

03.06.2015

Note to: **Director (Technical)**

Subject: **Enquiry Committee Report**

Kindly find attached for your kind perusal, the Enquiry Committee Report on the fire incidence that occurred in Hydrocracker Unit on 11.05.2015. This is in line with your Office Order ref: NRL/D(T)/45 dtd. 11.05.2015.



Debashish Choudhury
GM(DM)



Bimlesh Gupta
CM(OPS)



Pallav Das
CM(TS)



Dibyojyoti Saikia
CM(DM)

INVESTIGATION REPORT OF THE FIRE INCIDENT
ON 11th May '2015, IN HCU

1. Introduction :

1.1 While starting up Hydrocracker Unit (HCU) after the recent refinery turn around, a fire broke out at around 11:09 am on 11/05/2015, due to leakage of upstream flange of downstream isolation valve of pilot operated PSV (04-PSV-8301B) of cold high pressure separator (04-VV-004). Emergency shutdown of Hydrocracker Unit was taken safely and fire was immediately brought under control. Hydro carbon contained in the separator was allowed to be safely burnt under controlled condition. Since the HCU start up process was aborted, consequently shut down of the Hydrogen unit was taken. Fire was extinguished at around 11:45 am. However, cooling of the nearby area was continued till around 1.30 pm.

1.2 An enquiry team comprising of

- 1) Mr. Debasish Choudhury, GM (DM)
- 2) Mr. Bimlesh Gupta, CM (Ops)
- 3) Mr. Pallav Kr. Das, CM (TS)
- 4) Mr. Dibyajyoti Saikia, CM (DM)

was constituted by Director Technical, vide office note Ref. NRL/D(T)/45 dated 11th May' 2015 to investigate the fire incident with the following terms of reference:

- To assess the root cause of the incidence
- To suggest remedial measures to prevent recurrence in future.

Office note (ref NRL/D(T)/45 dated May 11, 2015) is attached as Annexure-I.



2. Damages/Injuries/Loss in financial terms

2.1 Damages:

There was property loss due to the incident, as mentioned below. The overall damages were under control & impact on adjoining area was minimum.

Mechanical:

- GATE VALVE-A Replacement
- GATE VALVE-B Replacement [Fire Affected]
- PSV -A Calibration
- PSV -B Calibration [Fire Affected]
- 2" pipe segment replacement
- Replacement of 4"/18" Expander

Instruments:

- Cable Replacement [50 Nos.:Single pair Branch Cables + 3 Nos. Multicore Cables]
- Control Valve/SDV Replacement [05 Nos.]
- VV-04 Instruments-LTs [06 Nos.]
- PT/PG/FT Replacement [11 Nos.]
- Checking/ Cleaning Of RGC Local Control Panel

Electrical:

- Cable Replacement [28 Nos.]
- MOV Repairing [03 Nos.]
- Replacement Of Lighting Fixtures [FLP/ IIC] -15 Nos.

FIR by Shift In Charge (SIC) is attached as Annexure-II.

2.2 Injuries:

While there was no fatality due to the incident, 11 persons sustained minor injury, out of which 8 were released after first aid at the Occupational Health Centre located within the Refinery. The remaining 3 persons, after first-aid were sent to VKNRL Hospital located at the Township for further medical



examination. Their medical report confirmed no major injury and subsequently, they were released from the hospital.

2.3 Financial loss

HCU was under shut down for total fire recovery job from 11th May to 15th May 2015. All recovery jobs were completed and handed over to Operation at 10PM of 15.05.2015 for Unit Start-up. The extent of the financial loss is yet to be ascertained.

3. Plant Status Prior to Incident:

Prior to occurrence of the incident, the plant status on 11th May, at 11-09 AM were as follows:

- a) CDU/ VDU: running at 91%
- b) DCU : start up activity
- c) HCU : 1ST stage feed cut was done on 10th May, 2015
- d) H2U : running at 63 %
- e) MSP : start up activity
- f) SRB : start up activity
- g) P&U : running

Prior to occurrence of the incident, the HCU plant status on 11th May, at 11-09 AM were as follows:

- 1ST stage feed cut was done on the previous day i.e. 10th May, 2015.
- Plant stabilization was going on to make ready for 2nd stage feed cut
- The system pressure and temperature of RB-001 and RB-002 were 155 Kg/cm² and 388 Deg C and 387 Deg C Deg C.

