



UNIVERSITY KASDIMERBAHOUGLA
INSTITUTE OF TECHNOLOGY
APPLIED ENGINEERING DEPARTMENT



End of study thesis to obtain a professional Bachelor degree

Field:Science and technology

Specialty:Health Safety and Environment

Realizedby :

- Boughebache Mohammed Yazen
- Kebieche Abderraouf

***Environmental management system case
study:National drilling company***

Jury members:

President:Abbas Abdelbari

Institute Of Technology

Supervisor :SiboukeurHicham

Institute Of Technology

Examiner:Sellami Ilyas

Institute Of Technology

University year 2023/2022

Dedication

To my parents, who have always been my guiding light and my rock.

*To my friend **Mohammed**, who has supported me every step of the
way.*

To my professors, who have challenged and inspired me to grow.

*To my work partner, who has been my constant source of
encouragement.*

To all those who believe in the power of knowledge and hard work

This thesis is for you.

-Kebieche Abderraouf-

Dedication

I dedicate this work

*To my partner, whose unwavering love and encouragement have been
my anchor.*

*This work is dedicated to my mentor, whose guidance and expertise
have been invaluable.*

*To my family... my parents, my both sisters and my brother, who have
always been my unwavering support system.*

*To my colleagues, who have challenged and inspired me to strive for
excellence.*

*To my nieces and my nephews, who have always inspired me and
motivated me*

To my friends wherever they are near or far

-Boughebache Mohammed Yazen-

Acknowledgments

We would like to express our deepest gratitude to the following individuals and organizations for their invaluable support and assistance in the completion of this thesis.

*First and foremost, I would like to thank my supervisor Professor **Hicham Siboukeur**, for his guidance, expertise, and patience throughout this research project. Their insightful feedback and constructive criticism have been instrumental in shaping my ideas and improving the quality of my work.*

*I am also grateful to my committee members, **Abbas Abdelbari** and **Sellami Ilyas** for their insightful comments and helpful suggestions that have greatly enriched my understanding of the subject matter.*

*Finally, I would like to acknowledge the Guidance and support, and Informational assistance provided by **Merouane Azizi**, **QHSE DEPARTEMENT**, and all **ENAFOR** staff who have made it possible for me to pursue my academic goals and complete this thesis.*

Thank you all for your invaluable contributions and support.

Contents

Dedication	I
Dedication	II
Acknowledgments	III
Contents.....	IV
Figure list.....	VII
Table list.....	VIII
Acronyms	IX
Abstract:	X
I. Chapter : An Overview of Certifications	1
I.1 Introduction.....	2
I.2 The certification.....	2
I.2.1 Certification of the Quality Management System	3
I.2.2 Certification of the Safety Management System.....	3
I.2.3 Certification of the Environmental Management System	4
I.3 Important and benefits of certification	4
I.4 Conclusion	5
II. Chapter 2: ISO 14001: The Cornerstone of Environmental Management Systems.....	6
II.1 Introduction.....	7
II.2 History	7
II.3 ISO 14001 standard	7
II.3.1 The International Organization for Standardization “ISO”	7
II.3.2 ISO 14001.....	7
II.4 The environmental management system	11
II.4.1 EMS implementation.....	11
II.4.2 The Purpose of EMS Implementation	11
II.4.3 EMS implementation objective	12

II.4.4	EMS implementation benefits	13
II.5	conclusion	13
III.	Chapter: Analyzing the Environmental Management System: Case Study of ENAFOR	14
III.1	Introduction	15
III.2	Company presentation.....	15
	Mission	16
III.2.1	ENAFOR QSE POLICY	16
III.2.2	ENAFOR's Organizational chart	18
III.2.3	The Organizational chart of the worksites	19
III.3	ENAFOR'S Environmental Management System.....	20
III.3.1	Terms and definitions:.....	20
III.3.2	The identification and evaluation Environmental aspects.....	20
III.3.2.1	identification of environmental aspects and their associated impacts:	21
III.3.3	Waste Management:	29
III.3.3.1	Principle:	29
III.3.3.2	Legal side:	29
III.3.3.3	Type of waste	29
III.3.3.4	Treatment and elimination of wastes in ENAFOR	31
III.3.3.5	The types of containers:	31
III.3.3.6	Waste storage conditions:	31
III.3.3.7	Parameters are taken into consideration for the organization of the collection: 31	
III.3.3.8	Transportation of waste:.....	31
III.3.3.9	Traceability:	32
III.3.3.10	Recyclable materials / Reusable:	32
III.3.4	strategic goals	35
III.3.4.1	Analyze	37

III.3.4.2	Energy consumption (electricity).....	37
III.3.4.3	Water consumption	37
III.4	Conclusion	38
IV.	General conclusion.....	39
V.	Bibliographicreferences.....	40

Figure list

Figure 1 PLAN DO ACT CHECK CYCLE[15]	8
Figure 2 : Deming wheel for iso 14001[15]	10
Figure 3 Integrated management system ENAFOR[19]	16
Figure 4: ENAFOR's obtained Management system certification[20]	17
Figure 5: ENAFOR's organizational chart[19]	18
Figure 6: worksites organizational chart[20].....	19
Figure 7 Aspects identification and evaluation flowchart[22]	23
Figure 8: Waste management flowchart "ENAFOR"[20].....	30
Figure 9: ENAFOR Waste transfer slip example[20]	32

Table list

Table 1: Identifying activities products or services[22].....	24
Table 2 The sensitivity of the environment [22]	25
Table 3: Aspect/Impact Occurrence Probability, impact severity, and the mastery level[22].	26
Table 4 Final criticality of the aspect[22].....	27
Table 5 Prioritization of the environmental aspects[22]	28
Table 6: Example of waste generation in a ENAFOR worksite	33
Table 7: Example of waste generation in a ENAFOR worksite (2).....	34
Table 8: Energy consumption in life bases[20].....	35
Table 9: Water consumption in life bases[20]	35

Acronyms

AHW: assimilated household waste

DSW: dangerous special waste

DTM: dismantling, transporting, and assembling

EA: environmental aspect

EMS: environmental management system

ENAFOR: entreprisenationale du forage (national drilling company)

HCW: health care waste

HSE: health safety environment

ISA: the International Federation of the National Standardizing Associations

ISO: International Organization for Standardization

IW: inert waste

MS: management system

OH&S: Occupational Health and Safety

OHSAS: Occupational Health and Safety Assessment Series

PDCA: plan do act check

QHSE: Quality, health, Safety, Environment

QMS: Quality Management System

SEA: significant environmental aspect

SMS: Safety Management System

SW: special waste

Abstract:

Over time, the environment has undergone significant impacts, necessitating concerted efforts towards its preservation. Particularly, manufacturers have played a crucial role in compelling organizations to adopt proactive measures aimed at effectively managing their environmental impact.

The primary objective of this research is to investigate comprehensively the environmental management system implemented by ENAFOR, examining its constituent processes. Furthermore, the research aims to analyze and evaluate these processes within the framework of the environmental management system, with a particular emphasis on their effectiveness, efficiency, and overall contribution to environmental sustainability.

Keywords: Environmental management system, ISO 14001, environmental aspects, Waste management

الملخص:

بمرور الوقت، تعرضت البيئة لتأثيرات هامة مستدعية بذل جهود مشتركة للحفاظ عليها، ولا سيما أن المصنعين قد لعبوا دوراً حاسماً في إجبار المنظمات على اتخاذ إجراءات استباقية تهدف إلى إدارة تأثيرها البيئي بفعالية. الهدف الأساسي لهذا البحث هو التحقيق الشامل في نظام إدارة البيئة الذي تم تنفيذه بواسطة ENAFOR، مع دراسة عميقة للعمليات المكونة له. وعلاوة على ذلك، يهدف البحث إلى تحليل وتقييم هذه العمليات ضمن إطار نظام إدارة البيئة، مع التركيز بشكل خاص على فعاليتها وكفاءتها والمساهمة الشاملة في الاستدامة البيئية.

الكلمات المفتاحية: نظام الإدارة البيئية، آيزو 14001، الجوانب البيئية، إدارة المخلفات

Résumé :

Au fil du temps, l'environnement a subi des impacts importants, nécessitant des efforts concertés en vue de sa préservation. En particulier, les fabricants ont joué un rôle essentiel en incitant les organisations à adopter des mesures proactives visant à gérer efficacement leur impact environnemental.

L'objectif principal de cette recherche est d'examiner de manière exhaustive le système de gestion environnementale mis en place par ENAFOR, en analysant ses processus constitutifs. De plus, la recherche vise à analyser et évaluer ces processus dans le cadre du système de gestion environnementale, en mettant particulièrement l'accent sur leur efficacité, leur efficience et leur contribution globale à la durabilité environnementale.

Mots clés : Système de management environnemental, ISO 14001, aspects environnementaux, gestion des déchets

General introduction:

For several years, the human has contributed to harming the physical and natural world that surrounds and sustains his life, the environment which is an essential part of our survival and well-being. Man harms the environment through different activities, one which he relies on to provide for his basic needs, but in recent times the human impact on the natural world has become more apparent than ever and also alarming. However, the man got his way through from damaging the environment carelessly to contributing to reducing the impact by taking several procedures and measures which permit him to resume his activities and rely on the environment for his needs, so international organizations and governments have made important decisions to reduce the impact on the environment. obligations rule certificates..., So the current companies tend to do the duty to help to reduce this impact on our world as well as avoid Fines and get certificated through management systems which are good helpers to organize the situation.

So, the current companies tend to do their duty to help reduce this impact on our world, as well as avoid fines and get certified through management systems which are good helpers to organize the situation, Environmental Management is a result of past preventive measures which reduce environmental impact ...etc. And environmental management refers to the process of managing certain human activities' impacts on the environment and it's an important component of corporate, social responsibility and sustainability. By managing the impact on the environment, organizations can reduce their own environmental footprints and improve their overall performance.

This is a study under the framework of the environmental impacts of companies, and the measures taken to protect the environment on their part, whether by legal obligation or in order to improve the company's reputation

In the first chapter, we will get acquainted with certificates in general, in the second chapter, we will talk about ISO 14001, since our topic talks about your environmental system, and ISO 14001 is considered the cornerstone of its application, and the last chapter will be a presentation of the environmental system in our study company, ENAFOR.

I. Chapter : An Overview of Certifications

I.1 Introduction

Within the context of enterprise development, wherein diverse products, processes, or services are required to meet specific standards, institutions often seek certifications as a means of validation.

the industry may need to obtain certification from a third-party organization to demonstrate compliance, obtaining certification can help the industry meet regulatory and customer requirements, demonstrate its commitment to quality, improve processes and efficiencies, and gain a competitive advantage.

Some normative reference documents define the characteristics of the product and at the same time serve as a means of testing to verify them, they are important in system management, such as

- Iso 9001 sets for client satisfaction
- Iso 14001 sets for environmental aspects
- Iso 45001 sets for improving workplace safety

I.2 The certification

“Certificate” is the act or process of providing someone or something with a formal document attesting to their status or level of achievement.

