

Environmental Damage Assessment Radioactive Damage case

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Abstract;

The emergence of the industrial revolution in Britain at the beginning of the twentieth century and the subsequent industrial and technological development change the concept of pollution, where waste has become beyond household waste and some waste resulting from some simple human activities into industrial waste of all kinds: solid, liquid, chemical... Resulting from the work of machines, factories and industrial workshops. Man also looked for using new energy sources, other than the ones before this revolution, which led to a rift between man and the environment, and create an imbalance between them, especially the big damage for environment in which man lives: either by using more of environmental resources to produce energy and obtain primary resources, or by throwing huge quantity of harmful and toxic waste into the environment. With the increasing demand for energy, people have to search for new sources for producing big quantities of nuclear energy without paying attention to the damage they may cause to the environment, especially damage caused by radiation or radioactive damage.

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1. Introduction

Environmental pollution and the damages resulting from it have become one of the biggest problems that threaten the environment and the economy at the same time, and with the development of technologies and economic progress, these problems have come together to become a real threat to the future of our planet. In order for us to confront this big problem, we must first know the size of this problem by evaluating it and finding ways and tools to measure it.

1.1.Statement of the Problem:

The following study aims to shed light on one of the biggest environmental problems that threaten humanity and its continuity on the face of the earth, as it highlights the danger of environmental damage to various environmental components, especially the damage caused by radioactive emissions, as it sometimes shows that helps to assess this damage, especially for institutions Transactions in the field of energy, such as the American Baker Corporation, which was taken as an example in this study

1.2. Research Questions:

From the above, the following question can be asked is:

How much do the radioactive pollutants harm the environment? Is it possible to assess this damage?
What are the mechanisms and tools used in that?

1.3. Hypothesis/ hypotheses:

To answer the main question, the following hypothesis can be put forward.

1.3.1 The radioactive pollutants are very harmful which make it very difficult to evaluate.

1.3.2 Although the radioactive damage to the environment is difficult to assess, there are some mechanisms and tools can be used to measure this damage.

1.3.3 Despite the existence of mechanisms and tools for measuring environment damage, it remains insufficient to give accurate figures.

1.4. Significance of the Study:

This study aims to highlight the threats to the environment caused by certain industries that use radioactive in their production by highlighting environmental damage and how it is assessed.

1.5. Objectives of the Study:

This study aims to highlight the following points:

1.5.1 What is radioactive contamination and its effect on the various components of the environment.

1.5.2 Definition of damage and environmental damage in particular.

1.5.3 Definition of environmental damage assessment and the tools and micanzimes used therein.

1.5.4 A case study of an intercontinental United States company in the field of oil.

1.5.5 Highlight this company's approach to assessing environmental damage from its oil extractive industries.

1.6. Methodology of the Study:

Narrative descriptive approach was used in the creation of this work, where the pillars of this topic were addressed by giving what each element is in a theoretical nature, and studying a situation of reality in a practical nature.

1.7. Previous researches:

For previous researches, there are many researchers who have applied the topic of environmental damage, some of whom can be mentioned as follows:

1.7.1 Doctorate thesis, International Liability without Harm - The State of Environmental Damage - by Dr. Mallem Yusuf, where the researcher addressed the topic in three chapters, Preliminary Chapter: International Liability and Environmental Damage, Chapter I: International Liability without Harm and Methods of Compensation, Chapter II: Grounds for Abandoning Damage onment and Adoption of International Liability without Harm.

