Improving of Crude Oil Specifications at Oilfield Surface Production Facility- Case Study

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Abstract- Crude oil enters the gas plants into the separation phase, which is carried out through a series of separators, which removes the oil from most of the gas contained in it. However, significant quantities of light hydrocarbons that cannot be removed by traditional separation methods. When the amount of these hydrocarbons is not large, it is neglected in most plants or gas stations, which leads to the evaporation of these quantities of storage tanks to air and loss it, in addition to its significant environmental impact and quality decreased of exported crude oil. The oil produced by the separation process also contains a quantity of salts that may be acceptable at the start of the gas plant, but with time it becomes large and unacceptable, affecting the oil specifications, leading to major problems in the pipes and equipment, which leads to unjustified costs and stops for long hours for the implementation of maintenance and repair procedures.
As a result, the study requires the in-depth design of both desalter and stabilization tower, sampling, comparisons and possible experiments in order to reach the specifications required for crude oil globally, which prevent operational problems and reduce maintenance..
Keywords – Desalter, Stabilizer, wet crude oil processing, Raid vapor pressure (RVP), Emulsifying.

I. INTRODUCTION

The objective of the study is to improve the specifications of crude oil by using the desalter and oil stabilization units to:
Increasing life of the equipment of the processing units in the gas plant;
Decreasing of chemical corrosion caused by salts deposition in processing units;
Mitigation of poisoning of catalysts used in treatment units;
To reduce the content of salts in crude oil to the minimum limits globally, which is less than (11 ppm) and thus increase the price of crude oil.
Reduce the minimum vapor pressure RVP to the internationally minimum limits (RVP≤7), thus increasing the price of crude oil and utilization of amount of lost gas and reducing its environmental impact.
Implementation of transport and storage operations easily and safety;
The study also aims to improve the specifications of crude oil to solve some of the problems resulting from operations and conditions are not expected, and the most important of these problems can be mentioned:
Disposal of deposited salts in heat exchangers;
Disposal of deposited salts in reboilers;
Handling the flooding phenomenon inside the stabilization tower trays;
Treatment of the phenomenon of the formation of oil emulsions.

II. PROPOSED ALGORITHM

From the above, it can be said that implementation the study in-depth design of both the desalter and the stabilization tower, sampling from each of them and making comparisons and possible experiments in order to reach the specifications required for crude oil globally, could prevent operational problems and reduce maintenance operations. In addition to proposing a number of recommendations that improve the performance of the wet oil treatment unit, taking advantage of the great problems that occurred in plant of Hayyan field and the solutions reached after many experiments.

2.1 Treatment of Wet Crude Oil by Desalter:

In the advanced stages of the life of the reservoir, the oil produced contains a high percentage of water and salts, and because of the continuous of production, the amount of water out with oil will gradually increase over time.

2.1.1- Effect of salt and water presence in crude oil:

The presence of water and salts dissolved could cause many of the negative effects, including:
Deposition of salts in heat exchangers and furnaces resulting in significant loss of production due to the discontinuation of these units for maintenance operation.
Forming Hydrochloric Acid (HCl) which causes corrosion in production equipment, according to:

$$2NaCl+H_2O \rightarrow 2HCl+Na_2O \quad (1)$$

Mg〖Cl〗=+H2O→2HCl+MgO (2)

Increase in energy consumption as water needs energy equivalent to (8) times the energy used to evaporate crude oil.
Some mineral salts can inhibit catalysis, and it has been shown that sodium is most harmful metal on catalysts.
Minimize the capacity of crude oil pipelines and the volume of equipment used in treatment processes.

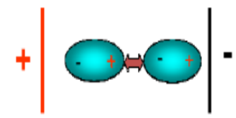
2.1.2- Components of Salt Disposal Unit:

Low pressure separator (LP) is a tank of untreated wet oil.
Oil pumps which pump oil from (LP) to the desalter.
Demulsifier injection system.
Desalter.
Water washing system and produced water system.
Auxiliary systems: such as control air and fire extinguishing system.

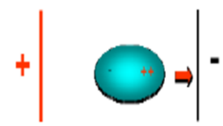
2.1.3- The double electrical method for wet oil treatment:

When the water disperses in the crude oil occurs a coalescing between water droplets then collide drops enough to overcome the barriers of coalescence, and there are three main electrical forces affect the process of coalescence are:

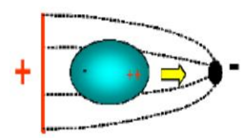
1- Bipolar Attraction: The drop of water has both positive and negative ends and is therefore polarized. These polarized droplets are attracted by adjacent water droplets. Bipolar attraction is more effective for the emulsions of crude oil with high content of water and where water droplets are larger and closer to each other.



2- Electrophoresis: Electrophoresis represents the movement of charged water droplets within an electric field. Electrophoresis moves water droplets horizontally between the plates, achieving greater opportunities for water droplets to coalesce with each other. The power of electrical attraction is four times greater than the force of binary attraction.



3- Bielectrophoresis: The associated figure refers to the movement of polarized water droplets in the non-uniform electric field with the movement towards convergence in this field. Biodegradation is one of weakest of the three electric forces and reaches about half of the bipolar attraction, depending on the geometry of the field and is available in all field



In electrostatic method, the wet oil emulsion is first exposed to a low AC (50-60 Hz) to remove the total water, thus exposing a stronger DC field where the remaining water droplets are removed. Since the DC field exists only between polar plates, there is no chance of electrical corrosion. In the DC field, the water droplets gain charge and accelerate towards the electric plate with an opposite polarity. A drop of water when approaching the opposite polarity plate acquires the charge of that plate and then accelerate towards the opposite plate, and with the drop of water drop in the field (DC) are deformed and collide and thus become larger and eventually detach from the DC field and settle down as a saline phase at bottom of the desalter.

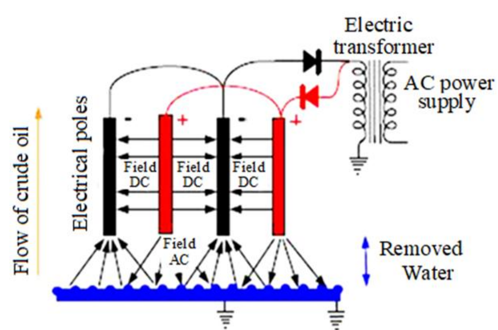


Figure 1 The optimal multipolar arrangement.

