

**INDUSTRIAL POLLUTION
REGULATION AND FACILITIES
COMPLIANCE**

**(A CASE STUDY OF KUDENDE INDUSTRIAL AREA IN
KADUNA SOUTH).**

BY

OYEKUNLE MICHEAL OLUGBENGA
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DEDICATION

This work is dedicated to the Almighty God whom I have my being, for giving me the power, strength and ability to complete this program and work successfully may all glory, honor and adoration be unto his name.

Also to my parents Dn & Mrs. S. A. Oyekunle, my elder Sister & her husband Mr. & Mrs. Bankole, my younger ones; kikelomo, Shola and Ibukun for their guidance and support throughout my study.

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CERTIFICATION

This is to certify that this project work being submitted by OYEKUNLE MICHEAL OLUGBENGA PGD/GEO / 2003/2004/273 is my original work and has not been submitted before by anybody for any purpose and meets the requirement governing the award of PGD in Environmental Management, Geography Department, Federal University of Technology, Minna Niger State.



DR (MISS) A.A. OKHIMAMHE
SUPERVISOR

DATE 07/1/05

DR M. T. USMAN
HOD

DATE-----

PROF. J. A. ABALAKA
DEAN, POST - GRADUATE SCHOOLS

DATE-----

EXTERNAL EXAMINER

DATE-----

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ABSTRACT

The purpose of this project work is to provide data and information of various industries within the study area which are complying with the regulation and that which have always being treated and flared. Basically, questionnaire and relevant information from the regulatory agencies was the only instrument used in this study. The data's collected were analyzed and percentages were used for testing the acceptance and rejection.

The major findings of the study were that most of the industries within the study areas do not have the means of treating their effluents before releasing it into the air, land or sea and this in turn have serious effect on the environment both man and even the aquatic life.

Based on this, some recommendations were made in order to avert or ameliorate the consequences of industrial pollution within the study area.

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Chapter one

INTRODUCTION

1.1 BACKGROUND INFORMATION:

Industrial is related to companies engage in the manufacturing of products. Pollution could be said to be the process or act of polluting or the state of being polluted, especially the contamination of soil, water or the atmosphere by the discharge of harmful substances. This act or process of polluting could include also (either intentionally or accidentally) an unwanted substances or factors. In other words, it is also the destruction of purity and sanctity. Industrial pollution therefore is not just a local issue but rather that which have gotten attention globally. We have a lot of problems in which pollutions by industries have caused and create. Industrialization is very important to the socio-economic development of any nation.

The fact that these industries provide employment opportunity for a reasonably number of population; we can not also do away with the fact also that there are consequences ranging from the various emissions and pollution in which these industries caused. However, industrial pollutions vary from the type of polluted substances; the technological process and even the kind of products characteristics and the weight of discharge.

Furthermore, the rapid development of industries in both the developed and developing countries have actually increased pollution emitted both to outer space, and within the environment. For industries to be sited; a lot has to be put in place. The higher level of environmental existence and awareness of regulatory environmental protection measures in the developed countries have actually discouraged the indiscriminate successive pollutions within the developed nation.

However; industrial pollution contains hazardous and toxic substances more of which can be harmful to human health. In Nigeria for example; the technologies available are very expensive in cubing the complexity and the voluminous pollution generated by these industries. These global phenomenon "industrial pollution" is therefore the business of every industry in the world especially the heavily industrialized nation to start having at the back of their mind the environment consequences of these pollutions

The way and manner in which pollution occurs in Nigeria vary from the products generated from these industries. It can therefore be found out that most of these industries have improper way of releasing these polluted substances. Not long before now, the promotion of industrial activities have

given the signal of dangers that could be coming from these industries and the call for the abatement and drastic measure to be taken in order to avert both the short term and long term effects.

In the data available, most of the abatement facilities are seriously lacking for most of the industries in kaduna south. Only very few industries are said to be in total compliance with the standard and the regulation of the laws of the federal government. All over the world, it is accepted that countries sign the pact of curbing pollution and threats of serious environmental dangers; hence the lack of scientific certainty should not be used as an excuse for the postponement of measures to be taken in the prevention of environmental degradation. Therefore, environmental monitoring and assessment should be anticipated in the prevention and minimizing industrial pollution all over the world.

1.2 STATEMENT OF RESEARCH PROBLEMS

Industrial pollution is as a result of industrial activities within the Environment. Majority of industries located within the kudende industrial areas in kaduna south of Kaduna state discharge their waste product directly into the air, some of the pollutants goes into the public drains, some goes into the rivers. Those that go into the rivers result in the lost of aquatic life; the ones directly expose to the air e.g. the emission of chlorofluorocarbon

(CFCS), continue to deplete and have effect on the protective ozone layer at an alarming rate. The textile industries also pollute the environment. The main source of air pollution emitted is said to be the various manufacturing processes. These include Nitrogen oxides, hydrocarbon, photo chemical oxidant, sulphur oxide and carbon monoxide; among others.

1.3 AIMS AND OBJECTIVES OF THE STUDY

The aim is to study the impact of industrial pollution and to also assess the compliance of industrial pollution regulations within the study area. Hence, the objective of the study includes:

1. To identify a useful means of analyzing gaseous substances before emitting them into the atmosphere.
2. To identify the attendant environmental problems and recommend ways of solving the problems
3. To suggest and highlights the advantages of using new technology in the areas of industrial pollution emission.

1.4 JUSTIFICATION OF THE STUDY

The study of this research work will serve as a platform by which necessary action can be taken by government in dealing with the non-compliance of industries regarding their pollution abatement regulation. Also, steps that are to be taken by both the government and the authorities of the industries

concern in ensuring that pollution is being reduced to the beeriest minimum. This research work will also provides data, information of industries complying with the regulation and that have ways and manner their effluents are being treated and flared. Hence, providing solution where need be for the non-complying ones. This research work will also be useful and important to future researchers coming on board.

1.5 DESCRIPTION OF STUDY AREA

This research work covers the industries within the kudende industrial layout. The Kudende industrial layout is situated in Kaduna south local Govt. area of Kaduna state, with about 28 different industries producing different items. Apparently, the biggest industrial area in the whole of the Northern States. It is bounded to the North by the Kaduna River. Attached herein is a guide map for an easy location of the research area.