Certification is the provision by an independent body of written assurance clearing that the product service or system in question meets specific requirements.

There is not only one definition for certification for our field we could stick with the following definition;

"Certification is a procedure by which a third Part gives written assurance that a product, service, system, or organization complies with specified requirements" [1]

"Certification is first and foremost a tool that gives us a measure that is intended to be objective according to specific criteria. It thus allows the comparison between different products or services, which has earned it an analogy with the scale as a tool for comparative analysis"[2]

Generally, there are 3 types of certifications:

- Staff certification
- Product certification
- Management system certification [3]

"In recent years, management system certification has become an essential requirement in manufacturing to remain competitive. This is because the long-term success of an organization is dependent on its ability to improve its operations by reorganizing itself, to meet the challenging environmental contingencies on a continuous basis" [4] therefore the companies tend to get (MS) certifications which are divided to three main categories:

- Certification of the Quality Management System
- Certification of the Safety Management System
- Certification of the Environmental Management System

I.2.1 Certification of the Quality Management System

Quality is simply meeting the consumer requirements and when we talk about quality, we must mention the 9001 ISO for quality systems in companies, Quality Management System (QMS) there are different quality certifications but this one (**ISO 9001**) is the most popular quality management standard in the world, with more than one million certified organizations in 180 countries

Possessing the ISO 9001 certification demonstrates an internationally recognized quality management system (QMS), that guarantees consumers that you can give steadily elevated quality manufactures and services.[5]

I.2.2 Certification of the Safety Management System

A Safety Management System(SMS) is a standardized, proactive way to handle safety risks inside an organization. It targets to ensure that companies have identified possible threats and taken appropriate action to address them. The SMS approach is based on the principles of continuous improvement, including steady monitoring

“A safety management system (**SMS**) is either a system that is used to manage and control safety or it is a management system specifically aimed at safety”[6]

“Modern SMSs could be defined as an arbitrary collection of activities that were deemed necessary actions to discharge responsibilities under the new age of the delegated responsibility of self-regulation”[7]

there are many types of (**SMS**)in the field, companies could choose pending on the specifics of the company/industry may the **OHSAS 18001**was the most popular one until we come to 2018 when the ISO 45001 was released to replace the **OHSAS 18001**.

“ISO 45001:2018 specifies requirements for an occupational health and safety (OH&S) management system, and gives guidance for its use, to enable organizations to provide safe and healthy workplaces by preventing work-related injury and ill health, as well as by proactively improving its OH&S performance”[8]

I.2.3 Certification of the Environmental Management System

To regulate its impact on the environment, comply with regulations, and continually enhance its environmental performance, an organization implements an environmental management system (EMS). An EMS is purposefully crafted to oversee the environmental influence of an organization's undertakings, merchandise, or amenities, while also establishing a framework for managing environmental chances and threats,

“ if financial management is managing the finances of a company, and quality management is managing the quality of its products and processes then it stands to reason that environmental management is managing the environment that the company operates in”[9].

For the environmental field the latest certification version for companies and industries is ISO 14001, which we can consider as the main guide to implementing an EMS in companies, and to that there are important steps related to the standard that we going to explain later in this study...

I.3 Important and benefits of certification

The certification can be a great useful tool to add credibility to the company by showing clients that the product or service is up to their expectations or even that the impact on the environment of this company is reduced, the certification can be a legal requirement and that depends on the type of the industry.[8]

Getting a certificate mostly brings benefits to the corporations and these benefits could help a company to improve itself internally and externally in many fields, depending on the certificate of course:

- Standing on the nature of the certificate, the company can help distinguish between competitors and attract new customers or keep in hand the customers that it already has, and this help in the marketing
- A certificate demonstrates the commitment of the company to quality, safety, and environmental impact and this surely improves the good reputation of the company and effect positively its value, and gives the company an enhanced reputation

- Certain industries or specializations may put an obligation on companies to obtain certain certificates guaranteeing that the company meets these requirements, and this gives the company regulatory compliance
- A certificate may include the process of gaining an audit certificate of the operations and procedures of a certain company, which would help to find and identify different areas for more improvement and also to increase the overall operational efficiency
- Funding is a common problem faced the companies in their career, some certificates may be necessary to get into specific sources of financing or funding.
- Risks are always present in the companies no matter which type of these companies or what service or product they give, a certificate can help the company identify and manage the risks associated with quality, security, or compliance... and this could help reduce the potential responsibilities and this help the company improve risk management [10]

I.4 Conclusion

In this chapter, we have seen the certification generally and the different certification types then we talked about the management system certification that helps the companies with its advantages.

II. Chapter :ISO 14001: The Cornerstone of Environmental Management Systems

II.1 Introduction

Companies recently are applying the environmental management system more than last few years; in this chapter, we talk about the EMS widely and the related standard.

II.2 History

To become more relevant and advantageous since the 1970s, several businesses have created their own EMS in terms of environmental and sustainable growth considerations, The need for organizations to control their environmental impact and the growing concern over environmental degradation led to the development of environmental management systems in the late 1980s. The International Organization for Standardization (**ISO**) published the **ISO 14001** standard in 1996, which marked the introduction of the EMS concept.[11]

Moreover, over time, the EMS standards became more adaptable. For example, following the 1996 version, a new version in 2004 was produced with significant improvements to the standard; eleven years later, **ISO** announced **ISO 14001 2015**, which is now the most often used EMS standard.

II.3 ISO 14001 standard

II.3.1 The International Organization for Standardization “ISO”

“The organization which is known as ISO today started in 1926 under the name **ISA** which was highly focused on mechanical engineering until 1942 during World War II when it was disbanded, but in the end, it was reorganized as ISO in 1946”. [12]

To explore the future of international standardization, 65 delegates from 25 nations assemble in London in 1946. 67 technical committees make up **ISO** when it is formally established in 1947. (Groups of experts focusing on a specific subject) and for now, operate with a membership of 168 national standards bodies.[8]

The ISO is a world federation of national standardization organization, it's a voluntary organization and its members are recognized standard authorities[8], this organization develops standards according to its technical committee, and any study-interested member committee has the right to be part of the technical committee created for this purpose[12]

II.3.2 ISO 14001

The international standard **ISO 14001: 2015** outlines the criteria for a successful environmental management system (EMS) Instead of forcing an organization to develop its own EMS, the standard outlines a foundation for one, it aids businesses in enhancing their

environmental performance through resource management that is more effective and waste reduction that results in a competitive advantage and stakeholder trust. There are ten portions in it. It offers a thorough policy for businesses of any size, thus it may be utilized by everything from nuclear power plants to small local manufacturers.[13]

“**ISO 14001** is an International Standard of worldwide acceptance based on the concept that better environmental performance can be achieved when environmental aspects are systematically identified and managed giving a major contribution to Sustainability, through pollution prevention, improved environmental performance and complying with applicable laws”[14]

The **ISO 14001** is based on the “**PLAN DO CHECK ACT**” methodology like the other ISO standard which offers continuous improvement to the party who wants to implement it, this **PDCA** references to:

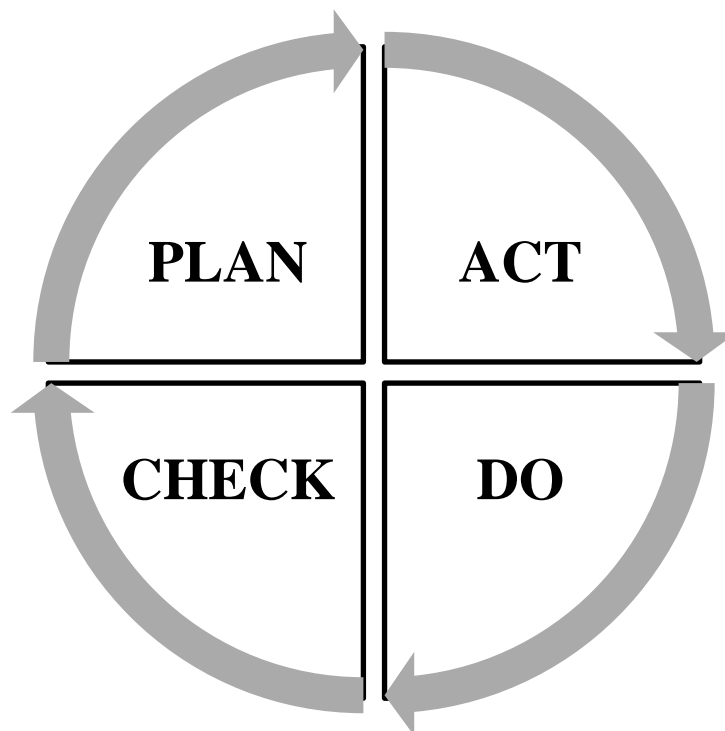


Figure 1 PLAN DO ACT CHECK CYCLE[15]

PLAN; The company seeks to identify and organize an environmental action. The number of assessments made of the company's environmental effect and any areas where it may have found room for improvement will serve as the basis for the decision.

DO; The company should execute the planned action after coming to an agreement on the plan. To accommodate for any unexpected obstacles, it can be beneficial to start modestly and in a controlled setting.

Check; review and analyze the performance of the planned action(s) and identify what already have learned from the process.

Act; The final action should be based on what the company learned from the other steps. If the initial plan was ineffective, it is possible to repeat the PDCA cycle and modify the plan and activities. If the plan worked as intended, the company should now start trying to apply what it learned from the experiment to more significant organizational changes.