2.1.4- Treatment of wet oil in Hayyan Field Plant:

Wet oil is processed in the Hayyan plant using the electrical method and with the help of the chemical method, according to the following steps:

1. Low pressure tank (LP separator): In this separator, the bulk of the associated water is removed based on the density difference between water and oil at sufficient time. A Demulsifier agent is also injected into the crude oil entering this tank.
2. Use of Demulsifier to break emulsions (chemical method): The Demulsifier is injected into the desalter input with the incoming crude oil stream at specific flowrates. The commercial Demulsifier (CC3450-SJ) is used in the treatment process and has the following specifications:

Table 1 Specifications of used Demulsifier.

Commercial name	Viscosity	Type	Concentration
CC3450-SJ	Low	Non-Ionic	(100-10)ppm

The Demulsifier agent enters between the water and oil layer. During the process, the surface is replaced by other materials. Emulsion is stable when presence a layer of stabilizing film isolates between water and the oil that prevents the coalescing process.

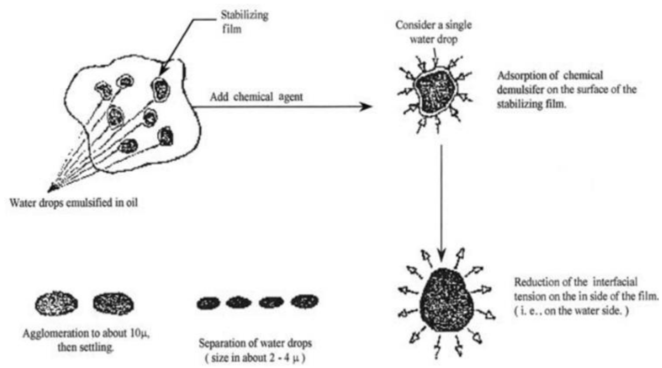


Figure 2 Action of chemical agents in demulsification of water drops

3. Electric desalter: contains an electric transformer in which the crude oil is subjected to a high voltage alternating voltage field (0.03A) and voltage (400V). The transformer converts the voltage (400V) to (12000V), the alternating current then turns into a direct current to polarize small water droplets suspended in the oil. The electrodes are usually connected to the transformer by a wire passing through a fully enclosed tube.

When a liquid is non-conductive (oil) containing another liquid conductive (water) and is exposed to an electric field, the water droplets will coalesce with each other one of the following three phenomena:

•These droplets become polarized and tend to align according to the lines of the electric field, and because of the electric torque, positive and negative droplets collide with each other, making it easy to collect.

•Droplets are attracted to the grid because of the electric field, and because of the torque the small droplets vibrate farther than the large droplets, leading to their aggregation.

•The electric field causes the emulsion film to weaken and thus break it as the droplet is horizontally and vertically enlarged due to increased surface tensile strength between oil droplets and emulsified water.

On the basis of such considerations, the algorithm uses a different color image multiplied by the weighting coefficients of different ways to solve the visual distortion, and by embedding the watermark, wavelet coefficients of many ways, enhance the robustness of the watermark.

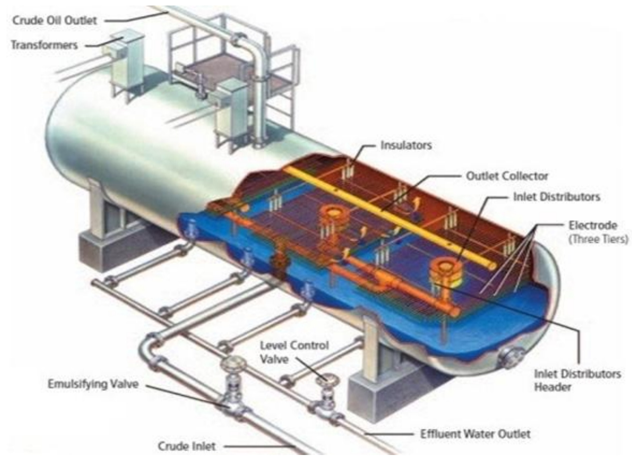


Figure 3 Watermark embedding algorithm Block Diagram

The process of salts disposal is achieved by changing the power of the electric field (DC) between the electrodes. Four distinct stages of mixing and coalescing were identified at uniform field strength (Fig. 4): dispersion, mixing, coalescing and precipitation.

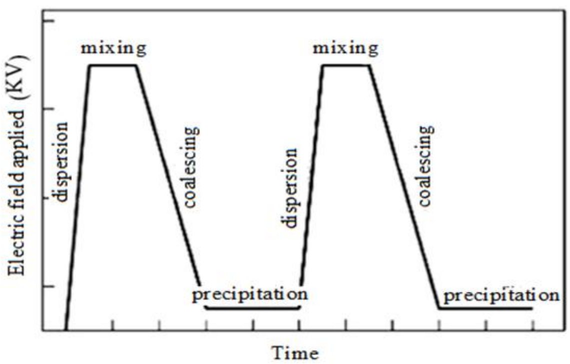


Figure 4 Voltage modulation for electrostatic mixing coalescing.

4. Mixing valve and pressure differentials: Fresh water is added to the desalter as wash water. The mixing degree of the oil and the wash water are related to the value of the pressure differential during the mixing valve. The best value for the pressure differential for this valve should be between 700-1000 mbar.
5. Sand jetting system: Where some of the separated water is pumped back into the bottom of the desalter in a number of jet nozzles, in parallel exist a series of open discharge valves to allow the discharge of the solids that have been removed and some water. This system, as shown in Figure (5), contains a manifold pipe of wash water, a rotary basin for separating the sand, the wash water jets and the sand drainage system.

