**Well: DA#3 (ADC)**

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| **General Well Data** | | | | | | |
| Well Name | | | | :DA#3 (ADC) | | |
| Field/Structure | | | | :Agartala Dome | | |
| Well Type | | | | :Exploratory Step Out | | |
| Target Depth | | | | :3500 m (Depth was increased to 3700m as desired by Director(E) to test lower horizons, as encountered in AD#2 well.) | | |
| Drilled Depth | | | | : 3721.97 m (Logging) | | |
| Rig | | | | : ARMCO-1320-UE-II | | |
| Location | | | | : Latitude - 23º45′27″ N  Longitude - 91º19′48 ″ E | | |
| Elevation | | | | : GL- 52.503 m  KB- 60.201 m | | |
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| **Operations at a Glance:** | | | |  | | |
| Drilling Rig (Rig-ARMCO-1320-UE-II) | | | | :06.02.1988 to 10.08.1988 | | |
| 1st Work Over Job (Rig- IR-500-I) | | | | :02.01.1992 to 11.05.1992 | | |
| 2nd Work Over Job (Rig- IR-500-I) | | | | :11.11.1993 to 17.03.1994 | | |
| 3rd Work Over Job (Rig- IR-500-I) | | | | :24.01.2010 to 27.02.2010 | | |
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| **Casing Details:** | | | | | | |
| **Casing Size (Inches)** | **Shoe at (m)** | **Cement Rise** | | **Grade & Thickness** | **Remarks** | |
| 13⅜ | 398.4 | Upto surface | | C-95, 68ppf, BTC | - | |
| 9⅝ | 1721.0 | 600m from surface | | N-80, 46ppf, BTC  K-55, 46ppf | - | |
| 5½ | 3694.2 | 3050m from surface | | N-80, 23ppf, LTC | - | |

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| **Operation with drilling rig (**06.02.1988 to 10.08.1988**)**  **Rig:** ARMCO-1320-UE-II  **Objective:** To explore and evaluate the hydrocarbon prospect of the Surma sequence of the rocks.  Five objects in this well were found interesting out of which four objects, two in lower Bhuban and Two in Middle Bhuban Formation (all below PA-60) were tested. Object-I, II and IV produced water with minor gas. Object-III gives poor influx of water. Testing of Object-III and Object-IV were not conclusive and decided to test again with workover rig. | | | |
| **Object** | **Sand** | **Interval (mMDKB)** | **Testing Result** |
| Object-I |  | 3708-3704, 3700-3688 | Minor gas with 3.0m3 of water. Salinity of formation water- 7.6gm/lt.  Reservoir Pressure- 488Kg/cm2 (??) Reservoir Temperature- 245ºF  **Cement plugged with top at 3649.89 m** |
| Object-II |  | 3624-3650 | Minor gas with 0.8m3 of water. Salinity of formation fluid- 5.6gm/lt.  **Cement plugged with top at 3578m** |
| Object-III |  | 3555-3561 | Very poor influx of water |
|  |  | 3500-3506 | Testing Skipped |
| Object-IV |  | 3202-3210 | Minor gas with 36m3 of water. Salinity of formation water- 8.19gm/lt. Reservoir Pressure- 347Kg/cm2.  **Cement plugged with top at 2913.37m** |
| **Status of well:** Cement plugged with cement top at 2913.37m. | | | |

**Initial Production Testing:**

After drilling a depth of 3707m, logs were recorded and actual depth of the well DA#3 was found to be 3721.97m. Production casing was lowered and cemented. Cement was cleared up to 3689m and CBL-VDL log was recorded. Negative test was carried out and casing was found to be hermetically sealed. Though the cement top was at 3689m as per tubing tally, during the perforation of Object-I with N-N log control, the logging tool went smoothly up to 3710m and perforation was carried out.

**Object-I:**

This object was perforated in the interval 3688.0-3700.0m & 3704.0-3708.0m @12SPM in the mud of sp. gr.1.28. After applying compressor and observing for 20hours, well indicated influx of about 3.0m3 water with feeble gas. However no flow of gas was observed later on. Reservoir pressure was recorded as 488Kg/cm2 (??) and reservoir temperature was recorded as 245ºF. Object-I was isolated by placing cement plug with top at 3649.89 m.