1.7.2 Doctorate thesis, International Commitment to the Protection and Preservation of the Marine Environment from Pollution Hazards, Dr. Abu Al Khair Ahmed Attiya, Ain Shams University, Egypt. The topic is dealt with in two sections. The obligation to protect and preserve the oceans and seas from the risk of pollution is set out in Part One of the content of that obligation and of the most important duties derived therefrom and of the basis of that obligation. And then the basis for the obligation in international justice and we present, in Part Two, the provisions of the implementation of the international obligation to protect the marine environment. Section II of the letter specializes in the study of the rules of international liability arising from the breach of the obligation to preserve the marine environment. Part I deals with the elements of international liability resulting from pollution of the marine environment, namely breach or violation of an international obligation - customary or incidental - and the occurrence of damage as a prerequisite for the triggering of liability for pollution of the sea and the causal relationship between pollution and damage. The effect of proven liability for pollution of the marine environment, which is to compensate for damage caused by the pollution act, is then presented in Part Two.

1.7.3 Doctorate thesis, Legal Regime for the Protection of the Marine Environment from Pollution, Dr. Saliha Ali Sadqa, University of Karpunis Bani Ghazi, Libya. To examine the problem of transboundary marine pollution and the legal mechanisms to combat it, three main chapters, chapter I on the sources of transboundary marine pollution, and chapter III on the assessment of the prevailing legal regime developed by Algerian legislation, are discussed.

1.7.4 An article in the Journal of the Bridge of Development, published in Kuwait, by the researcher Najat Elnish, entitled "The costs of environmental degradation and the scarcity of resources between theory and applicability in Arab countries".

1.8. Organization of the Study:

The work section is divided into two main sections. The first is theoretical, highlighting all aspects of pollution from radioactive and environmental damage in terms of definition, types and how to assess it. The second section is practical, highlighting Baker Hughes company' interest in this area and how to assess the damage caused by its oil extraction, by establishing a full department for the study and assessment of environmental damage.

2. Radioactive pollution

2.1. The concept of radioactive pollution

It is every negative change that affects one of the environment's elements because of the excessive use of radioactive substances and isotopes in various vital and industrial activities by man, resulting in an excessive increase in the proportion of nuclear radiation in the environment beyond the permissible limit. (Saidan, 2012, p. 49)

2.2. Effects of radioactive contamination

2.2.1 Effects of radioactive contamination on soil

Soil radioactive contamination means the presence of radioactive elements alien to the components of the terrestrial environment that negatively affect the soil and humans. (Saidan, 2012, p. 50) The main cause of soil pollution with radiation is due to accidents affecting nuclear reactors or explosions carried out by some countries, either in wars or in the form of nuclear experiments, as happened in the Algerian desert and carried out by the French colonizer in the region of Reggane. (Saidan, 2012, p. 51) Soil pollution with radiation leads to the contamination of plants and crops, either directly by exposing them to radiation during the absorption of radiation or indirectly by absorbing the dissolved salts in the soil, which becomes radioactive due to the leakage of radioactive atoms into the soil. Radiation is transmitted to humans and animals when they eat plants and crops that have been affected by radiation, which leads to the injury of humans and animals with several serious diseases. (Saidan, 2012, p. 52)

2.2.2 Effects of radioactive contamination on water

It is the change in the basic components of water directly or indirectly from one of the radioactive materials, which makes it unsuitable for use, whether for drinking, irrigation or other uses. Nuclear radiation enters the aquatic environment, where it affects living organisms from humans, plants and animals either by drinking or irrigation indirectly and directly as it is the medium in which they live. (Saidan, 2012, p. 52)

2.2.3 Effects of radioactive contamination on the air

It is the mixing of the natural components of the air of oxygen and nitrogen with radioactive pollutants, which increases the maximum that should not be exceeded. Air pollution with radioactive materials is considered one of the dangers of air pollution, as the volatile atoms that radioactively fall on the surface of the earth in areas where nuclear tests are conducted or radioactive leakage resulting from nuclear plants is carried out. (Saidan, 2012, p. 52)

