



**Federal Board of Supreme Audit**

**Iraq**

**Specialized Performance Audit**

**The policy of Ministry of Oil**

**For development of storage, transport**

**And pumping system of crude oil and gas**

**At Basra oil Company for the period (2015– August2018)**

Based on the requirements of the provisions of paragraph (II) of Article (6) from the law of Federal Board of Supreme Audit No. (31) of 2011 (amended), and according to the administrative order No.( 13642) on 2/7/2018, the specialized audit team has performed specialized performance audit on the policy of Ministry of Oil for development of storage, transport and pumping system of crude oil and gas at Basra oil Company for the period (2015- August 2018) and in accordance to the adopted standards , indicators and based on the information and indicators submitted by Ministry of Oil and its formations in addition to the information derived from the field visits and the statistical charts and tables, we have the following:-

### **1- Background:-**

#### **A- Objectives of Ministry of Oil**

The ministry of Oil in accordance to its law no. (101) of 1976 aims at enhancing the storage capacity of the oil products to insure a storage equals to consumption in addition to transport and marketing the crude oil and gas and their products and constructing the oil projects and implementing the law of oil wealth and natural hydrocarbons maintenance and protecting the environment and solving the environmental problems arising from oil and gas activities.

#### **B- Objectives of Basra Oil Company**

The stock company aims at enhancing the national economy in the oil sector through development of fields and production of crude oil and gas to achieve the objectives of developmental plans and the adopted plans in the Ministry concerning the proper methods applied in the oil industry and according to the provisions of oil wealth and natural hydrocarbons maintenance law no. (48) of 1985 and its instruction.

The company executes the following activities to achieve its objectives:-

- Pumping the crude oil and supplying it to the refineries and local consumption sites to the export and storage outlet.
- Producing and treating the natural gas and compressing it in the gas treatment station and connecting it to Qatar gas network and export outlets.
- Operating and repairing the pipelines systems and the export ports of crude oil.
- Managing and achieving all the technical and service works to support the activities.
- Dealing with the companies of the Ministry as related companies that has the right to act according to their awarded authorities as an independent companies financially and administratively and this is determined by the following activities:-
- Cooperation with oil pipelines company in transporting and discharging the crude oil.
- Cooperation with state company for marketing oil (SOMO) in exporting crude oil.

### **C- Transport, storage and pumping system of Basra Oil Company**

Transport, storage and pumping system of crude oil at Basra Oil Company includes a group of oil reservoirs of various capacities and sites to receive and store the crude oil from the produced fields in Basra governorate as well as Missan, Thi Qar and Midland Oil Companies and pumping it to the export ports. The system also includes wide network of main and secondary pipelines in addition to inner network to transport oil among the reservoirs and for the purpose of storage flexibility and export.

The system includes pumping systems that consist of assistant pumps and turbine pumps exist within the reservoirs to pump the crude oil in the pipelines network while the pipelines of gas within the network belong to South Gas Company and oil Pipelines Company not to Basra Oil Company according to the technical Office/ Ministry of Oil no. (8998) on 25/9/2018.

#### **D– Scope of performance audit**

The audit team determines the sample of ministry of oil and its formations according to the administrative order.

#### **Headquarters of the Ministry**

- Technical office.
- Planning and studies office.
- Reservoirs and fields development office.

#### **Affiliated companies**

- Basra oil company
- Oil pipelines company
- South gas company
- state company for marketing oil (SOMO)

#### **E– The problem and its impact on society**

The problem is identified based on the statistical groups and technical reports issued by the ministry through the risk matrix set by the audit team specialized in the oil affairs as a result of its work in the oil sector. The audit team concludes law efficiency in storage, transport and pumping system of Basra Oil Company as a result of lack of clear policy at ministry of oil in developing this system to cope with the development of oil production rates of crude oil and gas in the oil fields, which are served by the system to achieve the required flexibility of storage and transport operations to be reflected on an increase of oil production rates without any wholly or partly stoppage of the oil stations. This will contribute in supporting the national economy though its effect on increasing export rates.