By looking at the standard, we find it splits into 10 main chapters as mentioned in ISO 14001:

1-Scope

2-Normative references

3- Terms and definitions

4- Context of the organization

- Understanding the organization and its context
- Understanding the needs and expectations of interested parties
- Determining the scope of the environmental management system
- Environmental management system

5-Leadership

- Leadership and commitment
- Environmental policy
- Organizational roles, responsibilities, and authorities

6-Planing

- Actions to address risks and opportunities
- Environmental objectives and planning to achieve them

7-Support

- Resources
- Competence
- Awareness
- Communication (general, internal, external)
- Documented information (general, creating/updating, controlling)

8-Operation

- Operational planning and control
- Emergency preparedness and response

9-Performance evaluation

- Monitoring, measurement, analysis, and evaluation
- Internal audit
- Management review

10- Improvement

- General
- Nonconformity and corrective action
- Continual improvement

Applying the PDCA method to the ISO 14001 standard has allowed us to create the following Deming Wheel:

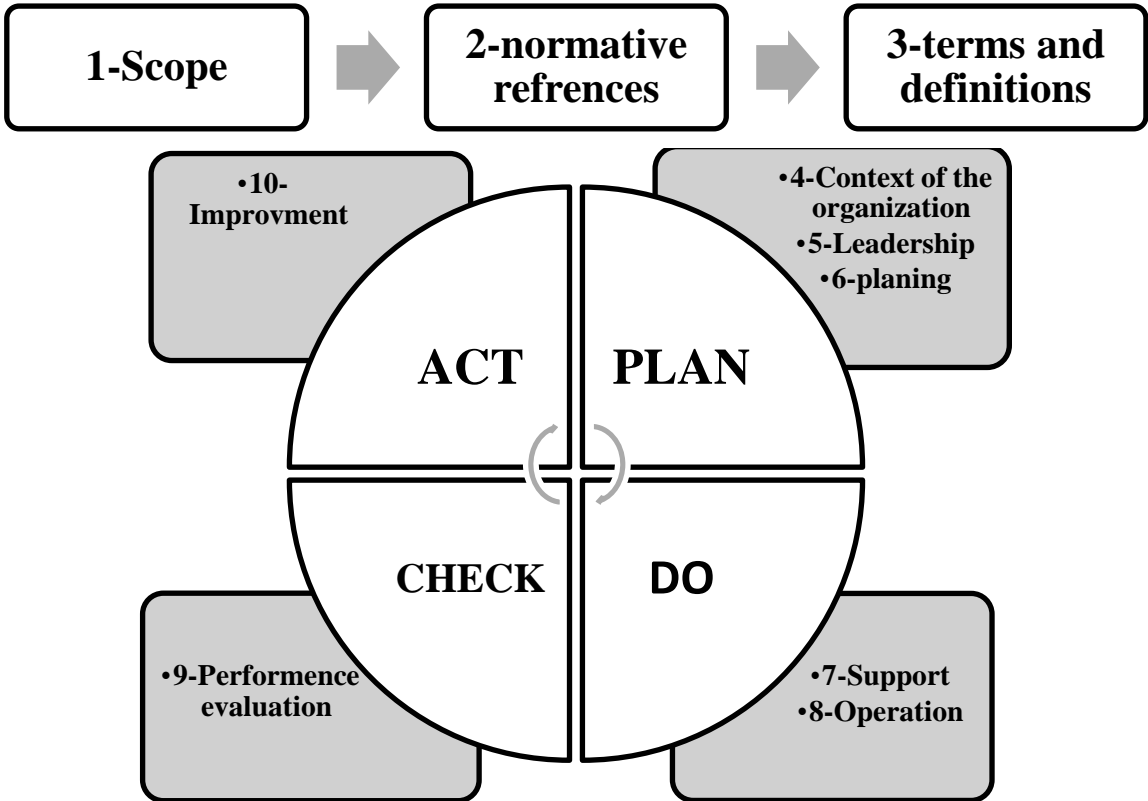


Figure 2 : Deming wheel for iso 14001[15]

II.4 The environmental management system

(EMS) is a framework that helps an organization achieve its environmental goals through consistent review, evaluation, and improvement of its environmental performance. The assumption is that this consistent review and evaluation will identify opportunities for improving and implementing the environmental performance of the organization. The EMS itself does not dictate a level of environmental performance that must be achieved; each organization's EMS is tailored to its objectives and targets.[16]

II.4.1 EMS implementation

An EMS helps the organization achieve environmental goals and systematically respond to regulatory requirements profitably. To provide a proactive approach to work towards environmental goals, reduce risks and improve health and safety practices. Better yet, an environmental management system can help the business address and work on unregulated worldwide issues, such as energy conservation.

The systematic approach and framework at the foundation of an Environmental Management System can benefit any organization looking to mitigate its impact. EMS can be useful for organizations of all sizes, geographies, or industries, which is applicable, regardless of what stage the organization is on it an environmental trip.

For example, for a just-started organization, EMS can provide the framework for the company to start analyzing and understanding the impact of the organization. Then This will allow making a plan to take the necessary steps to improve the organization's environmental performance.

Similarly, it may be related to mature environmental organizations looking for a type of guidance on what kind of measures they can take. For example, an organization can have many different work streams that all contain an environmental focus, but these were not jointly in a complementary way. In addition, an organization may be searched for a third-party check for the work they have already done[17]

II.4.2 The Purpose of EMS Implementation

The Environmental Management System is a framework designed to help organizations monitor, control, and improve their environmental performance. Organizations can use the framework as an organized principle to organize their environmental strategy. An environmental management system (EMS) can be used to reduce the organization's

environmental impacts and improve the overall process efficiency while demonstrating to the stakeholders and interested parties that the action is being taken.

EMS is directed to assist organizations to identify, manage, monitor, and control their environmental performance. Risk assessments will be implemented to help determine the context of the Organization's environmental impact.

The controls will then be made to help manage these risks and strategies designed to minimize them.

By implementing EMS, the Organization will relate to all relevant environmental issues for their operations. This includes but is not limited to energy, water consumption, waste production, carbon emissions, and actual biodiversity.

II.4.3 EMS implementation objective

The organization must decide on short- and long-term goals after having a clear understanding of the aim of environmental system management because this approach will only be a small portion of the core of any business. These goals will change over time and undoubtedly become a more detailed assertion when actual accomplishments are made along the route.

Any organization's goals should center on the following:

- Avoid any negative effects that a company's operations, services, or goods may have on the environment
- Ensuring that the relevant environmental parts of the business's activities are compliant with the law
- Create executive policies or guidelines that establish the organization's action plans and help it achieve its environmental goals
- Enhance the company's standing or image Strengthen links with key stakeholders (related parties or Stakeholders).

On the other hand, EMS requires an environmental awareness commitment from all those who make up the organization, an ideal alignment, that everyone is talking and understanding the same language so that the same decision-making standards are used, conflicts are reduced and the effectiveness is guaranteed.

II.4.4 EMS implementation benefits

EMS brings various benefits to the company that seeks to implement it such as:

- **Performance in terms of the environment:** The implementation will assist in taking the necessary actions to reduce environmental hazards and achieve ongoing improvement.
- **Organization reputation:** The implementation helps to boost stakeholders' trust and the reputation of the organization. The key stakeholders will be informed that the company has achieved a high level of accreditation by acquiring a certificate from the International Organization of Standards (ISO).
- **Financial advantages:** The implementation may provide you with an edge over others. The most effective use of resources is ensured by EMS, which assesses how to use organizational resources and defines solutions to decrease things like waste.
- **Improved Employee staff morale:** Workers are increasingly looking for companies to help fulfill their sustainability obligations, which can frequently impact how they choose whichever company to work for. By attracting like-minded individuals, a company is more likely to expand its skill set and demonstrate its commitment to people and the environment.[18]

II.5 conclusion

In this chapter, we have talked about iso 14001 and components and the implementation of EMS in a company and what it brings to the company from benefits and vice versa.

**III. Chapter: Analyzing the
Environmental Management
System: Case Study of ENAFOR**

III.1 Introduction

In this chapter, we introduce the company “ENAFOR” in French **ENTREPRISE NATIONALE DE FORAGE** an Algerian company, and we present its environmental management system and its different tasks following ISO 14001.

III.2 Company presentation

The national drilling company ENAFOR was created by Decree No. 81-170 of August 1, 1981. It is the result of the dissolution of ALFOR, a joint venture, created in 1966 between SONATRACH and SEDCO (USA). ENAFOR was set up on January 1, 1982, by the interministerial decree of December 31, 1981, bearing the effective date of substitution of the company ENAFOR to SONATRACH in part of its skills in drilling, ENAFOR becomes an independent company in the form of a joint-stock on November 26, 1989. ENAFOR has become a 100% subsidiary of the SONATRACH holding company since 2006 following the transfer of shares of the SGP INDJAB which held 49% of the capital.

ENAFOR is an Abbreviation of its official name in French “Enterprise National de Forage”, and According to its statutes, the ENAFOR Company is responsible for conducting drilling operations for national and international operators to explore and exploit hydrocarbon deposits and/or water tables. In addition, they also perform maintenance operations on oil or gas-producing wells (**Work-Over**). The company ENAFOR is also a member of the International Association of Drilling Contractors “I.A.D.C”.

ENAFOR operates with more than 50 rigs at different worksites across Algeria, and it has facilities in HassiMessaoud that serve as support, in particular for all its Drilling and Work Over sites. These facilities consist of:

- A Headquarters located in HassiMessaoud and Operations Headquarters located in IRARA.
- The company has several workshops that specialize in different areas, including mechanical engineering, machining and manufacturing, electrical equipment repair, and maintenance and repair of petroleum equipment. There are also workshops dedicated to the upkeep of the company's fleet of vehicles and machinery, which are specifically designed for the process of (DTM).
- Two (02) residential bases: the 1ST MAY in HassiMessaoud base and the IRARA base
- Operational bases: Drilling, Work-Over, Transport, Tubular Equipment, Revamping-Yard
- Warehouses for parts and drilling equipment.

Mission:

the primary mission of the company is part of the overall strategy of the SONATRACH group: Actively participate in the development and reconstitution of energy reserves for current and future generations, and support the SONATRACH Group as part of its national and international development program., besides this the company seeks to:

- Meet the needs of its customers, its shareholders, and of its employees
- Comply with applicable laws and relevant industry standard practices relating to HSE.
- Consistently enhance the efficiency and effectiveness of all company processes to ensure long-term sustainability.
- Enhance the company's brand identity

III.2.1 ENAFOR QSE POLICY

The company got certificated with the latest versions of **ISO 14001**, **ISO 45001**, and **ISO 9001**, and all organized as an Integrated Management System that has an entire department under this name.



Figure 3 Integrated management system ENAFOR[19]

the Quality, Safety, Environment (QHSE) policy of ENAFOR comes from the policy of the SONATRACH group, ENAFOR's General Management commits to and takes responsibility for ensuring that all of its operations are carried out in accordance with the industry's best practices for the management of health, safety, and environmental issues in the workplace.