4. Sequence of Events:

- The start-up (s/u) activities in the unit were started after the completion of RTA jobs on 9th May`15.
- The 1st stage feed cut-in was done at 3:30 PM on 10.5.15 at 170-180 Deg C and 135 Kg/cm² (g).
- The Reactor temperature and system pressure were gradually increased at a slow rate as per guidelines (@ 10 DegC /Hr) to achieve the reaction in the reactor.



- By evening of 10th, the system pressure was increased and steadied at 155kg/cm2 and 1st stage reactor temperature was maintained at around 330 °C.
- At 11:23pm the pilot operated PSV-8301A of CHPS VV-04 popped at 154.4 Kg/cm2 and reseal immediately at 150 kg/cm2.
- Upstream isolation valve of the failed PSV (PSV-8301A) was closed. The downstream isolation valve continued to be kept in open condition.
- 2nd PSV (PSV-8301B) was continued to be in line.
- The system pressure was being maintained at 151 to 153 kg/cm2 throughout the night (refer Annexure-III for DCS data).
- On 11th May morning, the system pressure was again increased gradually to normal operating pressure of 155 kg/cm2 at 11: 07AM.
- At 11:09 AM on 11th May, a loud sound was heard and huge ball of fire was observed in the vicinity of upstream flange of downstream isolation valve of PSV-8301B. During that period operating pressure was 156.2 kg/cm2(g).
- Immediately Feed was cut-off out and furnace were put off as per the standard operating procedures to be followed during such emergencies. Dump valves located on the CHPS vessel were operated from control room to depressurize the system.
- By this action supply of hydrocarbon was reduced and fire was immediately brought under control.
- Hydrocarbon vapor and H2 rich gas present in the CHPS vessel and its associated pipelines was allowed to burn under controlled condition by spraying fire water/ foam, till the time entire vessel became hydrocarbon free.
- Nitrogen was also introduced into the vessel to inertize the same and to facilitate faster extinguishing of the fire. The flare header was also purged with nitrogen during the fire fighting.
- Fire was extinguished at around 11:45 am.
- Cooling of the nearby area was continued till around 1.30pm.

5. Site Visit Observation:

5.1 On 11th May evening, committee members visited the site and followings are the observations :

- Fragments of damaged backing strips of gasket found protruding out of the upstream flange of the downstream isolation of failed PSV-8301B.
- Electrical and Instruments cables in that vicinity of CHPS got exposed to heat of fire.
- Aluminum cladding at the top of the CHPS vessel got melted.
- Piping of the nearby vicinity of PSV-8301B might have also got exposed to heat of fire.

5.2 Field Observations: (refer Annexure-IV for photos):

- i. After dismantling of PSV-8301B from position, it was observed that the gate of the downstream isolation was in closed position although the spindle (rising stem type) of the valve was in open position. The valve wheel was found free to rotate.
- ii. It is pertinent to note that the valve wheel of the downstream isolation of PSV-8301A was also found to be free to rotate even though in this valve the stem was not dislodged from the gate.
- iii. The affected gasket was found to be in blown out condition. The gasket was compatible to pipe spec.
- iv. Visited central workshop and checked testing records of both the aforesaid PSVs and found to be in order (set at 167.2 Kg/cm²g).
- v. Calibration records of the PSV test bench pressure gauge was found in order.
- vi. On dismantling, the tubing connecting the pilot valves to the dome of both the PSVs were found completely choked at the upstream of the NRV mounted on the dome. Photographs attached as annexure-III. Such deposits were also found inside the dome of the PSVs.
- vii. The deposits were sent to NRL QC laboratory for analysis and found that Fe- 75%, Carbon- 3.3 %, Grease- 0.1% and Silica- 0.1%. Lab report attached as Annexure-V.



