# CHAPTER V

## DEVELOPMENT OF SHIFT HANDOVER SYSTEM

### 5.1 Shift Handover

Consider the situation when a person with sole responsibility for a task takes a break from work, then returns to the same task following their absence. If the task has not been progressed or altered by someone else, communication is not an issue. Contrast this with work, which is shared between more than one people or continues during an absence. Under such conditions, communication and co- ordination assume crucial importance. In industries, which operate continuous processes, continuity is maintained across shift changes via shift changeover. Shift changeover typically includes

- A period of preparation by outgoing operator team,
- Shift handover, where outgoing and incoming operator communicate to exchange task-relevant information and
- Cross-checking of information by incoming personnel as they assume responsibility for the task

The goal of shift handover is the accurate, reliable communication of task-relevant information across shift changes, thereby ensuring continuity of safe and effective working.

Oil refinery production units are continuous 24-hour operations. Their goal is to maximize production or support functions without compromising safety. Complex technical systems place demands on the operator's information-processing and decision- making skills. The operator may be physically remote from the system, and rely on an internal "mental model" to understand and control the invisible process. The accuracy of this model determines how effectively operator's start-up, monitors, adjusts and shutdown the process. Successful control requires three components to be present:

- Clear specification and understanding of the future goals of production
- An accurate mental representation of the current state of the process
- An accurate internal model of process dynamics.

Many continuous process tasks are characterized by long system response times between process alterations and effects. Actions may not have their effects until subsequent shifts. Without adequate communication of information at shift handover, diagnosis of effects resulting from actions on previous shifts is problematic.

Furthermore, refinery workers can be exposed to high noise levels, both on and off-duty, which increases potential for misunderstood verbal communication.

## 5.2 Development of Logbook and Log sheet for shift handover

According to the existing problems found in the logbook and log sheet system. It found that there is no set of standardization on the essential contents on logbook and log sheet system. Also the requirement of the system should contain in the report.

The proper report system and the way of description of communication o incoming operation must be developed to reduce the risk such as problem and enhancement the system of the operation for shift change.

As well as face-to-face communication is essentially needed to transfer and received quite effectively in shift handover. There would be another possibility of information channels that have been communicate for the shift change.

### 5.2.1 Information, knowledge and understanding

Regarding to "R. Lardner, Safe Communication at shift handover, The Keil Centre" state that, Information theory analyses information flow in terms of a system whose purpose is to transmit information between separate locations.

A channel links information source and destination. Information from the source must be transfer in a form suitable for receiver at the destination. System performance is limited by channel capacity, transmission rate and noise.

According to information theory, information is transmitted when reduction in uncertainty regarding the content of the transmitted message results. This definition is related to the commonplace definition of information; namely data which increases knowledge and thereby reduces uncertainty.

"Staw, B. and Cummings, L. (Eds)" also mention that information channels have been categorized in terms of their richness. Face-to-face communication is the richest channel for information. It provides immediate feedback thus allowing understanding to be checked and corrected. It is argued that face-to-face communication is most effective for mitigating ambiguity and creating shared understanding. In contrast, written information is lower in richness, lacking the capacity for rapid feedback.

"Anderson, J.R." state that Knowledge can be defined as the body of information possessed by an individual. Two types of knowledge can be distinguished: procedural and declarative. Procedural knowledge refers to practical operational knowledge about how to do something. Such knowledge may be implicit and difficult to verbalize. Declarative knowledge consists of facts about the world, which are accessible consciously.

The notion of achieving understanding or comprehension via communication relates to the use of information from a dialogue, in combination with existing knowledge, to arrive at a shared meaning. In their attempt to reach shared understanding, dialogue participants must each assess the mental world or mental state of their conversational counterpart to determine what information is required to achieve understanding.

Having distinguished between information, knowledge and understanding, we now return to the notion of "effective communication" of information.

## 5.3 Drafting and construct a logbook

After the result and literature review from the experiences have been precisely conclude what should be contained in the shift handover logbook.

The concept to draft and construct a logbook was based on the two categories that have mention in the previous section of this chapter. But in the deep detail of these problems are in the fundamental of Human factor, first of all the initial of human framework analysis to get overview of constructed shift logbook.

A combination of information on the role of the operator in the process industries and the research literature on potential human error was used as the basis for an internal workshop which sought to create an initial listing of human errors to provide a theoretical Framework.

