Effect Of Petrollution On Environment During Well Drilling

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***Abstract* — Environmental pollution is one of the most serious problems facing humanity and other life forms on our planet today. Environmental pollution is defined as "the pollution of the physical and biological components of the Earth/atmosphere system to such an extent that normal environmental processes are adversely affected". It includes oil pollution, water pollution, surface water, ground water, air pollution and polluted pollution.**

Pollution control has become almost an integral part of the manufacturing process. Appropriate laws were passed restricting and regulating the growth of pollution-intensive industries, especially in major cities. It became mandatory for industrial units to take measures to control pollution and several ways to reduce pollution were mentioned in the research. The objectives of the study are to identify the important factors of petroleum pollution affecting the environment, to find appropriate methods that contributed to reducing petroleum pollution, and to analyze the pollution factors involved in the disposal of petroleum waste.

***Keywords— Environment*: *Pollution*: *Well Drilling*.**

1.INTRODUCTION

1.1 BACKGROUND

Environmental pollution is one of the most serious problems facing humanity and other life forms on our planet today.Environmental pollution is defined as "the contamination of the physical and biological components of the earth/atmosphere system to such an extent that normal environmental processes are adversely affected". Pollutants can be naturally occurring substances or energies, but they are considered contaminants when in excess of natural levels. Any use of natural resources at a rate higher than nature's capacity to restore itself can result in pollution of air, water, and land. Of decades, various sources of pollution were identified that altered the composition of water, air, and soil of the environment. The substances that cause pollution are known as pollutants.

A pollutant can be any chemical (toxic metal, radionuclides, organ phosphorus compounds, petroleum , gases) or geochemical substance (dust, sediment), biological organism or product, or physical substance (heat, radiation, sound wave) that is released intentionally or inadvertently by man into the environment with actual or potential adverse, harmful, unpleasant, or inconvenient effects. Such undesirable effects may be direct (affecting man) or indirect, being mediated via resource organisms or climate change. Depending on the nature of pollutants and also subsequent pollution of environmental components.

Oil is actually called petroleum or crude oil and may exist as a combination of liquid, gas, and sticky, tar-like substances. Oil and natural gas are cleaner fuels than coal, but they still have many environmental disadvantages.

The secret to fossil fuels' ability to produce energy is that they contain a large amount of carbon. This carbon is left over from living matter — primarily plants — that lived millions of years ago. Oil and natural gas are usually the result of lots of biological matter that settles to the seafloor, where the hydrocarbons (molecules of hydrogen and carbon), including methane gas, become trapped in rocks.

Petroleum sources are usually small pockets of liquid or gas trapped within rock layers deep underground (often under the seafoor). Extracted crude oil is refined and used to manufacture gasoline (used in transportation) and petrochemicals (used in the production of plastics, pharmaceuticals, and cleaning products).

Drilling is the process in which a hole is made on the earth to allow subsurface HCs to flow to the surface. The process of drilling oil and gas wells generates a variety of different types of wastes. Some of these wastes are natural by-products of drilling through the earth,e.g., drill cuttings, and materials used to drill the well, e.g., drilling fluid and its associated additives. The major way in which drilling activities can impact the environment is through the drill cuttings and the drilling fluid used to lift the cuttings from the well. Secondary impacts can occur due to air emissions from the internal combustion engines used to power the drilling rig.

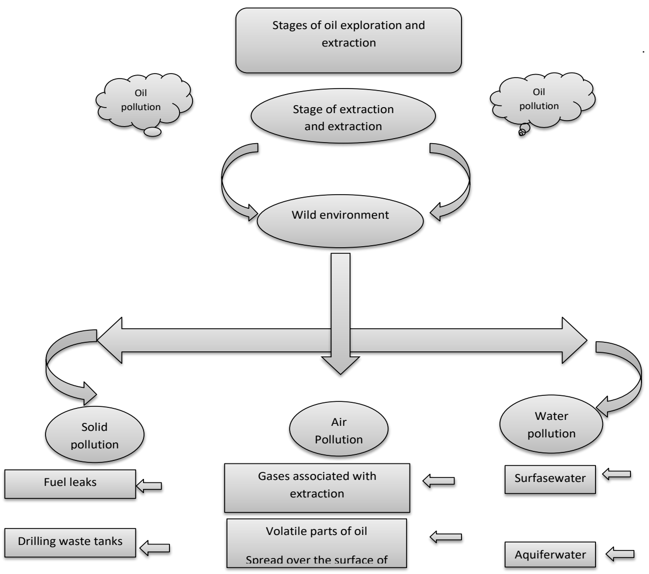

Figure (1.1) Flow chart of environmental pollution types

1.2 Objectives of Study

This study includes studying the effect of different types of wastes which are generated from petroleum well drilling on the environment. Also, investigates a suitable method to minimize environmental pollution resulted from these contaminated wastes.

The main objectives of the study are:

1- To investigate the important factors of petroleum pollution which affect on environment.

2- To find the suitable methods that contributed in decreasing the petroleum pollution.

3- To analyze the contamination parameters which included in disposing petroleum wastes.

1.3 Literature review

1.3.1 Petroleum Pollution

Crude oil is a colloidal mixture of huge number of hydrocarbon and non-hydrocarbon (Cadwallaer, 1993). The source material for nearly all petroleum products is crude oil. Spill, leaks and other releases of gasoline, diesel, fuels, heating oils and other petroleum products often result in the contamination of soil and water. Hydrocarbon form over 90 percent petroleum oil are grouped according to their chemical structures such as straight, branched and cyclic alkanes and aromatics. The non-hydrocarbon components of petroleum include (O2, N, S) and some metals related porphyrin oxygen containing compounds e.g. naphthenic acid, carboxylic acid, esters, ketones, phenols etc. (Odu, 1981). Oil pollution occurs when oil is introduced into the environment directly or indirectly by men's impacts resulting in unfavorable change in such a way that safety and welfare of any living organisms is endangered. Crude oil if spilled into the water spreads over a wide area forming a slick and oil in water immediately begins to undergo a variety of physical, chemical and biological changes including evaporation of high volatile fractions,dissolution of water-solubl fractions, photochemical oxidation, drill, emulsification, microbial degradation and sedimentation (Muller, 1987).