Figure 4: ENAFOR's obtained Management system certification[20]

III.2.2 ENAFOR’s Organizational chart

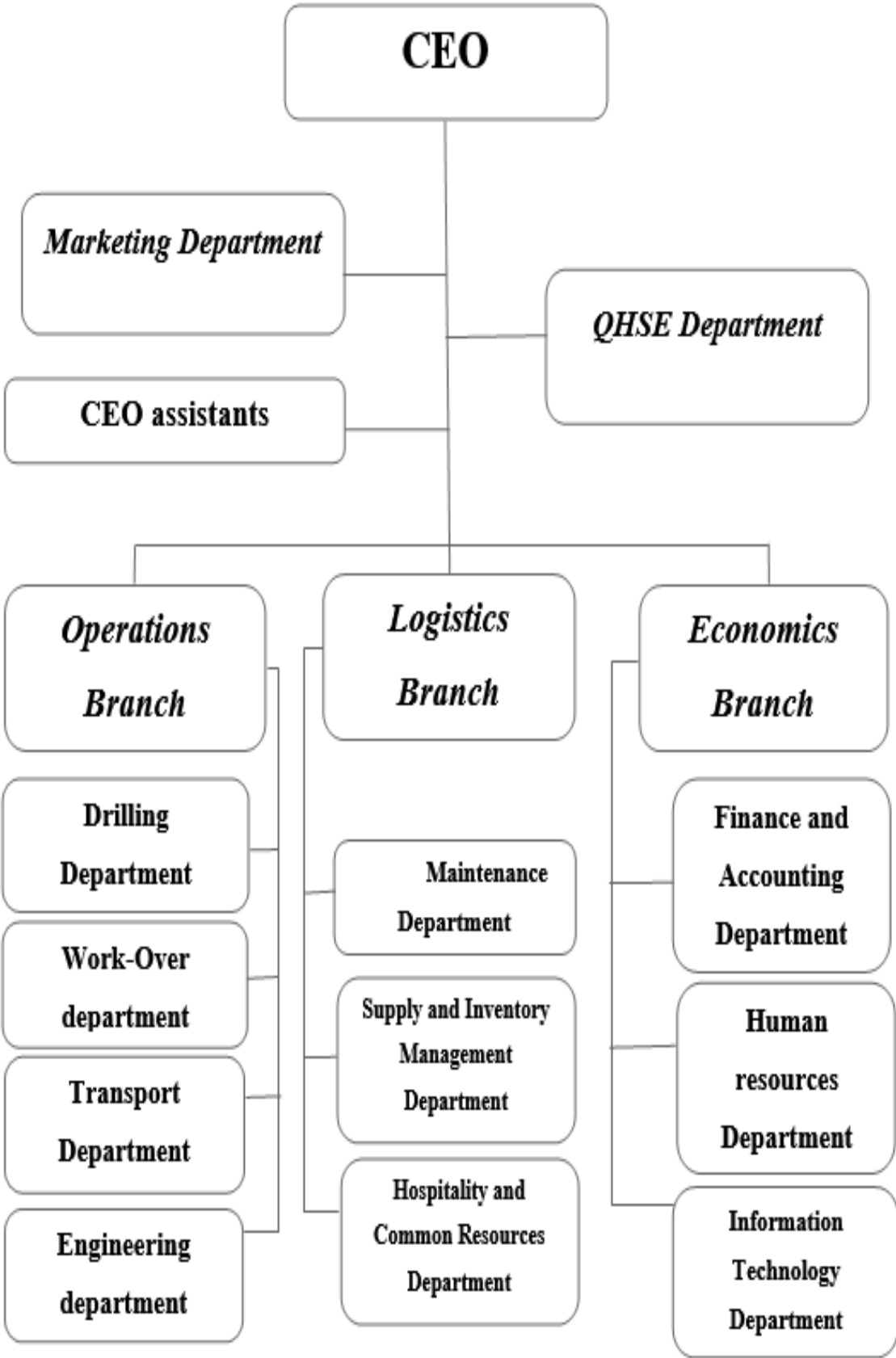


Figure 5: ENAFOR’s organizational chart[19]

III.2.3 The Organizational chart of the worksites

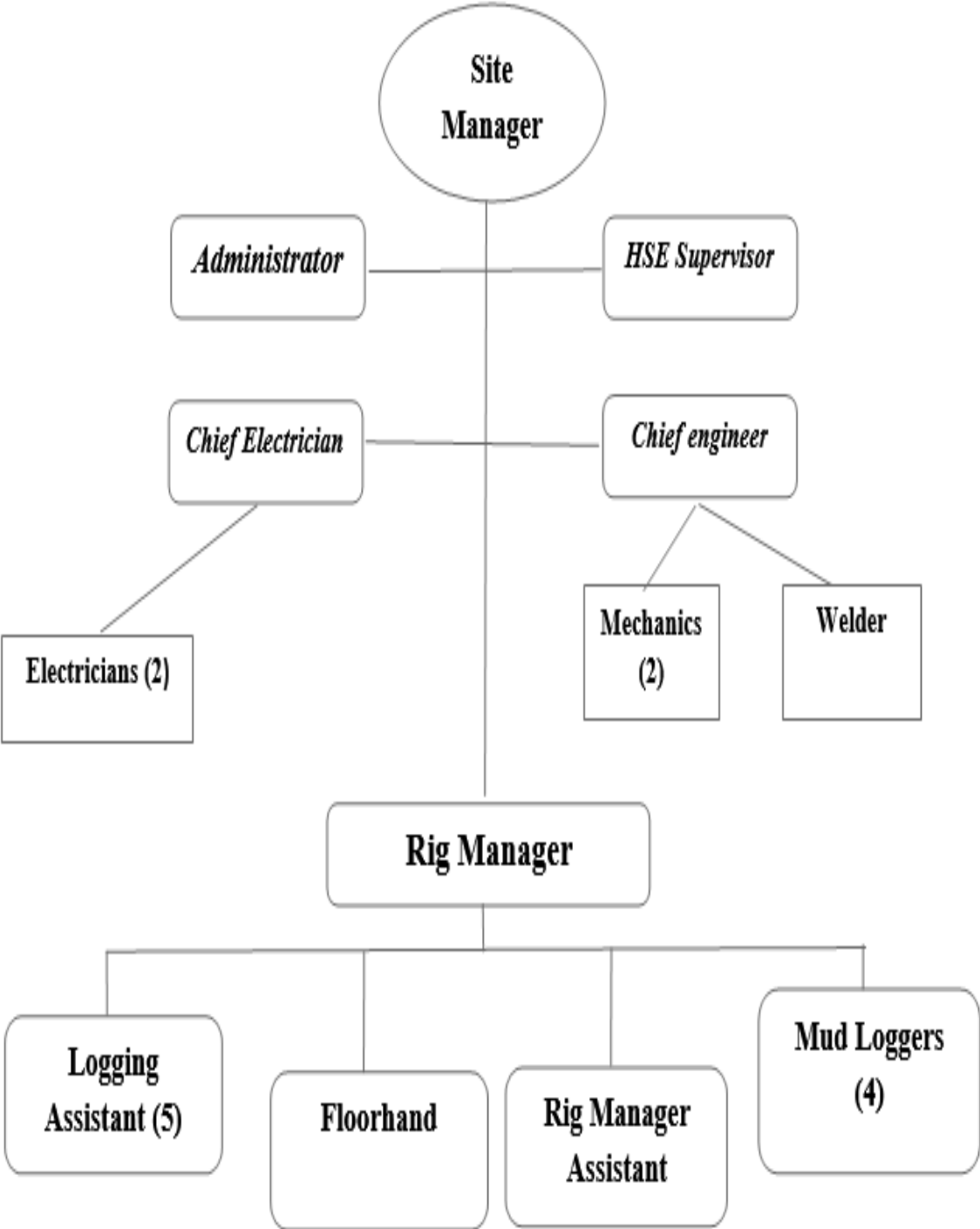


Figure 6: worksites organizational chart[20]

III.3 ENAFOR'S Environmental Management System

III.3.1 Terms and definitions:

Environment: the entourage in which an organism operates, including air, soil, natural resources, flora, fauna, human beings, and their interrelationships.[13]

environmental aspect: is an element of an organization's activities, products, or services that has or may have an impact on the environment. [13]

Environmental impact: any modification of the environment, negative or beneficial, resulting totally or partially from the environmental aspects of the organization. The relationship between environmental aspects and impacts is a cause-and-effect relationship.[13]

An environmental impact is said to be significant when its rating, established in a prioritization process, reaches or exceeds the threshold set by the organization.[13]

Sensitivity of the environment: degree of influence of the impact of an aspect on the elements of the environment such as water, air, and soil..., including human beings, fauna, and flora.

Probability of occurrence: number of times the aspect occurs over time

The gravity of the impact: it is the intensity and the importance of the quantity and the type of the polluting product generated

Level of control: actions and compensatory measures which make it possible to better control the environmental aspects and their associated impacts.

Waste: Any residue from a production, transformation, or use process, and more generally any substance or product and any movable property which the owner or holder disposes of, plans to dispose of, or which he has an obligation to dispose of or eliminate. Consumer Product Diversity Now Exceeds Biodiversity.[21]

Segregation (of waste): Operation of sorting and separating waste according to its nature.

Waste management: Consists of any operation relating to the collection, sorting, transport, storage, recovery, and disposal of waste, including the control of these operations. From this definition, several operations are distinguished in the existing waste management mode in Algeria

III.3.2 The identification and evaluation Environmental aspects

identifying environmental aspects is one of the processes of the environmental management system, the ENAFOR identifies these aspects following the internal procedure

for identifying and assessing environmental aspects, The environmental scan involves the following steps:

1. Environmental sensitivity analysis
2. Identification of environmental aspects and their associated impacts;
3. Rating and identification of significant environmental aspects/impacts.

III.3.2.1 identification of environmental aspects and their associated impacts:

For each activity, product, or service, environmental considerations are defined for each environmental area (energy, air, natural resources, noise, waste, soil, landscape):

- In normal operation: start-up, shutdown, and maintenance
- In abnormal mode: unplanned or degraded operation
- In an emergency: incident, accident, one-time occurrence variable, and having one or more degrees of gravity.

The method used to identify significant environmental aspects and their impacts on partners take place in 2 stages:

- **Step 1;** If the impact is non-compliant with the regulation {if exists) then the aspect is automatically significant, otherwise, we go to step 2 to perform the impact criticality rating:
- **Step 2** Four (4) rating criteria have been defined to measure the criticality of the impact:
 - Environmental sensitivity (S)
 - The probability of occurrence of the aspect/impact (P)
 - The severity of impact (G)
 - The level of control (M)

As mentioned in the internal procedure for the identification and assessment of environmental aspects of the company, each criteria is described as follows:

- The Environmental sensitivity (S):
 - ✓ Very strong: 4
 - ✓ Strong: 3
 - ✓ Weak: 2
 - ✓ Very weak: 1
- The probability of occurrence of the aspect/impact (P)
 - ✓ Very strong (4): From once a day (usual)

- ✓ Strong (3): From once a week (occasional)
- ✓ Weak (2): From once a month (rare)
- ✓ Very weak (1): Never or, from once a year (Very rare)
- The gravity of impact (G):
 - ✓ Very strong (4): non-biodegradable discharge or very low dilution, dispersion, or very high extraction of natural resources / very toxic effects, harmful to wildlife. the flora / very strong reduction in natural resources / very significant deterioration in the quality of the environment
 - ✓ Strong (3): Poorly biodegradable discharge or weak dilution, dispersal, or high extraction of natural resources / toxic, harmful effects on fauna, flora / strong reduction in natural resources / strong deterioration in the quality of the environment.
 - ✓ Weak (2): Biodegradable discharge or good dilution, dispersion, or low extraction of natural resources / few toxic or harmful effects on fauna, flora / low reduction in natural resources / low deterioration in the quality of the environment
 - ✓ Very weak (1): Rapidly biodegradable discharge or strong dilution, dispersion, or very low extraction of natural resources / no toxic or harmful effects on fauna, flora / very slight reduction in natural resources / negligible deterioration in the quality of the environment.
- Control Level (M):
 - ✓ Very weak (4): Lack of provision for prevention and monitoring
 - ✓ Weak (3): Some prevention and/or monitoring provisions exist or are little known and/or applied
 - ✓ Big (2): The majority of prevention and/or monitoring provisions exist and are known and applied
 - ✓ Very big (1): All prevention and/or monitoring provisions are known and applied

we calculate it following calculation formula: Criticality of impact = S × P × G × M[20]

