KELTON
FLOW MEASUREMENT CONSULTANTS

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Strictly Private & Confidential

To
International Advisory and Monitoring Board
The Committee of Financial Experts, and
The Government of Iraq

Dear Sirs

In connection with the Development Fund for Iraq Audit of 2010 we were requested to provide an external audit service on the technical progress in implementing the Ministry of Oil comprehensive oil metering plan.

Scope of Work

- Comment on the metering master plan
- Comment on the Iraqi National Code for Measurement of Hydrocarbon Fluids
- Observational report on a number of installations

Our report to you is based on observations, inquiries of and discussions with personnel of several installations and other documents made available to us.

Purpose of the report and restrictions on its use

This report was prepared on the specific instructions of the International Advisory and Monitoring Board solely for the purpose of assisting you in the connection with the assessment of the progress in implementing the Ministry of Oil comprehensive oil metering plan and should not be relied on for any other purpose. Because others may seek to use it for different purposes, this report should not be quoted, referred to or shown to any other parties (except the Addressee's professional advisers acting in that capacity provided that they accept that we assume no responsibility or liability whatsoever to them in respect of the contents) unless so required by court order or a regulatory authority, without our prior consent in writing. We assume no responsibility whatsoever in respect of or arising out of or in connection with the contents of this report to parties other than the Addressees. If others choose to rely in any way on the contents of this report they do so entirely at their own risk.

Yours faithfully

Gilbert M Tonner
Managing Director

CONTENTS

1.0 INTRODUCTION

The main purpose of this visit to the Basra Production Facilities Area in Iraq was to establish the current status of the Measurement systems in place for metering Hydrocarbons in line with the Iraqi National Code for Measurement of Hydrocarbon Fluids, International Standards and good oilfield practice. The visit was carried out by Iain Pirie of KELTON® Engineering Ltd during May 2011.

2.0 SCOPE

Following on from the initial visit and subsequent meetings the detailed scope of this report is as follows:-

- Comment on the Metering Master Plan and what it would take to execute it.
- High level comments on the Iraqi National Code for Measurement of Hydrocarbon Fluids (the code).
- Review the number of meters required by the distribution company.
- Report on the following site visits.
    - Al Zubair 1 Depot.
    - Al Basrah Oil Terminal.
    - Khor Al Umayyah Oil Terminal
    - Basra Refinery.
    - Missan Refinery.

3.0 METERING MASTER PLAN

Following on from a review of the comprehensive Metering Master Plan, and the status to date, there does not appear to have been a joint operator/government discussion as to the technical approach and practicalities of installing these meters within the stated times of the plan. This has ultimately lead to a backlog, and indeed the derailment of the plan, to the point that it is now at. It is the opinion of KELTON® that the plan should have been more dynamically driven by the individual companies with directives from the government. This approach would have given the individual company ownership and control of their plans.

This approach seems to have been taken up by one of the company's visited by KELTON® during the recent visit. The South Oil Company has in place a more detailed plan which indicates when the meters are to be installed and demonstrates that they are ahead of schedule at present, but also identifies that they are going to be late in delivering the last batch of meters during December 2012, see appendix A for details.

The number of meters required to be installed by the Oil Products Distribution Company was reviewed by KELTON® and we also took into consideration the Assessment Report on the Progress in Implementing the Ministry of Oil Comprehensive Oil Metering Plan as of the 30 June 2010. There seems to be no feedback in the above report on the status of the installation of these meters and also no feedback from the Oil Products Distribution Company. KELTON® again suggest that each company be made responsible for their own plans and to give regular feedback on progress with any mitigating circumstances for failing to deliver the required meters in the required timeframe.

4.0 IRAQI NATIONAL CODE for MEASUREMENT of HYDROCARBON FLUIDS

The 1st edition of the above code, dated the 12th of October 2007 was reviewed and the following high level comments have been identified.

It is understood by KELTON® that this document was presented by the Ministry of Oil for use in Iraq. Although this is a comprehensive document and reflects the United Kingdom Department of Energy and Climate Change Guidelines, formally BERR, the KELTON® opinion is that the document should have been further developed with the Iraqi oil industry in mind. It should have also been translated to Arabic and formally disseminated to the relevant metering technical authorities within each company.

Translate into Arabic

The main reason for the translation into Arabic is the fact that the key personnel within each company have a better understanding of Arabic than English. This may serve to help the key personnel to "Buy In" to the requirements of the code.

Publicise

The Iraqi government should consider forming a "Measurement Technical Forum" or have a "Measurement Technical Workshop" in order to get the Iraqi National Code for Measurement of Hydrocarbon Fluids further developed and understood by the people that will be using it. These forums should be attended by the metering technical authorities and more importantly the people that are responsible for controlling the inventory balancing and budgets within each company.

Post Review Comment from MoO:

The code has been translated to Arabic since 2008 and an update committee has been established in order to update the code. However, it did not conclude yet. As for the measurement forum, the ministry has replied that this is being conducted through many meetings, presentations, training sessions and site visits which we were furnished with lists of such.