6. Root Cause Analysis :

6.1 Rupture of Gasket:

PSV-8301B downstream isolation valve being in closed condition the discharge from the PSV not finding any outlet pressurized the portion of the piping between the PSV and the isolation valve resulting in failure of the gasket of the isolation valve.

PSV-8301B upstream line spec is F25A (1500 class) and PSV-8301B downstream line spec is A1A (150 class). This is evident from design aspect the piping in between the PSV and downstream isolation valve is not capable of handling the upstream pressure of the isolation valve. When the PSV popped, this piping A1A got exposed to the fluid pressure and for this reason the gasket gave away.

6.2 Cause of Fire:

The CHPS gas is having Hydrogen concentration in the range of 90-95 %. However Hydrogen does not necessarily ignite spontaneously when released at high pressure. Due to reverse Joule-Thomson Effect H₂ gains heat during expansion and if it reaches auto ignition temperature (585°C) fire may occur. Compression ignition, Joule-Thomson expansion, diffusion ignition and hot surface ignition are unlikely ignition mechanisms for most accidental releases of hydrogen at ambient temperature. There is the possibility that when hydrogen does ignite on release, two or more of the favourable conditions prevail together. It is possible that some form of electrostatic charging is one of the favourable conditions.

In view of the above discussion the probable causes of fire are enlisted as below:

- a) Heat release due to Reverse Joule-Thomson effect of H₂
- b) Static electricity generation
- c) Spark generation due to friction between the iron particle

Actual reason of fire may be any of the above mentioned reason or combination of all three.

6.3 Cause of popping of PSVs below Set Pressure:

- I. In pilot operated PSV-8301A/B, the pressure is supplied from the upstream side (the system being protected i.e. VV-004) to the dome by a small pilot tube. The downstream side is routed to the flare header.



- II. The upstream pressure tries to push the piston open but it is opposed by that same pressure, because the pressure is routed around to the dome above the piston.
- III. The area of the piston on which fluid force is acting is larger in the dome than it is on the upstream side. the result is a larger force on the dome side than the upstream side. This produces a net sealing force.
- IV. The pressure from the pilot tube to the dome is routed through the actual control pilot valve. When the pilot valve reaches set pressure it opens and releases the pressure from the dome. The piston is then free to open and the main valve exhausts the system fluid.
- V. Small parts in pilot valve are sensitive to contaminant particles. These type of pilot operated valves are considered for clean services.

The aforesaid phenomenon of opening of the main valve piston can also happen if the balancing pressure on the dome falls as a result of choking of the pilot tube, which was observed in these two PSVs. The PSVs popped at different pressures at 154.4 kg/cm²(g) and 156.2 kg/cm²(g), which are lower than the PSV set pressure of 167.2 kg/cm²(g).

7. Recommendation:

- 7.1 Ensure opening of d/s i/v at the time of box-up of PSV, by watching that in case of rising stem type, while opening the valve stem/spindle is not rotating, only stem is coming out. Accordingly an SOP should be developed and implemented to eliminate the chances of downstream gate valve remaining closed when the related PSV is online.
- 7.2 PSV-8301A/B downstream isolation valves should be kept lock open (LO), as per P&ID (refer E-183B R6, Cold High Pr Separator).
- 7.3 It is learnt that later designs of such pilot operated PSVs are provided with strainer on the upstream of the pilot inlet. Manufacturers / process licensor to be approached in respect of this.
- 7.4 BPCL has informed that the downstream isolation valves of the PSVs of CHPS of Mumbai refinery HCU is of ball type as against gate type at NRL. Requirement and type of isolation valves downstream of the PSVs 8301 A/B may be reviewed.
- 7.5 Internal cleaning of the CHPS vessel to be ensured including downstream portion of the demister, before box up. Also, the u/s header of the PSVs should be air/N₂ blown before boxing of PSVs.