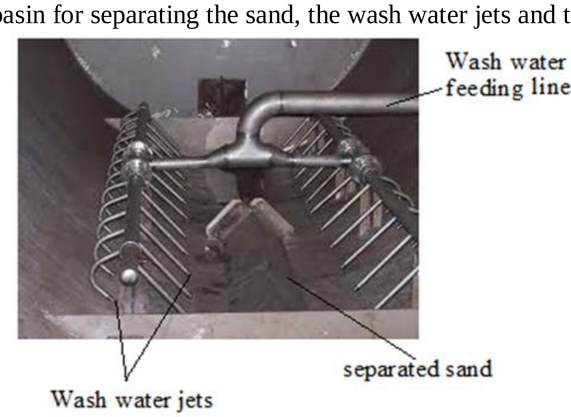


Figure 5 sand jetting system

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2.1.5 Effect of operating parameters

The efficiency of desalting is dependent on the following parameters:

Water–crude interface level. This level should be kept constant; any changes will change electrical field and perturbs electrical coalescence.

Desalting temperature: Temperature affects water droplet settling through its effect on oil viscosity; therefore, heavier crude oils require higher desalting temperatures.

Wash water ratio: Heavy crudes require a high wash water ratio to increase electrical coalescence. A high wash ratio acts similarly to raise temperatures.

Pressure drop in the mixing valve: A high-pressure-drop operation results in the formation of a fine stable emulsion and better washing. However, if the pressure drop is excessive, the emulsion might be difficult to break. The optimum pressure drop is 1.5 bar for light crudes and 0.5 bar for heavy crudes.

2.2 Treatment of Wet Crude Oil by Stabilization Tower:

The liquids that are separated from the gas stream during initial separation may be flowed directly to a tank or may be "stabilized" in some fashion. These liquids contain a large percentage of methane and ethane, which will flash to gas in the tank. This lowers the partial pressure of all other components in the tank and increases their tendency to flash to vapors.

2.2.1- The purpose of stabilization of crude oil:

Stabilization is the process of:

Increasing the amount of intermediate (C3 to C5) and heavy (C6+) components in the liquid phase while making the liquids safe for storage and transport.

Reducing the atmospheric emissions of volatile hydrocarbons.

Stabilizer plants are used to reduce the volatility of stored crude oil and condensate.

2.2.2- Components of crude oil stabilization unit:

The wet crude oil stabilization unit consists of several interconnected equipment in its operation in order to reach pure crude oil with the lowest (RVP) is possible, as follows:

2.2.2.1 Stabilization tower:

The stabilizer tower is a fractionation tower using trays or packing. Figure (6) shows a stabilizer tower with bubble cap trays. Trays, structured packing, or random packing are used in the tower to promote intimate contact between the vapor and liquid phases, thereby permitting the transfer of mass and heat from one phase to the other.

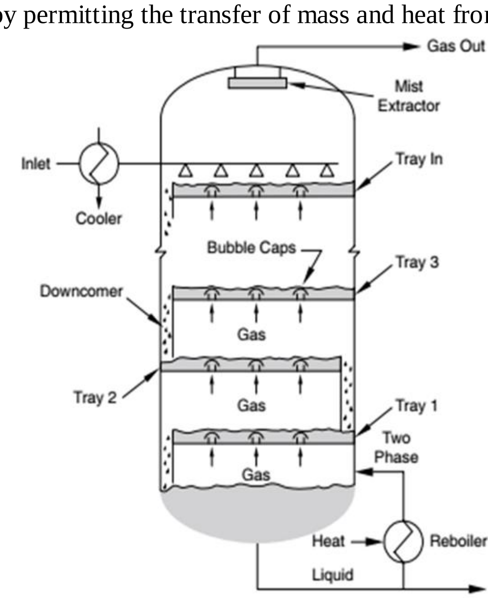

Figure 6 Schematic of a stabilizer tower

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Figure (7) illustrates a liquid hydrocarbon stabilizer system. The well stream flows to a high pressure, three-phase separator. Liquids containing a high fraction of light ends are cooled and enter the stabilizer tower at a pressure between 100 to 200 psi (700 to 1,400 kPa).

As the hydrocarbon liquid falls from tray to tray in the stabilizer tower, it is heated by the hot gases bubbling through the liquid. On each tray some of the liquids are vaporized and some of the hot gases are condensed. The liquids falling down the stabilizer tower become richer and richer in heavy hydrocarbon components and leaner and leaner in light hydrocarbons. At the bottom of the stabilizer tower, some of the liquids are cycled to a reboiler where they receive heat to provide the necessary bottom temperature which is normally in the range of 200 to 400F (90 to 200C). The reboiler could be a direct-fired bath, an indirect-fired bath, or a heating media exchanger. For a specific bottom product's vapor pressure, a lower stabilizer tower operating pressure requires a lower bottom temperature, but more compression is required for the overhead vapors.

The hydrocarbon liquid leaving the stabilizer tower at the bottom tray temperature is in equilibrium with the vapors and is at its bubble point. The liquid leaving the stabilizer tower is cooled before going to storage or pipeline. The hydrocarbon vapors leaving the top of the stabilizer tower are in equilibrium with the liquids on the top tray and are at their dew point.

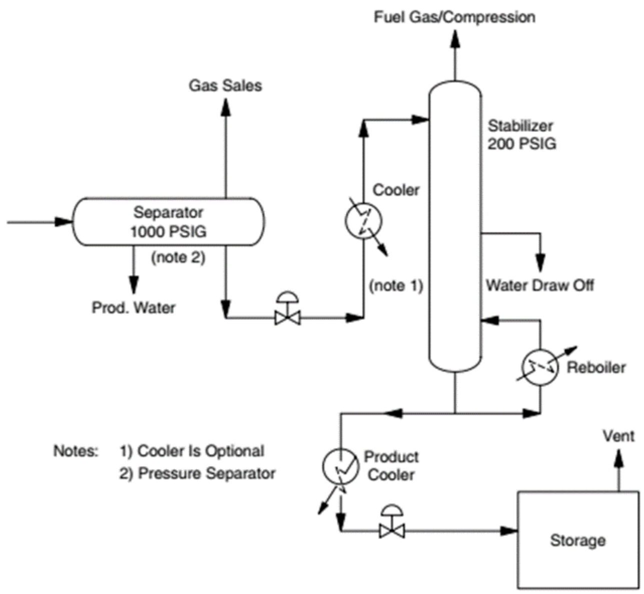

Figure 7 Schematic of a typical cold-feed stabilization system.