Several of the categories could be combined in the above sense, initially, on the basis of the fact that they were inter-related subsets. Therefore it can then construct level structure in the theoretical Human Factor Framework as the figure below.

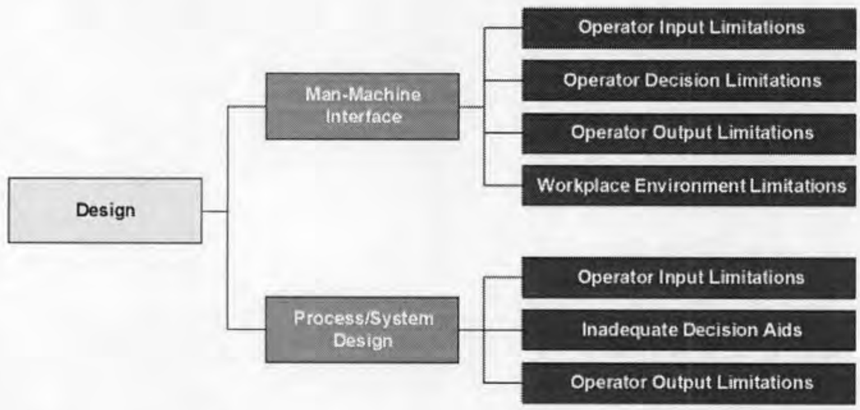


*Figure 7: Example of the three level structures in the Human Factors Framework*

### 5.3.1 Design and construct a logbook

Regarding to "R. Lardner, Safe Communication at shift handover, The Keil Centre" state that, categories of key information for inclusion in structured logbooks throughout the refinery. It can be divided into two categories, which are:

1. Mandatory categories

2. Discretionary categories

## 1 Mandatory categories

In this section, explains items that need to be concern to the plants to the reader to be able to understand the plant up to date condition. There are six items, which are need to be concluded which are:

- Safety
- Maintenance
- Technical problem
- Work outstanding
- Comment and remarks
- Signature or name of person who written the log

## 2 Discretionary categories

In this section, explains items that need to be concern on what is the actual condition and what it has to be done for the next shift. And people who might need to be contact. There are seven items that are needed to be concluding which are:

- Plant condition status update
- Production including in term of quality of the product
- Environment matters
- Personal issues
- External Events
- Actions taken during shift
- Routine duties

From the result of pilot test or questionnaires revealed the improving resulting from the introduction of structured logs was visible. The more information that has received on the maintenance and technical problems was being recorded, safety issues were being flagged up and timings of event were being recorded more precisely and consistently.

The comparison between log sheet before implementation and after implementation for each position illustrate as below.

**ACTIVITY FORM**

| ITEM | TIME | ACTIVITY |
|---|---|---|
| 1. | 20:00 | Soot blow. / check coke, flame, air. |
| 2. | 20:20 | Check $O_2$ free (3000L-V-101: after build $N_2$ ⇒ 3 bar |
| | | again. |
| | | – result $O_2$ free / keep 0.5 bar |
| | | – [illegible] block valve. HBSV-111, PCV001, |
| | | – [illegible] spade. $N_2$ |
| | | drain V-101 |
| | | |
| | | V-102 – block valve [illegible] B/V [illegible] |
| | | – bleed. $C_3H_6$ ⇒ [illegible] line 4" [illegible] |
| | | V-104. ( [illegible] to V-104 [illegible] ) |
| | | – [illegible] spade $N_2$. |
| | | |
| | 03:00 | Sample stripped water |
| | 05:00 | Soot blow. |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**STATUS**

| ITEM | TIME | ACTIVITY |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

*Figure 8: Illustrate format of log sheet for field operator before implement.*

| | | | | | |
|---|---|---|---|---|---|
| *Thai Lube Base Co.LTD* | THAILUBE | *Boad Man Area "A"* | | | |
| DATE | | Day Shift | Shift | **A** | |
| *DCS Operator* | | *Field Operator:* | | | |
| Safety&Environmental:- | | | | | |
| Maintenace Complete | | | | | |
| Maintenance in Progress | | | | | |
| Abnormal/Technical problem | | | | | |
| VDU plant conditions:- | | | | | |
| SRU plant conditions:- | | | | | |
| PDA plant conditions:- | | | | | |
| SWS Plant Conditions | | | | | |
| Filed Activities | | | | | |
| ..................................... | | | | | |
| Note for Comments | | | | | |

*Figure 9: Illustrate format of log sheet for field operator after implement*

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Before implemented

THAILUBE

## Lead Team Operator Report

Date 2-Feb-08

Shift [A] B C D ☑ Day Shift ☐ Night Shift

Narongsak Thammajaruk
Lead Team Operator.