Ref. NRL/D(T)/45

May 11, 2015

Office Order

Sub : Constitution of Enquiry Committee.

A committee is hereby constituted to enquire into the fire incidence occurred in the Hydrocracker Unit on 11.05.2015 with the following members :

1. Sh. Debasish Choudhury, GM (DM)
2. Sh. Bimlesh Gupta, CM (Ops)
3. Sh. Pallab Kr. Das, CM (TS)
4. Sh. Dibyajyoti Saikia, CM (DM& MR)

The committee is to assess the root cause of the incidence and suggest remedial measures to prevent recurrence in future. The committee is to submit the report to the undersigned within 15 days from the date of issue of this circular.

A handwritten signature in black ink, appearing to read 'S R Medhi', is positioned above the printed name.

S R Medhi
Director (Technical)

Copy to :

- MD/ D(F) - for information pl.
- GMs
- DGMs
- All members

FIRST INFORMATION REPORT

Type Of Incident	Fire	Incident-ID	FINRL105151600002
Incident Sub-Type	Major	Current Status	Investigation
GENERAL INFORMATION			
Incident Date	11/05/2015	Incident Time	11:09:am
Department - Section	049 - Operation		
Plant	HCU	Location	downstream isolation valve of the PSV of VV-004
Incident Description	While starting up Hydrocracker Unit (HCU) after annual turn around, a fire occurred at around 11:09 am on 11/05/2015, due to leakage of upstream flange of downstream isolation valve of the PSV of cold high pressure separator (CHPS).		
State What Happened			
State How Happened			
Immediate Control Action Taken			

DETAILS OF THE INJURY/OCCUPATIONAL ILLNESS & THE AFFECTED PERSON

Company Employee	No		
Name of the Injured		Designation	
Employee No.	Gender	Not Specified	Age
		Department	
Years of Experience		Qualification	
Fire & Safety Training		Nature of Work	
Nature of Injury			
Body part(s) affected			
Medical Treatment			
Accident Type			
Agency Of Accident			

DETAILS OF THE FIRE INCIDENT

Fire put-off Time	11:45:am	Duration of Fire	36 mins.
Fire-Call given Through	Telno		

INCIDENT INVESTIGATION INFORMATION

Immediate Cause	
Substandard Condition	Substandard Acts/Practices
Basic Cause	
Personal Factor	Job/System/Standard Factor
Lack of Management Control	
Lack of Management Control Programme	
Lack of Management Control Standard	

Lack of Management Control Compliance

Enclosures/Attachments

RoleDescription	Attachments
Area Safety Officer	Office Order.pdf

Suggestions

Recommendation Details not available

Team Details

Process Step	Role Description	Staff-Name	CurrentStatus	
FIRegistration	Shift Fire Officer	Tonmoy Phukan	Finalised	12
FISeverity	Area Safety Officer	Tonmoy Phukan	Finalised	12
Fire Investigation	Committee	Bimlesh Kumar Gupta		12
Fire Investigation	Committee	Debashish Choudhury		12
Fire Investigation	Committee	Dibyajyoti Saikia		12
Fire Investigation	Committee	Pallav Kumar Das		12
ATR Creation	Area Safety Officer			
ATR Acceptance	Section Head			
ATR Closure	Area Safety Officer			