2.2.2.2 Stabilizer Reboiler:

The stabilizer reboiler boils the bottom product from the stabilizer tower. The source of all heat used to generate vapor in a stabilizer is the reboiler. The boiling point of the bottom product is controlled by controlling the heat input of the reboiler. Together with the stabilizer operating pressure, this action controls the vapor pressure of the bottom product.

2.2.2.3 Stabilizer Cooler:

The stabilizer cooler is used to cool the bottom product leaving the tower before it goes to a tank or pipeline. The temperature of the bottom product may be dictated by contract specification or by efforts to prevent loss of vapors from an atmospheric storage tank.

III. EXPERIMENT AND RESULT

Hayyan oil and gas plant is one of the largest factories in the Syrian Arab Republic. It is located near the city of Palmyra (45 km west of the city). At the beginning of this work in 2010, it produced about (3.3 million cubic meters per day) of clean gas going to power plants, about (200 tons) of (LPG) for domestic consumption, and oil of about (12500 barrels per day) pumped to the Homs refinery to obtain petroleum derivatives, and fed from several fields:

Jahar field: The wells located in this field are collected at the Jahar gathering station and then to the Hayyan plant, which has the following wells: (J-1, J-2, J-6, J-7, J-8, J-9, J-10, J-11, J-12).

Mehr field: The wells located in this field are collected in a Mehr gathering station and then to the Hayyan plant which has the following wells: (M-1, M-2, M-3, M-4).
Jazal and Mizror fields: in which the wells enter directly into the Hayyan plant which has the following wells: (Jazal-1, Mazror-3).
Figure (8), shows the outline of the wells entering the Hayyan oil plant.

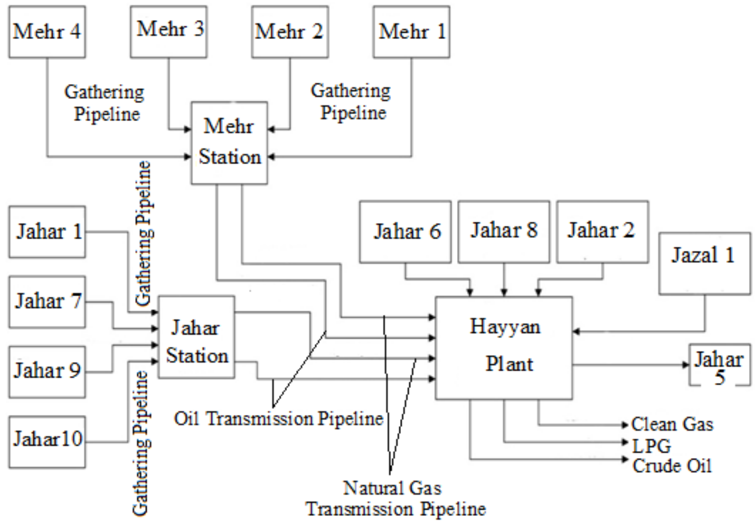

Figure 8 Hayyan Plant.

Experiments used in this study:
Determining the oil density, including the quality grade (API).
Determining the content of salts in oil (ppm).
Determining the Reid vapor pressure (RVP).
Operating problems:
During the operations and as a result of the frequent closing and opening of a number of wells and the exit of the content of salts, it causes some problems in the processing and operation, the most important:

3.1 The content of salts in the oil out from the desalter is greater than the permissible
The results of salt content for the oil coming from the Hayyan well fields are good within the required specifications when there are no wells in the field of Jazal and Mazror, but when entering the wells of Jazal and Mazror field, the content of salts increased significantly and led to the great problems in the parts of the wet oil treatment unit, and here are some specifications of crude oil coming from the field of Jazal and Mazror:

Table -2 specifications of crude oil coming from the wells of the field of Jazal and Mazror.

Date of sampling	Crude oil temperature (oC)	Salts content (ppm)	Water ratio (%)	Density (g/cm3)	API degree
March 2015	21	692	15	0.858	33.42
April 2015	19.7	725	14	0.857	33.61
May 2015	21.5	900	3	0.877	29.85
June 2015	22	700	12	0.840	36.95
July 2015	23.5	337	8	0.835	37.96
August 2015	25	780	6	0.864	32.27
September 2015	25.8	385	10	0.827	39.60

After processing this oil within the desalter, the following results were obtained:

Table-3 content of salts in wet oil treatment unit after entering the wells of Jazal and Mazror field.

Sample Number	content of salts (ppm)		
	Output Low Pressure Tank	Output of	Output of

	(LP)	Desalter	Stabilizer
1	188	77	42
2	218	87	55
3	214	92	67
4	249	112	78

By observing these results, we see that they do not meet the required specifications and it was necessary to deal with this by finding the appropriate solutions according to the operational situation and here we found the following solutions:

Change the amount of fresh wash water on the input of desalter and choose the optimal value: After entering the wells of Jazal and Mazror field, the oil flowrate and the content of salts increased significantly, where the oil flowrate reached (60 m3/h), and taking into account increasing of produced water, the amount of wash water was increased to (3m3 / h) after it was (1.2m3 / h). Figure (9) shows desalter in Hayan field plant.