**Object-II:**

This object was perforated in the interval 3624.0-3650.0m @12SPM. The well was activated with the compressor application of 110Kg/cm2. Negligible influx of water @0.7m3/d with minor gas was observed. Object-II was isolated by placing cement plug in the interval 3553.0-3639.0m with top at 3578m.

**Object-III:**

This was perforated in the interval 3555.0-3561.0m @10SPM. There was no influx even after compressor application up to 110Kg/cm2. The well was killed with mud of sp. gr. 1.30.

**Object-IV:**

This was perforated in the interval 3202.0-3210.0m @12SPM. Object-IV was isolated by placing cement plug in the interval 2900.08-3000.08m with top at 2913.37m.

It was suspected that lower water bearing layers might have contributed water through channeling behind casing, as cement bonding was poor in the interval 3215-3555m. After detection of water source, repair of cement bondage if any and testing of the Object-III with higher draw-downs were a lengthy process, the deep drilling rig was released by placing a cement plug with top at 2913.37m.

**1st Workover operation: Rig: IR-500-I (02.01.1992 to 11.05.1992)**

**Objective:**

1. To retest Object-III with additional perforation in the interval 3564.0-3568.0m & re-perforation of the interval 3555.0-3561.0m.
2. To retest Object-IV.

**Operations:**

After the deployment of the work over rig, cement plug was cleared up to 3582.49m and the well was scrapped twice to clean the well. Additional perforation of Object-III in the interval 3564.0-3568.0m and re-perforation in the interval 3555.0-3561.0m were carried out. Tubing string with retrievable packer, landing nipple, blanking plug, sliding sleeve and tail pipe was ran in and packer was set at 3529.24m. Wireline job to release bottom plug could not meet with success, so packer was released and the string was pulled out. Same exercise was repeated without any success.

After pulling out, the blanking plug, nipple and packer was found to be filled with barytes. Ran in with open end tubing and cleared the hole with thorough circulation. Ran in with a new packer and down hole assembly and set packer at 3520.76m. Though prong was removed by wireline job, the blanking plug could not be removed. While attempting to open the sliding sleeve, wire snapped. The string was pulled out and wireline tools and assembly was recovered.

Finally, ran in to 3545.91m with open end and compressor was applied thrice up to 120Kg/cm2, but no surface activity was observed. As it was not possible to give more draw down with the available equipment's, test was called off and the well was killed with mud of 1.36 sp. gr. Work over rig was released on 11.05.1992.

**Status of well:** Testing of the Object-III (**Perforation interval:** 3564-3568m (Additional perforation) and 3555-3561m (re-perforation)) remained inconclusive as desired draw down could not be achieved with existing facility and Object-IV was not retested. The well was killed with mud of sp. gr. 1.36.

**2nd Workover operation: Rig: IR-500-I (11.11.1993 to 17.03.1994)**

**Objective:**

1. To confirm the potential of the Object-III.
2. To retest the Object-IV.

**Operations:**

**Re-testing of Object-III:** The hole was cleared up to 3581m. Object-III was re-perforated in the interval 3564.0-3568.0m and 3555.0-3561.0m. Tubing was ran in with DST assembly and packer was set at 3544m. Object-III was tested with 250Kg/cm2 draw down but there was no influx. Testing of Object-III was concluded.

**Testing of Object-IV:** After isolating the Object-III with a cement plug, perforated the casing in the interval 3236.0-3237.0m. Block cementation was carried out to isolate the water bearing layers below the Object-IV and to improve cement bondage. Cement retainer was set at 3228m and injectivity was tested at 160Kg/cm2 surface pressure, but no injectivity was found.

Object-IV was perforated in the interval 3202.0-3210.0m. DST packer was set at 3190m and a draw down in the tune of 150Kg/cm2 was applied. After 6Hrs. well started flowing saline water @5liters/min. with negligible dissolved gas. Water salinity was constant as 12gm/litre. Testing of Object-IV was concluded. After placing abandonment plug work over rig was released on 17.03.1994.

