

# Executive Summary



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## Introduction

Oil and Natural Gas Corporation (ONGC) Limited (the Company) is an integrated oil exploration and production company. The Company conducts its exploration activities through 'Basins' and production activities through 'Assets'. Presently, the Company has 13 crude oil producing Assets both in offshore and onshore areas.

## Production of crude oil in Mumbai offshore

The well fluids from the offshore well head platforms are transported to the process platforms through subsea well fluid lines. At the process platform, the well fluids are separated into crude oil, gas and water. The separated, partially stabilized, crude oil is then pumped through the trunk lines to the onshore terminal (Uran) for further processing/stabilization before sale to consumers. The partially stabilised crude oil dispatched to Uran plant is measured using Turbine Meters (TM) at the outlet of the process platforms. This is the 'wet crude'. The water content in the crude is separately measured using Auto Samplers. The 'wet crude' is adjusted for the water content, so measured, to arrive at the 'dry crude' dispatched from the offshore terminal which is reported as the crude oil production from Mumbai offshore.

## Production of crude oil in onshore areas

Emulsion along with associated gas produced from the wells is collected at Group Gathering Stations (GGS)/Early Production Systems (EPS) through flow lines/tankers. The liquid so received at GGS/EPS is processed through a separator where liquid and gas is separated. The separated liquid (emulsion) is stored in tanks and after stabilisation, free water is drained out. For GGS/EPS without processing facility, the emulsion is transported to the designated processing installation. The processing installations will process the emulsion through Heater Treater by adding demulsifier to separate water and crude oil. The separated crude oil is stored in oil tanks at the respective processing installation and after stabilisation, further free water, if any, is drained out and crude oil with desired quantum (0.2 per cent) of basic sediment and water (BSW) is dispatched to refineries through trunk pipelines.

The Base office of the Asset collates the information from all processing installations in the Asset and prepares the Daily Production Report (DPR) for the Asset. The quantum of crude oil recorded in the DPR is reported as the production of the onshore Asset.

## Highlights

- i. ONGC defines 'condensate' as liquid hydrocarbons produced with natural gas, separated by cooling and other means. 'Condensate' is distinct from crude oil, being produced from gas fields. Inclusion of 'condensate' quantity as crude oil

production is neither in line with international reporting systems nor with the practice followed by domestic JVs, in which ONGC has participating interest. International consultants, M/s DeGolyer and McNaughton (D&M), appointed by ONGC in 2011-12, had pointed out that ‘condensate’ is reported as a separate stream wherever there is a gas processing plant. ONGC itself treats ‘condensate’ as natural gas while paying royalty to Government on its production yet reports it as crude oil production which overstates the crude oil production quantum.

**(Paragraph 3.1.)**

- ii. The PNG Rules 1959 and the Oil Industry (Development) Act, 1974 define ‘crude oil’ as “*petroleum in its natural state before it has been refined or otherwise treated but from which water and foreign substances have been extracted*”. The performance contract by which the Company internally sets crude oil production targets for individual assets, inter alia, defines crude oil production as ‘the quantity after adjustment of Basic Sediment and Water (BS&W)’. The reported production in offshore areas is of partially stabilised crude oil, despatched from the offshore platforms before removal of off gas and Basic Sediment and Water. Inclusion of off-gas and BS&W, therefore, overstates the crude oil production of the Company.

**(Paragraph 3.2. and 3.3.)**

- iii. Crude oil from the offshore platform is despatched to Uran through two pipelines, Mumbai-Uran Trunk line (MUT) and Heera Uran Trunk line (HUT). At both points, the crude oil is measured by Turbine Meters (TM). Test check of the measurement data (from August 2014 to August 2015) from Turbine Meters (at the offshore outlet and Uran inlet) indicates that for both MUT and HUT pipelines, the crude measured by TMs at offshore platform was consistently higher than that measured at Uran inlet; the average difference being 4.57 *percent* for MUT and 3.09 *percent* for HUT pipelines. Considering that the measurement by both meters were taken under the same conditions of temperature (15°C/60°F) and pressure, the volumes measured at both ends of the pipeline ought to be identical. This leaves open the likely possibility of human error in measurement/reporting at either or both ends.

**(Paragraph 3.5.)**

- iv. Uran plant maintains electronic and physical logs of the measurements of receipt of crude oil. However, at the offshore platform, no logs (either electronic or physical)

were maintained even though the flow computers have provisions for the same. In the absence of audit trail, the accuracy of this production data could not be verified. Considering the significant difference recorded in transit of crude oil by the MUT and HUT pipelines and no other justification for the same, the concern that the production recorded manually was inaccurate/over-stated could not be ruled out. The water content in the crude oil measured (Jan 2015 – August 2015) in offshore platform was consistently lower than that in the crude receipt at Uran, the average difference being 0.81 percent for MUT and 1.65 percent for HUT pipelines. In 2003, ONGC had appointed a consultant, M/s IHRDC regarding the reconciliation differences who had opined that the consistent trend of discrepancy points to un-representative sampling on part of ONGC. Audit analysis indicated that the situation has persisted for over a decade without being addressed by the Company.

**(Paragraph 3.6.)**

- v. There was no standard operating procedure for measurement of crude oil in onshore assets. As such, different onshore assets measure production at different points of the value chain and use different set of measurement techniques for the purpose.

**(Paragraph 4.1.)**

- vi. In Ankleshwar asset, the Daily Production Reports (DPRs) communicated to the base office of the Asset was much higher than the data maintained in the physical log books of the installation. In Ahmedabad asset, the quantity reported by the Asset office was much higher than the data communicated by the processing facilities to the Asset office. In Mehsana asset, the DPR reported a calculated production data which was higher than the actual production quantity recorded separately by the Asset. The net effect in all three assets was reporting of production that was higher than the actual/measured production.