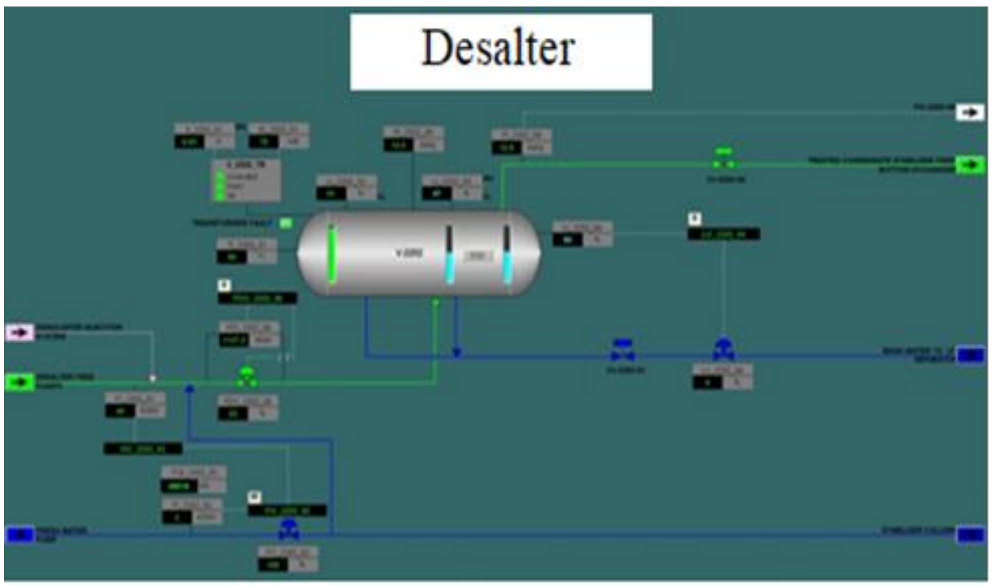

Figure 9 Desalter in Hayyan Plant.

The following table shows oil samples from the wet oil treatment unit by fixing all the parameters and changing the amount of wash water only on the desalter's input and determines the optimal value:

Table 4 salts content changes in relation to the injection rate of wash water.

Sample Number	flowrate of wash water (m3/h)	Salts content (ppm)	
		Output of Desalter	Output of Stabilizer
1	1.2	49	19
2	2	37	15
3	2.5	25	13
4	3	9	5
5	3.5	14	8
6	4	21	15

From the previous table, the best injection flowrate is (3m3/h). After this value, the emulsion of the wash water is obtained with the crude oil stream. The salt content increases in the oil instead of decreasing, so it is necessary to be careful when choosing the value of the injection flowrate.

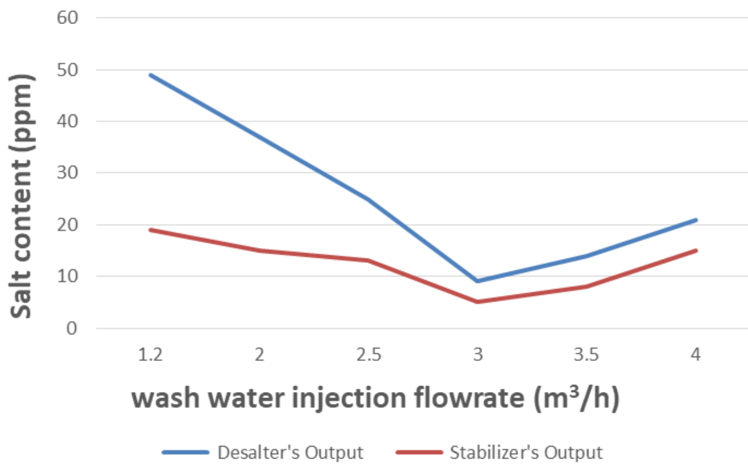

Figure 10 selection of the optimal value of wash water injection flowrate

Change demulsifier injection flowrate and choose the optimal concentration:
As a result of the increase the oil flowrate in the Hayyan plant when entering the wells of the Jazal and Mazror field, and because of the presence of a large amount of water and salts has led to the formation of emulsion within the wet oil treatment unit, forcing us to use high injection flowrates of demulsifier. Table (6) shows the effect of demulsifier injection flowrate on the content of the salts produced and the optimal value of the injection flowrate of the demulsifier, thereby reducing the economic cost while obtaining crude oil with the lowest content of possible salts.

Table-5 specifications of Demulsifier used

PH	Density (g/cm3)	Viscosity	Type	Commercial name
5.5-7.5	0.935-0.905	Low	Non-Ionic	CC3450-SJ

By fixing all other variables and to conduct experiments at different pumping rates by the demulsifier pump on the desalter's input, we find the values in the following table:

Table-6 salts content changes in relation to the demulsifier injection flowrate.

Sample Number	flowrate of demulsifier (L/h)	salts content (ppm)	
		Output of Desalter	Output of Stabilizer
1	0.8	22	12
2	1.0	19	8
3	1.5	10	5
4	1.8	8	4
5	2.0	8	4
6	0.8	7	4

From the table, the best demulsifier injection flowrate is any value above (1L/h). Considering the reduction in the economic cost of the treatment, the optimal value of the demulsifier injection flowrate is (1L/h), as shown in figure (11).

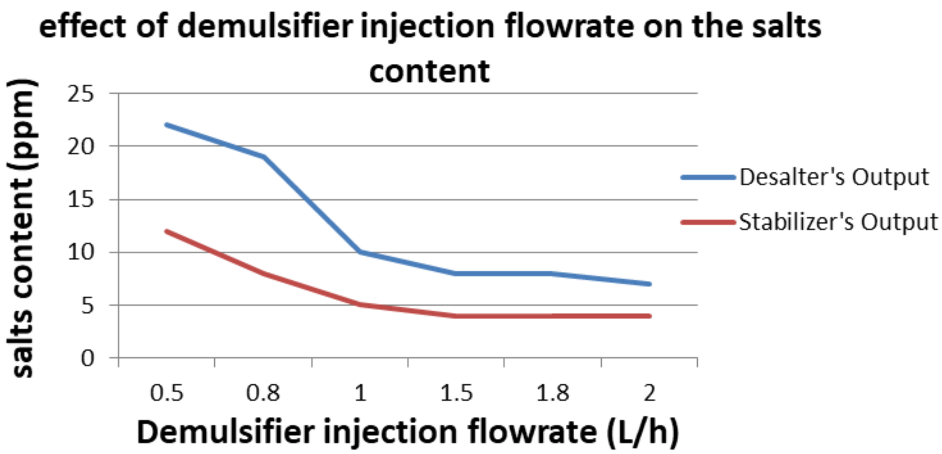

Figure 11 selection of the optimal value of the injection rate of the demulsifier

3.2 Salt deposition in the heat exchanger of the stabilization tower:

The large contents of water and salts produced, especially after entering wells of Jazal and Mazror field, at same traditional operation parameters of desalter, this led to the deposit of salt particles gradually on the input of this exchanger, and gradually increase the pressure differential between his input and output until it reaches a value that makes the income pipe partial blocked and return the oil to the desalter and separators causing great problem, This problem has been solved in several ways:

Washing the heat exchanger with fresh water to dissolve the salt:

A hose from the nearest source of fresh wash water is connected to the heat exchanger's input in the blockage area, and a certain amount of water is pumped (Most often 3 barrels). Figure (12) shows the condition of the heat exchanger and pressure differentials before and after the washing process.