In land drilling and production· operations accidental discharge of waste is normally impossible as the location is completely isolated from the surroundings; drainings to local sewer systems are subject to permits and all suspect material is collected and disposed of at allocated dumping sites, in accordance with regulations for chemical waste disposal (Handleiding Milieuhygiene).

Although the disposal of oil is subject to clear international regulations the public, press and government bodies frequently show ignorance and consequently suspicion for our operations.

1.3.2 Petroleum Pollution during Well Drilling.

EPA (u.s. Environmental Protection Agency) has recognized (EPA, 1988) that drilling. and production wastes do not pose a threat to public and environmental health if properly managed. Spillage of most other agents (phosphates, preservatives, concentrated salt solutions) that might contaminate the environment, can be prevented by reducing their use, ·replacement by alternatives or separate disposed. The· isolation of the drilling location from the surroundings, good solids removal (until today a neglected subject in drilling) and returning the mud to a mud plant, will solve most of the disposal problem. ·Much effort has been put is separation of solids and liquid which poses less problems if disposed of separately; experiments failed, because by definition a drilling fluid· cannot' be filtered or centrifuged.

The drilling operations produce two main types of waste cuttings produced by the action of the drilling bit and used drilling mud. Drilling mud is a mixture of clay (bentonite), drilling weight material (barite, or ilmenite), organic polymers, salts and other chemicals suspended in a liquid. The weighting agents comprise up to 90% of the mud. It contains heavy metals as impurities and is together with clay the main source of heavy metals in the drilling discharges (Neff, 2005; Frost et al., 2006). Three types of drilling mud (liquid) are used on the NCS: oil- (OBM), synthetic- (SBM) and waterbased (WBM) mud. Historically OBM and oil contaminated cuttings have been the main source of hydrocarbons finding its way down to the bottom sediments. However, due to the large impact on the benthic fauna around offshore installations the dumping of OBM drill cuttings were not allowed and from 1. January 1993 the OBM and its cuttings had to be brought to land for treatment or re-injected in suitable formations.

Today, therefore, the input of oil is clearly reduced and the main sources of hydrocarbons are from production oil getting into the drilling mud, added chemicals, completion fluid, cutting ingredients, and oil from the geological formations being drilled (Frost et al., 2006).

During active drilling, drill cuttings are discharged continuously to the sea floor while drill mud is reprocessed and recycled and discharged intermittently, usually with a larger batch (200 m³) at the end of the drilling operation (Breuer et al., 2004). The fate of chemicals in the water column and the deposition of the drill cuttings and mud on the sea floor will depend on local oceanographic conditions (e.g. prevailing current, water depth), type (e.g. mud, particle size, attachment, agglomeration and hydrophobic properties) and the amount of drilling wastes (Khondaker, 2000; Rye, 2002). In some areas large cutting piles (2,000 – 240,000 m3) are found underneath the installations (Jensen, 2004). These accumulations may act as a secondary pollution source to aquatic and benthic organisms (Breuer et al., 1999). The deposition on the sea floor may be re-distributed (e.g. waves, currents, bioturbation), and hydrocarbons and metals undergoes chemical and physical changes (speciation) and biological degradation, accumulation, migration, e.g. through bacterial activity and assimilation into the gut of benthic fauna.

1.3.3 SOURCES OF WASTE

All drilling muds generally have a number of unwanted components that can potentially harm the environment. The most common of these are heavy metals, salt, and HCs. The concentration of these materials varies significantly. The primary concern arises when the drilling fluid must be disposed off (Metcalf and Eddy, 1999).

1.3.3.1 HEAVY METALS

Heavy metals can enter into drilling fluids in two ways: (Metcalf and Eddy) many metals occur naturally in most formations and will be incorporated into the fluid during drilling. These includes arsenic, barium, cadmium, chromium, lead, mercury etc. also metals are added to the drilling fluid as part of the additives used to alter the fluid properties. This includes barium from barite weighing agents and chromium from chrome-lignosulfonatede flocculants The environmental impact of heavy metals is manifested primarily through their interaction with enzymes in animal cells. Enzymes are complex proteins that catalyse specific biochemical reactions.

Heavy metals affect the action of enzymes. Excess concentrations of metals inhibit normal biochemical processes in cells. This inhibition can result in damage to the liver, kidney, or reproductive, blood forming, or nervous systems. These effects may also include mutations or tumours. Heavy metals may incorporate into the Drilling fluid from the thread compound (pipe dope) used on the pipe threads when making up a drill string or from the formation containing crude oil.

The heavy metals encountered during drilling activities are related to a variety of environmental concerns, depending on the metal and its concentration. At very low concentrations, some metals are essential to healthy cellular activity. Because most concentrations encountered during drilling are relatively low, the environmental impact is generally observed only after chronic exposure.

1.3.3.2 SALTS

Another unwanted component of drilling fluid at disposal time is salts, like sodium or potassium chloride, are often added to drilling fluid to protect sensitive formations from reacting with the drilling fluid.

Salt (sodium chloride) in low concentrations is essential to the health of plants and animals. At concentrations different from the naturally occurring levels found in a given ecosystem, however, salt can cause an adverse impact.