**(Paragraph 4.2.)**

- vii. Crude oil is used by the asset in work over operations for hot oil circulation/squeezing jobs to improve productivity of sick wells. In such cases, a part of the crude oil is recoverable subsequently from the well. All Western onshore assets used to treat the entire quantity used for hot oil circulation/squeezing jobs as internal consumption. Recoverable crude oil thus treated as production led to possibility of double measurement.

**(Paragraph 4.3.)**

- viii. Ahmedabad asset recognised significant quantity of pit oil as closing stock (accumulated from 2006-07 to 2009-10). While this increased the production quantum for crude oil, the asset did not value this stock in the books of accounts and the closing stock quantity pertaining to pit oil was gradually written off.

**(Paragraph 4.4.)**

- ix. Ankleshwar, Rajahmundry and Cauvery assets have reported significant water drainage after processing and before custody transfer to the refinery. Such a high quantity of water drainage, post processing, raises doubt on the efficiency of the processing installations and contributed to overstatement of crude production.

**(Paragraph 4.5.)**

- x. Ankleshwar asset had over-reported production significantly and to adjust this, it reported a much higher quantum of crude oil theft than actual theft of 550 litres. The asset showed a pipeline leakage of 3556 MT which the asset later accepted was to adjust the over-reporting of crude oil. The asset also over-stated the closing stock of crude oil at processing installations by introducing water/effluent in the closing stock taken at financial year end (31<sup>st</sup> March) and then drained the water in April. This was done to adjust the excess production reported by the asset. Similarly, it was noticed that the closing stock (31<sup>st</sup> March) in one of the processing installations of Assam asset had significant quantum of water which was drained in April for two years, 2013-14 and 2014-15, leading to an over-statement of closing stock, thereby over-stating the crude production.

**(Paragraph 4.6. and 4.7.)**

- xi. Audit noticed various shortcomings in the measurement system of crude oil in ONGC. Tank calibration was not carried out every five years as mandated in ONGC. In fact, most of the 120 tanks in Assam asset had not been calibrated or cleaned after commissioning in 1970s. ONGC implemented the Supervisory Control and Data Acquisition (SCADA) system in March 2008 at a cost of ₹385 crore. Though SCADA system had been installed in most installations and tanks, the same is not being used for reporting. Manual tank dips continued to be resorted to. In Assam asset there were differences in log book and SAP data. SAP ERP has production revenue accounting (PRA) module capable of generating the DPR from the stock positions, liquid received and despatched at the processing installations. It was however noticed that in Western onshore assets, DPR was generated manually outside Production Revenue Accounting module of SAP.

**(Paragraph 4.8.1. to 4.8.4.)**

- xii.** ONGC signs a MoU with MoPNG regarding performance of the company in which crude oil production by the company is a key performance indicator. By including BS&W of 3.9 per cent, off-gas of 1 per cent, and recoverable internal consumption of 0.12 per cent, the production performance was over stated. If the actual crude oil production was reported, the company would not have met its crude oil production targets in any of the years (2010-11 to 2014-15). As performance related pay (PRP) of its employees is related to achievement of production targets, actual production reporting would have resulted in lesser pay-outs of ₹106.51 crore of PRP to the employees. Condensate was also included in the crude production incorrectly.

**(Paragraph 5.1.)**

- xiii.** The subsidy burden of up-stream companies since 2011-12 was determined as a function of reported production of crude oil. ONGC has borne a subsidy burden of 56 USD per barrel of its total production of crude oil. By over-reporting its production of crude oil, ONGC has borne additional burden of ₹18626.74 crore during the period from 2011-12 to 2014-15. Further, over reporting of production in Ankleshwar and Assam Assets (inflating closing stock) has resulted in additional subsidy burden of ₹160.69 crore.

**(Paragraph 5.2.)**

The following recommendations are suggested for improvement in the crude oil production measurement and reporting system.

- The loss/gain during transportation of crude oil through closed pipeline systems should be closely monitored to ensure that the variations are in normal range and identify abnormal loss/gain for corrective action. Such reconciliation and monitoring as well as corrective actions taken should be adequately documented.
- Asset-specific Standard Operating Procedures (SOPs) for measurement of crude oil production may be formulated and implemented in all onshore Assets in a time-bound manner to ensure that uniform measurement practices are followed across all production installations of the Company. Asset specific guidelines for segregating internal consumption of crude oil into 'recoverable' and 'non-recoverable' may be designed and 'recoverable' quantum may not be included as crude oil production. Norms for crude oil transit loss should be fixed and cases of abnormal transit loss should be investigated and remedial action taken to prevent revenue loss.
- The Company should strictly adhere to prescribed schedules laid down for calibration of all crude oil measuring devices, such as storage tanks and Mass Flow Meters, Turbine Meters, Auto Samplers, etc. in both offshore and onshore Assets to ensure accuracy of their measurement.

- Electronic and physical trails in support of measurement of crude oil at various stages of production should be maintained to derive assurance regarding their accuracy. SCADA installed in all production installations may be integrated with ICE-SAP ERP system for capturing data and to minimise manual intervention and improve accuracy of reported information. The production reports for onshore Assets should be generated through the SAP-PRA module, in line with the practice in offshore Assets, to preclude the possibility of their manual manipulation.
- The Company may report condensate as a separate stream as opined by the international consultant.
- The Company may ensure that items other than crude oil, namely, condensate, off-gas, basic sediment and water, etc., may not be reported as crude oil production. Considering the difficulties expressed by the Management/Ministry in accurately measuring the crude oil at the production point, there appears to be a case for shifting the production reporting point to a suitable location where stabilized crude (excluding BS&W, off-gas and condensate) can be accurately measured.