5.0 SITE VISITS, OBSERVATIONS & OPINIONS

5.1 South Oil Company

5.1.1 System Overview

The South Oil Company offices are located a 30 minutes drive from Basra. They are responsible for a number of measurement systems which KELTON® visited during his time in Iraq, these are; Al Zubair (1), also known as Iraq ZR1 depot, Al Basrah Oil Terminal (ABOT) and the Khor Al Umayyah Oil Terminal.

KELTON® would like to thank, Mr Wael Abdul Aziz, Mr Ahmad Jasseb Shawkat, Mr Ali Baker and Mr Haidar Sami of the South Oil Company for their valuable input and assistance during the visits to the installations.

5.2 The Iraq ZR1 Depot

5.2.1 System Overview

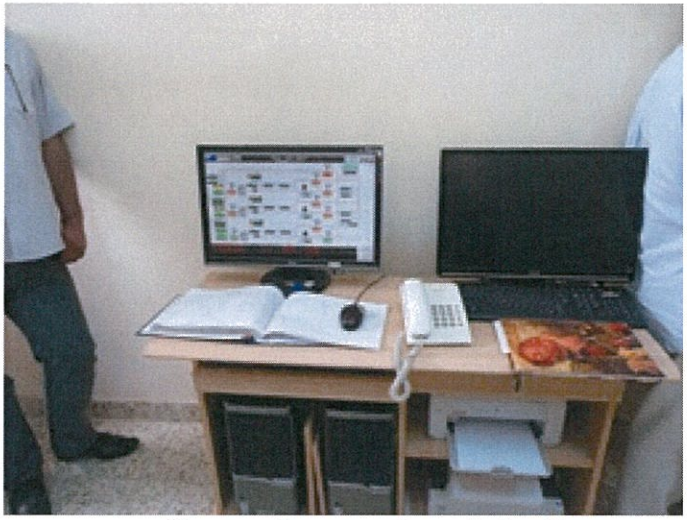
Located a further 10 minutes drive from the South Oil Company office, comprises of three (3), 10" crude oil turbine meters connected via manifolds, valves and pipework to a compact prover, for regular on line reverification of the in-use meters. It also comprises of a fully automated computer management system consisting of OMNI 6000 stream flow computers and PEG supervisory system. This measurement system measures fluids which are pumped from storage to the Basra Oil Refinery some 40 kilometres away. The system is classed as custody transfer measurement, as defined in the Iraqi National Code for Measurement of Hydrocarbon Fluids. This system, if operated and maintained properly would comply with the uncertainty requirements of a liquid system of 0.25%.

The following photographs were taken during the visit to the installation, showing the overall skid complete with compact prover, the individual Omni 6000 stream flow computers and the supervisory interface computer.

5.0 SITE VISITS, OBSERVATIONS & OPINIONS

Al Zubair 3 stream and compact prover metering skid

Al Zubair stream flow computers



Supervisor system interface

5.2.2 Observations

Following on from an observational tour of the skid and associated equipment, the following items were noted:-

- The meter skid is fully exposed to the elements which could lead to temperate gradient across the system, especially when proving.

  The operator should consider shielding the entire skid from the direct sunlight to prevent temperature gradients, or prove that they do not cause any effect to the measurement

  Post Review Comment from MoO:
  The skid was initially designed in accordance to the environmental conditions of the location in addition to that the quantities of the crude oil supplied through the skid is not affected by the change in the environment parameters as the quantities are adjusted in accordance with the original design standard temperature. Additionally, the putting a roof over the skid may block maintenance procedures.

- Not all double block and bleeds appear to have been regularly checked for leakage.

  The on-line calibration of the meters using the compact prover can be seriously affected if the valves are not checked regularly for leakage during proving operations.

- Login to the supervisory system to obtain the latest proving report was via Administrator level, the highest permission level, which can cause issue with security and configuration. It was also noted that the login and password were written on the wall above the Supervisor System Interface Computer.

  The security of the system is important and should be better defined and controlled.

- The compact prover was last calibrated in August 2008.

  Provers shall be calibrated on an annual basis, as detailed in section 7.10 Prover Calibration, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

  Post Review Comment from MoO:
  The prover was not calibrated due to the fact that the Central Measurement and Quality Control Bureau of the Ministry of Planning is the responsible party for performing the calibration which is not yet ready to handle the calibration process.

- The last prove recorded, viewed on the HMI, was on the 2nd of May 2011. This was also the report obtained in the office earlier. Apart from being 16 days since that stream had been proved it was also over 250 m3/hr different in flowrate, i.e. Prove on the 2nd of May 2011 performed at 720m3/hr while on the 18th of May 2011 at 1000m3/hr.

  It is extremely important that proving is carried out at regular intervals or when the process variables change, such as temperature, pressure, density or flowrate, as there are likely to cause a change in K-factor of more than 0.1%. There is clear guidance for this in section 7.9 Proving Regime, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

- There is no evidence of turbine meter performance monitoring in place.