1.3.3.3HYDROCARBONS (HC)

Except for oil-based mud, HCs are normally an undesirable material in drilling mud because they contaminate the cuttings. HCs enter into mud while drilling through a HC bearing formation or when oil is used for spotting fluid when a pipe becomes stuck. 1.3.4 Methods of Decreasing Petroleum Pollution

Emissions from the petroleum industry occur in every chain of the oil producing process from the extraction to the consumption phase . In the extraction phase there are emissions of not only carbon dioxide but various other pollutants like nitrous oxides and aerosols. Certain by products include carbon monoxide and methanol. When oil or petroleum distillates are combusted , usually the combustion is not complete and the chemical reaction leaves by-products which are not water or carbon dioxide. However despite the large amounts of pollutants there is uncertainty about the amount and concentration of certain pollutants In the refinement stages of petroleum also contributes to large amounts of pollution in urban areas. This increase of pollution has adverse effects on human health due to the toxicity of oil. A study investigating the effects of oil refineries in Taiwan . The study found an increased occurrence of pre-mature births in mothers that lived in close proximity to oil refineries than mothers who lived away from oil refineries.

There were also differences observed in sex ratios and the birthweight ofthechildren. Also,fine particulates of sootbl acken humans' and other animals' lungs and cause heart problems or death.

Chintan Pathak and Dr. Hiren Chandrakant Mandalia studied the Environmental Pollution Effects, Management and Treatment Methods. They concluded that with the rise of an environmental protection movement, the petroleum industry has placed greater emphasis on minimizing environmental impact of its operations. Improved environmental protection requires better education and training of industry personnel. There is a tremendous amount of valuable information available on the environmental impact of petroleum operations and on ways to minimize that impact; however, this information is scattered among thousands of books, reports and papers, making it difficult for industry personnel to obtain specific information on controlling the environmental effects of particular operations. They covered the various aspects of drilling and production and impacts related to them. Discussion is also emphasis on the toxic materials transport, plan and manage activities that minimize potential environmental impacts. The treatment of drilling and production wastes to reduce their toxicity and/or volume before disposal.

The following considerations are important when addressing specific waste management options.

- Environmental characteristics
- Regulatory environment
- Logistical challenges
- Community and outreach

AL_ibrahim studied minimizing environmental pollution while conserving Oil during sour heavy oil well testing to reduce flaring of produced hydrocarbon during well testing operations in order toprotect the environment, comply with safety regulations and conserve oil.methods, procedures, process: during well-testing operations the produced hydrocarbon is usually flared in the open flare pit. As per the existing company's HSE procedures, flaring during well testing is considered as a safe option. However, flaring activities needs to be minimized or eliminated as some wells are located in environmentally sensitive areas which are close to farms, highways or camping area. Due to location constraints the flaring should be minimized to the possible extent. As the well is exploratory, the well was not connected yet to the production facility. The only means of oil transportation will be by using road tankers, for that the H2S concentration in oil needs to be reduced to a permissible limit.

The heavy oil well to be tested contains H2S concentration up to 22 %(220,000 ppm) in gas. A novel process was initiated to eliminate/minimize flaring during well testing operations. H2S scavenger technology was selected for field trial to convert the produced sour liquid to be suitable for transportation through vacuum tankers to the nearest production facility. Accordingly H2S scavenger chemical was arranged and well test surface layout was modified with additional chemical dosing points. After separating the gas from oil using surge tank and separator dosed H2S Scavenger into oil line. This exercise resulted in ensuring that the H2S concentration in treated oil is at a permissible limit and the oil is suitable to be transported using road tankers.Results, Observations, Conclusions: Field trail was implemented in sour heavy oil well to evaluate the feasibility of using H2S scavenger chemical to mitigate/minimize high H2S concentration in the produced fluid. Two heavy oil wells (17-200 API) were tested with this process and H2S content in oil was reduced to almost 15 ppm. Achieved economical H2S scavenger treatment cost of $18/bbl for reducing H2S in oil from 600 ppm to 15 ppm. Oil flaring was eliminated and only small quantity of the produced sour gas0.001mmscfd) was flared safely through flare stack. Approximately 5,500 bbls of crude oil were produced from an exploratory well and safely transported by road tankers to nearby production facility. The innovative solution of H2S Scavenger technology was successfully applied during testing of sour heavy oil well and reduced H2S content in oil from 600 ppm to almost 15 ppm. This novel flaring reduction method had prevented flaring of crude oil which reduced the wastage of resource, environmental pollution, CO2 emission and conserved the produced oil.

Flaring reduction resulted in carbon emission reduction meaning cleaner environment, increase in resource availability and revenue enhancement.For the first time in Kuwait an exploratory sour heavy oil wells were successfully tested without flaring crude oil.Economical H2S scavenger treatment cost of $18/bbl was achieved for reducing H2S in oil from600-200 ppm to 15 ppm weeks of testing period. For the first time in Kuwait an exploratory sour heavy oil well was successfully tested without flaring oil. The innovative solution of using H2S Scavenger during testing the sour well had eliminated flaring of crude oil which avoided environmental pollution and conserved the produced oil. This success proves that sour heavy oil wells can be tested safely without flaring oil and paves the way for implementing this novel concept in future applications.

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2.Treatment Methods of Environmental Petroleum Pollution

This chapter included investigation of the treatment methods used to minimize the petroleum pollution in petroleum fields. The analysis data of parameters have been collected from PETRONAS field in AL-Garaaf destination in Thi-Qar state.