La-ong Sriauem
Shift Superintendent.

### VACUUM DISTILLATION UNIT (100L)

| | Flow T/D | Temp. °C | % Yield | Tank | Vis. Lab. | Vis. Online | FP, FBP | dis10%,CCR |
|---|---|---|---|---|---|---|---|---|
| Feed | 2696.22 | 368.30 | | T-101C | | | | |
| LVGO | 72.52 | 98.28 | 2.69 | T-104B | | | | |
| 60VGO | 331.68 | 195.55 | 12.30 | T-105A | 13.36 | 12.75 | n/a | n/a |
| 150VGO | 456.47 | 247.10 | 16.93 | T-109 | n/a | 5.535 | 233.00 | |
| LSL | 0.26 | 278.46 | 0.01 | | | | | |
| 500VGO | 701.09 | 305.68 | 26.00 | T-110C | n/a | 15.36 | n/a | n/a |
| HSL | 0.24 | 353.24 | 0.01 | | | | | |
| VR to PDA | 756.31 | 172.67 | 37.89 | PDA | n/a | | | |
| VR to Tank | 165.18 | 172.67 | | T-102 | | | | |
| NAPHTHA | Tag not found | | | TOP | | | n/a | |
| Yield 150VGO + 500VGO | | | 42.93 | | | | | |

***VDU note*** 60VGO Vis 12.5-13.0cst, 150VGO Vis 5.5-5.7cst, 500VGO Vis 15.1-15.3cst.

Normal mal conditon

1. Adjust condition 60 VGO spec viscosity = 12.3 cst - 12.5 cst.
2. 09:00hr.Tank sample 60 VGO to LAB viscosity = 12.39cst ( DCS = 12.626 cst)

Inaccurate information

These should be detailed in Abnormal cond.

*Safeguard System and Chemical.*

Hydrolic System ☑ Normal ☐ Abnormal Ammonia ($NH_3$) ☑ Normal ☐ Abnormal

Fire tube System ☑ Normal ☐ Abnormal Oil mist(turbo 46) ☑ Normal ☐ Abnormal

### PROPANE DEASPHALT UNIT (200L)

DAO YIELD %wt. = 22.33 ASPHALT YIELD %wt. = 81.73

| | Tank | Flow T/D | Temp. °C | Press.bar | Level % | Vis. Online | Vis/Pen. Lab | Ratio,CCR | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | ☐ | K-101A |
| Feed | VDU / T-102 | 956.30 | 67.88 | 4.50 | 54.96 | | | | ☑ | K-101B |
| Pre-Dilution | | 480.09 | 36.94 | | | | | 0.50 | ☐ | 100 % |
| Dilution | | 2178.58 | 39.96 | | | | | 2.28 | ☑ | 67 % |
| Upper Coil | | | 67.88 | | | | | | ☐ | 50 % |
| Lower Coil | | | 57.70 | | | | | | | |
| V-101 | | 1298.98 | 81.75 | 35.70 | 30.23 | | | | | |
| V-102 | | 1549.87 | 36.94 | 15.68 | 31.26 | | | | | |
| DAO. Pro. | T-111A | 213.54 | 98.60 | | 31.34 | 41.19 | n/a | n/a | | |
| Asp. Pro | T-103A | 781.55 | 168.45 | | 29.85 | | n/a | | | |

***PDA note.*** DAO Vis. 40-41 cst, CCR < 1.5%wt

1. Balance PDA feed for maintaining T-102's level about 3.00 m.

*Safeguard System and Chemical.*

Hydrolic System ☑ Normal ☐ Abnormal Anti Foam ☑ Normal

Fire tube System ☑ Normal ☐ Abnormal ☐ Abnormal

*Figure 10: Illustrate format of log sheet lead team operator before implemented*