1.6 SCOPE AND LIMITATIONS OF THE STUDY

The limitations of the study however will include the industries within the kudende industrial layout located in the southern part of Kaduna state. Hence, all other industries that do not fall within the said area are not to be included. The work will cover categories of industries within the study area (kudende industrial area) in the southern part of Kaduna state and the

compliance of these industries, in terms of industrial pollution. Hence, the following therefore are the main scope of this research work:

- (a) The ways and manner in which this industrial pollution is being emitted will be analyzed for these industries within the study area.
- (b) This research work will also assess the compliance of these industries of environmental auditing of its pollution & facilities put in place for these industries.
- (c) This work will also assess the installation of treatment plants particularly for the industries that generate both liquid and air pollutants.
- (d) The submission of a mandatory monthly or quarterly analysis of all Physio-chemical to the regulatory agencies concern; i.e., the Federal Ministry of Environment, Federal Environmental protection Agencies (FEPA), Kaduna State Environmental Protection Authority (KEPA). These industries that generate liquid effluent and gaseous emissions are mandated to conduct this analysis. All the parameters are also expected to be analyzed and must not exceed the acceptable limits as set down by the Federal Ministry of Environment.

Chapter two

LITERATURE REVIEW

2.1 OVERVIEW OF INDUSTRIAL POLLUTION CONTROL (AIR).

A wide variety of industrial process and environmental remediation activities generate gas stream contaminated by volatile organic compounds (VOCs). One example of this is of-gases generated during painting operations e.g. (Peugeot Automobile Nigeria limited). Emissions of the automotive industry (Kim et al., 2000a, 2000b). Smith and Brown (1993) estimated that nearly one million tons of solvents were emitted from paint spray booths globally in 1987, with 409, 100 tons consisting of hydrocarbons. The contaminant constituents present in paint spray booth off-gases vary depending on the type of paint utilized; however, a typical composition includes a mixture of solvents including acetone, methyl ethyl ketone, methyl isobutyl ketone, methyl propyl ketone, toluene, benzene, and n-butyl acetate (McMinn et al., 1992; Webster et al., 1998; Kim et al., 2000a, 2000b; Kazenski and Kinney, 2000).

There are many effective industrial and pollution control technologies, but not all can be applied to every waste stream (Deshusses, 1994). Selection of the technique appropriate for a particular application is guided by several

considerations including the required removal efficiency, economic aspects, and regulatory requirements. The effectiveness of a technology depends on the particular application, but it can often be constrained by the gas flow rate and contaminant concentrations present.

The most widely used technologies for removing gas-phase pollutions from air streams, incineration and sorption to activated carbon, have substantial disadvantages. During incineration, pollutants are combusted at temperatures between 700 oC and 1400 oC. Although treatment performance is generally uniform with effective removal of most compounds, incinerators require large fuel input and may also produce harmful secondary waste/pollution streams including NOx. Carbon adsorption permits high removal efficiencies for low pollutant concentrations; however, this technology has high capital and operation costs because of the expenses of the medium and its disposal or regeneration. Furthermore, this process transfers contaminants from the gas to a solid phase that requires further treatment (Deshusses, 1994, and Devanny et al, 1999). An alternative to these technologies could be a biological treatment.

2.2 TYPES OF POLLUTION

Pollution into the environment could either be by air, water or land. These three major ways of industrial pollution have increasingly caused

deterioration to the environment and also cause hazard to the being both man and animal living within the environment. These industrial activities is related to the production of fertilizer, various sources of chemicals etc aimed at solving economic and social problems tends to pollute the environment. For this project work, the three ways of pollution is to be looked into. But mostly, is the pollution that is been released into the air which affect the environment especially the depletion of the ozone layer. Hence, these pollutions from the various industries within the environment produces ghastly odour, unsightly condition etc.

2.3 ENSURING SUSTAINABLE INDUSTRIAL PRODUCTION

The industries in Nigeria has continue to expand and enlarged with very little cognizance to their rapidly growing environment impacts. We therefore must move towards industrial technologies and processes that are less polluting, less resource consuming, less energy intensive and even less hazardous for workers and less producing. The most urgent challenges are said to be industrial air including noise pollution hazardous wastes and water pollution. The actual policy goal is to ensure that the industrial air, noise, water pollution are reduced to the beeriest minimum that can not be harmful to the health of the people or on the environment. Also priority objectives also include establishing and enforcing new ambient and emission standards

for air, noise, water pollution as well as introducing economic incentives in order to encourage changes in the industrial technologies and processes to meeting the newer standards.

Other policy goal is to develop and implement new standards and programmes for the environmentally sound management, its control and disposal of industrial wastes, especially the hazardous or even the radioactive substance. These priority objectives include the registration, monitoring and control of all toxics, hazardous substances and the proper monitoring of all phases of the life cycle of all other industrial substances that are likely to have an adverse impact on human health or even environment.

Finally, the health and safety of Nigerian including the Nigerian workers are also a priority concern. These objectives includes, setting, monitoring including the enforcement of appropriate standards and regulation for protecting workers and Nigerian against air pollution, noise and other threats to their health and safety: preparing contingency plans for responding effectively to industrial accidents, and educating both the management and workers on the dangers posed by these industrial pollution and hazardous wastes.

2.4 GENERAL GUIDELINES FOR POLLUTION CONTROL IN INDUSTRIES

- (a) The federal ministry of environment office will serve as a pollution response centers for the co-ordination of response activities of the said industries and each industry must draw up a contingencies plan in order to curb accidental release of pollutants.
- (b) Every industry that is into manufacturing must set up some machinery in combating pollution hazard and also maintaining equipment in the event of any emergency. Hence; the stock of pollution response equipment should be made readily available and accessible ensuring that the general aesthetic sanitary condition of these industries including their surrounding is being adequately maintained.
- (c) The environmental auditing of these industries including the environmental impact assessment (EIA) will be mandatory and in the case of pollution emergency, the nearest federal ministry of environment office shall be the “on the scene co-ordination” which should co-ordinate response activities.
- (d) No industry shall release toxic substances into the air, water and even land of the Nigerian environment beyond permissible limits and all the manufacturers must submit the chemicals that are in use

to the nearest federal ministry of environment office. The detail about their chemicals and storage condition must also be submitted.

- (e) There is no new point source of industrial pollution that shall come on board without complying with the provision of these guidelines and for the present point and non-point sources of industrial pollution, it is hereby stated that all industries with potential for the release of gaseous substances particularly liquid or solid untreated discharge are mandated to install into their systems, appropriate abatement equipment accordance with the prescribed guidelines.