2.1 The analysis of parameters for samples of air.

Parameter of Analysis	Sample ID															Max. allowable Iraqi National Limits of Ambient Air Quality
	Units	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-12	A-13	A-14	A-15	
Total Suspended Particle (TSP)	µg/m³	75	23	8	64	•	•	•	40	9	5	6	7	•	•	150
PM	mg/m³	0.059	0.021	0.007	0.055	•	•	•	0.033	0.006	0.003	0.005	0.005	•	•	-
Carbon Monoxide (co)	PPM	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	250
Carbon Dioxide (co2)	PPM	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	-
Hydrogen Sulfide(H2s)	PPM	Nil	Nil	0.2	Nil	Nil	Nil	Nil	0.4	Nil	Nil	Nil	Nil	Nil	Nil	5
Sulphur DIOXIDE(SO2)	PPM	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	0.5
Nitrogen Dioxide(NO2)	PPM	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	0.2
Hydrocarbon content(LEL)	PPM	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	-
Temp	C°	22.8	16.8	20.8	24	20	19	20.5	21.7	21.5	22.8	21	22.6	19.1	20.8	-

Table.1

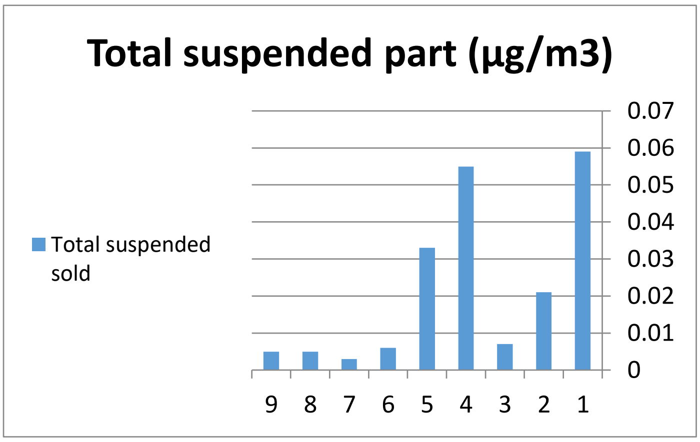
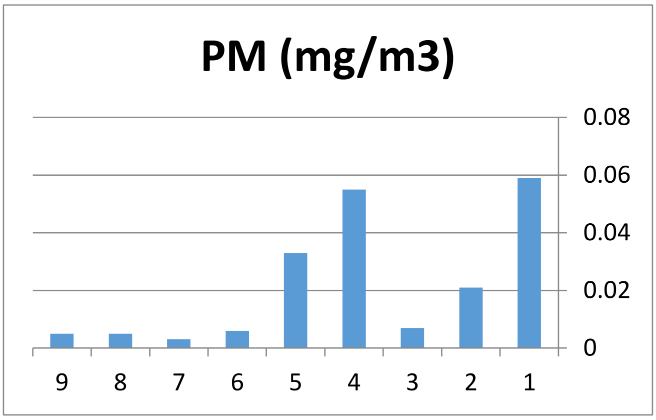


Figure (2.1) Total suspended part in petroleum sample.

Figure(2.1) show that the highest values of total suspended part are in a well(A-1) and then start to fall in the well (A-2,A-3) and return to rise in the well (A-4) And then decrease by a small percentage in well (A-5) And then go down dramatically in the well(A-6,A-7,A-8,A-9).



Figure(2.2) The analysis of PM in petroleum sample.

Figure(2.2) show that the highest values of PM in a well(A-1) and then start to fall in the well (A-2,A-3) and return to rise in the well (A-4) And then decrease by a small percentage in well (A-5) And then go down dramatically in the well(A-6,A-7,A-8,A-9) .

2.2 The analysis of parameters for sample water.

Parameter of Analysis	Sample ID										
	Units	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	SW10
PH		7.7	7.55	7.8	7.5	7.4	8.1	7.9	7.8	7.7	8.1
Dissolved Oxygen(DO)	mg/l	11.38	13.6	11.8	11.6	13.2	12.2	11.8	12.5	11.52	12.5
Turbidity	NTU	13.7	14.7	17.4	5.8	9.3	9.55	23.2	20.8	19.75	10.7
Temp	C°	12	12	11	12	12	13	13	12	12	14
Biochemical Oxygen demand(BOD5)	MG/L	17	19	16.6	12.8	14.8	15.6	14.7	16.2	11.6	20.2
Chemical Oxygen demand(COD)	mg/l	55	61	49	38	40	52	47	49	43	72
Total suspended Solid(TSS)	mg/l	57	58.4	64.4	7.8	14	33.8	67.8	60.6	58.6	29.6
Oil & grease	mg/l	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
E. Coli		Growth	Growth	No growth	No growth	No growth	growth	NO growth	growth	No growth	Ni growth

Table.2

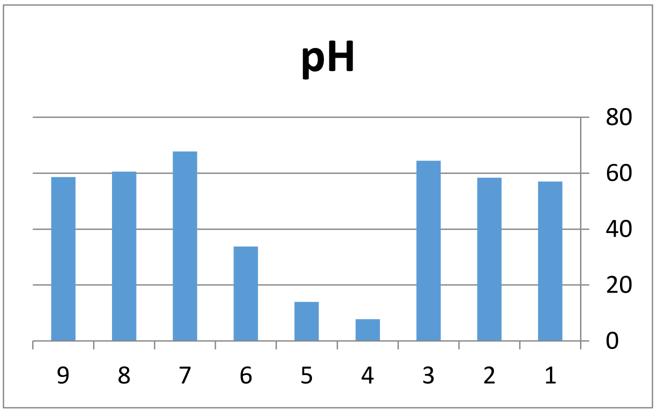


Figure (2.3) PH in petroleum sample.

Figure (2.3) show the difference in the percentage of pollution from the location of a well to another. Where in the well SW1 the value of PH is greater than the normal value also in well (SW2,SW3,SW6,SW7,SW8,SW9) and highest value in the well SW7.

In the well,(SW4,SW5) the value is small but also exceeds the normal value.