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MP REFINING UNIT (300L)

| RAFF YIELD %wt. = | 56.65 |
|---|---|

| | Flow. t/d | Temp. °C | Prees bar | Level % |
|---|---|---|---|---|
| Treating Feed rate | 1548.50 | 61.59 | 4.200 | 35.52 |
| Solvent rate | 1706.75 | 65.96 | 0.195 | 48.98 |
| Inter.cool rate | 2399.57 | 47.92 | | |
| Water injection. | 34.86 | 105.95 | | |
| Gradient. Temp. | | 12.24 | | |
| Solvent Ratio | 1.102 | | | |

| Tank No. | Level(m) |
|---|---|
| T-101 | 7.016 |
| T-102 | 0.575 |
| T-103 | 0.042 |

| | |
|---|---|
| C-109 Strip S. (t/h) | 0.459 |
| C-106 Strip S. (t/h) | 0.429 |

| Stream | Rate TPD | Unit Tank No | VI | Vis @40 °C | Vis @100 °C | Solvent Cont. PPM | RI Lab | RI Online |
|---|---|---|---|---|---|---|---|---|
| Feed | 1548.50 | T-110B | | n/a | n/a | | n/a | |
| Raff. | 877.16 | HFU | 100.53 | 98.94 | 11.33 | 6.19 | 1.4773 | 1.4780 |
| Extract | 997.67 | T-105B | | | | 21.61 | 1.5489 | |
| OVHD-C-101 | | | | | | 0.33 | | |

*MPU note.* 500 Raff. RI 1.4740-1.4755 VI >106, Solvent cont. Raff. < 10 ppm , Ext. < 20 ppm , OVHD < 50 ppm

1. Decrease wash rate 1.10 to 1.05 .
2. Decrease feed from 1550 T/D to 1525 T/D.
3. Decrease solvent temp from 66 °C to 62 °C.
4. Decrease flow intercooler from 2400 T/D to 2200 T/D.
5. Increase stripping steam to C-106 from 0.4 tph to 0.425 tph.

HYDROFINISHING UNIT (500L)

| HTR YIELD %wt. = | 105.72 |
|---|---|

| Reactor Condition | | |
|---|---|---|
| press.(bar) | temp. °C | diff.temp. °C |
| 69.73 | 324.84 | -15.14 |

| | |
|---|---|
| C-104 Strip S. (t/h) | 1.195 |
| C-102 Strip S. (t/h) | 0.045 |

| Stream | Rate TPD | Sulfur % Wt | flash point °C | Tank/Unit |
|---|---|---|---|---|
| Feed | 866.71 | | | MPU |
| HT Raff. | 916.25 | n/a | n/a | SDU |
| Distillate | 5.83 | | | |
| Naphtha | 0.011 | | | |
| $H_2$ make up | 9.800 | | | |
| $H_2$ to F/G | 8.987 | | | |

| | Result | Spec. |
|---|---|---|
| $H_2$ mark up | 88.59 | >85 |
| $H_2$ recycle | 87.88 | >85 |

*HFU note* 500 HT Raff. Sulphur 0.20-0.35 %wt , FP >237°C

Normal condition

ADIP UNIT (550L)

| | Flow t/d | | Top, BTM | Ratio | Level % |
|---|---|---|---|---|---|
| | Acid gas | Lean Adip | Temp °C | | |
| C-101 | 61.70 | 153.57 | | 2.493 | 60.02 |
| C-102 | 10.89 | 75.16 | | 6.881 | 70.17 |
| C-103 | | 345.71 | 102.26 | | 85.16 |
| C-104 | 40.01 | 13.19 | 35.13 | 0.330 | 64.91 |
| A/G to SRU | 12.23 | | 44.34 | | |
| | | | | T-101 | 10.85 |

| | Result | Spec. |
|---|---|---|
| ATB | 22.30 | Dif. <3 |
| RFB | 26.82 | 26-32% |
| $H_2S$ | 881.33 | <900PPM |
| Foaming | 210.00 | <140 |
| PH | 10.82 | >10.5 |
| SS | 33.33 | <10 |
| Treat HP | 0.01 | <10 |
| Treat LP | 0.01 | <100 |

*ADIP note.*

1. 08:12hr. Stop make up lean adip to C-103 ( make 5% of tank ).
2. Skim oil C-101 and C-102.