#### **F– Policy of ministry of oil in solving the problems**

Setting the five-year plan from 2014 to 2018 included developing the system of pumping, storage and transport of crude oil and gas to increase the storage capacities in the depots and extending the transport network of crude oil (oil pipelines) but this plan has not been confirmed based on the letter of planning and studies office no.( 537) on 5/2/2019 and the projects listed in the plan have not been completed , such as the project of oil FAW depot in addition to the project of (19) tankers distributed among the depots of Basra Oil Company . These projects have been relisted within the current five-year plan (2018-2022). The audit team observed lack of adherence in the time table of executing these projects which was reflected adversely on developing the system in a manner that is appropriate with the development in the rest of the extractive sector of crude oil.

## **2– Methodology of evaluation process**

In order to know the main reasons of the problem, the audit team applies the following procedures during the stage of detailed planning:-

### **A– Risk Analysis**

Risks related to the main problems represented by ( low efficiency of transport, pumping and storage system of crude oil for Basra Oil Company) are analyzed with searching for the reasons lead to the problem in the attached matrix [ matrix no.(1)] after studying the reasons of the problem and identifying the minor problems which are:-

First: law of storage capacities comparing with production rates in the fields.

Second: Obsolescence in the crude oil pipelines that affects negatively on the pumping and transport operations.

Third: The Property Transfer System doesn't cover all the gas outlets of South Gas Company and Basra Oil Company.

Fourth: delay in executing the storage and transport projects for the lack of concluding contracts concerning the accomplished projects by Oil Projects Company on behalf of Basra Oil Company.

Fifth: lack of proper planning in the beginning of projects concerning the pumping, storage and transport operations to avoid the problems that occur during executing the works.

### **B– Objective of evaluation**

The main objective of performance evaluation represented by solving the problem of degradation of efficiency of pumping, storage and transport system of crude oil and gas of Basra Oil Company that affects directly on the production rates and therefore on the export rates that contribute in supporting the national economy, and identifying the real reasons of the evaluation problem and presenting the solutions and suggestions to the concerned authorities in compatible with the available possibilities to solve the problems.

### **C– Questions of audit**

First: what is the policy of ministry of oil in developing the of pumping, storage and transport system of crude oil and gas for Basra Oil Company?

Second: what are the reports of the projects status listed below concerning the development of pumping, storage and transport system of crude oil and gas for Basra Oil Company from the technical and financial side including all the contracts and requests of these projects, their amounts, execution periods, additional periods with the percentage of technical and financial achievement, the problems and barriers concerning the operation and execution works?

- Pipeline PS 1 – FAO
- ZUBAIR PIPELINE 2-
- REVERSR ELASTIC PIPELINE – ZUBAIR2- TOBA AND ZUBAIR PS1 .
- CONSTRUCTIND AND WIELDENING THE REGULAR OIL PIPELINE.

Third: what is the status of meters system concerning pumping, storage and transport system of crude oil and gas for Basra Oil Company with stating the problems and barriers?

Fourth: what are the technical report concerning the above system?

Fifth: what are the abstract of the study of Japanese Toyo Company concerning the system development?

Sixth: what are the design and real capacities of storage depots of crude oil of Basra Oil Company?

Seventh: what are the real and design capacities of the pipelines network of pumping and transporting the crude oil of Basra Oil Company?

Eighth: what is the current status of storage projects in the depots of Basra Oil Company?

Ninth: what are the production rate of crude oil and gas from Basra Oil Company of 2008?

Tenth: what are the project status of FAW depots, the problems and barriers?

#### **D– Audit Standards**

- Iraqi code concerning the Property Transfer System (financial accountability by the meters system).
- The international standard issued by American Petroleum Institute API and the national measurement system.
- Adopted standards from the processes of designing, operating, manufacturing the equipment and the measurement systems like the American Society for Testing and Materials (ASTM) and the American Society for Nondestructive Testing (ANST).
- International testing companies like ( Bureau Veritas) concerning the charts and manufactured testing.
- Terms and instructions of Iraqi Association of Occupational Health and Safety.

- Technical and annual reports and the statistical groups from the period (2015-2017).

