directly or indirectly under the control of the company

D = directly control

I = indirectly control

Part of normal operation or abnormally used during operation

N = used in normal operations

A = abnormal used during operation

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Environmental emergency cause so far by this activity

E = emissions into either air, water and land

N = no environmental emergency associated

Using significance methodology discussed above, scores are assigned to each of the activities carried out by paper mill companies, summing together all the assign scores in order to identify the environmental aspects of each of the activities. The summation of the whole activities is shown in appendix table 2.

A significance threshold of ≥ 21 is chosen, and will assist to identify the activities that have higher impact on the environment i.e the significant environmental aspects.

VI. PRINCIPAL LEGISLATION ASSOCIATED WITH ENVIRONMENTAL ASPECTS AND IMPACT OF PAPER MILL INDUSTRY

The principal environmental legislation on the impacts and aspects of Paper Mill Industry are as follows:

- Solvent Emissions (Scotland) Regulations 2010 SSI 236
- CRC Energy Efficiency Scheme Order 2010 SI 768
- Environmental Protection (Disposal of Polychlorinated Biphenyls and Other Dangerous Substances) (Scotland) Regulations 2000 SSI 95
- Contaminated Land (Scotland) Regulations 2000 SI 178
- Landfill (Scotland) Regulations 2003 SSI 235
- Environmental Protection Act 1990
- Environmental Damage (Prevention and Remediation) Regulations 2009 SI 153
- Environment Act 1995
- Noise Emission in the Environment by Equipment for Use Outdoors (Amendment) Regulations 2005 SI 3525

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- Environmental Protection (Controls on Ozone-Depleting Substances) Regulations 2002 SI 528
- Water Act 2003 (Netregs.gov.uk)

VII. ENVIRONMENTAL OBJECTIVES AND TARGETS

Environmental objectives and targets are part of EMS requirement for an organisation to undergo continuous improvement on the environmental performance over a period of time which can be long or short term. The aim which is the goal of the organisation should be stated clearly and the target must be precise which should follow the SMART criteria (Specific, Measurable, Achievable, Relevant, and Time-bound).

Using the threshold ≥ 21, seven (7) Significance Environmental Aspects (SEAs) was identified; the environmental objectives and target are set to reduce the SEAs which encourage a continual improvement. The Environmental Objectives and Targets for the Significance Environment Aspects (SEAs) for the paper mill companies are identified below in the appendix table 3.

The most significant environmental aspect identified from the activities been carried out by most of the paper mill companies using the significant threshold ≥ 21 is the use of electricity generated from fossil fuels, bleaching chemicals and noise pollution, all with significant threshold of 22. However, the most common and important activity that generates huge amount of emissions to the atmosphere or environment is the use of electricity from fossil fuels with CO_2, NOx which causes global warming and air pollution.

VIII. CONCLUSION

Environmental Management System is a method used in controlling the environmental performance of any organisation in order to manage their most significant environmental impact on the environment. The impact caused on the environments varies, depending on the kind of activities that is been carried out by the company. The environmental impact identified within the paper mill sector is the emission of greenhouse gases, depleting of non renewable resources, air, noise, and water pollution which if not controlled or regulated caused more damage to the environment.
After considering the different types of EMS options, the recommended EMS for most of the paper mill was the BS885, a British Standard for the small and medium enterprises (SMEs) for implementing an environmental management system which will be in stages because of financial demands in implementing a complete EMS.

Seven (7) Significant Environmental Aspects (SEAs) were identified from all the activities carried out by the paper mill using the significance threshold ≥ 21 with different targets that are SMART introduced to reduce the SEAs, thus, encourage continual improvement.

This EMS implementation will help the paper mills to control their day to day activities, certifies and deals with their Significant Environmental Aspect which will be in continuous steps to further minimise the impacts to the minimal level so as to comply with the environmental legislations that govern the activities been carried.

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Appendixes

Table 1: Environmental Impacts and Aspects for Paper Mill

Ref	Processing Stage	Activity	Environmental Aspect	Environmental Impact
1	Recover paper	Storage of recover paper	Use of electricity in conveying the waste paper	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution.
2	Recover paper	Used of light for screening	Use of electricity for screening the waste paper before sending for pulping	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution.
3	Recover paper	Screening by machine	Electricity is used to operate the machine	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution.
4	Pulping process	Energy used in pumping	Electricity is used	Fossil fuels are used to generate electricity e.g coal. Depletion of

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		water		non-renewable resources with CO2, NOx emission which causes global warming, air pollution.
5	Pulping process	Pumping of water	Water taking from rivers/springs	If not it is controlled, cause harm to environment and the aquatic ecosystem
6	Pulping process	Blender or grinder used	Used of electricity to drive the blender during pulping	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution.
7	Pulping process	Sending recover papers to the pulper	Electricity used in conveying the recover paper to the pulper	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution
8	Pulping process	Breaking down of the pulps to slurry	Electricity is used in breaking down	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution
9	Pulping process	Sieving to have a uniform paper pulping	Electricity is used to drive the sieving machine	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution
10	Pulping process	Waste from the pulps	Waste generated sent to landfill	When decomposes produces methane, CO_2 in the landfill site which are the greenhouse gases and