**Status of well:** Object-III: Dry and Object-IV: Water bearing, **Abandoned the Well**

**3rd Workover operation: Rig: IR-500-I (24.01.2010 to 27.02.2010)**

**Objective:** Completion as effluent disposal well and testing the injectivity of non-hydrocarbon bearing sandstone layers developed within the Bokabil Formation.

**Background:** ONGC, Tripura Asset has four **Gas Collecting Stations** (GCS) where effluent/ produced water is separated out along with condensate while processing *Natural Gas* being produced from wells of different fields. Corresponding to present gas production of around *1.47 MMSCMD*, effluent produced is approximately *12 m3/day (Max-18 m3/day).* Presently this effluent is being disposed off by natural & gas assisted evaporation. With increased gas production after the commissioning of OTPC power plant expected by 2011 end, corresponding effluent production will also increase and evaporation pits will not be sufficient to handle the effluent produced.

Field wise effluent production volumes from the presently producing gas fields of Tripura Asset are as follows:

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| **Installations** | **Present production (m3/day)** | **Envisaged Future production (m3/day) (IRS Study)\*** |
| Agartala Dome | 3.0 | 15-40 |
| Baramura | 5.0 | 5-15 |
| Konaban | 8.0 | 15-30 |
| Rokhia | 2.0 | 5-15 |
| **Total** | **18** | **40-100** |

\*For peak gas rate of 4.5 MMSCMD

In order to comply with Pollution Control Board regulations and also with a view to find out a permanent solution to the effluent disposal problem, Effluent Treatment Plant (ETP) is required with either sub-surface or surface mode of disposal of treated effluent.

***Standard Modes of Disposal of Treated Effluent/produced water:***

1. *Sub-surface disposal:* Inject the treated effluent in a well at a depth below 1000 m. As per the statutory requirement, only two parameters viz oil & grease and TSS in the treated effluent have to be complied with.
2. *Surface disposal:* As per the statutory requirement, 21 parameters in the treated effluent need to be complied with for any surface disposal.

***Constitution of Multi-disciplinary Team:***

To establish the possibility of sub-surface disposal of effluent, which is considered to be a safe & cost effective option and is followed worldwide in the Hydrocarbon Industry, a *Multi Disciplinary Team (MDT)* was constituted in the Asset comprising of members from Sub-Surface Team, Forward Base, Logging, Well Services & Surface Team.

***Findings of MDT:***

1. The well DA#3 has been identified as the most suitable well for testing the injectivity of non-hydrocarbon bearing sandstone layers developed within the Bokabil Formation and completion as effluent disposal well based on the comparative study of the 3 wells viz DA#3, AD#8 & AD#17, w.r.t.
   1. Status of Casing/Cementation,
   2. Position of Cement Plugs,
   3. Distance of Approach Road and
   4. Condition of the Approach Road.
2. Three sandstone layers with good petro-physical properties developed in the intervals 1036-1112 m (76 m thick sand pack), 1146-1252 m (106 m thick sand pack) and 1264-1298 m (34 m thick sand pack) have been identified for testing of injectivity.

**Operations:**

The well was planned for drilling the cement plug top and scraped up to 1550 m. Then to cut 5½” casing at 1500 m and to retrieve the same.

The well was subdued with brine of 1.04 specific gravity by running in 27/8” drill pipe up to 1550 m and displacing with fresh mud of 1.04 specific gravity. 2 7/8" drill pipe was pulled out and ran in 5½” mechanical casing cutter but tool could not pass through tubing spool. Tried to run in by changing spring tension several times, but could not succeed. Ran in 5½” scrapper up to 1550 m. Pulled out and nipple down BOP & Tubing Spool, observed casing spear not entering casing. Welded 5½” 20 PPF casing piece and engaged spear with great difficulty. Given pull of 60 Ton in stages, but observed no movement of casing slips. Spear stuck in casing, cut casing piece & removed spear. Tried to engage overshot but not succeeded. Rigged up Logging Unit and ran in junk basket. Observed held up at 551.5 m. Scrapped up to 649 m with reciprocation from 525 to 649 m. Pulled out scrapper and run junk basket up to 1520 m. Tried to give 80 tonnes pull but pull was not going beyond 42 tonnes. Engaged spear and gave pull to casing but pulling not going beyond 60 tonnes. Gave pull up to 75 tonnes, but welded joint of casing broke. Casing rope got stuck in-between Crown Block Pulley and Guide. Lowered the mast and put back the casing line in crown block pulley. Raised the mast and made up Kelly with casing spear. Casing spear was not got engaged in casing.