The Criticality of Impact threshold was set at 36 for ENAFOR the number has to be defined by the company as the iso 14001 standard said, and it could get revised at each SEA update operation, if necessary, any aspect that would have a higher or equal score at this threshold will be considered a significant aspect, the next graph summarizes the operation:

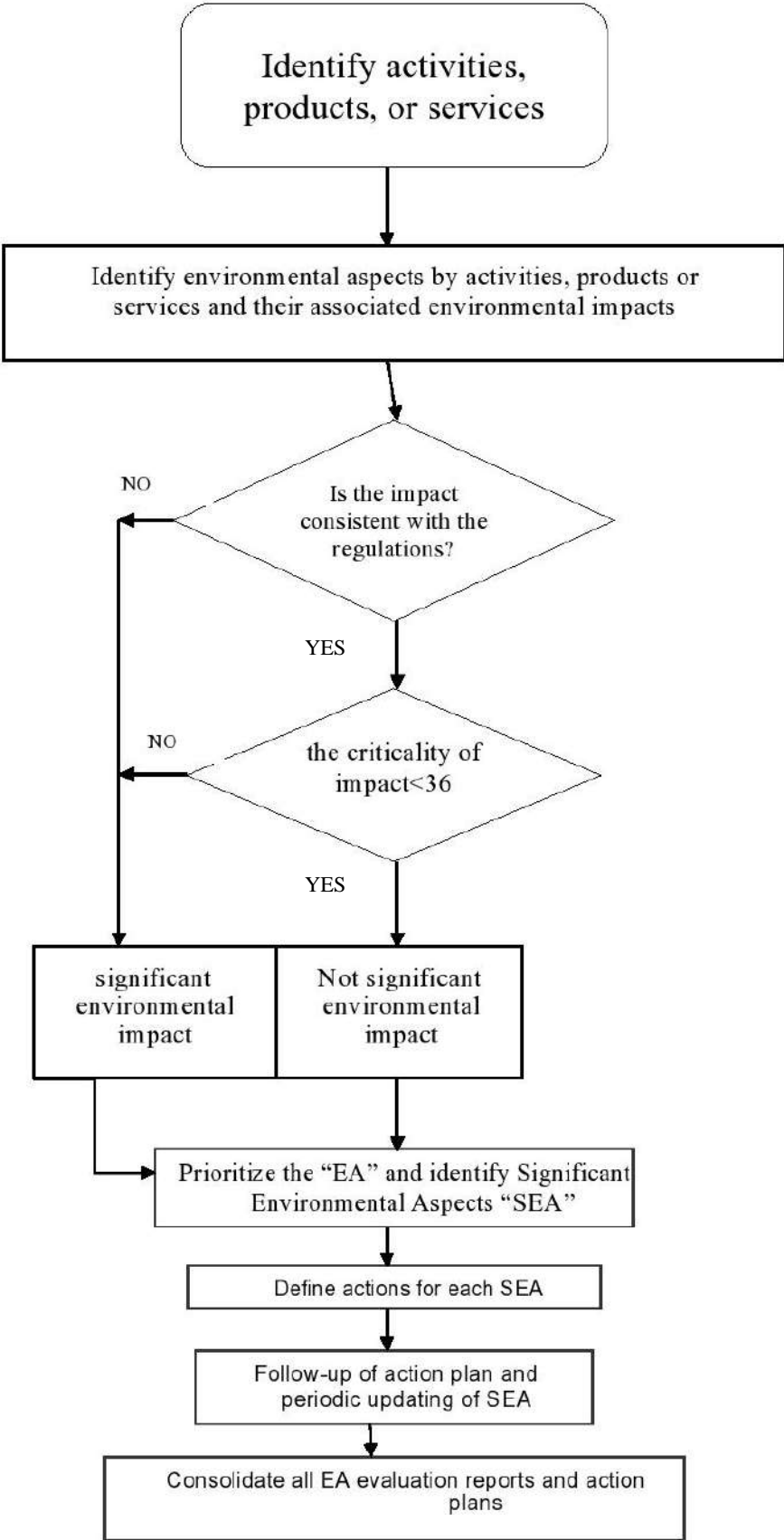


Figure 7 Aspects identification and evaluation flowchart [22]

To evaluate environmental aspects within ENAFOR, the prescribed approach involves adhering to the XCEL model. In this regard, the drilling operation at one of ENAFOR's sites serves as an illustrative case, wherein the model's distinct steps are applied:

Table 1: Identifying activities products or services[22]

Activité	Sous-activité	Mode de fonctionnement	Domaine	Aspect	Impacts associés	Conformité à la réglementation (R)
Opérations de Forage	Manœuvre	Situation d'urgence	Sol	déversement de boue de forage sur le sol	pollution du sol pollution des eaux souterraines	Conforme
		Situation d'urgence	Air	rejets incontrôlés en cas d'incendie ou d'explosion	pollution de l'air et du sol	Conforme
		Anormal	Déchets	sable contaminé	pollution du sol pollution des eaux souterraines	Conforme
		Normal	Nuisances sonores	génération de bruit	Gêne des riverains et du voisinage	Conforme
		Normal	Déchets	génération de plastique non contaminé par des produits chimiques (D.M.A)	nuisance olfactive nuisance visuelle engorgement du sol	Conforme
		Normal	Déchets	génération de chiffons souillés (D.S.D)	nuisance olfactive nuisance visuelle engorgement du sol	Conforme
		Normal	Déchets	génération de gants/chaussures/habillages souillés (D.S.D)	nuisance olfactive nuisance visuelle engorgement du sol	Conforme

The initial phase of the assessment is this part of the assessment table, which it involves identifying the activity, sub-activity, and the corresponding operating mode, categorized as normal, abnormal, or emergency. Subsequently, we proceed with the field evaluation, followed by the identification of specific aspects and their associated impacts. Finally, regulatory compliance is cited as an essential consideration in this assessment section.

Table 2 The sensitivity of the environment [22]

Sensibilité du milieu (S)							
Eau	Faune et flore	Air	Voisinage	Ressources naturelles	Biodiversité	Sol	Sensibilité globale
Fort	Faible	Faible	Très faible	Fort	Faible	Fort	Fort
Fort	Faible	Faible	Très faible	Fort	Faible	Fort	Fort
Fort	Faible	Faible	Très faible	Fort	Faible	Fort	Fort
Fort	Faible	Faible	Très faible	Fort	Faible	Fort	Fort
Fort	Faible	Faible	Très faible	Fort	Faible	Fort	Fort
Fort	Faible	Faible	Très faible	Fort	Faible	Fort	Fort
Fort	Faible	Faible	Très faible	Fort	Faible	Fort	Fort

Within this provided table, we are presented with a comprehensive depiction of the environmental sensitivity assessment. It showcases the assignment of scores for individual elements that collectively determine the overall sensitivity of the environment. These elements encompass crucial aspects such as Water, Air, Soil, Fauna and flora, Neighborhood, Natural resources, and Biodiversity. Notably, the value denoted by "S" represents the most restrictive measure among these factors, signifying the utmost importance placed on safeguarding the environment.

Table 3: Aspect/Impact Occurrence Probability, impact severity, and the mastery level[22]

Probabilité d'occurrence de l'aspect/impact (P)		Gravité de l'impact (G)		Niveau de maîtrise (M)	
Probabilité	interprétation	Gravité	interprétation	Niveau	interprétation
Très faible	jamais ou à partir d'1 fois par an (très rare)	Très fort	Rejet non biodégradable ou très faible dilution, dispersion ou très fort prélèvement des ressources naturelles / effets très toxiques, nuisibles sur la faune, la flore / très forte diminution des ressources naturelles / dégradation très importante de la qualité de l'environnement.	Grande	La majorité des dispositions de prévention et/ou de surveillance existent et sont connues et appliquées
Très faible	jamais ou à partir d'1 fois par an (très rare)	Faible	Rejet biodégradable ou bonne dilution, dispersion ou faible prélèvement des ressources naturelles / peu d'effets toxiques, nuisibles sur la faune, la flore / faible diminution des ressources naturelles / dégradation faible de la qualité de l'environnement	Très grande	L'ensemble des dispositions de prévention et/ou surveillance sont connues et appliquées
Très faible	jamais ou à partir d'1 fois par an (très rare)	Faible	Rejet biodégradable ou bonne dilution, dispersion ou faible prélèvement des ressources naturelles / peu d'effets toxiques, nuisibles sur la faune, la flore / faible diminution des ressources naturelles / dégradation faible de la qualité de l'environnement	Grande	La majorité des dispositions de prévention et/ou de surveillance existent et sont connues et appliquées
Très fort	à partir d'1 fois par jour (habituel)	Très faible	Rejet rapidement biodégradable ou forte dilution, dispersion ou très faible prélèvement des ressources naturelles / pas d'effets toxiques, nuisibles sur la faune, la flore / très faible diminution des ressources naturelles / dégradation négligeable de la qualité de l'environnement.	Grande	La majorité des dispositions de prévention et/ou de surveillance existent et sont connues et appliquées
Fort	à partir d'1 fois par semaine (occasionnel)	Très faible	Rejet rapidement biodégradable ou forte dilution, dispersion ou très faible prélèvement des ressources naturelles / pas d'effets toxiques, nuisibles sur la faune, la flore / très faible diminution des ressources naturelles / dégradation négligeable de la qualité de l'environnement.	Grande	La majorité des dispositions de prévention et/ou de surveillance existent et sont connues et appliquées
Fort	à partir d'1 fois par semaine (occasionnel)	Fort	Rejet peu biodégradable ou faible dilution, dispersion ou fort prélèvement des ressources naturelles / effets toxiques, nuisibles sur la faune, la flore / forte diminution des ressources naturelles / dégradation forte de la qualité de l'environnement.	Très grande	L'ensemble des dispositions de prévention et/ou surveillance sont connues et appliquées
Fort	à partir d'1 fois par semaine (occasionnel)	Fort	Rejet peu biodégradable ou faible dilution, dispersion ou fort prélèvement des ressources naturelles / effets toxiques, nuisibles sur la faune, la flore / forte diminution des ressources naturelles / dégradation forte de la qualité de l'environnement.	Grande	La majorité des dispositions de prévention et/ou de surveillance existent et sont connues et appliquées

Within this table, we can observe the depiction of impact probability attributed to each aspect. Notably, accompanying each probability is a descriptive explanation. This inclusive approach allows for a deeper comprehension of the rationale behind assigning a specific probability, such as "very weak," empowering analyzers to gain insights into the underlying factors influencing the probability determination. Similarly, the gravity of the impact and the level of mastery are also articulated in the table in the same way as the impact probability, further enhancing the comprehensive evaluation framework of the EAs.