  It is important to monitor the performance of turbine meters to ensure continuous good operation. "The performance of a turbine meter shall be monitored throughout its service in order to detect any short or long changes in its characteristics", further details are in section 7.9 Operation and Re-verification of Turbine Meters, of the

Iraqi National Code for Measurement of Hydrocarbon Fluids.

- No evidence of Metering Station Logbooks.

  Logbooks should be maintained at the measurement station, as detailed in section 6.1 Procedures and Work Instructions, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

- There were no maintenance procedures at the installation.

  A full set of up to date operation and reverification procedures should be maintained at the measurement station, see section 6.1. Procedures and Work Instructions, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

- The system Functional Design Specification was not available for review.

  This should be available at the measurement station, see section 6.1 Procedures and Work Instructions, of the Iraqi National Code for Measurement of Hydrocarbon Fluids for further details

5.2.3 Opinion

It is the opinion of KELTON® that this measurement station can meet the requirements of Fiscal /Custody Transfer with an increased awareness to on-going monitoring and maintenance. A selection of these are detailed in **bold** above, in section 5.2.2 of this report.

5.3 Al Basrah Oil Terminal (ABOT)

5.3.1 System Overview

Located offshore Iraq, comprises of four (4) crude oil metering systems on two platforms, Platform A and Platform B. Each platform consists of two (2), 6 Stream 10" crude oil turbine meters connected via valves and pipework to both a compact prover and master meter configuration, for regular online reverification of the in-use meters. These also comprise of a fully automated computer management system consisting of Daniel S600 stream flow computers with an Emerson Delta V supervisory system. These measurement systems are the countries main export of crude oil from storage to tankers and are classed as custody transfer measurement, as defined in the Iraqi National Code for Measurement of Hydrocarbon Fluids. This system, if operated and maintained properly would comply with the uncertainty requirements of a liquid system of 0.25%.

The following photographs were taken during the visit to the installation, showing the overall skid complete with compact prover and master meter configuration, the individual Daniel S600 stream flow computers and the supervisory interface computers.

Al Basrah Oil Terminal Platform B Metering Station

5.0 SITE VISITS, OBSERVATIONS & OPINIONS

Platform B Metering Station Compact Prover and Master Meter

Platform B Metering Station Stream Computers

Platform B Metering Station HMI

5.3.2 Observations

Following on from an observational tour of the skid and associated equipment, the following items were noted:-

- No spare thermowells were apparent in the meter streams. This can cause difficulty in carrying out maintenance tests.

  "Thermowells shall be provided adjacent to the temperature transmitters to allow temperature checks to be carried out", as detailed in section 7.4 General design and Installaion Criteria of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

- It would appear that all the prove results KELTON® reviewed were against the master meter and none against the compact prover. This suggests that this is the easier method of carrying out the proving operation and has been used as the normal method to prove.

It is the opinion of KELTON® that the master meter was designed and installed as a back-up for when the compact prover was out of service, or used on an infrequent basis. The compact prover should be the main device for reverification of the on line meters, with the master meter used as a cross check and back up.

- The compact prover has not been calibrated since the start-up of the system.

  Provers shall be calibrated on an annual basis, as detailed in section 7.10 Prover Calibration, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

  Post Review Comment from MoO:
  The compact prover was last calibrated on 12 March 2011.

- There is no evidence of turbine meter performance monitoring in place.

  It is important to monitor the performance of turbine meters to ensure continuous good operation. "The performance of a turbine meter shall be monitored throughout its service in order to detect any short or long changes in its characteristics", further details are in section 7.9 Operation and Re-verification of Turbine Meters, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

  Post Review Comment from MoO:
  The monitoring is being performed on a daily basis and its being also monitored by a third inspector "Intertech".

- No evidence of Metering Station Logbooks.

  Logbooks shall be maintained at the measurement station, as detailed in section 6.1 Procedures and Work Instructions, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

- There were no maintenance procedures at the installation.

  A full set of up to date operation and reverification procedures shall be maintained at the measurement station, see section 6.1. Procedures and Work

Instructions, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

- The system Functional Design Specification was not available for review.

  This should be available at the measurement station, see section 6.1 Procedures and Work Instructions, of the Iraqi National Code for Measurement of Hydrocarbon Fluids for further details

5.3.3 Opinion

It is the opinion of KELTON® that this measurement station can meet the requirements of Fiscal / Custody Transfer with an increased awareness to on-going monitoring, maintenance and awareness to the Iraqi National Code for Measurement of Hydrocarbon Fluids. A selection of these are detailed in **bold** above, in section 5.3.2 of this report.