### **3- Results of evaluation process**

The audit team made field visits and studied the technical and operative reports concerning the transport, storage and pumping system of Basra Oil Company and found the following:-

A- the available storage capacities is considered relatively low and doesn't provide the sufficient flexibility in case of occurrence any stoppage of the export or sale of crude oil for any reason such as the weather conditions and other reasons may effect on the navigation movement, where the storage capacities of the depots of Basra Oil Company is (1637085) cubic meter equivalents (10297265) barrel by adopting the transfer factor (6, 29). According to the last report of crude oil depots in Basra Oil Company in August / 2018 the production rate of southern and middle fields reached to (3961000) barrel/ day that has been pumped to depots of Basra Oil Company and subtracted quantities prepared for internal consumption which is estimated at a rate (463000) barrel/day.

It has been observed that the available storage capacities couldn't provide storage period for the produced oil more than (2) days in case of occurrence of any emergent stoppage in the sale of crude oil that effects negatively on the production rates of the fields especially the foreign companies (licensing rounds), which is considered stoppage periods resulting due to Iraqi side and causes financial costs incurred by the Iraqi government.

Therefore, we recommend accelerating the plans and projects related to transport, storage and pumping system of Basra Oil Company especially constructing the tanks various capacities in the depots that contributes in developing the storage capacities in compatible with the development in the increased rates of crude oil production.



b- The technical documents of Basra Oil Company in its book no. (1421)

on 4/10/2018 replying to our memo. No (18) on 4/10/2018 showed that the available storage capacities represent (66%) from the exploitable storage capacities, that means third of these capacities are out of service currently for the purpose of maintenance or existence of some technical barriers for tanks newly established. The table below shows the available storage capacities of the depots of Basra Oil Company that represents the main depots to receive and pump the Iraqi crude oil in the southern and middle areas. Note that the figures in the table represent the current storage capacities of the depots according to the statistics of three quarters of 2018.

depot	No. of tanks	No. of tanks out of service	Designing capacity	Operational capacity	Storage capacity	Rate of available to total operational
Zubair 1	20	9	560000	425970	230985	55%
Zubair2	16	6	92800	780000	490000	63%
Ps1	10	4	820000	748000	444000	59%
toba	11	1	726000	525100	472100	90%
fao	24	24	1392000	Out of service	Out of service	Out of service
total				2479070	1637085	66%

C- Lack of periodical maintenance table for the crude oil tanks in the depots as well as the net pipelines of oil transport from fields to depots and the transport pipelines to export ports because of non-existence of sufficient capacities in the depots of oil storage or oil transport pipelines to cover any facility in case of being out of service. Consequently, most of maintenance work are compulsory in order not to remove the facility from work completely that affects negatively on the operational capacity of the facility for long period of time ranged from (3-4) years due to the amount of damage caused or worn out parts of it , for example:-

First: most of the old tanks are suffering from a complete damage of their base, which requires full replacement, and this work requires considerable effort and time since these tanks of large capacities.

Second: The pipeline of crude oil from the West Qurna field to the Tuba reservoir suffers from a large number of problems and the high rate of waste due to the aging of this line, which necessitates replacing it according to the report of the engineering examination of this pipe.

D- Oil project company was deployed by ministry of oil to establish (19) tanks of crude oil of different storage capacities distributed to depots of Basra Oil Company to increase the storage capacities of these depots . The audit team observed during the field visit to the sites of theses depots that they are not entering into service due to technical and designing problems that prevent from their continuity to service therefore these tanks have not been received by Basra Oil Company as it is the beneficiary and the end- operator although Oil Projects Company was deployed to execute these works since 2010.

E- non-existence of a contract or any form of official work with Oil Projects Company as an implementing entity for the FAW oil warehouse in addition to (19) tanks distributed among the warehouses of Basra Oil Company instead Oil Projects Company was deployed directly by Ministry of Oil to execute these works according to the letter no. (4428) on 22/5/2018 and letter of Basra Oil Company no. (60254) on 19/8/2018 that leads to the following:

- Lack of timeline for these works.
- Lack of location determination of the workload to be performed.
- These acts have taken long periods of time without their effective entry into force and their use to date, due to the existence of certain reservations and objections to their implementation which have not been resolved until the date of preparing this report.

So we recommend speeding up the completion of all the shortages and the resolution of all technical belongings in order to enter these tanks for service and utilization of the capacity in an optimal manner.

F- As a result of the lack of access to the warehouse of FAW oil for the service, despite the passage of more than 15 years to start the implementation, which was supposed to provide the actual storage capacity exceeding 6 million barrels in addition to the high flexibility that will be provided in terms of storage and pumping to the ports of export Of the central and southern region of Iraq, which estimated about 80% of the oil produced in the country.