3. The concept of environmental damage

3.1. Concept Damage

The damage is everything that affects a person in his money or body, whether in relation to one of his rights or in one of his legitimate interests, (Mansour, 2001, p. 283) with the entry of pollution problems and issues related to the environment, the depletion and abuse of the human being, as a natural person, or companies, institutions and units whose activities cause damage to the environment, appeared what is called environmental damages. (Jamila, 2001, p. 68) It is difficult to give a correct and accurate concept of environmental damage, as we find many concepts, some defined it as it is a negative change that affects the primary vital areas of the elements of the environment and therefore it is the damage that affects the environment itself or directly affects the environment. Or that harm caused to people as a result of compromising the environment, which affects their money, bodies, health or security through the environment in which they live, indirectly. (Hashish, 2001, p. 165)

3.2. Types of damage

The damage can be classified according to several criteria. There is damage according to its degree, according to its impact and according to the method of its occurrence.

3.2.1 According to its degree

- Simple damage: It is the familiar damage whose impact on the environment is limited and does not exceed the permissible limit, and often does not exceed the borders of the state where the damage occurred. (Sadaqa, 1996, p. 301)

- **Grave damage:** It is the harm that exceeds the permissible limit and amounts to harming the environment, the ecosystem and the human being in terms of his health, property or money, and this harm goes beyond the scope of the state wherever it occurs to other countries. It is also considered the most serious type of damage. (Sadaqa, 1996, p. 498)

3.2.2 According to its impact

- **Physical:** It is the tangible damage that affects the environment in its tangible entity, as it touches the human being with his money, his body and his possessions. The material damage can also be the term of deducting part of the state's territory, or causing serious damage to the commercial, industrial and agricultural interests of the state, whatever they may be. (Salama, 1997, p. 498)
- **Moral:** It is the harm that affects the human psyche or the state entity, and it is often verbal. This type of damage is difficult to quantify and evaluate. (Attia, 1995, p. 288)

3.2.3 According to the method of occurrence

- **Direct:** *It is the damage that occurs and affects the environment, man or the state... that is, the responsibility of the directly or first-degree victim.* (Zanati, p. 351)
- **Indirect:** It is the harm that goes beyond the place and time of its occurrence, to fall on the victim in the second degree, that is, it transcends from one person to another, from one environment to another, from one country to another, and from time to time...

3.3. The concept of environmental damage

- It is a type of damage in kind, as it affects the vital areas and elements of the environment, and since it is reflected on people, their money, health, bodies and security, we can say that it turns into personal harm. (Jamila, 2001, p. 70)
- It can also be the damage that results from an attack on the environment or one of its elements, as it is a complex ecological compound on the one hand, and the interference of environmental phenomena on the other hand, which leads to the difficulty of determining the value of the environmental damage. (Jamila, 2001, p. 70)
- How some have defined it as ecological damage resulting from an attack on a group of components of the environment in an indirect way. (Prieur, 1991, p. 72)
- It is also the damage that affects people or things through the environment in which individuals live. It is that harmful action resulting from pollution that humans cause to the environment and affects its various fields: such as water, air and nature as long as these elements are used by humans. (Prieur, 1991, p. 72)

- The definition of environmental damage varies according to the affected environmental fields, where we find: damage to biological diversity, damage to natural landscapes, which leads to the loss of aesthetic aspects and enjoyment, and loss of tourism resources, damage that leads to the loss of economic materials by destroying environmental elements and depletion, damage Which affects human health and leads to serious diseases, such as cancer and congenital malformations... (Jamila, 2001, p. 75)

3.4. Types of environmental damage

Environmental damage varies According to the environmental field in which it is affected, the way in which it is affected, or the scope in which it is located. Where we find: (Youssef, 2015)

3.4.1 Depending on how the damage is done

- Direct damage or damage in kind: It is the damage that affects the environment or one of its elements directly. Hence, the first victim is the environment itself. Therefore, we say that it is an eye damage caused by pollution of water, air and soil, i.e. environmental elements or the depletion of natural materials.
- Personal damage or indirect damage: It is that damage that extends to people and biological components that live in the environment, through damage to the environment in which these elements live, where we find that in-kind damage has turned into personal damage in an indirect way, which is an expression on the imbalance that affects the ecological balance and the human being in his health, body, money and interests by harming the environment.