5.4 Khor Al Umayyah Oil Terminal

5.4.1 System Overview

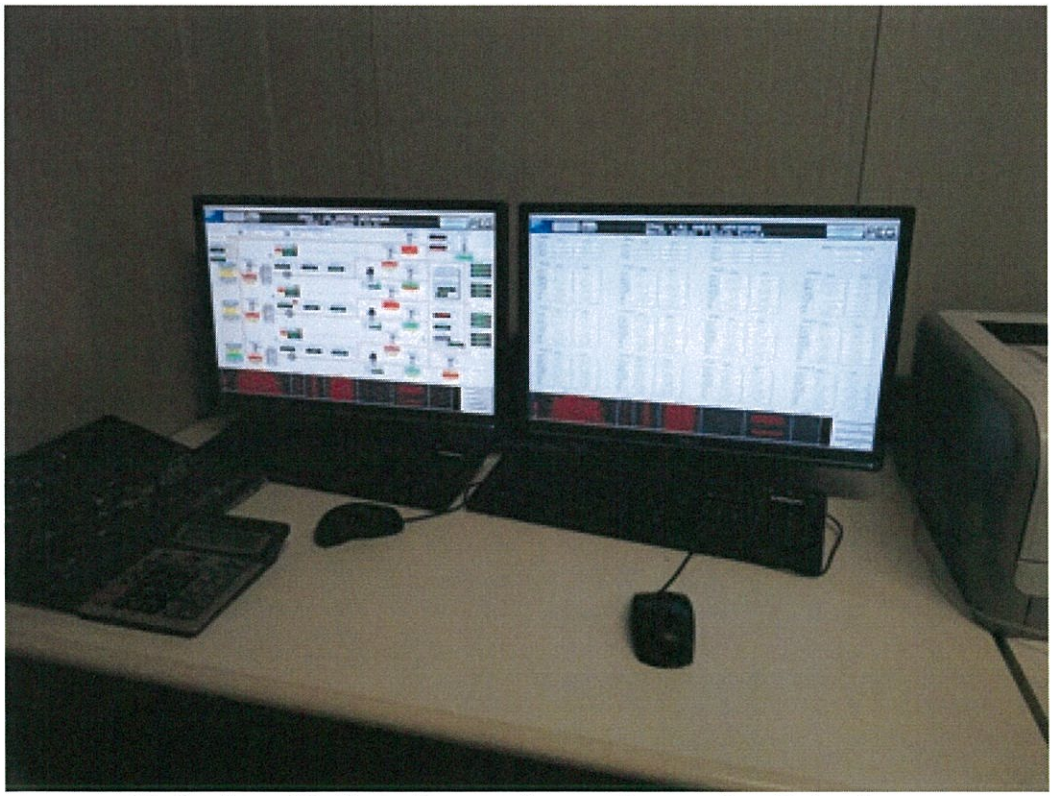
Located offshore Iraq, comprises of two (2), 6 stream 10" crude oil turbine meters connected via valves and pipework to a compact prover for regular online calibration of the in-use meters. It also comprises of a fully automated computer management system. The turbine meters are manufactured by Daniel, and feed into OMNI 6000 flow computers and a PEG supervisor system. These measurement systems are for export of crude oil from storage to tankers and are classed as custody transfer measurement as defined in the Iraqi National Code for Measurement of Hydrocarbon Fluids. This system, if operated and maintained properly would comply with the uncertainty requirements of a liquid system of 0.25%.

The following photographs were taken during the visit to the installation, showing the overall skid complete with compact prover, the individual Omni 6000 stream flow computers and the supervisory interface computer.

5.0 SITE VISITS, OBSERVATIONS & OPINIONS

Khor Al Umayyah Oil Terminal Metering Stations

Metering Station Stream Computers



Metering Station Supervisory Computer Interface

5.4.2 Observations

Following on from an observational tour of the skid and associated equipment, the following items were noted:-

- There appeared to be no cavity wall vents on any of the stream and prover isolation valves.

  It is extremely important to be able to verify the valve integrity during proving of the turbine meters to ensure good repeatability.

- The compact prover has not been calibrated since start-up of the system.

  Provers shall be calibrated on an annual basis, as detailed in section 7.10 Prover Calibration, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.
  (In this case the system has not been operational for more than a year)

- There is no evidence of turbine meter performance monitoring in place.

  It is important to monitor the performance of turbine meters to ensure continuous good operation. "The performance of a turbine meter shall be monitored throughout its service in order to detect any short or long changes in its characteristics", further details are in section 7.9 Operation and Re-verification of Turbine Meters, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

- No evidence of Metering Station Logbooks.

  Logbooks shall be maintained at the measurement station, as detailed in section 6.1 Procedures and Work Instructions, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

- There were no maintenance procedures at the installation.

  A full set of up to date operation and reverification procedures shall be maintained at the measurement station, see section 6.1. Procedures and Work

Instructions, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

- The Competence of the technician came into question when he was unable to retrieve the constants list from the flow computer when requested by KELTON®.

  The Operator should consider more training as detailed in section 6.0 Resource Management, of the Iraqi National Code for Measurement of Hydrocarbon Fluids.

- The system Functional Design Specification was not available for review.

  This should be available at the measurement station, see section 6.1 Procedures and Work Instructions, of the Iraqi National Code for Measurement of Hydrocarbon Fluids for further details

5.4.3 Opinion

It is the opinion of KELTON® that this measurement station can meet the requirements of Fiscal / Custody Transfer with an increased awareness to on-going monitoring, maintenance and awareness to the Iraqi National Code for Measurement of Hydrocarbon Fluids. A selection of these are detailed in **bold** above, in section 5.4.2 of this report.