*Figure11: Illustrate format of log sheet lead team operator before implemented*

SOLVENT DEWAXING UNIT (400L)

DWO yield %wt. = 80.15

| | Flow(t/d) | Temp. °C | Ratio,Press |
|---|---|---|---|
| Feed to SDU. (TPD) | 849.84 | 68.03 | |
| First dilution ratio (initial dilution) | 1595.76 | 27.91 | 1.88 |
| Second dilution ratio | 0.01 | 28.41 | 0.00 |
| Third dilution ratio | 0.27 | 28.07 | 0.00 |
| Forth dilution ratio | 43.30 | 28.62 | 0.05 |
| Fifth dilution ratio (final dilution) | 974.06 | | 1.15 |
| Fitration Temp. (V-102) | | -16.15 | |
| Solvent Temp. | | -17.77 | |
| Cross over Temp. | | -0.57 | |
| Primary cold wash | 749.62 | | |
| Repulp cold wash | 460.60 | | |
| Inject boot ratio | 719.36 | | |
| Vacuum Pump pressure | | | -0.722 |
| Dehydrate Pump pressure | 25.743 | | 1.798 |

FILTERS

- ☑ M-101
- ☑ M-102
- ☑ M-103
- ☑ M-104 PRI.
- ☐ M-104 REP.
- ☑ M-105
- ☑ M-106
- ☐ M-109A
- ☐ M-109B

DPE/DPC

- ☑ E-121
- ☑ E-122
- ☑ E-123
- ☑ E-124
- ☐ E-125
- ☑ E-126
- ☑ E-131
- ☑ E-132
- ☑ E-133
- ☐ E-134
- ☑ E-106A
- ☑ E-106B
- ☑ E-106C

| K-401 Condition | | Flow t/d | Temp. °C | Press bar | Level % |
|---|---|---|---|---|---|
| 1st Suction | | 806.49 | -25.27 | 0.123 | -1.168 |
| 2nd Suction | | 317.23 | -4.17 | 3.166 | 24.546 |
| Discharge | | 1018.77 | 108.40 | 20.198 | 36.497 |
| Ampare | 156.59 | | | | |

| Tank No. | Level(m) |
|---|---|
| T-101 | 0.604 |
| T-102 | 0.529 |
| T-103 | 0.020 |
| T-104 | 0.304 |

| Stream | Rate TPD | Pour Pt. °C | VI, oil cont | vis@40°C | vis@100,FP | MEK cont | Tolu cont | RI,PPonline | Unit/Tank |
|---|---|---|---|---|---|---|---|---|---|
| HTR | | | | n/a | n/a | | | | HFU |
| DWO | 681.15 | -10.00 | 94.78 | 96.88 | 10.820 | 13.49 | 22.29 | -11.95 | T-116C |
| SLW | 109.21 | | 3.67 | | | 13.04 | 19.73 | 1.4721 | T-106A |

***SDU Note.*** 500 DWO PP -9°C to -10°C, VI 94.8-95.4, Vis@100oC 10.8-11.25cst, oil cont <10%.

1. Hot wash filter = 8 time.
2. Increase filtration temp from -16.25 °C to -15.75 °C.

*Safeguard System and Chemical.*

Fire tube System ☑ Normal ☐ Abnormal

Oil mist(turbo 46) ☑ Normal ☐ Abnormal

HOT OIL BELT UNIT (560L)

| | Flow t/d | Temp oC | Press bar | Level, $O_2$ % | Efficiecy % | Hot oil coil |
|---|---|---|---|---|---|---|
| Hot Oil Supply | 18685.75 | 351.77 | 15.80 | | | 4215.14 |
| Hot Oil Return | | 266.83 | | | | 4517.74 |
| V-101 | | 267.60 | 5.60 | 21.37 | | 4708.60 |
| F-101 | | | | 5.60 | 87.94 | 4754.19 |

***HOU note.*** F/O firing 19 burner , F/G firing no 2, 5, 8, 14, 17

Normal condition

***Receive oil***

☐ VP-1

*Figure12: Illustrate format of log sheet lead team operator before implemented*

## SOUR WATER STRIPPER UNIT (600L)

| | Flow T/D | Temp. oC | Tank |
|---|---|---|---|
| Feed | 470.97 | 77.04 | VDU , PDA , Adip , HFU |
| Sour Gas | 0.275 | 67.80 | Flare |
| Stripper Water | 447.91 | 41.94 | ETP. |
| Steam-ratio | 2.553 | 118.38 | 0.131 |

| | Result | Spec |
|---|---|---|
| $H_2S$ | 0.00 | < 5 ppm |
| PH | 9.13 | 6.0-10.0 |
| SS | 20.80 | <100mg/l |
| Ammonia | 0.00 | < 50 mg/l |
| Oil content | 4.00 | < 100 mg/l |
| COD | 374.00 | < 1000 mg/l |