3.4.2 By scope (Diffuse damage)

It is the one that affects the environment in a direct and indirect way, and its scope is spatial or temporal.

- As we find that there is damage that spreads according to a long-time scale, such as damage caused by nuclear pollution, whose effects extend for several years.
- As for the damage according to the scope of the place, it is the damage that goes beyond the area in which the damage occurred, as it reaches areas further away from it, which makes it reach global issues such as the ozone hole or global warming.

3.4.3 cumulative and gradual damage.

We also find other types of damage, such as cumulative damage or gradual damage.

- The cumulative damage is the damage that results from the accumulation of pollutants until it reaches an unacceptable limit, so pollution becomes harmful to the environment.

- While gradual damage is that damage caused by pollution whose effects appear gradually over time.

4. Damage assessment

4.1. concept of the damage assessment

Economic damage assessment is intended to critically assess the negative changes in the most important properties of the natural environment because of economic activities. The monetary assessment of environmental damage aims to introduce economic rationality into investment related to non-assessable environmental resources at market prices in order to preserve them and rationalize their use. (Al-Nish, 2004)

4.2. Damage assessment mechanisms

We can assess the environmental damage and access many data that help us in finding solutions to many environmental problems and even avoiding them in the first place. Where we can start from some points that we mention some of them as follows: (AbuDayyeh, 2008)

- Gathering information and statistics to identify the environmental impacts from environmental sites such as the plant and animal revolution and its quality, demographic growth, climatic and geological changes...
- Assessing the potential environmental impacts of the project by analyzing the multiple overlapping factors, and reconstructing them in a way that highlights the results of the analysis, logical reasoning, and the release of possible hypotheses, and trying to test them by prioritizing them to the project to ensure the coherence of these hypotheses and put them to the test to strengthen their effectiveness.
- Inference and extrapolation from the available information to reach negative and positive results, and then establish a balance between them, and develop clear recommendations that would be likely for the decision to support or abandon the project, with an indication of the reasons and general and specific circumstances surrounding making the appropriate decision.
- Continuous and continuous evaluation of the projects authorized to be established, so that recommendations are added or modified in line with the development of work and the emergence of new problems.
- Social impact assessment, shedding light on the impact of the new projects on local communities, their culture, their social, psychological and economic relations, and the dangers that may befall people and their properties...
- Evaluating the strategic environmental impact, highlighting the alternative policies for these projects, such as studying the project's strategic plans and their relationship to development and the

national options available for alternative projects that have a less harmful impact on the environment and the local community.

- Assessing the product life cycle, and the task in this study is limited to the materials produced by the project and those needed for production and the energy used in it, starting with bringing materials to the site, through their storage and the development of the stages of manufacture and then marketing and disposal of its waste, whether it is waste resulting from the energy used in the project or the materials produced.
- Environmental Impact Assessment. This study takes into consideration the impact of large projects and infrastructures on the environment.

5. Environmental Damage Assessment, the of Baker Hughes company case.

Baker Hughes Incorporated is a responsible corporate citizen committed to the health and safety of people and the protection of the environment while supplying products and services in a safe and sustainable manner. We firmly believe this commitment adds value to our customers, employees and shareholders.

This element establishes the requirement to identify and control: Health and Safety Risks and environmental Impacts.

5.1. The Location/Line Manager

It is responsible for ensuring that health and safety hazards, risks, environmental aspects, and impacts arising from activities, products and services are identified, assessed and controlled.

5.1.1 Aspects

They are elements of an organization's activities, products, procedures or services that can interact with the environment.

5.1.2 Impacts

They are changes to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products, procedures or services.

5.1.3 Hazards

They are sources or situations with the potential for harm in terms of human injury or ill health, damage to property, damage to workplace environment, or a combination of these.

5.1.4 Risk

It is the product of the consequence and frequency of a specified hazardous event occurring.