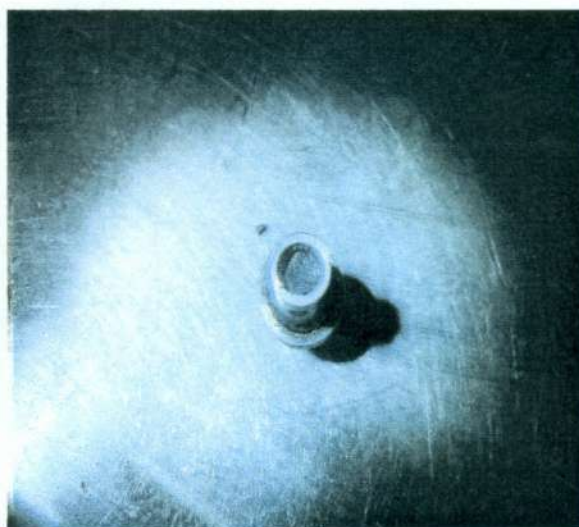
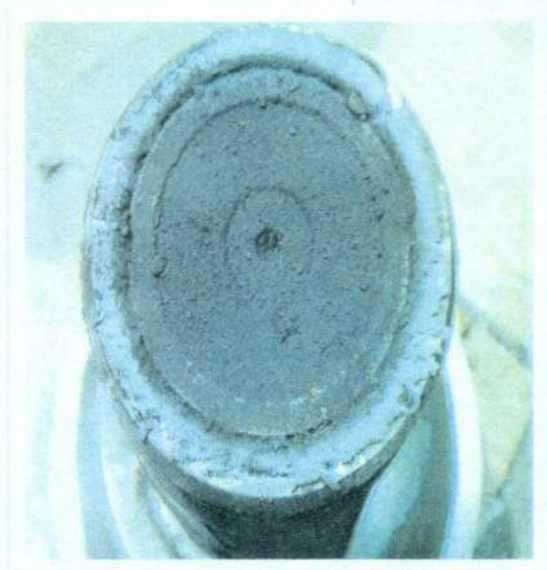
ATR