Table 4 Finale criticality of the aspect[22]

Note sensibilité du milieu	Note probabilité d'occurrence	Note gravité de l'impact	Note Niveau de maîtrise	Note criticité	criticité finale	
3	1	4	2	24	aspect non significatif	E2
3	1	2	1	6	aspect non significatif	E2
3	1	2	2	12	aspect non significatif	E2
3	4	1	2	24	aspect non significatif	E2
3	3	3	2	54	aspect significatif	E1

Following the evaluation of each environmental aspect, a score is allocated. If the score falls below 36, the aspect is categorized as "not significant" and visually emphasized in green, represented by the symbol E2. Conversely, if the score is equal to or exceeds 36, the aspect is deemed "significant," highlighted in red, and denoted by the symbol E1. This systematic process ultimately leads to the determination of a final score for each EA.

Chapter 3: Analyzing the Environmental Management System: A Case Study of ENAFOR

Table 5 Prioritization of the environmental aspects [22]

DWOK																														
Réaliser la prestation de Work-Over/Forage																														
Conditions de fonctionnement	Activité	Reconnaissance	Reconnaissance	Transport	Opérations de Forage	Opérations de Forage	Opérations de Forage	Opérations de Forage	Opérations de Forage	Opérations de Forage	Opérations de Forage	Opérations de Forage	Soins infirmiers	Manutention	Manutention	Fabrication de boue	Fabrication de boue	Opérations spéciales	Opérations spéciales	Opérations spéciales	Opérations spéciales	Maintenance	Maintenance	Soudure à l'arc et oxycoupage au chalumeau	Nettoyage	Services hôteliers	Services hôteliers	Contrôle de gestion	Groupe électrogène	Criticité finale
	S/Activité/produits /services	Itinéraire	Plateforme	Transport	Forage trou de service	Travaux sur tube guidé	Montage / Démontage TOP Drive	Gerbage/ dégerbage	Réception de l'appareil	Forage/ reforage	Manœuvre	Travaux sur BOP	Soins infirmiers	Manuelle	mécanique	Fabrication	Circulation	tubage/tubing	Cimentation	diagraphie	Contrôle des Venues	mécanique	électrique	Soudure à l'arc et oxycoupage au chalumeau	Nettoyage	Hébergement	restauration	Technico-Administratif	Génération d'électricité (Groupe électrogène)	
	ASPECT	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité	criticité
N	génération de déchets de bois (D.M.A)																	E2					E2			E2	E2	E2		E2
N	génération de déchets de bois contaminés par des produits chimiques (D.S.D)															E2							E2							E2
N	génération de chiffons souillés (D.S.D)			E2	E2	E2	E2	E2	E2	E2	E2		E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2					E2
N	génération de gants/chaussures/habilles souillés (D.S.D)			E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2		E2			E2
N	génération de déchets de soins (D.A.S) (D.A.S.R.I)											E2																		E2
N	génération des équipements électriques en rebus (D.S.D)																						E2	E2		E2	E2	E2	E2	E2

In this table we see the next step of making an Environmental Aspects Assessment Report, we see that the conditions have been set as either normal condition abnormal or emergency conditions the difference between this table and the previous one is the first one is to identify all aspects for each activity and sub-activity and this table is to make the global mark for the aspect across all activities, this is because the same aspects might be significant for an activity and not significant for other one, then we observe that the final criticality has been set once an aspect is significant for in one activity, we consider it significant generally the purpose of this analyze is to identify the types of aspects and make a plane to make the significant aspect as not significant aspect or eliminate it at all.

III.3.3 Waste Management:

III.3.3.1 Principle:

The management, control, and disposal of waste are based on the following principles:

- Prevention and reduction of the production and harmfulness of waste at source.
- The organization of sorting, collection, transport, and treatment of waste.
- The recovery of waste by reusing and recycling it.
- The environmentally sound treatment of waste.
- Information and awareness of staff on the risks presented by waste and their impact on health and the environment.

III.3.3.2 Legal side:

Waste management as mentioned in ISO 14001 must follow the rules of governance, in the ENAFOR case the company follow the Algerian law (Law No. 03-10 of July 19, 2003, Law No. 01-19 of December 12, 2001), and their following of waste management from collecting, setting waste types and classification, to the conditions of storage, transportation, and elimination

III.3.3.3 Type of waste

Inert waste: All waste resulting in particular from demolition, construction, or renovation, which does not undergo any physical, chemical, or biological when they are landfilled, and which is not contaminated with hazardous substances or other elements that cause nuisance, likely to harm health and/or the environment.

Assimilated household waste: All waste from households as well as similar waste from industrial, commercial, craft, and other activities which, by their nature and composition, are similar to household waste.

Special waste: All waste resulting from industrial, agricultural, service activities, and all other activities which, due to their nature and the composition of the materials they contain, cannot be collected, transported, and treated under the same conditions as household and similar waste and inert waste.

Dangerous special waste: All special waste which, by their constituents or by the characteristics of the harmful materials they contain, is likely to harm public health and/or the environment.

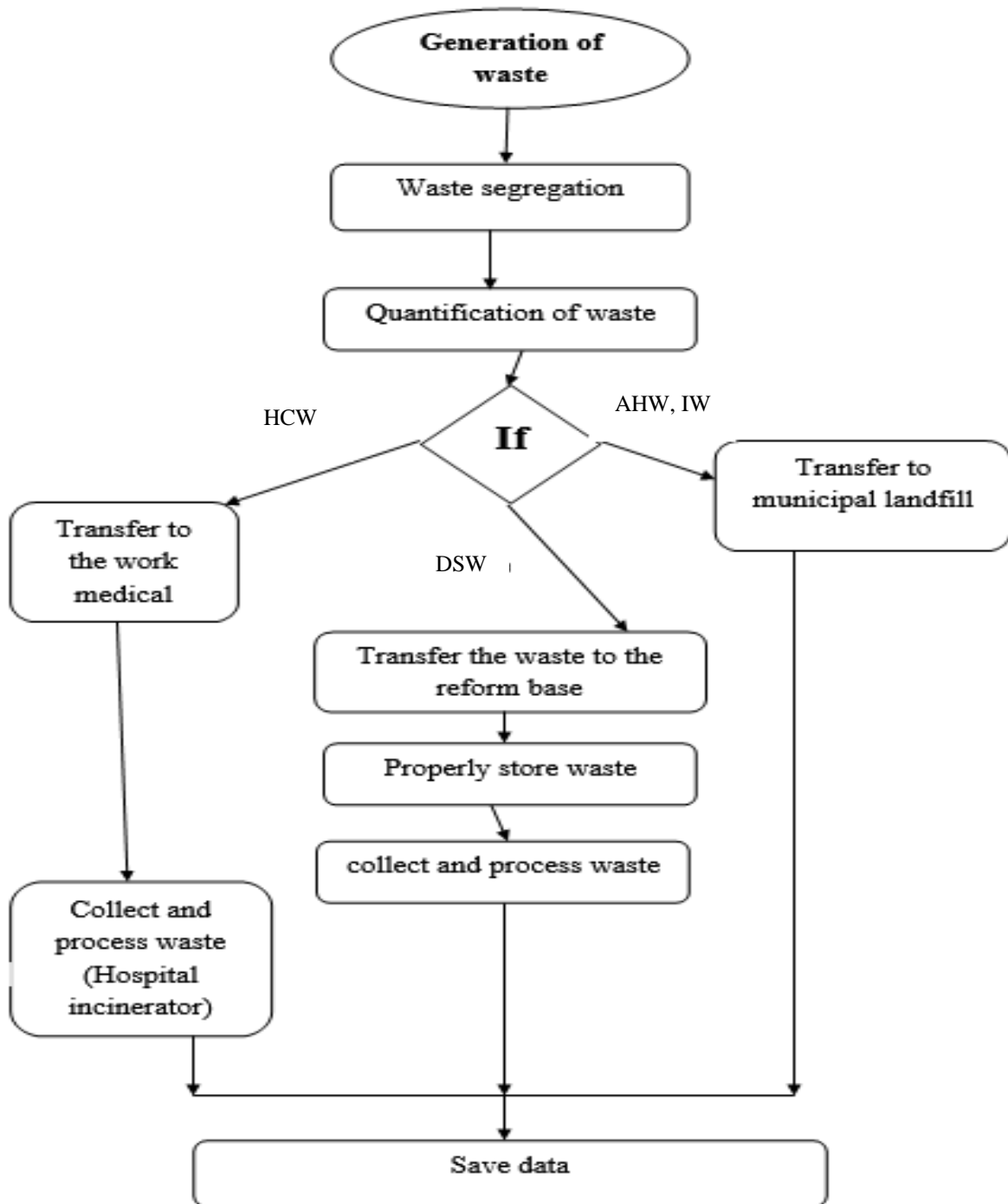


Figure 8: Waste management flowchart "ENAFOR"[20]

III.3.3.4 Treatment and elimination of wastes in ENAFOR

At all work sites, pre-collection operations are generally done by the employee at his workstation. Then, waste collection and delivery are done by the internal or means of the subcontractor either towards a technical landfill, the ENAFOR reform base, or directly to the buyers.

III.3.3.5 The types of containers:

- **Lost bag collection:** plastic bags that have an appropriate capacity ranging from 16 to 90 liters. The bags are "lost", and eliminated with the waste they contain.
- **The collection by 2-wheel drive tray:** This mode consists in using polyethylene bins with standard swivel covers and having a capacity of 120 L, 240, and 330 L.
- **Collection by 4-wheel drive Tray:** Standardized polyethylene or metal bins with swivel cover and having a capacity of up to 600 L, 750, and 1100 L.
- **Collection by exchangeable containers:** uses containers or boxes of metal with a capacity of 3 to 8 m³.

III.3.3.6 Waste storage conditions:

- The proper storage of waste requires sorting it according to its type (IW, AHW, SW, DSW) and keeping it in appropriate conditions.
- Retention bins are required for the storage of waste materials such as used oil drums, batteries, and any other waste that contains chemicals.
- Items or devices that cannot be used must be returned to their original packaging.
- Awareness signs and instructions must be displayed in storage areas

III.3.3.7 Parameters are taken into consideration for the organization of the collection:

- The collection circuit,
- The collection frequency,
- Waste-producing points,
- The quantities of waste produced by points,
- The number and capacity of containers set up for each waste generator point.
- The appropriate vehicle.

III.3.3.8 Transportation of waste:

- Collection vehicles, which may be of different capacities, carry the transportation of waste to the place of treatment or discharge.

- In the case of the transfer of waste from the site, ENAFOR uses its ways, and this is done with a waste transfer slip.
- For the transport of dangerous special waste, the company sometimes calls for an authorized carrier for the transport of relevant waste.

III.3.3.9 Traceability:

Any transfer of DSW is accompanied by a waste transfer slip internally and a waste tracking slip externally.

III.3.3.10 Recyclable materials / Reusable:

After selective collection and sorting, many waste components can be reused for the production of new products.