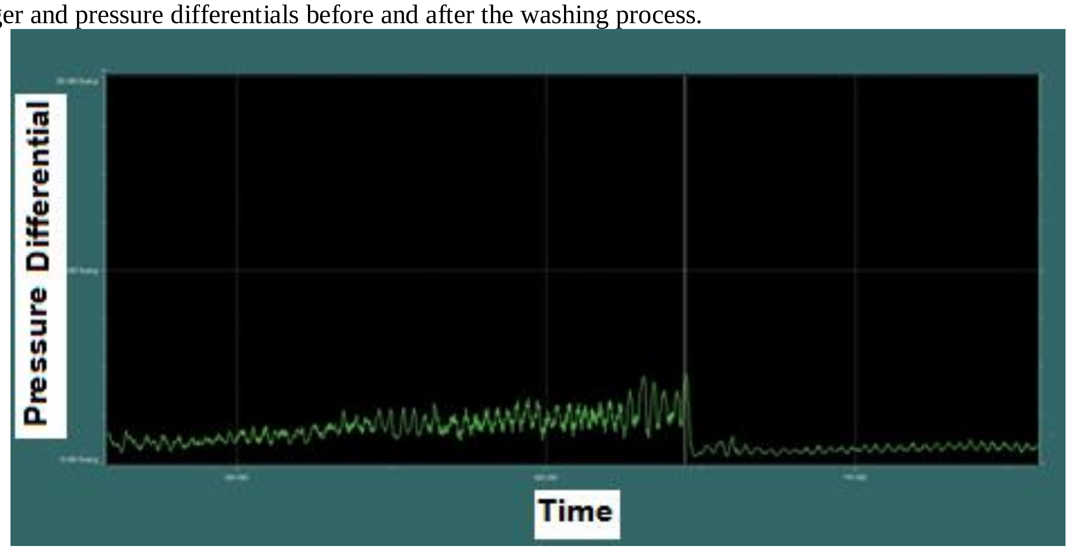

Figure 12 Pressure differential on the heat exchanger before and after washing the salts.

Change the operation parameters of desalter:

The blockage of the heat exchanger's input frequently, leads to repeated washings, this affects the specifications of the crude oil produced, and in order to reduce the number of wash times of the heat exchanger, the operation parameters of the desalter are changed to the ideal values as explained above to get the lowest content of salt and thus less possible washings.

In table (7) and for one day, several values were taken from the pressure differential on the exchanger at different salt content to balance the number of washings. It was found that when the content of salts increased, the number of times the heat exchanger’s blockage has increased thus his washing process, this requires two washing processes during the same day if the content of salts (39 ppm) and above. If the salt content is less than (11 ppm), we may need one washing process per day and it may not be necessary, depending on the content of salt on the exchanger's input.

Table-7 number of washing times of heat exchanger in relation to pressure differential on both ends.

	Day	Salt content on the desalter's output (ppm)				
		49	35	18	11	7
Pressure differential on the heat exchanger ends (bar)	08.00	0.2	0.2	0.2	0.2	0.2
	12.00	1.9	0.9	0.5	0.3	0.2
	16.00	3.5	1.8	0.9	0.7	0.5
	20.00	4.0	2.4	1.3	0.9	0.5
	24.00	1.2	4.0	2.0	1.0	0.9
	04.00	2.9	0.2	4.0	1.5	1.0
	08.00	4.0	1.0	0.2	1.8	1.0

The following diagram shows the relationship between the pressure differential on both ends of the heat exchanger and time at the constant content of salts, thus estimating the number of wash times required to remove the salt from the heat exchanger.

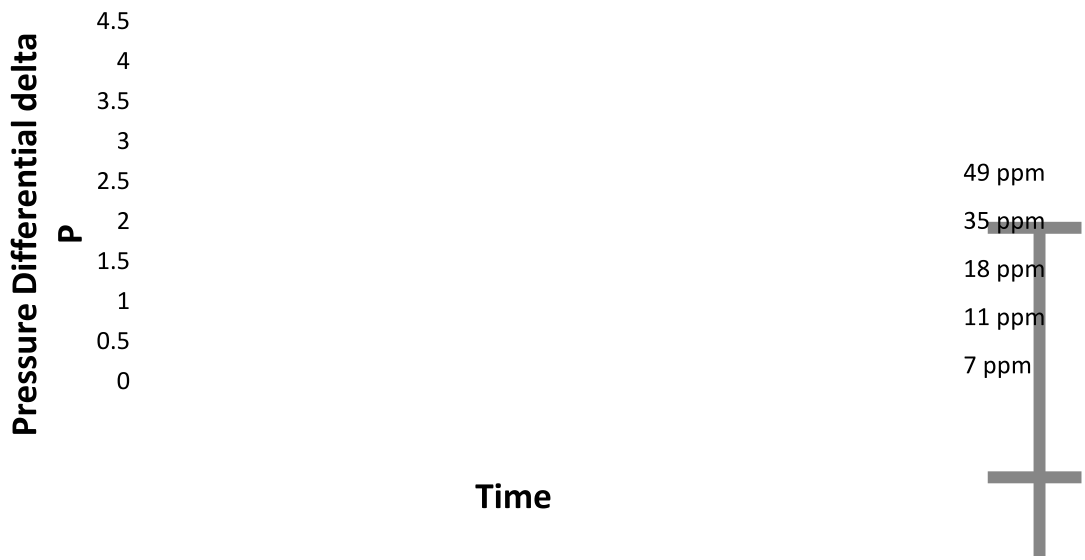

Figure 13 the relationship between pressure differential and time at constant content of salts.