Due to constraint in retrieving 5½” casing and loss of rig-time, it was decided for cementation job.

**Cementation Job:**

Perforated the interval 1353-1354 m @18 SPM for cementation job. Ran in 27/8” tubing with mechanical packer and set packer by keeping tubing shoe at 1333 m. Established circulation between 95/8" x 51/2" casing. Displaced old mud with 30 m3 of fresh mud and circulated thoroughly. Pulled out 2 7/8” tubing and packer; carried out junk basket run and set cement retainer at 1347 m. Ran in and stabbed top of cement retainer and established circulation behind 95/8" x 51/2" casing. Carried out cementation job by pumping 11.5 m3 of cement slurry and displaced with 3.0 m3 of water. Reverse washed with 6.0 m3 of mud. Pulled out 27/8” tubing with stabbing tool and ran in 2 7/8” tubing with scrapper. Changed well volume of mud with water and pulled out the same.

**Injectivity Test:**

Perforated the interval 1275.0-1264.0 and 1157.0-1146.0 m @18 SPM. Mechanical packer was placed at 1141 m. Compressor was applied up to 50 kg/cm2 for back flow and the well was cleaned. Again Mechanical packer was set at 1241 m and injectivity test was carried out for interval 1264-1275 m through tubing. Injectivity rate was 2.75 m3/hr at 87 kg/cm2 and 4.11 m3/hr at 110 kg/cm2.

For interval 1146-1157 m, injectivity testing was carried out through annulus. Injectivity rate was 5.5 m3/hr at 52 kg/cm2 and 11.6 m3/hr at 80 kg/cm2.

Perforated the interval 1046-1036 m @18 SPM. Set mechanical packer at 1060 m. Applied compressor up to 50 kg/cm2 and cleaned the well. Set mechanical packer at 1063 m. While testing injectivity found return at ‘0’ kg/cm2. Tested integrity of packer by setting at 1000 m. It was found OK. Set packer at 1100 m. Pumped through annulus and observed return at “0” kg/cm2 from tubing. Set Packer at 1200 m. Tested combined injectivity for the interval 1146-1157 and 1046-1036 m. Injection rate was 156 m3/d.

**Completion:**

Pulled out tubing along with packer and ran in 2 7/8” tubing and landed hanger by keeping shoe at 1021.86 m. Circulated with Corrosion inhibiter treated water.

**Rig was released at 1800 hrs on 27.02.2010 for next location RO#7.**

**Status of the well:** Completed as Effluent Disposal in the intervals 1275-1264, 1157-1146 and 1046-1036 m.

Injection history:

The well was completed as effluent disposal well through WOJ during Jan-Feb-2010 and effluent injection was started. The injectivity in wells was observed to be decreasing with increase in FTHP. Attempts were made to restore the injectivity by bottom cleaning with CTU and acid job during 2017-19.