ENAFOR SMI.QHSE	BORDEREAU DE TRANSFERT DES DECHETS	STRUCTURE : ENF # 34	
		INDICE : 03	
BORDEREAU N°		004 / 16	
DATE		12 / 08 / 2016	
SITE		ENAFOR # 34	
Nous soussigné « C/Chantier & SUP/HSE » avoir procédé au transfert des déchets repris dans le tableau ci-dessous du site ENF # 34 vers la base de réforme (ferraille) HMD.			
Types	désignation	Quantité	
Déchets ménagers et assimilés	Emballage carton et papier	/	kg
	Emballage métallique	/	kg
	Reste de cantine	/	kg
	Bois et dérivés	50	kg
	Bouteilles plastiques (PET)	0.5	kg
	Tissus / chiffons (non contaminés)	/	kg
	Verre	/	kg
Déchets Spéciaux	Déchets Métalliques	200	kg
	Câbles électriques	/	kg
	Câbles en acier	170	kg
	Pneus usagés	01	Unité
	Huiles de friture	/	Litres
	Autre	/	
Déchets Spéciaux Dangereux	Huiles industrielles usagées	300	Litres
	Batteries et accumulateurs	02	Unité
	Equipements électroniques	/	Unité
	Chiffons & gants contaminés	/	Kg
	Mélanges huiles et eau	/	Litres
	Tubes fluorescents	/	Unité
	Cartouches d'huiles	/	Unité
	Patins de frein amiantés	/	Unité
	Récepteur vide fréon	/	Unité
	Toner fax, Cartouches d'impression,	/	Unité
	Autre : Filtres à l'huile	04	
	Filtres à gasoil	08	
compresseurs	03		

Figure 9: ENAFOR Waste transfer slip example[20]

Table 6: Example of waste generation in a ENAFOR worksite

Direction: WORK_OVER		Gestion des consommations et de génération des déchets															
Chantier: ENF34																	
Année: 2021																	
Types	Items	Sources des données	Unité	Janvier	Février	Mars	Avril	Mai	Juin	Juillet	Août	Septembre	Octobre	Novembre	Décembre	annuelle	
Consommables	Gasoil	SAP	m3	110.2	82.2	88.7	111.8	109.7	110.6	83.3	160.5	93.3	99.5	105.4	101.6	1256.8	
	Essence		m3	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Huiles de lubrifications	SAP	m3	1.2	0.49	1.5	1.061	0.6	0.809	0.552	0.895	0.325	0.875	1.158	0.8	10.265	
	Huiles hydrauliques	SAP	m3	0.8	0.4	1	0.81	0.2	1.21	0.435	0.8	0.4	0.4	0.3	0.2	6.955	
	Graisse de forage	SAP	Kg	50	18	18	90	18	18	0	0	0	36	18	18	284	
	Graisse mécanique	SAP	Kg	36	10	22	20.45	18	10	27	15.75	43.7	18	16.05	18	254.95	
	Eaux industrielles (Rig)	Outils de mesure	m3	517	517	517	517	517	517	517	517	517	517	517	517	517	6204
	Eaux industrielles (Camp de vie)	Outils de mesure	m3	1228	1228	1228	1228	1228	1228	1228	1228	1228	1228	1228	1228	1228	14736
	Eaux filtrées	Intendant	m3	8	9	4	8	9.3	9	9	9	9	9	8	9	10.2	101.5
	Eaux minérales	Intendant	m3	10.5	11.25	12.3	11.25	16.275	18	19.5	18	19.5	15	13.5	10.28	175.355	
Énergie Électrique		(KWH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Déchets ménagers et assimilés	Reste de cuisine biodégradable	Constataion visuelle	Kg	750	800	770	820	775	720	775	700	720	895	730	680	9135	
	bouteille en plastique	Constataion visuelle	Kg	43	50	45	48	57	38	57	30	50	47	50	55	570	
	Papier et carton	Constataion visuelle	Kg	22	18	25	17	23	10	23	8	10	13	10	12	191	
	Verre	Constataion visuelle	Kg	3.5	2	3.5	3	2.5	0	2.5	0	2	1.5	0	5	25.5	
	Métallique non contaminé (canette, boîte de conserve.....)	Constataion visuelle	Kg	17	15	21	16	17	16	17	12	17	22	15	35	220	
	Bois et dérivés (palette, sciure, chute de bois)	Constataion visuelle	Kg	9	20	33	19	33	19	33	10	15	36	20	40	287	
Déchets spéciaux	Huiles de fritures	Intendant	m3	0.045	0.05	0.05	0.05	0.055	0.05	0.055	0.05	0.05	0.025	0.05	0.056	0.586	
	Cable électrique	Constataion visuelle	Kg	3	15	7.5	10	26	0	6	0	0	27	0	0		
	Pneus usagés		Unité	0	0	0	0	0	0	0	0	0	0	0	0	0	
Déchets spéciaux dangereux	Plastique contaminé (FLEXIBLES)		Kg	0	120	35	200	140	100	90	80	70	80	50	0	965	
	Métallique contaminé (cable de forage, soudure.....)	Constataion visuelle	Kg	155	80	250	150	295	150	200	150	120	170	100	355	2175	
	Huiles de lubrifications usagées	SAP	m3	0.2	0.49	0.5	0.51	0.6	0.794	0.3	0.895	0.32	0.875	0.32	0	5.804	
	Huiles hydrauliques usagées		m3	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Cartouche d'huile/ gasoil / air	Outils de mesure	Unité	38	16	15	6	21	27	21	17	8	20	17	0	206	
	Infectieux	Constataion visuelle	Kg	0.02	0.5	0.2	0.2	0.15	0.2	0.15	0.15	0.5	0.2	0.5	0	2.77	
	Équipement électrique en rebut		Kg	0	0	0	30	0	0	0	0	0	0	0	0	30	
	Patins de frein contenant de l'amiant		Unité	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Batteries usagées		Unité	0	0	1	1	0	0	0	0	0	0	0	2	4	
	lampe à néon / économique		Unité	0	0	5	5	0	0	0	0	0	2	0	2	14	
	Récipient sous pression (aérosols)		Unité	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Équipements contenant des gaz fréon (HCFC ou HFC)		Unité	0	0	1	1	0	0	0	0	0	0	0	0	2	
	Toners d'impression		Unité	0	0	1	1	1	0	0	0	0	0	0	0	3	
	Gants et chiffons souillés	Constataion visuelle	Kg	12	2	25	8	28	8	10	5	5	35	5	0	143	
Sable contaminé		Kg	0	0	0	0	0	0	0	0	0	0	0	0	0		
protecteurs de tubaqe	Outils de mesure	Unité	60	60	0	0	0	0	0	0	0	0	0	0	120		

Table 7: Example of waste generation in a ENAFOR worksite (2)

Direction: WORK_OVER		Gestion des consommations et de génération des déchets															
Chantier: ENF34																	
Année: 2022																	
Types	Items	Sources des données	Unité	Janvier	Février	Mars	Avril	Mai	Juin	Juillet	Août	Septembre	Octobre	Novembre	Décembre	annuelle	
Consommables	Gasoil	SAP	m3	113.9	92.3	106.4	97.9	107	108.3	96.9	118.2	122.2	123.7	104.04	102.822	1293.662	
	Essence		m3	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Huiles de lubrifications	SAP	m3	1.158	0.6	0.73	0.3	1.291	0.6	0.36	1.225	1.2	1.53	0.5	1.11	10.604	
	Huiles hydrauliques	SAP	m3	0.3	1	0.73	0.36	0.686	0.72	0.36	1	0.4	1.025	0.6	0.605	7.786	
	Graisse de forage	SAP	Kg	18	0	54	18	54	18	18	54	20	80	18	18	370	
	Graisse mécanique	SAP	Kg	16.05	36	15	18	3.4	18	18	11	18	13	18	14	198.45	
	Eaux industrielles (Rig)	Outils de mesure	m3	517	517	517	517	517	517	517	517	517	517	517	517	517	6204
	Eaux industrielles (Camp de vie)	Outils de mesure	m3	1228	1228	1228	1228	1228	1228	1228	1228	1228	1228	1228	1228	1228	14736
	Eaux filtrées	Intendant	m3	9	9.95	9	7.2	9	7	9	13.4	9	13.5	9	10.85	115.9	
	Eaux minérales	Intendant	m3	13.5	5.984	13.5	11.1	13.5	19.5	21	19.086	21	17.5	21	13.95	190.62	
	Énergie Électrique		(KWH)	0	0	0	0	0	0	0	0	0	0	0	0	0	
Déchets ménagers et assimilés	Reste de cuisine biodégradable	Constatation visuelle	Kg	730	635	720	950	700	870	900	1050	850	800	850	780	9835	
	bouteille en plastique	Constatation visuelle	Kg	50	40	45	67	44	60	50	80	60	75	60	85	716	
	Papier et carton	Constatation visuelle	Kg	10	22	12	30	18	45	30	49	35	30	35	17	333	
	Verre	Constatation visuelle	Kg	0	2	1	0	1	6	5	12	5	7	5	0	44	
	Métallique non contaminé (canette, boîte de conserve.....)	Constatation visuelle	Kg	15	35	18	38	20	67	30	35	35	22	30	32	377	
	Bois et dérivés (palette, sciure, chute de bois)	Constatation visuelle	Kg	30	10	20	0	15	34	10	60	15	16	15	30	255	
Déchets spéciaux	Huiles de fritures	Intendant	m3	0.05	0.245	0.1	0.25	0.1	0	0.05	0.34	0.05	0.125	0.05	0.465	1.825	
	Cable électrique (câble en acier)	Constatation visuelle	Kg	250	260	200	0	200	0	0	150	0	0	0	0		
	Pneus usagés		Unité	0	0	0	0	0	0	1	0	0	0	0	0	1	
Déchets spéciaux dangereux	Plastique contaminé (FLEXIBLES)		Kg	50	0	0	0	0	0	0	0	0	0	0	18	68	
	Métallique contaminé (cable de forage, soudure.....)	Constatation visuelle	Kg	1200	260	800	0	800	90	100	130	80	77	1500	150	5187	
	Huiles de lubrifications usagées	SAP	m3	0.32	0.6	0.32	0.45	0.32	1.2	0.18	0.22	1.2	0.64	0.7	0.8	6.95	
	Huiles hydrauliques usagées		m3	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Cartouche d'huile/ gasoil / air	Outils de mesure	Unité	18	16	11	24	11	29	26	9	20	120	29	17	330	
	Infectieux	Constatation visuelle	Kg	0.5	0	0.5	0	0.5	0	0.5	0.02	0.5	0	0.5	0	3.02	
	Équipement électrique en rebut		Kg	30	0	10	0	10	0	0	0	0	0	0	0	50	
	Patins de frein contenant de l'amiant		Unité	0	0	0	9	0	0	0	0	0	0	0	0	9	
	Batteries usagées		Unité	1	2	0	4	0	1	0	0	0	1	0	0	9	
	lampe à néon / économique		Unité	0	2	0	0	0	0	0	0	0	0	0	0	2	
	Récipient sous pression (aérosols)		Unité	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Équipements contenant des gaz fréon (HCFC ou HFC)		Unité	5	5	2	0	2	0	0	0	0	0	0	0	14	
	Toners d'impression		Unité	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Gants et chiffons souillés	Constatation visuelle	Kg	5	25	5	30	5	40	0	0	5	40	5	0	160	
	Sable contaminé		Kg	0	0	0	0	0	0	0	0	0	0	0	0	0	
	protecteurs de tubage	Outils de mesure	Unité	0	350	0	0	0	0	0	0	0	0	0	0	350	

The two tables represent the consumption and production of waste in one of the company's facilities for the years 2021 and 2022. It can be observed that each workplace contains several types of waste, including household waste such as food leftovers and kitchen waste, plastic waste, and hazardous waste such as used tires and metal electrical cables, as well as special hazardous waste such as used batteries, oil cartridges, and filters. There are also consumables, such as used diesel to power the necessary electrical transformer to supply the entire workplace with energy, lubricating oil, and others.