2.5 NATIONAL ENVIRONMENTAL PROTECTION

(POLLUTION ABATEMENT IN INDUSTRIES)

REGULATION 1991

Commencement: 15th August, 1991

In the exercise of power conferred upon me by section 37 of the federal environmental protection Agency act and of all other powers enabling me in that behalf; I, major general Mamman Tsofo Kontagora (rtd), hereby make the following regulations:-

- (i) There will be no industry that will release into the air hazardous or toxic substances or on land of Nigeria ecosystem beyond limits approved by the Agency.
- (ii) An industry shall have the following.

- (a) A pollution monitoring unit within it's premises
 - (b) A pollution control on site or
 - (c) Assign the responsibility for pollution to a person or body corporate accredited by the Agency.
- (iii) Any discharge at all including solid; gaseous and liquid waste from any industries or facility will be subjected to analysis and hence reported to the nearest office of the Agency every month, via a discharge monitoring report.
- (iv) Also, an unusual discharge or accidental discharged of waste from any of these industries shall be reported to the nearest office of the Agency not later than 24hours of discharge.
- (v) An industries /facility shall also submit to the closest office of the Agency list of the following items:-
- 1- List of the chemicals used in the manufacture of its products.
 - 2- The details of stored chemicals and storage limitation
 - 3- Where these chemicals are bought, sold and obtained, including the name of any secondary layers

2.6 NATIONAL ENVIRONMENTAL STANDARDS
AIR QUALITY AND ATMOSPHERIC PRODUCTION

(1) The Agency shall establish more criteria, guidelines specifications and standard to protect and enhance the quality of the air resources as to be able to promote the public health or welfare and the normal development and productive capacity of the nation human, animal or plant life, and include in particulars:-

- (a) The minimum essential air quality standards, the control of concentration of substances in the air which separately or in combination are likely to result in the damage or deterioration of property or of human, animal or even plant health, the best option in preventing and combating various form of atmospheric pollution, the use of appropriate means in reducing emission to permissible levels.
- (b) Standards applicable to emission form any new mobile sources which in the Agency judgment cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare.
- (c) The controls of atmospheric pollution originating from energy sources, including that even produced by air craft and other self- propelled vehicles, in factories and power generating stations.

(2)The Agency may also establish monitoring station or networks to locate source of atmospheric pollution & determine its actual or potential danger it posses to the public at large.

The Agency shall undertake to study data and also recognize developments in international force and even other countries regarding the circulative effect of all substances, practices, processes and even activities which may in turn affect the stratosphere, especially ozone in the stratosphere.

(3)The Agency may also make recommendations and programes for the control of any substance, practice, process or activity which may reasonably by anticipated affecting the stratosphere, especially ozone in the stratosphere when such effect may reasonably be anticipated in order to endanger public health or welfare.

2.7 HAZARDOUS SUBSTANCES ETC

- (a) The discharge in such harmful quantities of any hazardous substances into the air or upon the land and the waters of Nigeria or at the adjoining shorelines is prohibited, except when such discharge is permitted or authorized under any law in force in Nigeria.
- (b) Where offence under this act has been committed by a body, corporate and every person who at the time the offence was committed was in charge of, or was responsible to the body,

corporate for the conduct of the business of the body corporate that deemed to be guilty of such an offence and shall be liable to be proceeded against and punished accordingly.

(c) Where also an offence under subsection (1) of this section is committed by a body corporate, it shall on conviction be liable to a fine not exceeding N500, 000 and an additional fine of N1, 000 for every day the offence subsist.

(d) Any person or group of person that violate the provision of subsection (1) of this section commits an offence and shall on conviction be liable to a fine not exceeding N100,000 or to imprisonment for a term not exceeding 10 years or to both such fine and imprisonment.

(e) The Agency shall, as soon as possible after the commencement of this act, determine for the purposes of this section what substances are hazardous and such hazardous substances that discharge of which shall be harmful under the circumstances to public health or welfare and for this purpose, the Agency shall take into account such special circumstances including location, quality and climatic condition relating to discharge as it may determined appropriate.

2.8 KADUNA STATE ENVIRONMENTAL PROTECTION

AUTHORITY EDICT NO OF 1998

The K.E.P.A. shall subject to this edict have the general responsibility for all matters relating to environmental and foregoing it shall therefore be the duty of the Authority to:-

- (1) Enact and also enforce state regulation control criteria, procedures, guideline and environmental standards for effective prevention, remediation, and control, also the prevention of point and non-point sources of pollution and degradation.
- (2) Formulate, implement and review environmental policy in the state and particularly to demand and review environmental impact assessment and statements for new development projects and to also demand and review environmental audit reports for existing developments and such other operations which are deemed to have significant impact on the environment.
- (3) To prevent, and stop any act of emission which consequences are likely to adversely affect the entire environment and to generally deal with any discharge solid, liquid or gaseous, deposited willfully or otherwise in the authority may deem hazardous to the environment and ecosystem at large.

Chapter three

RESEARCH METHODOLOGY

3.1 METHOD OF DATA COLLECTION

The research employed two basic materials for this case study. They are the questionnaire administration and relevant information from the regulatory agencies e.g. (Federal Ministry of Environment, and the Kaduna State Environmental Protection Authority KEPA).

3.2 QUESTIONNAIRE ADMINISTRATION

The use of a well structured questionnaire is a reliable method of gathering information, because the respondents have the opportunity and confidence to put down what he/she knows about the subject matter. The questionnaire were designed and administered to the selected people in the industries within the study areas. The questionnaires are provided with relevant answers chosen by the respondents to reduce the vagueness of the result.

3.3 REGULATORY AGENCIES

Discussions with the Director of pollution of the regulatory agency of the Federal Ministry of Environment and the Kaduna State Environmental Protection Agency (KEPA) were held and basically three similar major information was obtained from them this include:

1. The number of industries that are complying with the environment regulation agencies as to what they emit.
2. An enforcement strategy.
3. The constraints in monitoring and enforcement.

3.4 DATA ANALYSIS

Based upon the data that were collected from the various industries and the regulatory agencies, the data / information were critically analyzed statistically in obtaining the percentage of both compliance and non-compliance with the federal and state environmental regulation by the said industries.