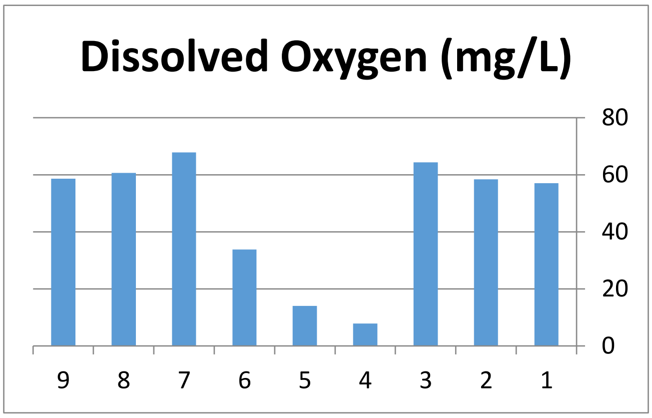


Figure (2.4) dissolved oxygen in petroleum sample.

Figure (2.4) show the difference in the percentage of pollution from the location of a well to another. Where in the well SW1 the value of dissolved oxygen is greater than the normal value also in well (SW2,SW3,SW6,SW7,SW8,SW9) and highest value in the well SW7.

In the well,(SW4,SW5) the value is small but also exceeds the normal value.

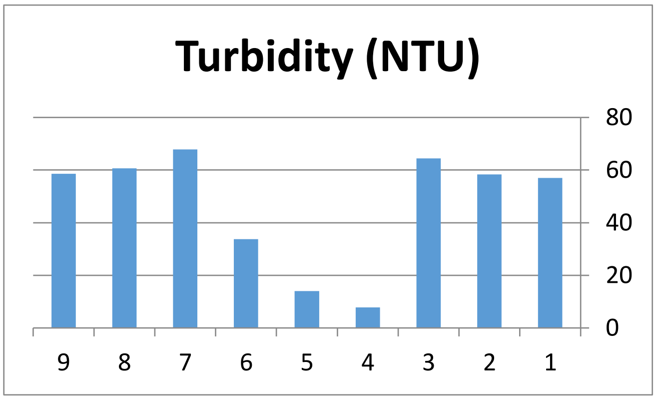


Figure (2.5) Turbidity in petroleum sample.

Figure (2.5) show the difference in the percentage of pollution from the location of a well to another. Where in the well SW1 the value of Turbidity is greater than the normal value also in well (SW2,SW3,SW6,SW7,SW8,SW9) and highest value in the well SW7.

In the well,(SW4,SW5) the value is small but also exceeds the normal value.

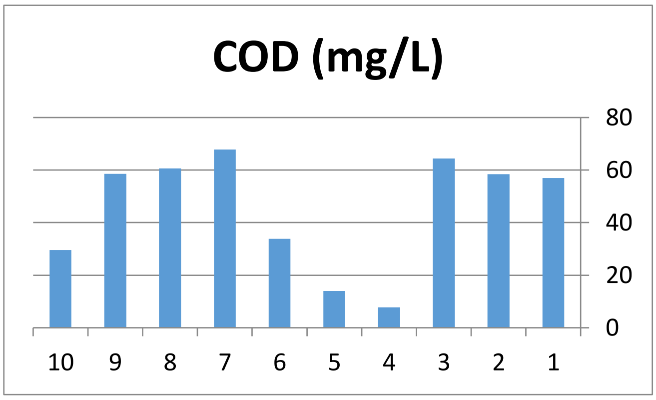


Figure (2.6) COD in petroleum sample.

Figure (2.6) show the difference in the percentage of pollution from the location of a well to another. Where in the well SW1 the value of COD is greater than the normal value also in well (SW2,SW3,SW6,SW7,SW8,SW9,SW10) and highest value in the well SW7.

In the well,(SW4,SW5) the value is small but also exceeds the normal value.

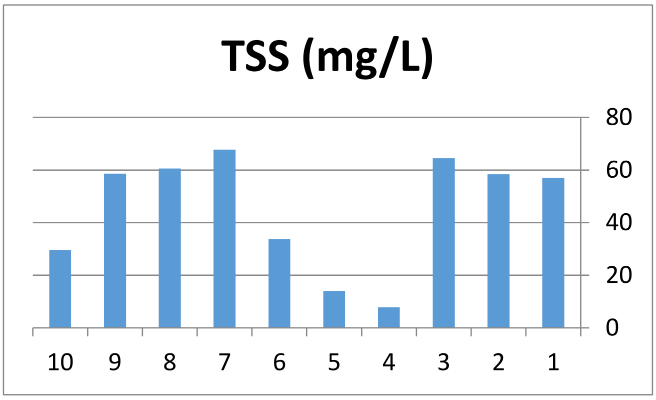


Figure (2.7) TSS in petroleum sample.

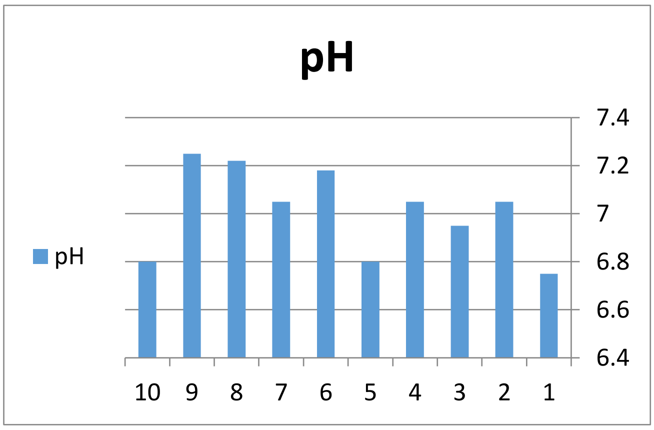
Figure (2.7) show the difference in the percentage of pollution from the location of a well to another. Where in the well SW1 the value of TSS is greater than the normal value also in well (SW2,SW3,SW6,SW7,SW8,SW9,SW10) and highest value in the well SW7.