5.5 South Refinery Company

The South Refineries Company Head Office is located some 40 Kilometres outside Basrah at the Basrah refinery. We met with the Chief Engineer for the South Refineries Company. At this meeting a status update was presented and is detailed in Appendix B. In Summary only one meter out of 21 is calibrated at the Basrah refinery and 4 at the Missan refinery. The meeting concluded with the decision to visit the Missan refinery some 200 kilometres away.

5.6 Missan Refinery

The Missan refinery imports crude oil from the Missan Pipeline Company through a Positive Displacement (PD) meter, which is the custody transfer point into the refinery and is under the jurisdiction of the Missan Pipeline Company. There are 2 meters of which only one is on line at any given time.

The refinery then processes the crude to obtain Gasoline, Diesel, Kerosene and Heavy Fuel Oil into storage vessels prior to loading to road tankers for distribution. These meters are defined as Fiscal and Custody Transfer due to the fact that the product now transfers its ownership to the Oil Products Distributions Company.

5.6.1 Replacement Coriolis Metering System

The Head of Metering for the Refinery firstly conducted a tour of the new coriolis meters and panel which are due to replace the existing PD meters for road tanker loading. At the end of the visit KELTON® were presented with all the documentation associated with this new equipment. When the head of Metering for the refinery was challenged as to when this equipment would be installed the answer was that he "did not know". On further discussions it was revealed that the original manufacturer and supplier of the company were requesting too much money to install the equipment and the Refinery staff did not have the required competencies. The project to install these meters is at present out to open tender to resolve this issue.

The equipment has been on site for a considerable length of time already, to the point that the certification for the coroilis meters has already expired (March 2010).

Due to the on going issues of being unable to maintain and keep the existing PD meters operational, it is essential that these new meters and control system be given the utmost priority for installation and operation.

5.0 SITE VISITS, OBSERVATIONS & OPINIONS

Post Review Comment from MoO:

The PD meters belong to Missan Oil Company and they will be replaced by Ultrasonic meters in August 2011, and for the Coriolis meters, they will be installed after finalizing the tender awarding process to Emerson Company and 18 weeks after opening the letter of credit to the company.

New Corilos Meters and Panel

5.6.2 Inlet Meters

Each meter seemed to be in a good condition, operational with only a slight gland leak at the inlet to the operational stream. This should be repaired as, not only is someone losing oil and therefore revenue, it is also harmful to the environment.

Missan Refinery Inlet Meters

We were also shown a new skid mounted import system, purchased from FMC. This consisted of a Liquid Ultrasonic Meter with a "Z" configuration pipework to allow cross checking using a Master Meter. This skid is owned by the Missan Pipeline Company who, again should prioritise the installation of this skid as soon as possible.

Post Review Comment from MoO:
The skid belongs to Missan Oil Company and it will be installed during August 2011 after the concrete base is built.

New Missan Refinery Inlet Metering Skid

5.6.3 Export or Tanker Loading Meters

Following an observational tour of the delivery meters, it is obvious that they are in a bad state of operation and repair, with the following issues noted:-

Heavy Fuel Oil Meters FQ24-1&2

Non-operational and leakages from various areas. These are Custody Transfer / Fiscal meters and a *ticket* generator for the truck driver.

This leaves the refinery exposed as to how much has been delivered and the distribution company exposed as to how much they have received.

The worst case would be if a road truck was loaded up and that it was not accounted for anywhere, as I do not see any checks and balances throughout the operation. Even during our walk about we witnessed the fact that the heavy Fuel Oil Storage Vessels regularly overflow, again a loss to the refinery operator.
Following the review of the calibration results for these meters it is obvious that the heavy Fuel Oil causes issues with the PD meters, with the first calibration run being nearly 2% out and the meter gradually getting better as the meters are flushed out with the calibration fluid, Gas Oil. See Appendix C. This would indicate that the meters may in fact seize up between tanker loads due to temperature drop and the viscosity of the product.

Heavy Fuel Oil meters FQ24-1 & 2
(Note the one on the left by-pass valve clean and blue handle, suggesting it is always the by-pass that's used)

It is obvious that these meters are not fit for purpose and should be replaced as soon as possible because the product is not being metered into the distribution company road tankers

Post Review Comment from MoO:
The Storage Vessel mentioned is now out of service and it was replaced with a new tanker of 5000 cubic meters tanker.

Post Review Comment from MoO:
For the meters that were not fit for purpose: these are the Naftha meters and they are out of service due to the fact that they are not in order and they will be returned back to stores due to this fact.

Kerosene Meter FQ22

This meter has been in service since they were last calibrated and shows no sign of any problems with the by-pass sealed with wire and lead seal. It would appear from the records that this meter was last calibrated on the 17th of November 2009.

Post Review Comment from MoO:
Kerosine meters were calibrated on 12 February 2010.