- Loss of pumping system capacity (turbine pumps and auxiliary, as well as the operational capacity of the oil pipeline).
  - Because of this delay in the completion of the warehouse led to linking oil storage depots of the fields in the Basra oil company directly to the ports of export through the work of alterations and temporary links to the pipeline linking these warehouses and the FAW warehouse, which led to financial obligations resulting from the work of the modification on the network that can be bypassed. For example of this is the link pipe (PS 1- FAO) at a cost of 22 billion Dinar, which was implemented by the oil projects company and according to the letter of Basra oil Company no. (69680) on 27/9/2018.

G- Not to keep crude oil in the tanks of oil depots in sufficient time for the occurrence of sedimentation of water and impurities associated with crude oil produced especially after the development of productivity in the oil fields and increase the quantities of production to enter most of the licensing rounds companies in commercial production in return for the development of the storage capacity in proportion to the increase in production rates resulting in:-

- Continuation of the work of the storage and pumping system in a circular manner, which was reflected negatively by the high proportion of water and

impurities in export crude oil and according to the reports of Basra Oil Company – Operation Commission.

- Corrosion and damage to tanks and pipes due to negative impact of water and impurities on equipment.

H- Basra Oil Company contracted with Toyo Japanese company in 2012 to work as a consultant and prepare a study of the location of storage, pumping and transportation systems of crude oil in Basra Oil Company to develop this system and accommodate the plans for the expected increase of oil fields and an export card approaching 6 million barrels per day and according to the plans of the Ministry of Oil in a scientific context commensurate with the possibilities currently available. Se we recommend to speed up the introduction of this study in a manner that ensures the smooth operation of these platforms and provide the necessary flexibility for the storage, pumping, transport and export of crude oil, which is in support of the national economy.

### **I– Status of storage, pumping and transport system**

Through the field visit to the sites of the system in Basra and study the technical reports provided to the work team under the letter of the Department of studies and planning and letter of Basra Oil Company and the reports of the pumping and storage section of Basra Oil Company for 2017 and the first three quarters of 2018 provided to the team during the field visit to sites of the system.

### **(3) Gas compressor**

Not to return the compressors borrowed by the Basra Company to Haritha power station to raise the pressure of gas received and operation of turbines at the request of the Office of the province of Basra for a period of five months as indicated in the letter no.(16430) on 2/7/2013 and receiving the compressors on 23/7/2013 according to letter of Basra Oil Company no. (70182) on 2/10/2015 that shows the ending period of

borrowing and the request to return the compressors for the urgent need. Given that the price of compressor is (750000) Dollar. Through the field visit of the work team it turned out that the status of the compressors is very unknown and they are now in need of them to operate the power plant and the pumping station in the Faw oil depot.

#### **(4) WESTERN PIPELINES**

The overtaking of the eastern pipeline continues in Zubayr district.

(5) The internal network of the pumping pipe system in the TOBA warehouse consists of two symmetrical systems that suffer from the destruction of one of these systems, including the pumps since the first Gulf War, which have not yet qualified to date. This has resulted in the loss of half of the pumping capacity that can be utilized. The construction of a pipeline network to transport oil from the destroyed Bank to the Bank operating in the warehouse.

(6) Disposal is currently being done from Tuba warehouse by single pipeline measuring 48 through Zubair warehouse. The aim of this pipeline was to achieve the flexibility and the oil transport between the two warehouses, which was reflected in the quantities of oil that can be discharged to the warehouse towards the export ports. It was implemented by the Oil Projects Company, which is the main drainage pipe towards the export terminals of Al-Tuba warehouse.

(7) Through the field visit to Al-Tuba warehouse belongs to Basra Oil Company and reviewing the technical report according to letters of Basra Oil Company no. (54389) on 30/7/2018 and (60727) on 20/8/2018. The work team observed number of technical problems concerning the electrical works, cathodic protection and fire extinguishing system, which have not been settled till the date of this report.

#### **First:- Electrical Works**

- Grounding points 2 failed in a tank (TK- 5105) where the grounding resistance is of high value.
- Concrete work is required for all Grounding points and for both warehouses.