In the well,(SW4,SW5) the value is small but also exceeds the normal value.

2.3 The analysis of parameters for sample of dry soil .

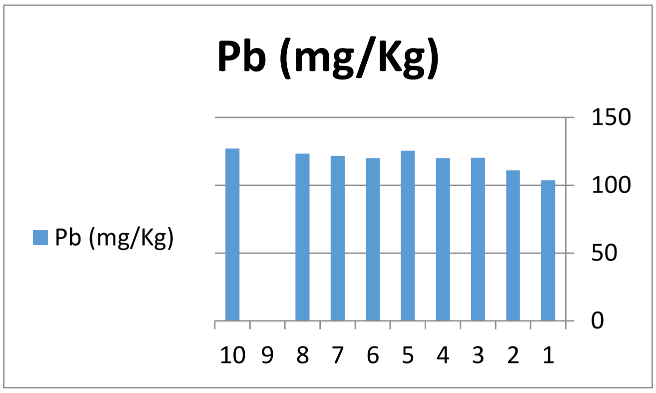
Parameter of Analysis										
	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	S-10
Moisture %@103C°	25.307	21.802	19.945	29.879	18.866	12.433	15.836	26.953	19.883	22.235
Total Organic carbon%	2.15	2.46	1.15	2.66	2.15	1.75	1.85	2.11	2.33	1.78
PH	6.75	7.05	6.95	7.05	6.8	7.18	7.05	7.22	7.25	6.8
As mg/Kg dry soil	21.91	20.59	28.36	27.1	24.91	24.52	22.93	27.83	12.57	27.17
Cd mg/Kg dry soil	23.89	25.35	28.36	26.08	24.91	26.9	23.85	28.32	27.59	28.06
Co mg/Kg dry soil	Nil	Nil	8.76	3.96	7.51	7.71	6.52	6.9	7.78	9.12
Pb mg/kg dry soil	103.7	111	120.3	120	125.31	120	121.62	123.23	Nil	127
Ni mg /kg dry soil	514.34	840.7	221.78	489.38	459.86	306.3	351.93	364.98	267.66	139.72
Zn mg/kg dry soil	190.6	199.7	231.68	212.28	224.05	224.9	219.59	228.7	110.67	230
Hg mg/kg	14.4	4.6	13	1.6	9.4	3.6	Nil	4.5	10.65	Nil

Table.3



Figure(2.8) PH in petroleum sample.

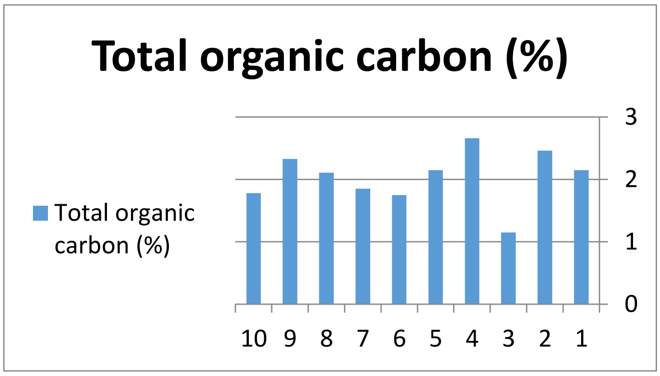
The figure (2.8) show different value of pollution from well to another in all wells the value of PH is close to the normal value . Where the height value in well S-9 and the less value in the well S-1.



Figure(2.9) Pb in petroleum sample.

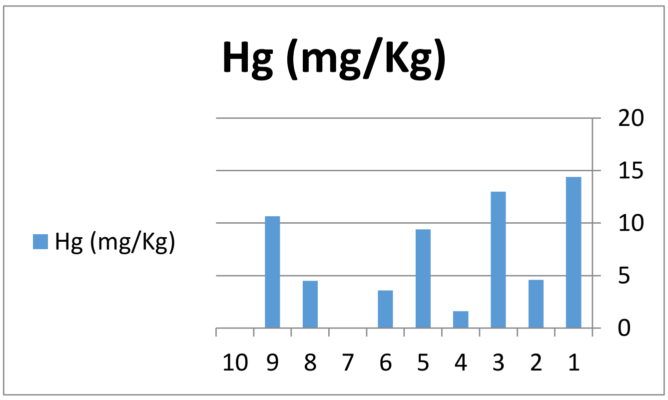
The figure(2.9) show the value of Pb in different location.

Where in the all well the value of Pb is Exceed the normal value .



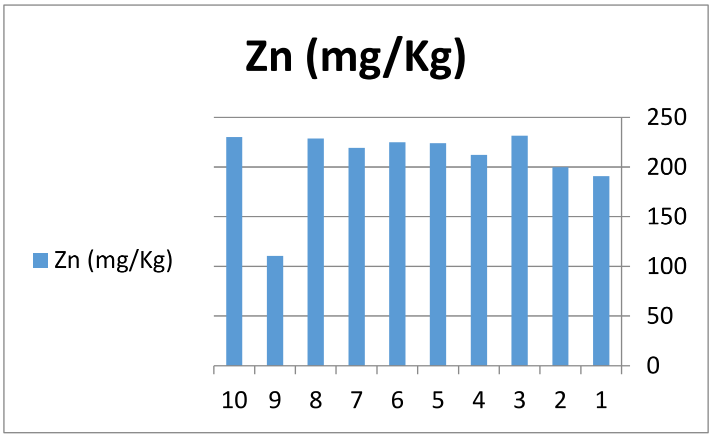
Figure(2.10) Total organic carbon in petroleum sample.