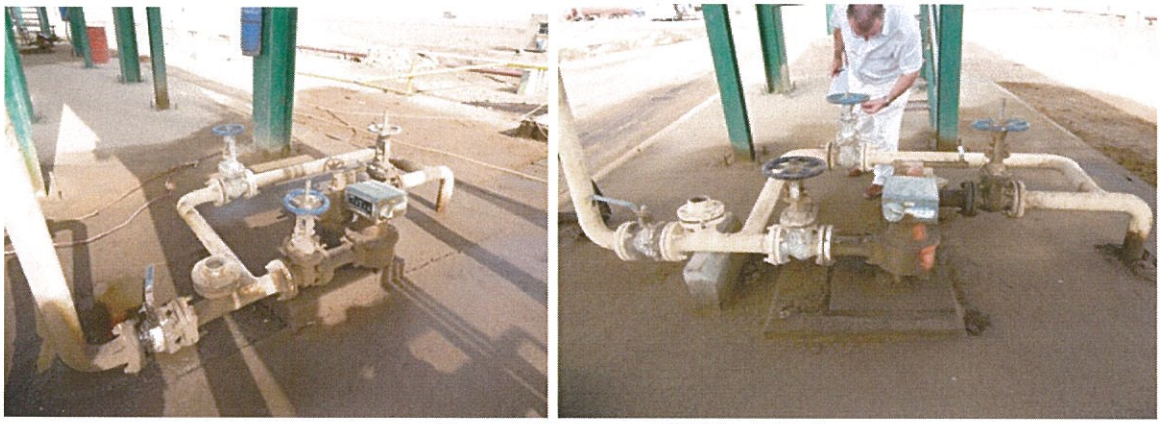
Kerosene Meter FQ22

5.0 SITE VISITS, OBSERVATIONS & OPINIONS

Diesel Meters FQ23-1&2

These meters have been in service since they were last calibrated and show no sign of any problems. By-pass sealed with wire and lead seal. It would appear from the records that these meters were last calibrated on the 21st of January 2010.

Post Review Comment from MoO:
Diesel meters were calibrated on 21st January 2010 and 22nd August 2010.

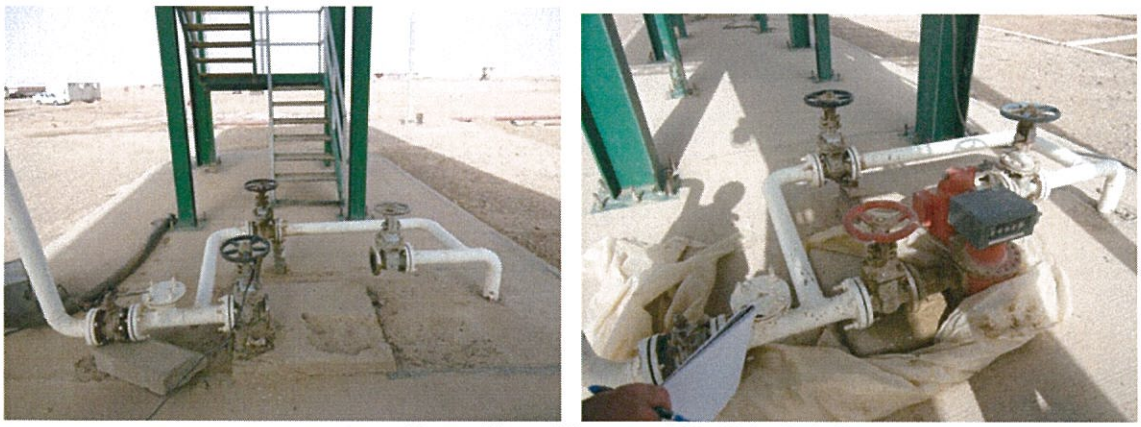


Diesel Meters FQ23-1 & 2

Gasoline Meters FQ21-1&2

These meters have been inoperable for some time with no spare meters available to replace them. They are not metering the Gasoline being loaded into the distribution company road tankers.

These meters should be replaced as soon as possible



Gasoline Meters FQ 21-1 &2

Storage Vessels

Whilst carrying out the review of the product meter it could be seen that there have been several instances of the heavy Fuel Oil overflowing these vessels.

Missan Refinery Storage Tanks

5.6.4 Opinion

It is the opinion of KELTON® that the Missan refinery requires a lot of effort to get anywhere close to the requirements of the Iraq National Code for Measurement of Hydrocarbon Fluids.
There seems to be a lack of focus, drive and commitment on the requirements to measure fluids being discharged from the refinery to the road tankers. In some cases no measurement has taken place for some time. They have made progress with the order and delivery the new meters but I am not sure if they are the correct meters for the job and that they have indeed been engineered properly. KELTON® believes that this project would have been better suited to a skid mounted arrangement and a full turn-key order to install and make operational.

There is also the issue of the over flowing tanks which suggest poor operational control.

KELTON® also believes that this operation could benefit from a Hydrocarbon Allocation and Product balancing system. This would cover metered oil in and product metered going out of the refinery, and may lead to make the people more responsible for the output of these systems.