- Change the selector switch no. /4 for the mixer motors where the switch must be attached to the bolts type ( normal open, normal close) that are then connected to the operating status (auto, off, manual).

## **Second: – Cathodic Protection Works**

### **(a) Tank (TK– 5105)**

- One of the wells is turned off and needs to be checked by you.
- No integrated cathode insulation 100%.
- Set up points of reference for the cables of wells and stations in the courtyard of the tank.

### **(b) Tank (TK– 5106)**

- Set up points of reference for the cables of wells and stations in the courtyard of the tank.
- Completing an integrated cathode insulation of the tank.

### **(c) Tank (TK– 5107)**

- Treatment of the problem of collecting rainwater above the floating surface of the above tank and not discharge it through the system of rain water for the tank.
- Change the selector switch no. /4 for the mixer motors where the switch must be attached to the bolts type ( normal open, normal close) that are then connected to the operating status (auto, off, manual) .
- No integrated cathode insulation between the pipelines and tank.
- The automatic fire extinguishing system implemented by the oil projects company is not approved by the safety and fire department in Basra Oil Company and requires to be of a kind (CF 31) as well as the absence of a control panel to transfer the fire signals to the fire department in Tuba warehouse.

## **Third: extinguishing and safety**

- The automatic fire extinguishing system implemented by the oil projects company is not approved by the safety and fire department in Basra Oil Company and requires to be of a kind (CF 31) as well as the absence of a control panel to transfer the fire signals to the fire department in Tuba warehouse.

As a result of the current status of the depots and pipelines network of pumping, storage and transport system for crude oil of Basra Oil Company , we conclude the following:-

- The delay in the maintenance of the technical problems that occur within the system as well as the maintenance of the main systems and assistance in the warehouses and the pipeline network take long periods relatively, which reflected negatively on the performance and efficiency of the system of storage and pumping and transport in general.
- The team noted that there is a continuous repetition of many technical faults within the system facilities and within short periods of time, especially with regard to control systems and precision machines and mechanical systems, indicating that the maintenance is not in the required level in addition to the aging of parts of the system in general and worn out, which necessitates comprehensive and effective maintenance of these systems in a manner that ensures its work with flexibility and high efficiency.
- Several stations and cathodic protection points have been stopped inside the warehouse as well as the pipeline network of the storage, pumping and transport system and delay in the processing of the necessary supplies for these stations to ensure continuity of its work which in turn will speed up the corrosion process of parts of this system so we recommend taking care of maintenance procedures

and providing spare parts for stations and Cathodic protection points of the system in question to protect its parts as long as possible.

- The self-extinguishing systems of many of the crude oil tanks in the warehouses of Basra Oil Company stopped in addition to a high percentage of blockages in the pumps and cooling pipes as well as the fumes of these systems, for example tanks Tk4, TK8 in the warehouse of Tuba. So we recommend speeding up the completion of maintenance and the introduction of these systems to work and the seriousness of the nature of work within the oil depots, which requires that all systems of automatic protection and safety are provided continuously 100%.
- Through the field visit to sites of the system, the work team noted that there is a lack of attention to safety procedures in general within the warehouses of the system despite the seriousness of neglecting this aspect because of its impact on the safety of workers in these warehouses, which requires great attention to safety measures in order to protect the workers as well as the facilities in general.

### **Seven: FAW depot**

FAW depot doesn't enter to service because of existence of the main items that have not been done, in addition to the existence of many technical obstacles to the completed paragraphs, as mentioned in the memorandum of the Office of the Assistant Director General of Basra Oil Company for Licenses No. 28 on 3/10/2018 and supplied to the team during field visit to the work site and below the warehouse status until 30/9/2018.

#### **(2) Delay completion of the power station project**

- Project under the auspices of oil projects company under ministerial guidance within the FAW warehouse project and there is no contract between Basra Oil Company and oil Projects Company.



- The oil projects company transferred the work to ROSCO Iraqi Company and the project has long been owned by the oil projects company so far.
- The gas pipeline was completed from Zubayr to Faw and a tender was prepared for the purchase of gas compressor which is part of the obligations of the Basra Oil Company.