Recommendation Details not available

ANNEXURE-III

DCS DATA, HCU							
DCS TAG	1st stage Feed	HP Loop Pr.	HP Loop Pr. At Top	RGC Suction Pr.	CAT1 of RB-01	CAT2 of RB-02	CAT3 of RB-03
	Root.HCU.PID.HIC7502.PV(Value)	Root.HCU.PVI.HPI8301.PV(Value)	Root.HCU.PID.HPC84028.PV(Value)	Root.HCU.PVI.HPI8411.PV(Value)	Root.HCU.PVI.HCAT01.PV(Value)	Root.HCU.PVI.HCAT02.PV(Value)	Root.HCU.PVI.HCAT03.PV(Value)
10-05-2015 23:00:00	92.3	149.0	149.6	147.5	321.4	331.6	279.1
10-05-2015 23:01:00	94.4	149.2	149.9	147.8	321.4	331.8	279.1
10-05-2015 23:15:00	90.4	152.5	153.1	151.1	321.2	334.1	279.3
10-05-2015 23:16:00	91.6	152.8	153.5	151.3	321.2	334.3	279.3
10-05-2015 23:17:00	92.4	153.1	153.8	151.7	321.2	334.4	279.3
10-05-2015 23:18:00	93.0	153.4	154.1	152.0	321.3	334.6	279.4
10-05-2015 23:19:00	86.3	153.8	154.5	152.4	321.3	334.7	279.4
10-05-2015 23:20:00	85.7	154.1	154.8	152.6	321.3	334.8	279.4
10-05-2015 23:21:00	90.8	154.4	155.1	153.0	321.4	335.0	279.5
10-05-2015 23:22:00	92.3	154.6	155.3	153.2	321.4	335.1	279.5
10-05-2015 23:23:00	91.6	154.8	155.5	153.5	321.5	335.2	279.5
10-05-2015 23:24:00	91.2	153.6	154.3	151.8	321.6	335.3	279.5
10-05-2015 23:25:00	91.8	150.1	150.8	148.8	321.6	335.4	279.3
10-05-2015 23:26:00	91.3	149.9	150.6	148.8	321.6	335.4	279.2
10-05-2015 23:27:00	91.8	149.7	150.4	148.6	321.7	335.4	279.2
10-05-2015 23:28:00	91.5	149.5	150.2	148.3	321.8	335.5	279.3
10-05-2015 23:29:00	92.2	149.3	150.0	148.1	321.9	335.6	279.3
10-05-2015 23:30:00	92.8	149.3	150.0	148.1	322.0	335.6	279.3
11-05-2015 00:37:00	95.0	148.7	149.3	147.2	332.1	337.1	279.5
11-05-2015 00:38:00	96.7	148.7	149.3	147.3	332.3	337.3	279.7
11-05-2015 00:49:00	91.7	147.6	148.2	146.3	335.0	337.2	279.2
11-05-2015 00:50:00	94.0	147.4	148.0	146.1	334.8	336.7	278.8
11-05-2015 01:01:00	98.4	146.3	146.9	144.9	337.6	336.3	279.4
11-05-2015 01:02:00	95.6	146.3	146.9	144.9	338.0	336.2	279.7
11-05-2015 03:33:00	88.3	152.1	152.7	150.8	348.0	358.7	280.6
11-05-2015 03:34:00	91.7	152.0	152.6	150.7	347.9	358.8	280.6
11-05-2015 07:04:00	99.3	152.9	153.6	151.6	370.0	381.0	281.8
11-05-2015 07:05:00	104.4	152.8	153.6	151.6	370.3	381.0	281.8
11-05-2015 08:28:00	96.1	147.0	147.9	145.9	382.8	386.7	280.9
11-05-2015 08:29:00	97.1	146.9	147.8	145.9	382.9	386.7	280.9
11-05-2015 09:51:00	91.2	143.4	144.4	142.2	386.4	386.3	280.3
11-05-2015 09:52:00	95.1	143.2	144.2	142.0	386.4	386.3	280.3
11-05-2015 09:53:00	98.2	143.1	144.1	141.8	386.4	386.3	280.3
11-05-2015 10:16:00	96.3	144.3	145.2	142.9	387.8	387.2	280.8
11-05-2015 10:17:00	93.3	144.4	145.4	142.9	387.8	387.2	280.8
11-05-2015 10:18:00	96.6	144.4	145.4	142.9	387.8	387.3	280.8
11-05-2015 10:19:00	99.1	144.5	145.5	143.1	387.9	387.3	280.8
11-05-2015 10:26:00	96.6	144.7	145.7	143.2	388.2	387.2	280.9
11-05-2015 10:27:00	100.7	144.8	145.8	143.4	388.3	387.2	280.9
11-05-2015 10:28:00	94.7	144.9	145.9	143.4	388.3	387.2	281.0
11-05-2015 10:29:00	95.5	145.0	146.0	143.6	388.4	387.2	281.0
11-05-2015 10:30:00	92.9	145.1	146.0	143.7	388.5	387.2	281.0
11-05-2015 10:31:00	93.6	145.2	146.2	143.7	388.6	387.2	281.0
11-05-2015 10:32:00	97.5	145.2	146.1	143.7	388.6	387.2	281.0
11-05-2015 10:33:00	97.9	145.2	146.2	143.7	388.7	387.2	281.0
11-05-2015 10:34:00	92.3	145.0	146.0	143.6	388.7	387.2	281.0
11-05-2015 10:35:00	96.0	144.7	145.7	143.5	388.8	387.2	281.0
11-05-2015 10:36:00	92.6	144.8	145.8	143.5	388.8	387.2	281.0
11-05-2015 10:37:00	93.4	145.1	146.0	143.6	388.8	387.2	281.0
11-05-2015 10:38:00	93.4	145.4	146.4	143.9	388.8	387.2	281.1
11-05-2015 10:39:00	95.9	145.8	146.8	144.3	388.8	387.2	281.1
11-05-2015 10:40:00	92.0	146.2	147.1	144.7	388.7	387.3	281.1
11-05-2015 10:41:00	90.6	146.5	147.5	145.1	388.7	387.3	281.1
11-05-2015 10:42:00	94.0	146.9	147.9	145.5	388.7	387.3	281.1
11-05-2015 10:43:00	96.6	147.3	148.3	145.9	388.8	387.3	281.1
11-05-2015 10:44:00	90.4	147.8	148.8	146.4	388.7	387.3	281.1
11-05-2015 10:45:00	95.9	148.3	149.3	146.9	388.7	387.4	281.1
11-05-2015 10:53:00	89.5	151.8	152.8	150.4	389.1	387.6	281.2
11-05-2015 10:54:00	90.5	152.3	153.2	150.8	389.2	387.6	281.2
11-05-2015 10:55:00	93.6	152.7	153.7	151.1	389.2	387.6	281.2
11-05-2015 10:56:00	89.2	153.1	154.1	151.5	389.2	387.6	281.2
11-05-2015 10:57:00	84.0	153.5	154.5	152.0	389.3	387.6	281.2
11-05-2015 10:58:00	81.7	153.8	154.8	152.3	389.3	387.6	281.2
11-05-2015 10:59:00	87.6	153.9	154.9	152.4	389.2	387.6	281.2
11-05-2015 11:00:00	91.0	154.1	155.1	152.6	389.2	387.6	281.2
11-05-2015 11:01:00	92.9	154.2	155.2	152.7	389.2	387.5	281.2
11-05-2015 11:02:00	87.4	154.4	155.4	152.9	389.1	387.5	281.2
11-05-2015 11:03:00	88.6	154.5	155.5	153.1	389.0	387.5	281.2
11-05-2015 11:04:00	90.1	154.7	155.7	153.2	388.9	387.5	281.2
11-05-2015 11:05:00	96.6	154.8	155.8	153.3	388.8	387.4	281.2
11-05-2015 11:06:00	99.8	154.9	156.0	153.5	388.6	387.4	281.2
11-05-2015 11:07:00	91.9	155.1	156.1	153.5	388.5	387.3	281.2
11-05-2015 11:08:00	94.2	155.2	156.2	153.7	388.4	387.3	281.2
11-05-2015 11:09:00	92.5	155.3	156.3	153.8	388.3	387.3	281.2
11-05-2015 11:10:00	98.2		144.4	142.9	388.1	387.1	281.1
11-05-2015 11:11:00	59.3		126.8	125.8	387.7	386.7	280.4
11-05-2015 11:12:00	0.0		99.9	97.6	387.0	385.7	278.9
11-05-2015 11:13:00	0.0		77.5	74.5	386.3	384.2	277.0
11-05-2015 11:14:00	0.0		60.6	57.2	385.6	382.4	275.5
11-05-2015 11:15:00	0.0		47.9	44.6	384.6	380.5	274.4
11-05-2015 11:16:00	0.0		38.2	35.1	383.4	378.7	273.7
11-05-2015 11:17:00	0.0		30.9	27.8	381.9	376.9	273.1
11-05-2015 11:18:00	0.0		25.2	22.3	380.3	375.1	272.8
11-05-2015 11:19:00	0.0		20.6	18.1	378.7	373.3	272.5
11-05-2015 11:20:00	0.0		16.9	14.8	377.2	371.5	272.3