5.1.5 Identification

Hazards and aspects are identified from a review of all activities, products, procedures and services of the organization. Hazards and aspects are reviewed periodically and for example when:

Significant changes or incidents occur, relevant information from regulatory agencies, customers, stakeholders or audits is received and additional hazards and aspects are identified.

5.2. Assessment

The hazards and aspects of each activity are assessed and prioritized for significance according to the Level 2 methodology. At a minimum, the following criteria are considered: consequence (severity) and frequency (likelihood).

5.2.1 Control

The risks and impacts of each activity are controlled according to the methodology, defined in the Level 2 document. The potential failure of controls should be considered for both normal and abnormal operations.

5.2.2 Communication

Employees and other relevant parties are made aware of the health and safety risk and environmental impacts and associated control measures for the work tasks.

When a change is expected (planned) or encountered (unplanned) the line manager initiates a Management of Change process and facilitates, with affected managers and appropriate staff disciplines, the evaluation and mitigation of health and safety risks and environmental impacts.

Health and safety risks and environmental impacts resulting from change should be assessed to determine if they are acceptable and consider whether control measures are adequate or needed. Control measures that are developed during this process are implemented and communicated.

5.3. Operational Control

The element establishes the requirement to minimize or eliminate Health and Safety risks and Environmental impacts associated with the organization's activities, products and services.

5.3.1 Location Managers

They are accountable for ensuring that operational controls are developed for the identified Health and Safety risks and Environmental impacts.

5.3.2 Line Managers

They are responsible for the implementation and effective communications of operational controls in their respective area.

5.3.3 Employees

They are responsible to conduct their activities in accordance with the operational controls, which apply to their functional areas.

5.3.4 Operational controls

They are developed for identified Health and Safety risks and Environmental impacts. Additional controls maybe developed to satisfy legal, business, and/or client requirements.

Operational controls may include engineering/administrative controls, documented procedures and training.

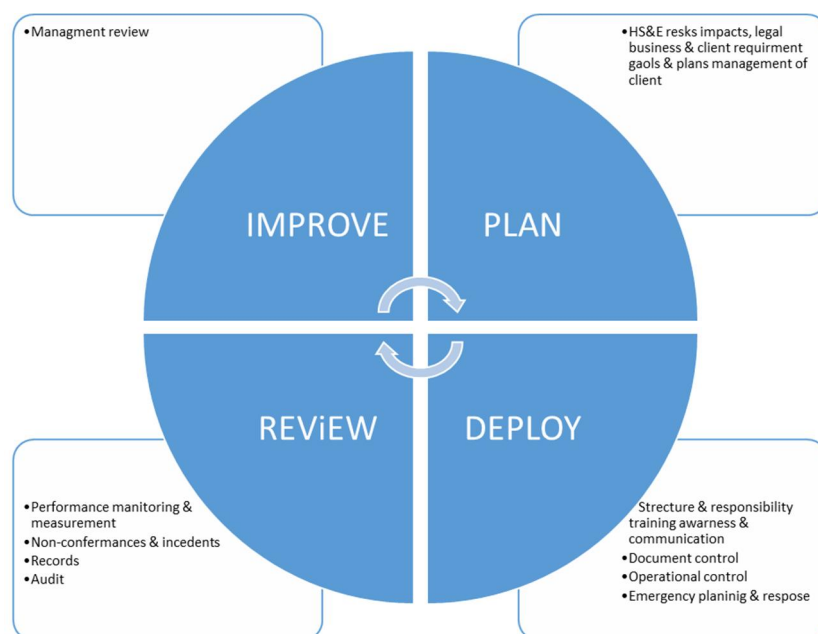
5.4. HSE Management System Structure

The Baker Hughes HSE Policy Statement is the foundation of the HSE Management System. This HSE Management System also supports the Baker Hughes Core Values of Integrity, Learning, Teamwork and Performance. The system incorporates principles of continual improvement and is based on the ISO 14000, OHSAS 18000 and ISO 9000 series of management system standards and related best practices.