It can be noticed that the consumption of materials between the two years is very similar in this facility, with a slight difference in quantities during the months, where water consumption increases during the summer months, for example. As for waste, the situation is almost the same, with a similar number of wastes produced during the two years in this facility. These figures can be generalized to other worksites in the company with a slight difference due to the differing conditions of each worksite.

III.3.4 strategic goals

Since ENAFOR has ISO 14001 certification it should set a certain strategic goal that aligns with its environmental policy and objectives, these goals should be specific, measurable, achievable, relevant, and time-bound

These objectives should be reviewed and updated periodically to ensure that the organization is constantly improving its environmental performance and achieving its objectives. By setting and achieving strategic environmental goals, organizations can not only meet regulatory requirements but also demonstrate their commitment to sustainability and reducing their environmental footprint. Speaking of ENAFOR they did set strategic goals to achieve these goals including reducing energy consumption and improving water management practices.

Table 8: Energy consumption in life bases[20]

Table 9: Water consumption in life bases[20]

Chapter 3: Analyzing the Environmental Management System: A Case Study of ENAFOR

TABLEAU DE BORD													
Processus : STRATEGIQUE				Pilote : DQSE				Propriétaire : DQSE				Date :29/01/2023	
But stratégique : Optimiser la consommation de l'énergie et de l'eau													
Objectif opérationnel : H.202 Maitriser l'utilisation des ressources naturelles non renouvelables : en réduisant la consommation d'énergie de 1% par rapport à 2021 pour les bases des vie 1er Mai et Irara .													
Indicateur : Réduire la consommation d'énergie de 1% par rapport à 2021 pour les bases de vi 1er Mai et Irara												Cible : -1% Energie	
	J	F	M	A	M	J	J	A	S	O	N	D	Annuel
Prévu	319928	329798	313915	329743	512843	802174	741506	737019	628058	409932	306529	301327	5732773
Réalisé	488059	411369	287390	241861	415792	706336	636505	773513	636089	501285	252857	301042	5652098
Taux Mensuel	153%	125%	92%	73%	81%	88%	86%	105%	101%	122%	82%	100%	99%
Taux Cumulé/Obj.													
Ecart / Cible	53%	25%	-8%	-27%	-19%	-12%	-14%	5%	1%	22%	-18%	0%	-1.4%

Objectif : -1% energie	1000000	488059	411369	287390	241861	415792	706336	636505	773513	636089	501285	252857	301042
Résultat :		J	F	M	329743	512843	802174	741506	737019	628058	409932	306529	301327
Écart/Cible :													

— Prévu — Réalisé

TABLEAU DE BORD										
Processus : STRATEGIQUE		Pilote : DQSE		Propriétaire : DQSE		Date : 29/01/2023				
But stratégique : Optimiser la consommation de l'énergie et de l'eau										
Objectif opérationnel : H.201 Maitriser l'utilisation des ressources naturelles non renouvelables : en réduisant la consommation d'eau de 5% à 2021 pour les bases de vie 1er Mai et Irara.										
Indicateur : Réduire la consommation d'eau de 5% par rapport à 2021 pour les bases de vie 1er mai et irara					Cible : -5% Eau					
	1er trimestre		2ème trimestre		3ème trimestre		4ème trimestre		Annuel	
Prévu	46303		70526		78243		52038		247110	
Réalisé	78573		87192		114605		60531		340901	
Taux Mensuel	170%		124%		146%		116%		138%	
Taux Cumulé/Obj.										
Ecart / Cible	70%		24%		46%		16%		38%	

Objectif : -5% Eau	200000	78573	87192	114605	60531
Résultat :		1er trimestre	2ème trimestre	3ème trimestre	4ème trimestre
Écart/Cible :					

— Prévu — Réalisé

Observations
Compteurs d'eau fonctionnels par rapport à 2021, il faudrait s'attendre à une augmentation significative de la consommation pour l'année 2022

III.3.4.1 Analyze

In general, the performance of the company in terms of energy consumption and water highlights the importance of developing realistic and achievable goals, regularly monitoring, and taking action to address any weak performance.

By doing so, the company can continue to improve its environmental performance and contribute to a more sustainable future.

III.3.4.2 Energy consumption (electricity)

The goal to reduce energy consumption by 1% on an annual basis is a positive step towards improving the energy efficiency of the company. The fact that the company was able to achieve a reduction of 1.4%, exceeding this target, is indicative of the company's proactive efforts to reduce its energy consumption. Of course, take in mind that electricity consumption may vary significantly due to many factors including changes in production processes, equipment upgrades, and even weather conditions. Therefore, it is useful to further investigate the factors that contributed to the known reduction in energy consumption to identify the best ways to be replicated in the future.

the 1.4% reduction in power consumption is a good result, but there is still room for some future improvement. The company could consider setting more targets in the next years, such as reducing energy consumption by 3% or even 5%, to improve its overall environmental performance.

III.3.4.3 Water consumption

The goal of reducing water consumption by 5% is a commendable goal that demonstrates the company's commitment and concern to reduce its environmental impact.

However, the fact that water consumption has increased by 38% means the company needs to re-evaluate its water management practices and identify opportunities for improvement. Possible causes of increased water consumption may include changes in production business expansion or equipment failure processes, the company said that the real and the main cause of that in contrast to 2021 when the water meters were not functioning, they have now been repaired. As a result, there is likely to be a significant increase in consumption during 2022, since the meters are now operational.

To identify the underlying reasons for the rise in water consumption and devise effective solutions, it would be advantageous to conduct a more thorough analysis of these factors. One potential solution to reduce water usage could be to implement water-saving technologies, such as low-flow faucets and water-efficient appliances.

The approach is to implement water management practices such as regular leaking detection and repair or training of employees to conserve water. Although the company has not met its water

consumption targets, it is still important to recognize its positive steps to reduce its environmental impact.

So after all, the energy and water consumption data provided show that the company is taking steps to reduce its environmental impact, The company met its energy consumption target, but could still do better in terms of setting more ambitious targets, water consumption highlights the need to further investigate the specific factors that have contributed to the increase and implement strategies to address them, By regularly monitoring performance and taking steps to address areas of poor performance, companies can continuously improve their environmental performance and contribute to a more sustainable future.

III.4 Conclusion

The case study conducted on ENAFOR Company focused on analyzing and identifying environmental impacts, waste management methods, and strategic environmental goals. The study aimed to classify the number and type of environmental impacts caused by ENAFOR's activities, as well as evaluate the effectiveness of the waste management system in place, including transportation and disposal method.

IV. General conclusion

In conclusion, the implementation of an effective environmental management system (EMS) is crucial for companies such as ENAFOR that operate in industries with significant environmental impact.

This thesis has shown that Environmental Management Systems (EMS) is an effective tool for organizations to manage their environmental impact and improve their environmental performance. The case study of ENAFOR, a drilling company, illustrates the benefits of implementing an EMS, including improved compliance with environmental regulations, reduced environmental impact, and enhanced reputation among stakeholders.

By comparing ENAFOR's EMS to the general EMS framework, this thesis has identified areas where the company has successfully implemented best practices, as well as areas where there is room for improvement. For example, ENAFOR has implemented a comprehensive environmental policy and established targets and objectives for environmental performance, which are important components of an effective EMS.

However, the company could improve its monitoring and reporting of environmental performance (the case of water and energy consumption), which would help identify areas for improvement and enhance stakeholder transparency.

Overall, this thesis highlights the importance of organizations taking responsibility for their environmental impact and implementing effective environmental management practices.

By doing so, organizations like ENAFOR can minimize their environmental footprint, comply with regulations, and enhance their reputation among stakeholders. Additionally, by continually improving their EMS, companies like ENAFOR can identify new opportunities for sustainability and contribute to a more sustainable future.

V. Bibliographic references

1. Couret, A., J. Igalens, and H. Penan, *“La certification”*, PUF. Que sais-je, 1995.
2. Iacono, G., *La certification d’assurance qualité: De nouvelles questions pour le Droit*. Revue internationale de droit économique, 1994. **63**: p. 63-84.
3. Samia, H., *étude critique du système de management environmental au niveau des entreprises algériennes* 2009.
4. Vinodkumar, M. and M. Bhasi, *A study on the impact of management system certification on safety management*. Safety science, 2011. **49**(3): p. 498-507.
5. American Society for Quality. 2023; Available from: <https://asq.org/quality-resources/iso-9001>.
6. Li, Y. and F.W. Guldenmund, *Safety management systems: A broad overview of the literature*. Safety science, 2018. **103**: p. 94-123.
7. Thomas, M., *A systematic review of the effectiveness of safety management systems*. 2012.
8. ISO. *ISO standards* Available from: www.iso.org.
9. Sheldon, C. and M. Yoxon, *Environmental management systems: a step-by-step guide to implementation and maintenance*. 2012: Routledge.
10. Johanson, S., *the benefits of certification for companies: An exploratory review*
11. Almaarofi, H.S.M.R., *The implementation of environmental management system in Kamunting Industrial Zone: a bio-economic approach*. 2009, University of Malaya.
12. Martincic, C.J., 1997.
13. iso.org, *iso 14001* 2015
14. Da Fonseca, L.M.C.M., *ISO 14001: 2015: An improved tool for sustainability*. Journal of Industrial Engineering and Management, 2015. **8**(1): p. 37-50.
15. *Developed by ourselves using ISO 14001-2015*.
16. United States environmental protection Agency; Available from: www.epa.gov.
17. Walsh, A. 2022; Available from: <https://www.greenelement.co.uk/blog/what-is-an-environmental-management-system/>.
18. Hui, I., A.H. Chan, and K. Pun, *A study of the environmental management system implementation practices*. Journal of cleaner production, 2001. **9**(3): p. 269-276.
19. ENAFOR S.P.A. 2023; Available from: <https://www.enafor.dz/>.
20. *An internal document provided by ENAFOR QHSE Departement*.
21. *the Official Journal of the Algerian Republic No. 77 in 2001, in Law No. 01-19 12/12/2001*.
22. ENAFOR, *Identification et évaluation AES, QHSE*.