Chapter four

PRESENTATION AND DISCUSSION OF RESULTS

4.1 INSTALLATION OF WASTE WATER TREATMENT PLANT

The National guidelines and standards for environmental pollution control in Nigeria; it states that; no industry whatsoever is allowed to discharge toxic substances into the air; water and land of the entire Nigerian environment beyond permission limit (FEPA 1991) and according to paragraph 1 of the National Environmental protection (Effluent Limitation) regulation of 1991, every industry must as a matter of compliance install anti-pollution equipment for the detoxification of effluent and chemical discharge emanating from their industry based on the best available technology (BAT), the best practical technology (BPT) or the uniform effluent standards (UES). In order to encourage all industrial establishments install the necessary pollution abatement facilities; a blank moratorium was first given to them and has already expired at the end of 1994. Industries are therefore required from 1995, to meet the compliance schedule drawn up for them or face administrative sanction and or criminal charges where appropriate (FEPA 1995). In order to further assist the industries & encourage cleaner technology or install the necessary pollution facilities the

federal ministry of Environment has been co-operating with appropriate organ of government on the necessity for fiscal incentives, including tax rebates and soft loans for investments in cleaner production methods. There are about 21 (twenty one) industries within the kudende industrial layout of Kaduna South Local Govt. of Kaduna State discharging, liquid effluent and they are therefore expected to have functional treatment plants, less than 2% of the industries have functional waste water treatment plants; 52% have the treatment plants installed but not properly functioning or requiring retrofitting, while about 46% of the industries are yet to install theirs.

Table 1. Installation of waste water treatment plant in Kudende industrial layout.

Name of industries	With functional treatment plant	With partially treatment plant	Without treatment plant
UNT PLC	*	-	-
AGIP	-	*	-
Unipetrol	-	*	-
PAN	-	*	-
SUNSEED	-	*	-
FINETEX	-	*	-
7UP Bottling Co.	-	*	-
Nigeria bottling Co.	-	*	-
IBBI	-	*	-
AVEWA TEXTILES	-	-	*
SUPERTEX	-	-	*
KADUNA TEXTILES	-	-	*
UNITEX	-	-	*
SUNGLASS	-	-	*
ELECTRIC METER CO.	-	*	-
D. I. C.	-	-	*

NICE TOP PAPER CO.	-	*	-
VULCAN GAS	-	-	*
TOWER GALVANIZED	-	-	*
FERTILIZER & CHEMICALS	-	-	*

Source: - Federal Ministry of Environment.

Only 35% of the industries adequately treat their effluents, while the remaining 65% either treat at primary level or discharge the untreated effluents into the environment. Mostly; the textiles industries and Beverages industries are the worst polluters. Despite the large number of textiles situated within the Kudende industrial layout; only one out of them has a functional treatment plant, there are three brewery & beverages industries and none treats its waste water before discharging into the environment.

Table 2: - Wastewater treatment plants among the industries in Kudende industrial layout of Kaduna South; Kaduna State.

Industrial categories generating waste water	% with functional treatment plants	% with partially functional treatment plant	%without treatment plants
Textiles	2.5%	97.5%	-
Pulp & Paper	-	-	100%
Wood & furniture	-	-	100%
Fertilizer	-	-	100%
Armament	-	100%	-
Breweries, food	-	100%	-
Automobile, Iron, steel & Aluminum	-	100%	-
MEAN	0.36%	56.79%	42.86%

Source: - Author's field Survey (2002).

The oil blending plants discharges their own effluent into the stream/river. Although; Agip and Unipetrol plants partially treat their own effluent before discharging totally into the environment. Hence, the river Kaduna is being polluted as a result of lack of treatment plants for most of the industries within industrial layout. Most of these industries do not have functional treatment plants; only a few of the industries partially treat their liquid effluent before finally discharging it. But in most cases, the treatments do not meet the acceptable limit of standards set by the Federal Ministry of Environment. The inability of some of the industries to install wastewater treatment plants from the prospective of the industries and the general public is attributed to the following factors: -

- (i) The inability of the regulatory agencies to sanction or take action against the defaulting industries creates room for them to flout the regulations and pollute the environment.
- (ii) Some industries lack the technical expertise in order to control pollution and the resources to engage the services of consultants.
- (iii) Some of these aforementioned industries perceived investing into pollution control and environmental protection as a wasteful venture, which they think cannot generate profits.

- (iv) The poor economic environment prevailing in the country makes it unfeasible for some of the industries to make substantial profits; part of which can be invested in installing the necessary pollution abatement facilities.
- (v) The installation of treatment plant is capital intensive. In order for industries to raise enough capital for the installation and maintenance of waste treatment plants; it will become a must for them to lay off certain proportion of their work force.

4.2 SUBMISSION OF PHYSIO-CHEMICAL ANALYSIS REPORT

According to paragraph 3, of the National Environmental Protection, (pollution abatement in industries and facilities generating waste). Regulation 1991 “a discharge including solid; gaseous, and liquid waste or pollution from any industry or facility shall be analyzed and then reported to the nearest office of the agency every month, through a discharge monitoring”. This is to monitor the nature or characteristics of the wastes and ascertain that they are being treated to the standard set by the Federal Ministry of Environment.

Table 3, 4, 5 indicates that majority of the industries are not submitting their physio-chemical analysis reports of their generated effluents and some of the

reports are not reflecting the true nature of the effluents. This can therefore be attributed to a number of factors, these include: -

1. Some industries have no facilities for treating their waste/pollution, hence, declining in conducting the physio-chemical analysis for the fear of being sanctioned by the regulatory agencies;
2. A number of the industries have no facilities or capabilities for conducting the physio-chemical analysis and are not also willing to engage the services of environmental consultants;
3. Some industries engaging the services of environmental consultants present false / manipulated reports in obscuring the actual nature of their effluents which are inimical to the ecosystems and the local communities or to avoid it.

Table 3: submission of physio-chemical reports by industries within the study area.

Industrial categories	Regular submission	Occasional submission	Not submitting
Textiles	37.5%	12.5%	50%
Petrochemicals	9.0%	-	90.9%
Automobile, Iron, steel & Aluminum	6.25%	-	93.75%
Food, Beverages and Tobacco / Breweries	65%	27%	8%
Chemicals/Fertilizer	-	-	100%
Wood & Furniture	-	-	100%
Pulp & Paper	-	-	100%

Armament	-	-	100%
MEAN	14.72%	4.94%	80.33%

Source: - Author's field Survey (2003)

Only about 37% of the textiles industries regularly conduct and submit their monthly physico-chemical analysis results. In the petrochemical industries; only about 9.0% conduct and submit regularly, 90.9% do not submit at all.

Automobile; Iron, and steel aluminum 6.25% regular submission, while 93.75% do not make any submission at all.

Food, beverages and breweries 65% submission while 27% submit theirs occasionally and 8% of the industries in this category do not submit at all.

All other categories of industries do not make any submission either on regular or occasional basis.