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				bad odur which resulted to air pollution
11	Deinking	Removing inks from pulps	Used of surfactant chemicals like caustic soda, borax	When discharge into waterbody causes water pollution, harmful to marine ecosystem and must treated before its been discharge back into environment. .
12	Deinking	Heat is needed in deinking	Heat is supply by the used of electricity	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution
13	Deinking	Ink removal by Floatation cells	Electricity is used to operate the floatation cells	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution
14	Cleaning the pulp	Pulp slurry pass through series of roller	Electricity is used to drive and operate the rollers	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution
15	Cleaning the pulp	Waste water from slurry	Chemical waste water generated for disposal	Waste water discharges contain dissolve chemicals and high COD, BOD, can cause water pollution, and affect aquatic life. Its require treatment before being discharge back into the water body.
16	Bleaching	Bleaching the paper pulps to have a brighter colour	Used of chlorine, hypochlorine, chlorine	If it is not controlled, it resulted to acid deposition, land pollution, and

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			dioxide in bleaching process	ozone depletion which can endanger human, animals and environment at large.
17	Calendaring	Pressing of the paper pulps	Electricity is used in driving the rollers	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution
18	Calendaring	Waste water from the pulps	Waste water generated for disposal	It should be sent to effluent treatment plant before discharging it back into the water body. It very rich with BOD, COD which are dangerous to aquatic life and human in general causing water pollution and air pollution through the odour of the water.
19	Dryer	Drying the pulps into paper (steam)	Electricity is used in drying	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution
20	Coating	Coating the paper	Chemical is used	When discharge, is made up of Emissions of water with high volume of BOD and suspended solid, it must be treated before been discharge into waterbody.
21	Coating	Used of electricity in coating	Electricity is used	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution.

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22	Dyeing	Dyes of paper	Chemicals is used	Soluble in water, alter the colour of the water and cause water pollution with low oxygen contents, endanger aquatic animals. It should treated before it been discharge
23	Dyeing	Use of machine	Dyeing operation is always Noisy both within and outside the factory	Causing nuisance and noise pollution to the environment
24	Sizing	Sizing the paper	Electricity is used	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution.
25	Trimming	Trimming the paper	Electricity is used	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution.
26	Solid waste	Waste from paper production	Waste is been sent to the landfill	When decomposes produces methane, CO_2 in the landfill site which are the greenhouse gases and bad odur which resulted to air pollution
27	Paper wrapping	Wrapping of paper	Electricity is used to used to operate the wrapper machine	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution.
28	Paper wrapping	Paper wrap send by conveyor for packaging	Electricity is also used to operate the conveyor	Fossil fuels are used to generate electricity e.g coal. Depletion of

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			machine	non-renewable resources with CO2, NOx emission which causes global warming, air pollution.
29	Carton wrapping	Packaging of the paper into cartons	Electricity is also used to operate for packaging	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution.
30	Loading to the storehouse	Final destination of packaging	Electricity is used in the loading process, used in operating the conveyors	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution.
31	Lightening	Lightening the storehouse	Electricity is used for lightening	Fossil fuels are used to generate electricity e.g coal. Depletion of non-renewable resources with CO2, NOx emission which causes global warming, air pollution.

Table 2: Assigning Significance Valves to each of the Activities carried out by the Paper Mill

	Frequency	Volume	Short/ long term	Legislation	Stakeholders	Total	Direct or Indirect Control (D or I)	Normal or Abnormal operations (N or A)	Emergency (E or U)	SEA (Yes or No)	Significance threshold (≥ 21)
1	5	2	5	3	4	19	D	N	U	No	
2	5	2	5	3	4	19	D	N	U	No	
3	5	3	5	3	4	20	D	N	U	No	

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4	5	2	5	3	4	19	D	N	U	No	
5	5	5	3	5	3	21	D	N	U	Yes	
6	5	2	5	3	4	19	D	N	U	No	
7	5	2	5	3	4	19	D	N	U	No	
8	5	3	5	3	4	20	Q	N	U	No	
9	5	2	5	3	4	19	D	N	U	No	
10	5	2	4	5	3	19	D	N	U	No	
11	5	3	3	5	3	19	D	N	U	No	
12	5	3	5	3	4	20	D	N	U	No	
13	5	2	5	3	4	19	D	N	U	No	
14	5	3	5	3	4	20	D	N	U	No	
15	5	4	4	5	3	21	D	N	U	Yes	
16	5	4	4	5	4	22	D	N	U	Yes	
17	5	4	5	3	4	21	D	N	U	Yes	
18	5	4	4	5	3	21	D	N	U	Yes	
19	5	5	5	3	4	22	D	N	U	Yes	
20	5	3	3	5	2	18	D	N	U	No	
21	5	3	5	3	4	20	D	N	U	No	