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| **Date** | **Job Objective** | **Job details** | **Job Outcome** |
| 27.01.2017 | ACID JOB | INJ: 186 LPM@260 PSI(AJ) |  |
| 08.09.2018 | Back surging of well fluid with N2 | Made surface arrangements. Rig up LN2 unit with annulus. Pressure test surface lines at 500/4000 PSI. Found OK. Started pumping with rate 550 SCFM FROM 0 psi. Increased rate to 900 SCFM. No return was observed till pumping pressure of 2000 PSI. Stopped pumping & rig down the unit for mobilization. |  |
| 04.10.2018 | Bottom Cleaning job with CTU | Rig up CTU .Function test BOP. RIH and cleaned with water and gel up to 1050 m. No help up observed. Reverse circulation was smooth (150 lpm @ 215 psi). Again RIH CT up to 1042 m and checked injectivity. Through CT it was found to be 125 lpm @ 1800 psi. Blackish water observed in return. POOH and rig down. | Cleared depth 1050 M |
| 05.10.2018 | Bottom Cleaning job with CTU | R/Up CT. Function test BOP. RIH and cleaned with water and gel up to 1150 m by reciprocation. Held up observed from 1075m to 1150m. POOH up to surface. Rig down. Parked units at site. Blackish water with sand in large quantities observed in return. |  |
| 06.10.2018 | Bottom Cleaning job with CTU | R/Up CT. Function test BOP. RIH and cleared up to 1257 m by reciprocation. Held up observed from 1157m to 1257m.Hard obstruction observed at 1178m. POOH up to surface. Rig down. Parked units at site. Blackish water with sand in large quantities observed in return. Job had to be stopped several times for want of technical water. |  |
| 08.10.2018 | Bottom Cleaning job CTU | Rig up CT. Function test BOP. Found OK. RIH CT and cleared bottom up to 1280 m by circulating water and gel with reciprocation. Hard obstruction observed from 1257-1260 m. POOH CT. Checked injectivity through annulus. Injectivity 180 lpm at 152 psi. Rig down CT and parked units at site. Observed blackish water and sand in return. |  |

Rigless through Tubing perforation:

**Additional perforation job in ED well DA#3 was carried out in the interval 1046-1054m, 1062-1074m in November 2019 and injection rate increased to 160 m3/d after TTP job.**

**4th Workover operation: Rig: HH-100-01 (13.05.2022 to 18.06.2022)**

**Brief activities carried out & Status of the well:**

**Objective: Milling operation (for hole clearance) along with re-perforation of existing open intervals i.e. 1046-1054 m, 1062-1074 m, 1146-1157 m and 1264-1275 m for improvement of injectivity.**

Observed STHP/SCHP-0/0 psi. C&C well with water. Tested and observed injectivity: 90 lpm @ 700 psi (~49 Ksc) and 105 lpm @ 900 psi (~63 Ksc). WUO-No activity. N/Dn XMT. N/Up BOP. P/O tubings. R/I tubings and observed held up at 1219.25 m. Cleared well with circulation upto 1238.18 m. Observed blackish water with fine sand in return. C&C well. Further cleared well upto 1268.12 m with reciprocation and circulation. Observed held up at 1268.12 m. Tried to clear but no success. C&C well with water. Further tried to clear the held up with circulation and reciprocation and cleared upto 1269.12 m. POOH tubings. R/I milling tool and observed held up at 1268.54 m. Established reverse circulation. Observed pressure shoot up upto 2500 psi. M/A for forward circulation and milled upto 1269.54 m. Observed pressure shoot up while milling. R/I AMT and observed held up at 1264.94 m. M/A and established circulation. Milled from 1264.94 m to 1272.01 m. While milling, observed pressure shoot up and couldn’t establish proper circulation. POOH. R/I SMT and observed held up at 1253.25 m. Milled/cleared upto 1273.20 m. While milling, observed string overpull upto 70T but string couldn’t be released. Tried several times to release stuck up by reciprocating string between 20T to 65T with circulation. Observed no proper circulation with increasing pumping pressure upto 3200 psi. After a series of unsuccessful attempts, observed free rotation of string and stuck up released. POOH.

R/I 2 7/8” tubing and tagged bottom at 1273.76 m. C&C well thoroughly. POOH. C/O 4.2" dummy run with GR-CCL & **tagged bottom at 1277 m**. perforated intervals: **1264-1275 m** by 3-3/8" gun conventionally.

WUO-No activity. R/I 2 7/8” tubing upto 1035 m and tested injectivity which was ~380 lpm @ 60 Ksc. Landed tubing hanger on well head **keeping shoe at 1035 m**. N/Dn BOP and N/Up XMT.

**Present Status: Utility Well**