TABLE 4 RECORD OF MONTHLY EFFLUENT ANALYSIS
REPORT FOR YEAR 2000

S/no	Name of industry	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	total
1	Unipetrol lube	-	-	*	*	*	-	*	-	-	-	-	-	4
2	Agip lube	-	-	*	*	*	-	-	*	*	*	*	-	7
3	Mineral petroleum	-	-	-	-	-	-	-	-	-	-	-	-	0
4	WABAN	-	-	-	-	-	-	-	-	-	-	-	-	0
5	Nice top paper ind	-	-	-	-	-	-	-	-	-	-	-	-	0
6	Finetex limited	*	*	-	*	*	*	*	-	*	*	*	*	10
7	Nigerian bottling company	-	*	-	-	*	*	-	*	*	*	*	*	8
8	7-up bottling company	-	*	*	*	*	*	*	*	-	*	*	-	9
9	PAN (Peugeot)	*	-	-	-	-	*	*	*	-	*	-	-	7

10	Tower galvanize	-	-	-	-	-	-	-	-	-	-	-	-	0
11	WABECO	*	-	-	*	*	*	-	-	-	*	-	-	5
12	Arewa Textiles	*	*	-	-	*	*	-	-	-	*	*	*	7
13	Supertex	-	*	-	-	-	-	-	*	*	-	-	-	3
14	Total oil blending plant	-	-	-	-	-	-	-	-	-	-	-	-	0
15	Defence ind. Corporation	-	-	-	-	-	-	-	-	-	-	-	-	0
16	Kaduna Textile limited	-	-	*	*	-	-	-	*	-	*	-	-	4
17	Elf blending plant	-	-	-	-	-	-	-	-	-	-	-	-	0
18	UNTL	-	-	*	-	-	*	-	*	-	-	*	*	5
19	F. S. F. C.	-	-	-	-	-	-	-	-	-	-	-	-	0
20	Fertilizer & chemicals	-	-	-	-	-	-	-	-	-	-	-	-	0
21	IBBI	-	-	-	-	-	-	-	-	-	-	-	-	0
22	Sunglass	*	-	-	-	-	*	-	-	-	-	-	-	2
23	Unitex limited	-	-	-	-	-	-	-	-	--	-	-	-	0
24	Sunseed	*	-	-	*	-	*	*	*	-	-	*	*	7
25	NNPC / PPMC	-	-	-	-	-	-	-	-	-	-	-	-	0
26	NNPC / K R PC	-	-	-	-	-	-	-	-	-	-	-	-	0

Source: - Federal Ministry of Environment (2002).

TABLE: 5 RECORD OF MONTHLY EFFLUENT ANALYSIS
REPORT FOR YEAR 2001

S/no	Name of industry	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	total
1	Unipetrol lube	-	-	-	-	-	-	-	-	-	-	-	-	0
2	Agip lube	*	*	*	*	*	*	*	*	*	*	-	-	10
3	Mineral petroleum	-	-	-	-	-	-	-	-	-	-	-	-	0
4	WABAN	-	-	-	-	-	-	-	-	-	-	-	-	0
5	Nice top paper ind	-	-	-	-	-	-	-	-	-	*	*	*	3
6	Finetex limited	-	-	-	-	-	-	-	-	*	*	*	*	4
7	Nigerian bottling company	-	*	*	*	*	*	*	*	*	*	*	*	11
8	7-up bottling company	-	*	*	*	*	*	*	*	*	*	*	*	11
9	PAN (Peugeot)	-	*	*	*	*	*	*	*	*	-	-	-	8
10	Tower galvanize	-	-	-	-	-	-	-	-	-	-	-	-	0
11	WABECO	-	-	-	-	-	-	-	-	-	-	-	-	0
12	Arewa Textiles	*	*	*	*	*	*	*	*	*	*	*	*	12

13	Supertex	-	-	-	-	-	-	-	-	-	-	-	-	0
14	Total oil blending plant	-	-	-	-	-	-	-	-	-	-	-	-	0
15	Defence ind. Corporation	-	-	-	-	-	-	-	-	-	-	-	-	0
16	Kaduna Textile limited	-	*	*	*	-	-	-	*	*	*	-	-	6
17	Elf blending plant	-	-	-	-	-	-	-	-	-	-	-	-	0
18	UNTL	*	*	*	*	*	*	*	*	*	*	*	*	12
19	F. S. F. C.	-	-	-	-	-	-	-	-	-	-	-	-	0
20	Fertilizer & chemicals	-	-	-	-	-	-	-	-	-	-	-	-	0
21	IBBI	*	*	*	*	*	*	*	*	*	*	*	*	12
22	Sunglass	-	-	-	-	-	-	-	-	-	-	-	-	0
23	Unitex limited	-	-	-	-	-	-	-	-	-	-	-	-	0
24	Sunseed	*	*	*	*	*	*	*	*	*	*	*	*	12
25	NNPC / PPMC	-	-	-	-	-	-	-	-	-	-	-	-	0
26	NNPC / K R P C	-	-	-	-	-	-	-	-	-	-	-	-	0

Source: - Federal Ministry of Environment (2002).

4.3 ENVIRONMENTAL AUDITING

All the existing industries within the study area are mandated according to the guidelines and standards for environmental pollution control in Nigeria to conduct environmental auditing of their facilities at least once in 3 years.

Also that new industries and major development projects are obliged to carry out environmental impact assessment (EIA).

As shown in table 6, very few industries since 1996 have conducted environmental audit of their facilities and submitted the reports to the industry despite the aggressive persuasion by the ministry.

Table 6: SUBMISSION OF EAR BY INDUSTRIES IN KUDENDE
SINCE 1996

Industrial categories	% Submitted	% Not submitted
Textiles	15%	85%
Petrochemicals	30%	70%
Automobile; Iron, Steel & Aluminum	45%	55%
Breweries, Food & Beverages	50%	50%
Chemicals / Fertilizers	-	100%
Wood & Furniture	-	100%
Pulp and paper	90%	10%
Armament	-	100%
MEAN	28.75%	71.25%

Source: Author's Field Survey (2001).

If we take a close look of the above table; it will be observed that 15% of the textile industries conducted and submitted their environmental audit report between 1996 and 2002. Petrochemicals industries performance is below average. This is due to the facts that most of the industries in these categories have never conducted their environmental audit for their facilities even once since 1996. Hence, most of the industries in this category are the major polluters; but unfortunately they are not doing anything aimed at improving the environmental pollution abatement, only three of these industries; Agip lube, and blending plant, total plant and Unipetrol lube & blending plant conducted and submitted their EAR.