Where in well (S-1,S-2,S-4,S-5,S-6,S-7,S-8.S-8,S-9,S-10) The ratios are close together and the height value in the well S-4 and less value in well S-3.



Figure(2.11) Hg in petroleum sample.

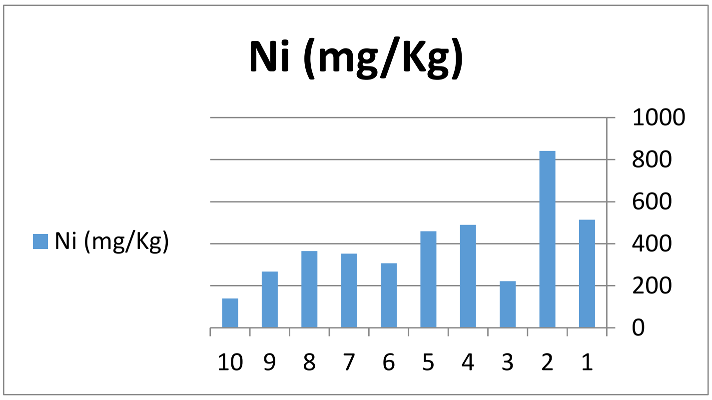
Figure show**(2.11)** The figure show different value of Hg in wells Where the height value in the well S-1 and the less the value in well S-4. In other wells the ratio of Hg is varying.



Figure(2.12) Zn in petroleum sample.

The figure(2.12) show the different value of Zn in wells.

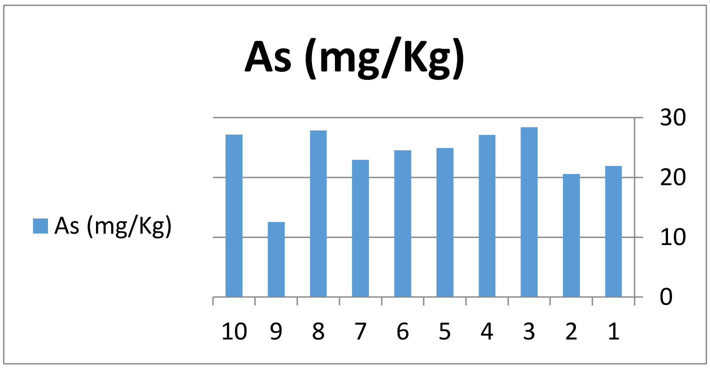
Where the values are close in wells(S-1,S-2,S-3.S-4,S-5,S-6,S-7,S-8,S-10). Only in the well S-9 where is the least valuable.



Figure(2.13) Ni in petroleum sample.

The figure(1.13) show different values of Ni in wells.

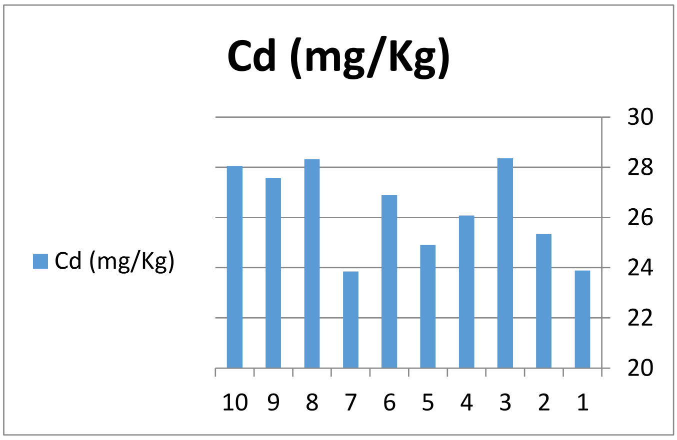
Where the highest value in well S-2 and less value of Ni in well S-10.In other well the value is variable.



Figure(2.14) As in petroleum sample.

The figure(1.13) show different values of Ni in wells.

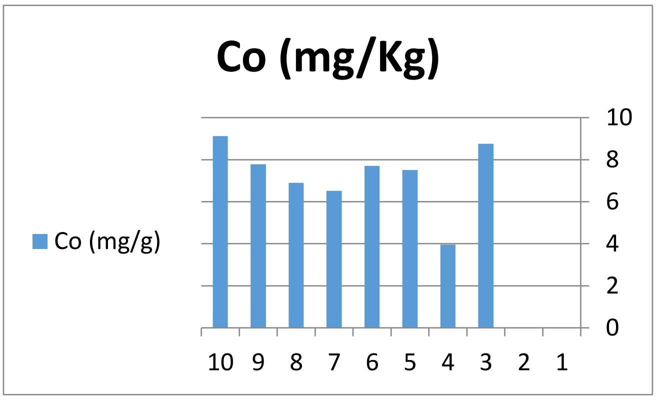
Where the highest value in well S-2 and less value of Ni in well S-10.In other well the value is variable.



Figure(2.15) Cd in petroleum sample.

Figure(2.15) show the variable value of Cd in different wells.

The height value in well (S-3,S-4,S-6,S-8,S-9,S-10) and less value in well(S-1,S-2,S-4,S-5,S-7).



Figure(2.16) Co in petroleum sample.

Figure (2.16) show different value of Co in wells.

2.4 Pollution Treatment

Pollution control is an essential task. There are four types of control: legal, social, economical, and technological measures, which help to prevent the pollution by various methods of operations. Waste products enter the environment in various forms and threaten the quality of the air, land, and water. The presence of waste products in water is especially serious, as many of these products can enter the food chain, where the biochemical processes can rapidly increase their concentration to toxic level.

Pollution control has almost become an integral part of the process of industrialization. Appropriate laws have been passed that restrict and regulate the growth of pollution intensive industries, especially in metropolitan cities. It has been made obligatory for industrial units to adopt measures to control pollution

AL-Brahimi proposed several ways to reduce pollution. Where he reduced the proportion of oil from 22% to 15% through several processes.