ANNEXURE-IV



Wahidul Amin [বাহিদুল আমিন]

From: Sobhan Konwar [শোভন কন্বার]
Sent: 27 May 2015 10:10
To: Pallab Das [পল্লব দাস]; Divyajyoti Saikia [দ্বিজ্যোতি শইকীয়া]; Wahidul Amin [বাহিদুল আমিন]
Cc: Debashish Choudhury [দেবশীষ চৌধুরী]
Subject: FW: lab analysis report

Forwarded.

From: ANANYAB
Sent: Wednesday, May 20, 2015 4:05 PM
To: Raktim Das [রক্তিম দাস]
Cc: QC Officers; Manabendra Gogoi [মানবেন্দ্র গোগোই]
Subject: RE: lab analysis report

Kindly find here the analysis report of sample collected from safety valves 04-PSV-8301A/B

1. Iron = 75%
2. Carbon = 3.3%
3. Grease = 0.1%
4. Silica = 0.1%

Regards,
Ananya Borgohain
Officer (Quality Control)

From: Raktim Das [রক্তিম দাস]
Sent: Wednesday, May 20, 2015 12:24 PM
To: Ananya Borgohain [অনন্যা বরগোহাই]
Cc: QC Officers; Manabendra Gogoi [মানবেন্দ্র গোগোই]
Subject: lab analysis report