Automobile, Iron, Steel and Aluminium industries had poor performances also as far as EAR is concerned though not bad. Only 45% of the industries

are able to conduct and submit their Audit report. Hence, only about four out of this category of industries are able to conduct and submit their Audit report, these industries include PAN, fine aluminium; Unisteel and the Automobile component industry (ACI). Breweries, food and Beverages industries performed credibly well. This is due to the facts that (from the table) 50% of the industries conducted their Environmental Audit Report (EAR). These industries include; IBBI, the Ideal Flour Mills, Sunseed Nigeria Plc, the Nigerian Bottling Company, the 7-up Bottling Company. The fertilizer and Chemical industries are not performing well in this regards. Furthermore, since the year 1995, Fertilizer and chemical company have not conducted their Audit report. Wood and furniture industries did not carry out their EAR at all. Pulp and Paper industries also perform credibly well with about 90% of them submitting their environmental auditing. Finally, only 28.75% of the industries submitted their environmental audit. These two tables will tell us the industries that are performing very well in the area of environmental pollution abatement. The EAR will also show the environmental pollution abatement facilities put in place by the industries. The regulatory agencies, the Federal Ministry of Environment and the Kaduna State Environmental Protection Authority will advise on the areas that need improvement.

It is the responsibility of the regulatory agencies to sit and review the audit report before given approval finally. After the improvements; the regulatory agencies will go for a post-audit monitoring in the industries.

4.4 GASEOUS EMISSION ANALYSIS RESULTS

Only two out of all the industries analysis and submit their gaseous emission results to the regulatory authorities.

The remaining industries are not complying with this regulation since 1996.

Despite the two industries, their submissions too are not regular. The two industries are IBBI and Sun seed Nigeria Plc.

Table 7:

INDUSTRIES	EAR	TREATMENT PLANT	PHYSICO-CHEMICAL ANALYSIS	PROCESSES	PRODUCTION	REMAINING
Agip Blending Plant	Conducted	-	-	Wet	-	-
Unipetrol	-	-	+	Wet	-	-
F. S. F. C.	Not conducted	-	-	Dry	-	-
Mennoil	-	-	-	Wet	Off	-
Total oil	Conducted	-	-	-	-	-
Mubeco	Not conducted	-	-	Wet	Off	-
Elf Blending Plant	-	-	+	Wet	Off	-
Vulcan gas limited	-	-	-	Dry	-	-
Almo gases	-	-	-	Dry	-	-
Ugochukwu Chemicals	conducted	-	-	Dry	-	-
Fertilizer & Chemicals	-	-	-	Dry	-	-
Nice top Paper industry	-	-	-	Dry	-	-
Safa foam	Not conducted	-	-	Dry	-	-
Automobile com. Ind.	Conducted	-	-	Dry	-	-
Finetex limited	-	-	-	Wet	-	-
Nigerian Bottling Co.	-	-	-	Wet	-	-
Super steel company	Not conducted	-	-	Dry	-	-
7 up Bottling Co.	Conducted	-	-	Wet	-	-
K.F.C.C.	-	-	-	Wet/dry	-	-
PAN (Peugeot)	-	-	-	Dry	-	-

Queensway Aluminium	-	-	-	Dry	-	-
Tower galvanized	-	-	-	Dry	-	-
United wire products	-	-	-	Dry	-	-
NOCACO	-	-	-	Dry	-	-
R.H. Plastics	-	-	-	Dry	-	-
Nortex	-	-	-	Wet	-	-
Unisteel	-	-	-	Dry	-	-
Arewa Textiles	-	-	-	Wet	-	-
Supertex	-	-	-	Wet	-	-
Crittall hope	-	-	-	Dry	-	-
Fine Aluminium	Not conducted	-	-	Dry	-	-
Sanders feeds	-	-	-	Dry	-	-
Arewa metal	-	-	-	Dry	-	-
D.I.C.	-	-	-	Dry	-	-
General metal productions	Conducted	-	-	Dry	-	-
Kaduna textiles	-	-	-	Wet	-	-
United textiles plc	-	-	-	wet	-	-
Ideal Flour Mills	-	-	-	Dry	-	-
IBBI	-	-	-	Wet	-	-
Sunglass limited	-	-	-	Dry/wet	-	-
United limited	Not conducted	-	-	Wet	-	-

Source: - Federal Ministry of Environment

Only twenty eight (28) industries conducted and submitted their EAR since 1996 out of the 41 industries listed above.

4.5 IMPLICATION OF FINDINGS

In Nigeria, the regulatory measure is more dominantly employed in environmental quality control. Although, the importance of economic measure is equally recognized, it is not applied with effectiveness in the country. Some of the regulatory instruments put in place by the Federal Ministry of Environment in controlling industrial pollution include:-

- (i) Environmental impact assessment (EIA) decree no 86 of 1992. This law makes EIA mandatory for any major developmental project likely to have

adverse impacts on the environment and prescribes the procedure for the conducting and reporting EIA's (FEPA 1995).

(ii) Pollution Abatement in industrial and facilities generating waste regulation S.I. 9 of 1991. This imposes restriction on the release of toxic substances and stipulates requirements for monitoring of pollution in ensuring that permissible limits are not exceeded, while unusual and accidental discharges contingency plans, generators liability and strategies for wastes regulation and the safety of workers are put in place (FEPA 1995).

(iii) Waste Management Regulations S.I. 15 of 1991. This regulates the collection, treatment and disposal of solid and hazardous wastes/pollution from municipal and industrial sources and gives the comprehensive list of chemicals and chemical wastes/pollution by toxicity categories (FEPA 1995).

(iv) National Effluent limitation regulations S. I. 8 of 1991. This makes it mandatory for industrial facilities to install anti-pollution equipment and makes provision for effluent treatment and prescribes maximum limits of effluent parameters allowed for contravention (FEPA 1995)

Chapter five

SUMMARY CONCLUSION AND RECOMMENDATION

5.1 SUMMARY OF FINDING

The National guidelines and standards for environmental pollution control in Nigeria 1991. This is the basic instrument for monitoring and controlling industrial and urban pollution. Hence, the guidelines and standards are the predominant means for direct regulation of environmental quality. They define environmental targets and also establish the permissible amount or concentration of particular substances or discharges into air, water and land. An industry is liable to a penalty in the form of sanction, or tax for contravening the provisions of any of the regulations.