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22	5	3	4	5	3	20	D	N	U	No	
23	5	4	3	5	5	22	D	N	U	Yes	
24	5	3	5	3	4	20	D	N	U	No	
25	5	3	5	3	4	20	D	N	U	No	
26	5	4	4	5	3	21	D	N	U	Yes	
27	5	3	5	3	4	20	D	N	U	No	
28	5	3	5	3	4	20	D	N	U	No	
29	5	3	5	3	4	20	D	N	U	No	
30	5	3	5	3	4	20	D	N	U	No	
31	5	2	5	3	4	19	D	N	U	No	

Table 3: Paper Mill Objectives and Targets

	Activity	Notes	Objective	Target
5	Water pumping for pulping from rivers	Has SEAs of 21 Part of the normal operation Under the direct control of the	1.0 To reduce the amount of water taken from rivers/ spring by 20% by agreed Date.	1.1 Investigate alternative method in saving the water taken from the river e.g recycle the water after used and save it into water storage tanks. To be completed by agreed Date. Responsibility of the Chief Engineer.

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		paper mill		
15	Cleaning the pulp (water from the slurry) waste ready for disposal	Has SEAs of 21 Part of the normal operation Under the direct control of the paper mill	2.0 To reduce the effluent sending into water-body	2.1 To ensure that the effluent from the pulp is been treated by installing water treatment plant. if discharging it back into the water body is the last option. To be completed by agreed Date. Responsibility: Chief Engineer. 2.2 To ensure proper handling of the effluent to prevent it entering the environment. Responsibility: Environmental Manager 2.3 To install a biological treatment plant e.g anaerobic digestion plant for generating biogas. To be completed by agreed Date. Responsibility: Chief Engineer.
16	Bleaching	Has SEAs of 22 Part of the normal operation Under the direct control of the paper mill	3.0 To reduce the amount of toxic chemicals used in bleaching by 10% by agreed Date	3.1 To investigate other method that can be used in bleaching apart from toxic chemicals that will not harmful to the environment. To be completed by agreed Date. Responsibility: Chief Engineer.
17	Calendaring	Has SEAs of 21 Part of the normal operation Under the direct control of the paper mill	4.0 To reduce the energy used from fossil fuel by 10% by agreed Date	4.1 To investigate alternative technologies in generating electricity e.g renewable energy like bio fuel. To be completed by agreed Date. Responsibility: Chief Engineer. 4.2 To ensure that machines not in used is shut down. Responsibility: Operation Manager.
18	Waste water from calendaring (white water)	Has SEAs of 21 Part of the normal operation Under the direct control of the paper mill	5.0 To ensure 80% of the white water is treated due to toxic compound presence by agreed Date.	5.1 To increase the install capacity for water treatment. To be completed by agreed Date. Responsibility: Chief Engineer. 5.2 To install ample buffer as to limit spill of white water. To be complete by agreed Date. Responsibility by the Chief Engineer

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19	Dryer (steam)	Has SEAs of 22 Part of the normal operation Under the direct control of the paper mill	6.0 To reduce the amount of energy during drying stage by 10% by agreed Date.	6.1 To investigate on new technology to generate steam for drying, e.g co-generation plant. To be completed by agreed Date. Responsibility: Chief Engineer. 6.2 To ensure maintenance is carried out on transmission lines and cables as to check for any losses. To be completed by agreed Date. Responsibility: Head of Maintenance.
23	Noise pollution from Dyeing machine	Has SEAs of 22 Part of the normal operation Under the direct control of the paper mill	7.0 To reduce the noise pollution from the production section by 10% by agreed Date.	7.1 To investigate and install a device for the noise pollution caused by the machines e.g silencers. To be completed by agreed Date. Responsibility: Chief Engineer 7.2 To ensure that the machines are housed within heavy walls made with sound absorbent materials. To be completed by agreed Date. Responsibility: Chief Engineer.
26	Solid waste deposal from trimming, packaging and	Has SEAs of 21 Part of the normal operation Under the direct control of the paper mill	8.0 To reduce the amount of solid waste sent to landfill by 60% by agreed Date.	8.1 To investigate how the waste can be reused again and made landfill last option for disposal. To be completed by agreed Date. Responsibility: Chief Engineer. 8.2 To investigate techniques to make used of the waste in bio gas energy generation. To be completed by agreed Date. Responsibility: Chief Engineer. 8.3 To ensure that every machines are working efficiently as to reduce the waste generated. To be completed by agreed Date. Responsibility: Operation Manager.