### **(3) MAIN TURBINE PUMPS**

Delay completion the project of main turbine pumps that are still stored in inappropriate conditions according to the report of Federal Board of Supreme Audit no. (12982) on 24/6/2018 concerning Faw Oil Depot. It is expected to install these pumps in 2022 if the installation is done in the meantime but this is unlikely because the work of erecting the foundations of these pumps, which needs 12 months and was not referred to a company to achieve it and until now.

### **(4) Booster Pumps**

- The delay of the completion of the project of installing and operating booster pumps in addition to the failure of the pumps that were accomplished incorrectly due to the existence of design errors where the required operational conditions have not been met and has been modified in the process of the monument to these pumps by changing the height of the depth that were installed by these pumps and change the axes of rotation for these pumps, but did not achieve operational conditions as well.
- Basra Oil Company tried to help the oil projects company to operate one of the pumps, but the company could not provide oil projects company with control system since 1/3/2018 until now.

### **(5) Faw depots tankers**

- The delay in the completion of the construction of tankers number 16, where no tank has been introduced to work so far.
- The tankers have not yet been received due to the lack of many defects in the work of these tankers such as deformities and incomplete systems control the

operation of reservoirs and systems of external and internal and external tubes and insulation of external protection and paint tanks from the outside and inside, in addition to the design errors that the oil projects company is still in the process of processing and some tankers are in the process of cleaning and painting, which require months.

#### **(6) Status of the FAW Advisory Project**

This project includes contracting with advisory TOYO Company to study the designing errors and problems in the contracts of Oil Projects Company in the depot and to give ways of solving these errors. This procedure will lead to set a plan to complete these project instead of remaining without a plan for 20 years, knowing that the study will be in the presence of the oil projects company and the Office of the Inspector General and Basra Oil Company and the project is currently in its initial stage where the preparation of standard documents and instructions to resolve the problems and obstacles above and Basra Oil Company obtained the fundamental approvals in this regard.

#### **(J) System of transfer of ownership and financial accounting**

After reviewing the reply of Basra oil Company and the Technical Department regarding the system of meters for the system of pumping and storage of crude oil and gas to the Basra Oil Company where the Technical Department in its letter (7544) on 13/8/2018 that the percentage achieved to Basra Oil Company regarding the system of crude oil meters amounted to 100% As for the system of raw gas meters, the rate of achievement amounted to 70%, noting that there is an order to convert the meter systems processed by FMC company for the remaining ports are under implementation by Basra Oil Company.

### **First: Gas Meters**

Number of counters purchased from FMC are 29 counter. Basra Oil Company installed all the counters except 9, which belong to the fields of South and North Rumaila, where have not been set up to date and to change its location at the request of South Gas Company. As a result of this change the manufacturer showed that these systems cannot be installed in the proposed sites, which areas of financial are accounting under the system of measurement and calibration because of the difference in the specifications of gas because it contains water and hydrocarbons, which makes the systems unsuitable for placement in the proposed sites. The assumption of 9 integrated systems after the compressor stations after the process of modification as described in the letter of the Technical Department No. 5348 on 20/8/2013 and the letter of South Oil Company No. 40420 on 23/6/2023 where the approval of the Minister of Oil on the letter of the Technical Department on 23/6/2013 on the process of modification in cooperation with the manufacturer in the presence of South Gas Company and the Office of Inspector General and the Technical Department .

several meetings were held with the manufacturing company for the period from 12-15 / 1/2014 in Istanbul in the presence of representatives of the Basra Oil Company and South Gas and the Office of Inspector General and the technical department and consultant in the Office of the Undersecretary for liquidation and there were several observations and recommendations of them.

To give all operational specifications and laboratory analyzes of raw gas in the new sites for the purpose of adoption by the manufacturer in making the necessary modifications and additions to suit the purposes of financial accounting in accordance with the measurement and calibration system, as well as South Gas Company to update the information on gas specifications within one week from the date of notification of the two companies. It has been observed the following:-

(1) The failure of the South Gas Company and Basra Gas to set a timetable for the installation of a meter system as stated in the recommendations of the minutes of the meeting held on 26/1/2017 in the presence of representatives of the Department of Technical and South Gas and South Oil Company.