The structure of the HSE Management System is modeled on a continual improvement cycle consisting of the four system phases and supporting elements shown in the figure below.

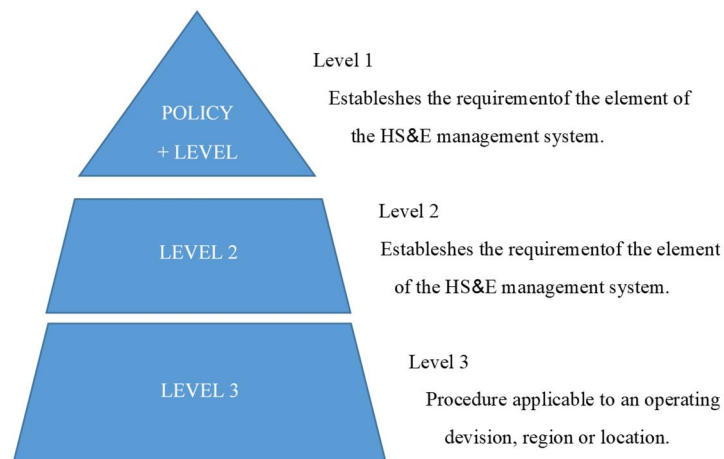
HSE Policy:

Fig.1. Top management statement of company HSE values and commitment.



Source: Health, safety, environmental management system, BAKER HUGHES Company, 2016, p6.

Fig.2. the HSE Policy level



Source: Health, safety, environmental management system, BAKER HUGHES Company, 2016, p6.

6. Incidents and non-conformances

6.1. Purpose

This element establishes the requirement to report, review and address incidents and non-conformances and implement corrective and preventive actions.

6.2. Responsibility

Management at all levels is responsible for ensuring all incidents and non-conformance in their respective areas are reported and documented. They are also responsible for insuring root cause identification and corrective and preventive actions are taken.

All Employees are responsible for taking immediate reasonable action necessary to prevent a potential incident. Personnel are responsible for reporting incidents and non-conformance to the supervisor.

All Employees are empowered to stop work if they experience or observe unsafe working conditions.

6.3. Definitions

First Alert - A Baker Hughes system for reporting HS&E incidents, investigating the immediate and underlying causes and resolving them through completing assigned actions and/or issuing incident notices.

Incidents - An unplanned and undesirable event that results in loss or, under different circumstances, could have resulted in loss.

Non-conformance - A condition or event resulting from a failure to follow established procedures.

6.4. Procedure

Non-conformances and incidents are reported, investigated and followed to closure. Corrective actions are developed for non-conformances and incidents are reviewed for implementation and effectiveness.

Lessons learned from investigations which may impact other parts of the organization are communicated.

Accidents, environmental releases and significant near misses are to be documented, reviewed and addressed using the First Alert system.

7. CONCLUSION

The Baker Hughes company is a responsible corporate citizen committed to the health and safety of people, protection of the environment, and compliance with laws, regulations, and company policies.

Therefore, they use to follow some ways that help to reach their goals within saving and protecting environment by damage assessing, evaluating, and measuring.

Baker Hughes Incorporated conducts business in a manner that does not harm people or the environment. This commitment is facilitated through a Health, Safety and Environmental (HSE) Management System, which includes:

- Measurable goals promoting continual improvement toward zero incidents and the prevention of pollution.
- Visible management commitment, effective communication and training to ensure environmental protection, and the safety and health of our employees and the community.
- Recognition by all employees and contractors that safety and environmental protection is a condition of employment and that they are responsible for their safety and the safety of those around them.
- Promoting a culture where Stop Work Authority is exercised freely and is valued as a proactive process to control HS&E risks and impacts.
- Integration of HS&E considerations, including identifying and controlling risks and impacts into our business decisions, plans and operations.
- This policy being available to employees and the public.

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