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APPENDIX A

SUMMARY of METERING PLAN for CUSTODY TRANSFER SOUTH OIL COMPANY

APPENDIX A

South Oil Company Summary of Metering Plan for Custody Transfer

Already Installed	Planned for year 2011	Planned for year 2012	*Total*
44	67	26	*137*

Notes:

a) The already installed meters (44 meters) represent the meters installed in the following location:
   - 24 meters at Basrah Oil Terminal
   - 12 meters at Aumayah Oil Terminal
   - 5 meters at PS1 Depot for the crude oil supplied to the beneficiary of the north strategic pipeline
   - 3 meters at Zubair 1 Depot for the crude oil supplied to Basrah Refinery

b) The planned meters for year 2011 (67 meters) represent the following:
   - 31 meters for the crude oil at the output point of the degassing stations
   - 36 meters for the natural gas at the output points of South Oil Company

c) The planned meters for year 2012 (70 meters) represent the following:
   - 5 meters for the gas utilized in turbine processing.
   - 8 meters for the crude oil at the inputs and outputs of the depots for the crude oil transferred between the depots.
   - 13 meters for the gas utilized for the flame at the degassing station at all South Oil Company sites.

d) Station for proving will be installed in SOC area during end of 2011 that contains one mobile prover and a fixed prover.

South Oil Company Metering Plan Execution Schedule

Sequential #	Planned Date	Number of Meters	Percentage of Total Remaining Plan	Location and Notes
1	September 2011	2	1.4%	Crude Oil meters at the output of Lahis Atawi degassing stations
2	October 2011	2	1.4%	Crude Oil meters at the output of DS1 and DS2 degassing stations
3	November 2011	3	2.2%	Crude Oil meters at the output of

APPENDIX A

				DS3, DS4 and DS5 degassing stations
4	December 2011	60	44%	a - Crude Oil meters at the output of the remaining degassing stations (24 meters). b - Natural Gas meters supplied for the beneficiaries at the supplying outputs (36 meters)
5	November 2012	13	9%	a - Gas meters for the gas utilized in turbine processing (5 meters) b - Meters for the crude oil at the inputs and outputs of the depots.
6	December 2012	13	42%	Meters for the gas utilized for the flame at the degassing station at all South Oil Company sites.
		137	100%	

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APPENDIX B

SUMMARY of METERING PLAN for CUSTODY TRANSFER SOUTH REFINERY COMPANY

South Refineries Company

Depatment of Metering and Custody Transfer measurement

Sequential #	Meter Type	Calibration Status	Manufacturer	Quantity	Location	To be supplied to	Oil Product	Fiscal or Custody Transfer
1	Coriolis	Un-Calibrated	Micro Motion	1	Basrah Refinery - Light Oils	Pipeline Company - Al Shoaiba Depot	Gasoline	Fiscal Transfer
2	Coriolis	Un-Calibrated	Micro Motion	1	Basrah Refinery - Light Oils	Pipeline Company	Gasoline	Fiscal Transfer
3	Coriolis	Un-Calibrated	Micro Motion	1	Basrah Refinery - Light Oils	Pipeline Company - Al Shoaiba Depot	Kerosene	Fiscal Transfer
4	Coriolis	Un-Calibrated	Micro Motion	1	Basrah Refinery - Light Oils	Pipeline Company	Kerosene	Fiscal Transfer
5	Coriolis	Un-Calibrated	Micro Motion	1	Basrah Refinery - Light Oils	Pipeline Company - Al Shoaiba Depot	Diesel	Fiscal Transfer
6	Coriolis	Un-Calibrated	Micro Motion	1	Basrah Refinery - Light Oils	Pipeline Company	Diesel	Fiscal Transfer
7	Coriolis	Un-Calibrated	Micro Motion	1	Basrah Refinery - Light Oils	Pipeline Company - Al Shoaiba Depot	Fuel Oil	Fiscal Transfer
8	Coriolis	Un-Calibrated	Micro Motion	1	Basrah Refinery - Light Oils	Pipeline Company - Export Deparment	Fuel Oil	Fiscal Transfer
9	Coriolis	Un-Calibrated	Micro Motion	1	Basrah Refinery - Light Oils	Returning to Zubair 1 Depot (South Oil Company)	Fuel Oil - Waste	Fiscal Transfer
10	Coriolis	Un-Calibrated	Micro Motion	1	Basrah Refinery - Light Oils	Strategic Pipeline - South Oil Company	Fuel Oil	Fiscal Transfer
11	Coriolis	Un-Calibrated	Micro Motion	2	Basrah Refinery - Loup oils	Oil Products Distribution Company	Ready Oils	Fiscal Transfer
12	PDM	Calibrated	Smith	1	Basrah Refinery - Loup oils	Oil Products Distribution Company	Ready Oils	Fiscal Transfer
13	Coriolis	Un-Calibrated	Micro Motion	6	Basrah Refinery - Loup oils	Oil Products Distribution Company	Asphalt	Fiscal Transfer
14	PD Meter	Calibrated	Smith	2	Missan Refinery	Oil Products Distribution Company - Missan Branch	Gasoline	Fiscal Transfer
15	PD Meter	Calibrated	Smith	1	Missan Refinery	Oil Products Distribution Company - Missan Branch	Kerosene	Fiscal Transfer
16	PD Meter	Calibrated	Smith	2	Missan Refinery	Oil Products Distribution Company - Missan Branch	Diesel	Fiscal Transfer
17	PD Meter	Calibrated	Smith	2	Missan Refinery	Trucks (tanks) related to Oil Products Distribution Company	Fuel Oil	Fiscal Transfer
18	Weighing Bridge	Calibrated	Molen	1	Thi Kar Refinery	Oil Products Distribution Company	Asphalt	Fiscal Transfer