(2) Basra Gas Company's failure to fulfill the timetable concerning approval on the agreed sites to install the meters system, where the representative of Basra Gas Company signed on the meeting minute that held in Dubai from 22-24/12/2015 to determine the sites in the presence of representatives from South Gas Company, Basra Gas Company and technical department with the manufacturing company of meters system and specifications of gas in the meeting held on 13/4/2016 headed by the Undersecretary for gas affairs ,where the representatives from Basra Gas Company stated in the meeting that the site agreed upon are still under approval by the management of FMC.

(3) The slow pace of the procedures of South Gas and Basra Gas Company led to the Ministry having to adopt the measurements of the ratio of gas to oil. The technical office / meters department and the measurement of transfer of ownership NO. 8031 on 29/8/2018 pointed to the adoption of measurement methods available in all gas processing outlets from Basra oil to South Gas Company whether it is a financial accounting , or a standard meter in locations where there are no meters matching the system of measurement and calibration.

(4) The continuation of the South Gas Company and Basra Gas by changing the specifications of the gas and operational conditions data despite the pledge in the minutes of the meeting on 19/9/2016 that these specifications and data are final, which led to the delay in the promotion of that order by Basra Oil Company and South Gas Company and Basra Gas in continuous change for gas specifications and operational conditions.

(5) Through the field visit of work team to the sites of gas meters, it has been noted that these meters have accurate specifications that can be adopted as an optimal design to install the systems of ownership transfer (meters) in other oil companies.

We recommend to settle all the technical matters concerning installation of meters systems for gas in North and South Rumila fields by considering it as a necessary order of financial accounting between the companies, and we need systems of ownership transfer (meters) with high accuracy since adoption of GOR ratio doesn't give the required accuracy.

## **Second: Meters of Crude Oil**

After noticing the status of meters and through the field visit to Basra Oil Company, we observed the following:-

All the outlets of financial accounting and internal accounting are provided with meters bearing calibration certificates except the following outlets:-

- (1) Ending the expiry date of calibration certificate of meters warehouse (ZR 1) number (3) Type ( TURBINE) where the last date of calibration was on 30/4/2016 supplied to Basra refinery ( financial accounting) till the date of his report.
- (2) There is no calibration certificate of meters at Allahais number (2) but there is manufacturing calibration certificate since 2011 (internal accounting) type (ultrasonic) supplied to oil warehouses of Basra Oil Company.
- (3) There are no meters at yamama field but there is a system under installation number (2) type (ultrasonic) will be used for internal accounting.
- (4) The calibration type (compact prover) number (2) doesn't bear the calibration certificate but has manufacturing calibration certificate at Basra site for the fields (ZR1+PS1).

Concerning the calibration meters related to receipt and delivery of the petroleum licenses:-

- Meters type (ultrasonic) number (14) at alzubair field where the last calibration was in February 2016.
- All the meters at South Rumila field (16) and meters of north Rumila field (14) number (16) type (ultrasonic) need recalibrating for being expired.

### **Third: consumer outlets at the strategic line**

After reviewing the mechanisms of the consumer outlets (refineries and power stations) in line with the strategic line based on the Ministerial Order no. (34009) on 15/10/2015 and the formation of a follow-up committee for measuring systems for consumers as well as the field visits since 2012 and up to field visits benefiting the above-mentioned ministerial order, in addition to the letters of Technical Office , we recognized the following:-

- (1) most of measurement systems at the consumers locations don't satisfy the national measurement system, and this was confirmed by the minutes of field visits achieved by the consumers and in the joint matching minutes by the representatives of Basra Oil Company with Pipelines Company without taking any actions by the consumers which led to the suspension of monthly matching work from 1/8/2017 with Pipelines Company as stated in the letter of Basra Oil Company no. (80413) on 26/10/2017.
- (2) The Technical Office informed Basra Oil Company in its letter no. (6708) on 13/11/2016 of not obtaining approvals for their proposals by adopting the meters system of the warehouse (PS1) feeding the strategic line for financial accounting purposes with oil pipeline company.
- (3) The fact that there are real differences between the quantities received from the fields of Basra Oil Company and the quantities released internally and externally. Basra Oil Company directs this to the failure of the metering systems in the internal consumer site from the strategic line of the national measurement system because all quantities of oil received from the oil fields are according to integrated meters and

satisfying the international standards and under the supervision of a third party as well as for oil exported abroad through the oil ports.