3.3 Salt deposition in the reboiler of the stabilization tower:

After entering wells of Jazal and Mazror field and because of the large content of salts and water, this led to the gradual deposition of salt particles on the input pipe of this reboiler and increasing in the flowrate of hot oil required for heating without access to the temperature required interchangeably. Therefore, a greater economic cost for heating the oil, and at the large deposition of salt inside the reboiler, this may lead to loss of heat exchange with oil and not achieve the required temperature, and therefore not achieving (RVP) required, which led to many problems and has been addressed in several ways:

Wash the stabilization tower and reboiler with fresh water to dissolve the salt:

A hose from the nearest line of fresh washing water shall be connected to the stabilization tower input from the top, and a certain amount of water shall be pumped.

Change the operation parameters of desalter:

The previous method requires stopping and losing a quantity of oil and gas in addition to changing the specifications of oil exported to storage so it should only be done in emergency situations, in order to avoid this method, the operation parameters of the desalter are changed to the optimal values, so that we get the lowest possible salt content. Table (8) shows the relationship between the hot oil flowrate (the temperature at the stabilization tower bottom) and the content of salts deposited inside the reboiler with the vapor pressure (RVP) at a constant salts content on the desalter output as follows:

Table-8 the relationship between the content of salt deposits in reboiler with (RVP).

	Salt content on the desalter's output (ppm)				
	49	35	18	11	7
Hot oil flowrate (m3/h)	100	75	60	40	25
temperature at the stabilization tower bottom (oC)	145	148	150	154	156
RVP (psi)	8.0	7.6	7.2	7.0	6.9

From the previous table, we find that when increasing the content of salt increases the flowrate of hot oil needed for heating, thus increasing the need to wash the stabilization tower and reboiler and therefore reduce the content of salts as much as possible for the stabilization of crude oil, the figure (14) shows how to choose the ideal values of salts which do not lead to deposition in the reboiler.

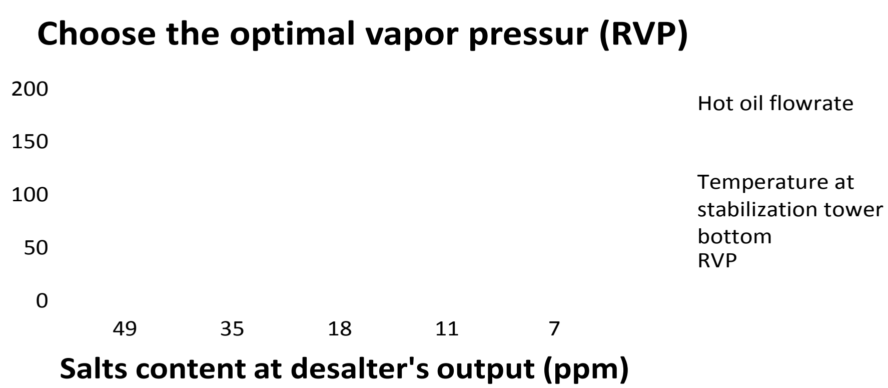

Figure 14 selection of the optimal vapor pressure in relation to the salts content.

3.4 Flooding in stabilization tower:

It is possible to know the occurrence of flooding in the stabilization tower by increasing the pressure differential on the trays, which impedes the flow of liquid and reduces the descent of liquid from downcomer between the trays, thus increasing the amount of liquid collected above the tray, then the fluid starts to rise instead of going down, and this problem may lead to:

Loss of material and thermal transfer between liquid and gas along the tower.

In the case of the arrival of this liquid with gas to subsequent processing equipment such as gas compressors, this will break the valves at gas compressor's input and stop work, and this will lead to significant economic cost due to the operations of maintenance and repair.

Decreasing of crude oil quality, and do not reach the required value for (RVP).

Figure (15) shows the status of the stabilization tower during the flooding and the values of pressure differentials on the trays along the tower.

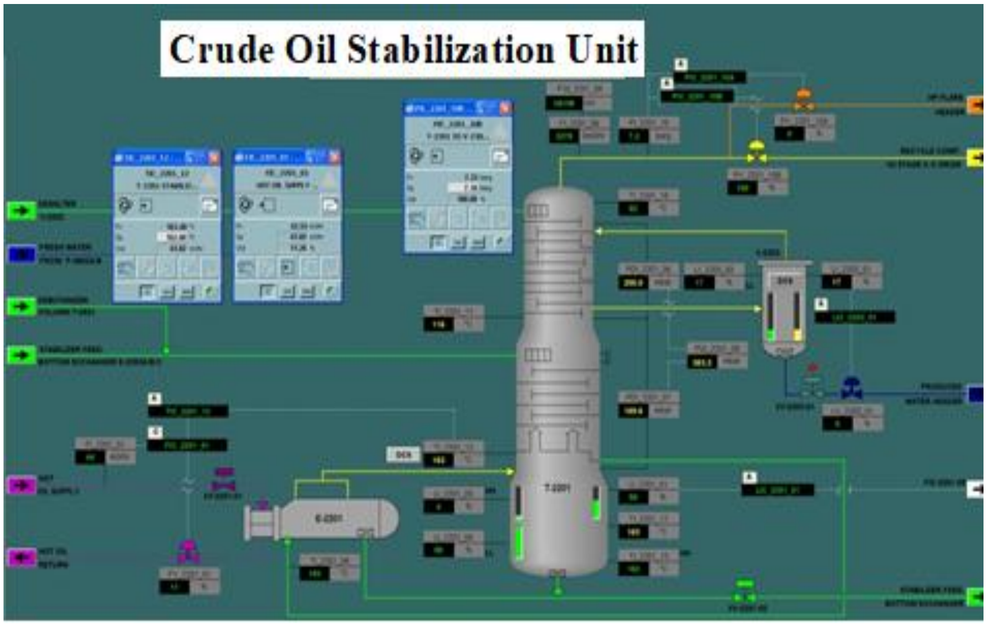

Figure 15 Stabilization tower during flooding.

This problem is solved by removing the liquid collected above the trays and removing it outside the stabilization tower by evaporating the liquid inside the tower.