A novel process was initiated to eliminate/minimize flaring during well testing operations. H2S scavenger technology was selected for field trial to convert the produced sour liquid to be suitable for transportation through vacuum tankers to the nearest production facility. Accordingly H2S scavenger chemical was arranged and well test surface layout was modified with additional chemical dosing points.

After separating the gas from oil using surge tank and separator dosed H2S Scavenger into oil line. This exercise resulted in ensuring that the H2S concentration in treated oil is at a permissible limit and the oil is suitable to be transported using road tankers.Results, Observations, Conclusions: Field trail was implemented in sour heavy oil well to evaluate the feasibility of using H2S scavenger chemical to mitigate/minimize high H2S concentration in the produced fluid. Achieved economical H2S scavenger treatment cost of $18/bbl for reducing H2S in oil from 600 ppm to 15 ppm. Oil flaring was eliminated and only small quantity of the produced sour.

As well use Polyethylene (high density material) for the lining of pterygium to prevent leakage of contaminants to the drilling mud inside the ground and the pollution of groundwater.

2.4.1Treatment of Oily Wastewater

Water waste treatment involves several methods(primary treatment, secondary treatment, and tertiary treatment or polishing).

Primary wastewater treatment includes separation of oil, water, and solids in two stages:

1-The first stage, oil–water separators are used to remove large quantities of free oil and heavy suspended solids from wastewater and are usually used when oil concentrations in the raw wastewater exceed approximately 500 mg/L.

2- The second stage of primary treatment is designed to remove small oil droplets and suspended solids, oil emulsions, and oil-wetted solids that have not been separated in the first stage of primary treatment.

In secondary treatment, dissolved oil and other organic pollutants are sometimes consumed by microorganisms. Biological-treatment processes can generally be classified as suspended growth processes such as activated sludge (AS) processes, sequencing batch reactors (SBRs), continuous stirred tank bioreactors (CSTBs), membrane bioreactors (MBRs), and aerated lagoons, and attached growth processes such as trickling filters (TFs), fluidized bed bioreactors (FBBs), and rotating biological contactors.

Tertiary treatment or polishing refers to any treatment that takes place downstream of the secondary treatment plant to obtain a high-quality effluent to meet discharge limits or possibly for reuse. Sand filtration, activated carbon adsorption, chemical oxidation, pressure-driven membrane-separation technologies.

2.4.2 Solid-Waste Management in the Petroleum Industry

The choice of treatment and disposal methods depends largely on the physical and chemical properties of the waste or the waste characteristics, regulatory requirements, and the availability of facilities to process these wastes. Several methods to treatment such as solvent extraction, centrifugation, surfactant enhanced oil recovery (SEOR), distillation/pyrolysis, microwave irradiation method, freeze/thaw (F/T) treatment, electro-kinetic (EK) method, ultrasonic irradiation method, froth flotation, adsorption, high-temperature reprocessing (HTR) or heating, and filtration have been applied to recover oil from oily sludge. In addition, methods such as percolation ponds, mechanical methods.

2.4.3 Control and Treatment of Air Emissions

The control and treatment of air emissions from the petroleum industry. It begins with an overview of the control and treatment of air emissions in the petroleum industry. This is followed by low-temperature NOx oxidation, selective noncatalytic reduction (SNCR), selective catalytic reduction (SCR), a sulfur-recovery unit (SRU), which commonly consists of a Claus process and a tail-gas treatment unit (TGTU) (e.g., SCOT process, Beaven sulfur removal (BSR) process, and Wellman–Lord process), flue-gas desulfurization (FGD) (both once-through and regenerable technologies), vapor recovery unit (VRU), vapor-destruction unit (VDU), scrubbing systems (dry or semidry scrubbing systems and wet scrubbing systems), electrostatic precipitator (ESP), multistage cyclone separators, and methods to prevent or reduce emissions from flaring. Finally, odor controls are summarized.

3.CONCLUSIONS AND RECOMMENDTAIONS

3.1 Conclusions

Through experimental work and previous experiments to prevent environmental pollution due to oil, these results were reached:-

1-During the process of oil extraction, the pollutants are not only carbon dioxide but various other pollutants like nitrous oxides and aerosols.

2- H2S scavenger technology was selected for field trial to convert the produced sour liquid to be suitable for transportation through vacuum tankers to the nearest production facility.

3-Water waste treatment involves several methods(primary treatment, secondary treatment, and tertiary treatment (polishing).

The first stage is used, oil–water separators to remove large quantities of free oil and heavy suspended solids from waste water. The second stage is designed to remove small oil droplets and suspended solids . In secondary treatment, dissolved oil and other organic pollutants are sometimes consumed by microorganisms. Biological-treatment processes can generally be classified as suspended growth processes and attached growth processes. Tertiary treatment(polishing) used to obtain a high-quality effluent to meet discharge limits or possibly for reuse .

4- control and treatment of air emissions from the petroleum industry. It begins with an overview of the control and treatment of air emissions in the petroleum industry. This is followed by low-temperature NOx oxidation, selective noncatalytic reduction (SNCR), selective catalytic reduction (SCR), a sulfur-recovery unit (SRU).

5-The use of polyethylene to bury drilling clay holes to prevent contamination of groundwater with oil.

3.2 Recommendations for further studies

-Minimize the gases emitted during drilling operations.

- Support is not helpful if it is not accompanied by advice administrative or technical, as it should not be for the benefit a certain segment of society and leave the other segments owed without support, and otherwise would be a manipulation

of money general.

-Collect the resulting waste during the drilling process and mix it with materials that are chemically and physically stabilized, eliminating their polluting effect and making it easier to handle.

- To resort to the environmental aspect through developments in the oil industry of new technology in the field of extraction.

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