Sequential #	Meters Type (Tank Prover, Master Meter, Small Volume Prover, Loop Prover)	Calibration Status	Manufacturer	Quantity	Location	To be supplied to	Oil Product	Fiscal or Custody Transfer
	NONE							

Total Turbine & PD Meters	26
Total Weighing Bridge	1
Total Meters	27

Notes:

1- 18 Coriolis meters at Basrah Refinery had been operned in order to be calibrated later on at the manufacturer as per purchase order number 5026

2- One meter Smith at sequential number 12 above is ro be replaced by a Coriolis meter

3- 7 Smith meters will be replaced by Coriolis meters as per contract number 4913

KELTON®

APPENDIX C

MISSAN REFINERY
FUEL OIL METER CALIBRATION REPORT

Point 2

ملحق (٢) شهادة معايرة

FQ 24-2 نفط اسود **sn.18XM76132**

وزارة النفط
شركة خطوط الانابيب النفطية
قسم العدادات وقياسات نقل الملكية

الموقع/ افرع تحميل الشعيبة
رقم العداد موقعيا/ عداد تابع الى شركة مصافي الجنوب/ قسم مصافي ميسان
تاريخ المعايرة / ٢٦ / ١٠ / ٢٠٠٩
تاريخ المعايرة السابقة/ / ٩ / ٢٠٠٩

شهادة معايرة عداد (التحميل/التفريغ) باستخدام الكيلات الحجمية

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
95185	5000	غير مصحح √	مصحح	18XM76132		0,6929	Gasoline

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
5000	5000	5000	5000	LITRE	الكمية المجهزة للكيلة	1
38	38	36	36	C	معدل درجة حرارة الكيلة	2
1.0011	1.0011	1.00107	1.00107	CTSp	معامل التصحيح الحراري للمعدن ctsp=(1+k(T-15),K=0.000051	3
0.9685	0.9685	0.9713	0.9713	CTLP	معامل التصحيح الحراري للمائع في الكيلة	4
4847,8267	4847,8267	4861,6964	4861.6964		حجم الكيلة المصحح =(الفقرة 1)× CTSp×CTLp	5

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
78185463	78180462	78175485	78170575	LITRE	القراءة الابتدائية للعداد	6
78190468	78185463	78180462	78175485	LITER	القراءة النهائية للعداد	7
5005	5001	4977	4910		القراءه الحقيقية للعداد= القراءة النهائية – القراءة الابتدائية	8
38	38	36	36	C	حرارة العداد	9
1.75	1.75	1.75	1.75	Kg/cm^2	ضغط العداد	10
0.9685	0.9685	0.9713	0.9713	CTLM	معامل التصحيح الحراري للمائع في العداد	11
1.000295	1.000235	1.00029	1.00029	CPLM	معامل التصحيح الضغط للمائع في العداد	12
4848.7724	4844.8973	4835.5620	4770.4660		حجم العداد المصحح =(الفقرة ٨)× CPLM×CTLM	13
0.01	-0.06	-0.53	-1.87		النسبة المئوية للخطا %= (حجم العداد المصحح / حجم الكيلة المصحح -١)× 100	14

ملاحظات:
تمت عملية المعايرة بتصحيح قراءة العداد بواسطة جهاز منظم الكميات حيث يعتبر (معامل العداد=١)(Meter Factor=1).
١- يتم احتساب النسبة المئوية لخطأ العداد في محاولة التعيير الاخيرة او معدل محاولات التعيير الاخيرة التي لم يحدث فيها تغيير بواسطة منظم الكميات (Calibrator) علما ان نسبة الخطأ المقبولة يجب ان لا تتجاوز (٠،١٥%).

نتائج:
العداد صالح للعمل وضمن مدى الدقة ☑
العداد غير صالح للعمل ويحتاج الى صيانة ☐

رقم الختم للعداد: (٣٢٣٦٩٣)

[illegible]	[illegible]	[illegible]
التوقيع:	التوقيع:	التوقيع:
الاسم: [illegible]	الاسم: [illegible]	الاسم: [illegible]
عنوان الوظيفة: [illegible]	عنوان الوظيفة: [illegible]	عنوان الوظيفة: [illegible]
التاريخ: / ١٠ / ٢٠٠٩	التاريخ: / ١٠ / ٢٠٠٩	التاريخ: / ١٠ / ٢٠٠٩