(4) The failure of the pipeline company to supply Basra Oil Company with a measure of quantities and receiving reports for all consumer sites, although Basra oil company was supplied with a letter containing the total monthly quantities received for all sites without any documents to calculate those quantities, according to the letter of Basra Oil Company no. (80413) on 26/10/2017.

(5) All the meters systems in operation at the crude oil consumer site of the strategic pipeline are calibrated by the oil pipeline company by a calibration device type (MOBLIE COMPOACT PROVERE) that contains expired calibration certificate, note that the oil pipeline company is in the process of calibrating the calibrating equipment mentioned earlier by third examiner has not done so to date.

## **CONCLUSIONS**

(1) Despite the development of a five-year plan for the period (2014-2018) is (not approved), including the development of the system of storage, pumping and transportation of crude oil and gas to Basra Oil Company, but we noted the absence of proper planning in the implementation of plans in a manner that fits and keeps pace with the development of crude oil and gas production of oil fields that the system works to serve achieving the flexibility of the storage and transport operations, which will in turn be reflected in the absorption of the increase in crude oil production rates, which led to the inclusion of the projects of the five-year plan above within the current five-year plan (2018-2022).

(2) In the crude oil capacity of the Basra Oil Company in general, there are not enough capacities to achieve the necessary flexibility in a manner that keeps pace with the development in the production rates of crude oil from the fields. The current capacity of the reservoir is about 66% of the capacity that can actually be exploited.

(3) Absence of tables of periodic maintenance for the system of storage, pumping and transportation and all current maintenance is considered to be the maintenance of the equipment due to the deterioration of the equipment.

(4) Exploitation of the projects of the storage, pumping and transport system for long periods of time without entering the service in addition to the existence of many failures in the implementation of these projects.

(5) The increase in the percentage of water and impurities in crude oil Source and according to the report of the Basra Oil Company / Operations Committee because of the development of production in the oil fields, especially after the entry of fields licensing rounds commercial production stage in contrast there is no development in the energies of the reservoirs that serve these fields.

(6) The loan is not yet lent to the Al-Haritha power station. Note that the borrowing period is over and the position of the compressor is unknown to date, despite the fact that Basra Oil Company needs the compressors and we inform you that the cost of these compressors is up to \$ 75000 per compressor.

(7) The absence of radical solutions to the problems of the FAO oil depot for a period of not less than fifteen years from the date of the start of the second stage of the construction of the warehouse, despite its great importance in storage and disposal.

(8) Absence of financial accounting equipment on all gas discharges between Basrah Oil Company and South Gas Company.



(9) No calibration work at all stations containing crude oil meter systems for Basrah Oil Company.

(10) Most of the measurement systems in the crude oil consumer sites of the strategic line under the responsibility of the Basra Oil Company do not meet the parameters of the national measurement system in addition to most of the counters and calibration systems for consumers expired.

### **Recommendations**

1- To establish a clear policy and accurate plans that can be implemented in the short and long term to develop the storage, pumping and transport system in a way that is compatible with the production rates of crude oil and gas in order to achieve the flexibility of storage, pumping and transport.

2- Develop realistic, short-term, and long-term plans to develop the reservoir's potential in order to accommodate expected increases in oil production.

3- To develop realistic plans that can be implemented short and long term to develop the reservoir capacities of the system in a way that absorbs the expected increases in oil production.

4- To resolve all technical and financial items and to set timetables for projects that are not completed in a way that ensures their entry into the service and as soon as possible in light of the current need to increase the capacity of the reservoir.

5- Requiring companies operating production fields to increase the efficiency of the initial processing of crude oil before pumping it to the reservoir.

6- Requiring the operator of the producing fields to increase the efficiency of the initial processing of crude oil before pumping it to the main warehouses.

7- The issue of returning the borrowed cables is done by the Ministry of Electricity because it is important to the Basra Oil Company.

8- Find radical solution to the problem of Fao oil depot for its extreme significance in increasing the capacities.

9- Accelerate the connection of gas meters on the outlets of the Basra Petroleum Company and the South Gas Company to ensure the accuracy of financial accounting between oil companies.

10- Compliance with timetables for the calibration work of the transfer systems.

11- The obligation of local consumers (Ministry of electricity, Ministry of Industry) to follow the national measurement systems and subjecting all of their systems to calibrations within specified schedules in a manner that ensures the accuracy of financial accounting.