Furthermore, in this chapter, the level of industrial compliance with the standards and regulations and other measures put in place by the Federal Ministry of Environment and Kaduna State Environmental Protection Authority in controlling the industrial pollution is to be examined.

5.2 CONCLUSION

Industrial pollution controls including waste management objectives can / may be obtained through a variety of policy instruments and prominent among them are the command – and – control or the direct regulation along

with monitoring and enforcement including the economic strategies. The general regulatory approach requires a government to set health or ecology based ambient environmental objectives and specifies the standards or amount of polluters should meet these objectives.

This (approach) relies basically on the application of regulatory instruments such as standards, permits, licenses, as well as land and water use controls. Industries are therefore required to meet the compliance schedule drawn up for them or face administration sanctions and or criminal charges, these effects from the year 1995.

The National guidelines and standards for industrial pollution control in Nigeria, states that no industry is allowed to discharge toxic substances into the air, water or land of the Nigerian Environment beyond permissive level / limit. All industry is also expected to install anti-pollution equipment for the detoxification of effluent and chemical discharges emanating from the industry. All the industry are therefore mandated to conduct an environmental Audit Report (EAR) of their facilities once every three (3) years while newer ones are obliged to carry out EIA (Environmental Impact Assessment).

Furthermore, industrial pollution has also become a global phenomenon as they have effects on the environment thereby carrying a lot of harmful

situation either to man and his immediate environment, including the bio-species that also exists. All these stated guidelines are therefore to be followed strictly in ensuring that the environment is kept safe.

5.3 RECOMMENDATIONS

5.3.1. INDUSTRIAL POLLUTION ABATEMENT COMMITTEE (IPAC)

The IPAC is a non – governmental organization in Kaduna State. Their major aim is pollution abatement for all the industries in Kaduna State. These industries are all members of IPAC while the regulatory bodies such as the federal Ministry of Environment, Kaduna Zonal Office and Kaduna State Environmental Protection authority (KEPA) serves as an advisory bodies and also policy makers to the committee. Hence, IPAC should be made to report regularly to the said regulatory agencies, any industry that does not comply in accordance to the standards, laws and regulations of the government. They (IPAC) should also be empowered to organize seminars, workshops for the industries on a regular basis.

5.3.2 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Environmental impact Assessment can be said to be a process or study in which the potential, physical, biological, economic and social impacts of a proposed development on the immediate or more distant environment are

being identified, analyzed and predicted. EIA also aim at studying the effects of proposed action on the environment, predicting the lively charges in the environmental quality which will emanate from the proposed action, hence finding ways of minimizing unacceptable impacts and providing options in design, sitting and operation of the proposed development.

5.3.3 POLLUTION MANAGEMENT

Pollution minimization approach or pollution treatments are predictable option to the ideal zero-pollution option. Industries should therefore assess their process in order to minimize or eliminate completely pollution and should endeavor to undertake proper pollution analysis at the beginning of the industry.

5.3.4 TACKLING THE BACKLOG OF ENVIRONMENTAL DEGRADATION

The main task will be the strengthening of the following.

- (i) Functions and capabilities of Nigeria environmental Agencies at both the Federal and State levels, and to also improve and enforce our environmental laws, regulation and standards.
- (ii) Expanding the scope of our scientific research.
- (iv) Preparing the State of the environmental assessment and action plans.

(v) Upgrading the Federal Ministry of Environment equipment including facilities and improving environmental management training.

5.3.5 INTEGRATING ENVIRONMENT AND DEVELOPMENT

These priority requirements in Nigeria include:-

- (i) The preparation of a new national suitable development strategy.
- (ii) Making greater use of economic incentives and disincentives.
- (iii) Improving resources accordingly.
- (iv) Making a sustainable development audit.
- (v) Assessing and avoiding significant adverse impacts on the environment.
- (vi) Analyzing the environmental implications of macro-economies policies.
- (vii) Strengthening environmental information systems especially for decision making.
- (viii) Building environment into the mandates of all major development agencies.

5.3.6 STRENGTHENING ENVIRONMENTAL LAWS AND ENFORCEMENT

A major review, streamlining and strengthening of our existing environmental laws are now urgently being needed. Priority requirements

include the need to update and bring our laws in line with the current scientific knowledge.

(i) To reduce overlap and conflicts as well as identify significant gaps in the existing legal frame work.

(ii) To recruit and train team of pollution control experts and inspectors to advice industries and to also check and ensure compliance with ambient and emissions standards.

(iii) To set more realistic standards and higher penalties in encouraging compliance.

1. Environmental friendly award should always be given to any of the industry that is found to be complying regularly and highly with the National and state pollution abatement regulation. This can come in form of incentives, loan or even subsidy and should be on a yearly basis. This can also be best done during the world environmental day celebration. These will encourage other industries in seriously complying with environment pollution abatement regulations
2. Intensive programme for captains of industries on the dangers of pollution and the need for a total compliance of Environmental pollution abatement regulation.

3. "Polluters pay principles" should also be introduced for an efficient and cost effectiveness into pollution control measures.

APPENDIX A
QUESTIONNAIRE FOR INDUSTRIAL ESTABLISHMENTS IN
KUDENDE INDUSTRIAL LAYOUT KADUNA – SOUTH,
KADUNA STATE

1. INDUSTRY _____ LOCATION _____
2. PRODUCT(S).....
3. NUMBER OF WORKERS.....
4. FORMS OF POLLUTION / WASTES GENERATED PLEASE TICK ANY

- Liquid Waste / pollution, waste water, etc.
- Solid Waste pollution
- Gaseous pollution
- Both Solid, liquid and gaseous wastes.

5. WASTE MANAGEMENT FACILITIES (TICK) THE FOLLOWING

- Waste Water Treatment Plant.
- “ Solid Waste
- Oil Separator
- Gaseous Separator.

6. HAS ENVIRONMENT AUDITING EVER BEING CONDUCTED FOR THE INDUSTRY?

YES _____ Year

NO _____ Briefly explain reason for not conducting.

.....

.....

7. WAS THE ENVIRONMENTAL AUDIT ACCEPTED BY THE REGULATORY AGENCIES?

YES

NO

If No, explain why

.....

.....

8. WHEN IS YOUR INDUSTRY EXPECTED TO CONDUCT A NEW ENVIRONMENTAL AUDIT?

.....
.....

9. HOW OFTEN DOES THE INDUSTRY CONDUCT AND SUBMIT RESULT ANALYSIS OF LIQUID, GASEOUS AND SOLID WASTES FOR THE REGULATORY AGENCIES?