IV.CONCLUSION:

Depending on the previous figures and graphic formats, the following results can be obtained:
The Hayyan plant includes many fields, mostly gas wells with associated oil, in this case, the wet oil treatment unit (desalter and the stabilization tower) is capable of handling this type of oil because the density of this oil does not exceed (0.750 g\cm3), but after entering of the wells of Jazal and Mazror field with a density of up to (0.980 g\cm3) close to the density of water, and therefore a great difficulty in separation. This requires the need to change the parameters of the oil treatment unit where the salt content is more than 70 ppm, and therefore the method of treatment has to be improved in order to reach the required specifications.
Entering of Jazal and Mazror wells has led to many operational problems, including:
Deposition of salts in the heat exchanger of the stabilization tower. This exchanger should be washed with fresh water several times according to the content of salts.
Deposition of salts in the reboiler of the stabilization tower. This problem has to be solved in order to reach the desired value of the RVP by washing the reboiler and the tower.
Flooding inside the stabilization tower and this leads to failure to achieve the value (RVP) required, and to solve this problem must stop the stabilization unit and evaporation of the liquid in its.
In order to eliminate the above problems and to meet the specifications of stored crude oil to the required specifications, have been carried out many laboratory experiments by using the accurate laboratory devices, It was reached:
Determine the optimal injection flowrate of the demulsifier for Jazal and Mazror oil field wells to be at least (1L / h).
Determine the optimal ratio of washing water to not less than (2.5m3 / h).
Determine the optimal pressure differential on both ends of the mixing valve of wash water with crude oil to no more than (1000 mbar) and not less than (900 mbar).

Suggestions and Recommendations:
Based on the above, the following recommendations and suggestions can be reached:
Installation of the desalter and the stabilization tower in any gas plant or oilfield facility, no matter how small, because the results are large.
The demulsifier should be used during the process of wet oil treatment with the quantity required to break the emulsification regardless of the purchasing value of the barrel.

Fresh water is used extensively in the wet oil treatment unit to remove the deposited salt. Therefore, we propose the following:
Design of an integrated fresh water treatment unit;
Use the ideal ratio of wash water on the desalter's input without increasing or decreasing;
Select the pumping rate of fresh wash water accurately, to remove the deposited salts on the tubes of heat exchanger and the reboiler;
The temperature of the stream of inlet crude oil to the desalter, different from the temperature of washing water mixed with him, so we propose the installation of a heater to heat the water to the temperature of the inlet crude oil, in order to achieve a thermal uniformity between washing water and inlet crude oil.
The heavy oil coming from the wells of the Jazal and Mazror fields is relatively cold and its density (980 g/cm3) is close to the density of water with high content of water and salts which makes it difficult to separate them, so we propose to install a heat exchanger on the oil line coming from these wells before entering the plant to raise the temperature to the degree (50oC), Thus reducing the viscosity of the crude oil slightly, this weaken the stabilizing film between water droplets and oil droplets, which facilitates the break of emulsification between them and thus, the separation process becomes easier In order to reduce the economic cost can be dispensed with the process of heat exchange with hot oil (in the heat exchanger) and take advantage of one of the hot lines of hot oil treatment unit.

V. REFERENCE

[1] Hayan petroleum company, Gas Processing plant/stage 3/ operation manual,2008.
[2] GPSA Gas Processing Handbook, 2007.
[3] www.capcost.com, Steps in using CAPCOST from the CD in the 2nd edition of Turton et al.,2010.
[4] Chemical Engineering Magazine, Modern Cost Engineering, McGraw- Hill, New York, 1979.
[5] Chemical Engineering Magazine, Modern Cost Engineering II, McGraw- Hill, New York, 1984. L.B. Evans, A. Mulet, A.B. Corripio, and K.S. Chretien.
[6] Engineering Data Book, SI Version Vol II, Section 16-26, Published by Gas Processors Suppliers Association, Tulsa, Okla 1998.
[7] ASTM D-19, Test methods cover the determination of chloride ion in water, wastewater, 2004.
[8] ASTM D323, Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method). 29 CFR 1910.106(a) (30).
[9] Salager.J.L, The Fundamental Basis for the Action of a Chemical Dehydrant. Influence of the Physical and Chemical Formulation on the Stability of an Emulsion, Int. Chem. Eng., Vol. 30, no. 1, Jan., PP.103-116, 1990.
[10] Dr. Maddox.R. N, Campbell-Vol3-Gas Conditioning and Processing, 1982.
[11] Mahmood.L, Demulsifier for Simulated Basrah Crude Oil, University of Technology in Iraq,2009.
[12] Dodd.H. V, The Resolution of Petroleum emulsions, Chem. Met. Eng, 28, 249-253, (1923), C.G, 1954.
[13] Mex.J, Optimum Temperature in the Electrostatic Desalting of Maya Crude Oil, 2005.
[14] IPS-E-PR-700, Engineering Standard for Process Design of Crude Oil Electrostatic Desalters,1995.
[15] Mosayebi. A, Abedini. R, Using Demulsifiers For Phase Breaking of Water/Oil Emulsion, Department of Petroleum Engineering, Mahallat Branch, Islamic Azad University, Mahallat, Iran, 2013.
[16] Gary and Handwerk, Petroleum refining technology &economics. Marcel Dekker, 3th Edition. New York, 1994.
[17] Petrofac Courses, Modules of Hayan Petroleum Company, 2010.
[18] Lee.R.F, Agents which Promote and Stabilize Water-in- Oil Emulsions. Spill Science and Technology Bulletin, 5, 117-126, 1999.
[19] Harris.R, Use desalting for FCC feedstocks Hydrocarbon processing August 1996, 63-65.
[20] Mahdi. K, Gheshlaghi. R, Zahedi. G, Lohi. A, Characterization and modeling of a crude oil desalting plant by a statistically designed approach, 2008.
[21] Sjoblom.J, Encyclopedic Handbook of Emulsion Technology, Marcel Dekker, New York, 2001.
[22] Aamir S. A, MSc. Thesis, De-Emulsification of Different Iraqi Crude Oil Emulsion, University Baghdad, Iraq 1998.