.....
.....

10. DOES THE INDUSTRY HAVE ANY CONTINGENCY PLAN?

YES

NO

11. If NO, state reasons

.....
.....

12. DOES YOUR INDUSTRY HAVE WASTE WATER TREATMENT PLANT?

Yes / No

13. IF YES ABOVE, IS IT:

- Functional

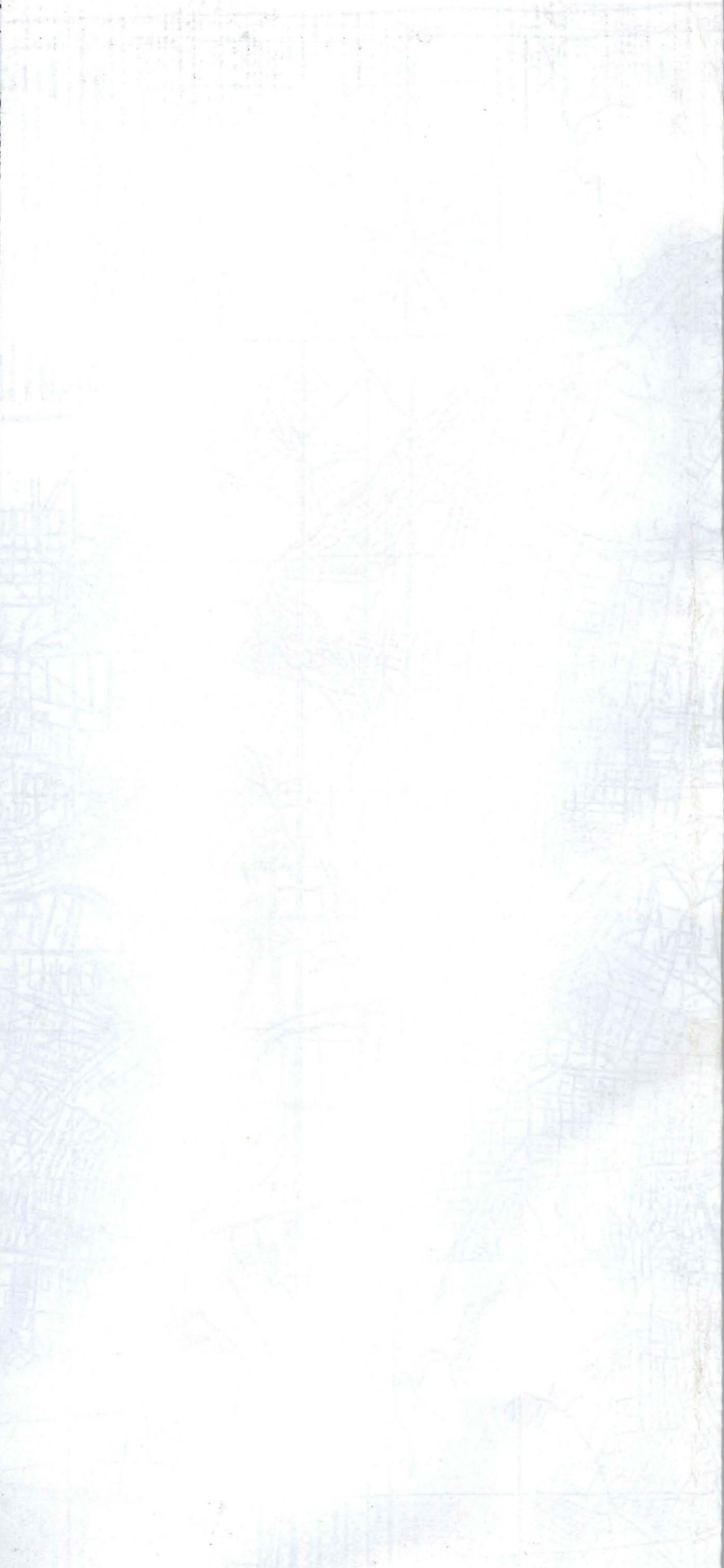
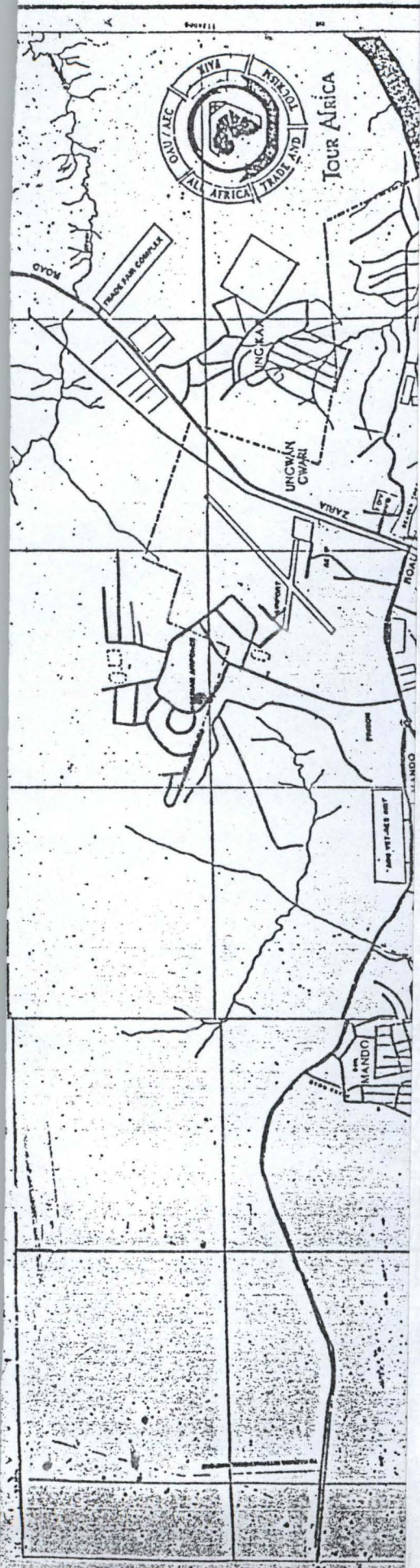
- Partially functional

14. BRIEFLY EXPLAIN THE RELATIONSHIP BETWEEN THE INDUSTRY AND THE REGULATORY AGENCIES (FEDERAL MINISTRY OF ENVIRONMENT AND KEPA)

.....
.....

15. BRIEFLY COMMENT ON THE FEDERAL AND THE STATE ENVIRONMENTAL REGULATION

.....
.....



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