***SWS note.***

1. Cont. skim oil from C-101 to V-101.

*Chemical & lubricant*

Anti Foam ☑ Normal ☐ Abnormal

## SULPHUR RECOVERY UNIT (700L)

| | SRU-1 | | SRU-2 | |
|---|---|---|---|---|
| | Flow T/D | Temp. °C | Flow T/D | Temp. °C |
| Acid Gas | 12.081 | | 0.594 | |
| Sour Gas | 0.405 | | 0.002 | |
| Flue Gas | 0.001 | | 0.400 | |
| F-101/201 | | 1109.08 | | 1019.65 |
| F-102/202 | | 750.37 | | 750.15 |
| | R-101 | R-102 | R-201 | R-202 |
| Top Temperature. °C | 229.17 | 219.65 | 235.84 | 219.90 |
| Btm Temperature. °C | 307.96 | 241.65 | 225.79 | 211.33 |
| Diff Temperature. °C | 78.79 | 22.00 | -10.04 | -8.58 |

| | TGT. | |
|---|---|---|
| | Flow T/D | Temp. °C |
| E-301 | | 257.36 |
| R-301 Top | | 264.28 |
| R-301 Btm. | | 280.13 |
| $H_2$ | 0.108 | |
| PH | 7.44 | level/ton/hr |
| T-101 % | 47.25 | 0.163 |

| | Analyzer % vol. |
|---|---|
| $H_2S/SO_2$ | 2.236 |
| $H_2$ | 2.59 |

***SRU note.*** SRU-1 run acid gas, SRU-2 keep hot stand by, keep 055L-PV-019-2 to closed, control C-301 PH 7-7.5

1. Balance flow A/G = 11.50 -12.0 T/D for control alarm SOX high.
2. Change water 700L-C-301 = 8 time for adjust PH.

*Chemical & lubricant*

Ammonia ($NH_3$) ☑ Normal ☐ Abnormal

## EMISSION MONITORING

| Source | Value (PPM) | | Condition | | | |
|---|---|---|---|---|---|---|
| | NOX | SOX | | | | |
| Stack 100L | 98.0 | 363.8 | ☑ | Normal | ☐ | Abnormal |
| Stack 700L | 27.4 | 588.9 | ☑ | Normal | ☐ | Abnormal |
| Stack 800L | 20.8 | 20.6 | ☑ | Normal | ☐ | Abnormal |
| Flare Stack | | | ☑ | Normal | ☐ | Abnormal |

Remark Condition limit SOX < 950 ppm. NOX < 200 ppm.

*Figure13: Illustrate format of log sheet lead team operator before implemented*

**BITUMEN BLOWING UNIT (800L,850L)**

| | | |
|---|---|---|
| BBU-1 YIELD %wt. | = | -292.38 |
| BBU-2 YIELD %wt. | = | #VALUE! |

| | BBU-1 | | | BBU-2 | | |
|---|---|---|---|---|---|---|
| | Flow T/D | Temp. °C | Tank | Flow T/D | Temp. °C | Tank |
| Bitumen Feed | 0.92 | 152.08 | T-118B | 0.00 | 101.36 | T-118B |
| Bitumen Rundown | -2.70 | 35.60 | T-119D | Bad | 29.02 | T-119A |
| Air- %op valve | 0.22 | -6.90 | | 0.00 | -6.90 | |
| Reactor | | 87.62 | | | 83.32 | |
| Incinerator | 24.02 | 740.12 | | | | |
| Feed Viscosity | S/D | | | S/D | | |
| R/D Pen./softenning | S/D | S/D | | S/D | S/D | |
| Grade/premature fuming | 60-70 | n/a | | 60-70 | n/a | |

***BBU note.*** Aim pen 63-68 mm.

Unit BBU-1 and BBU-2 on shut down. Incinerator is hot stand by. Cont. by pass Unit BBU-1, 2 to R/D tank.
1. Cont. Open steam out 800L , 850L -C-101 , R-101 and V-101.
2. 17:30hr. Switch rundown T-119D to T-119A.

*Safeguard System*
Fire tube System ☑ Normal ☐ Abnormal

**PROPANE STORAGE UNIT (3000L)**

| | Level m. | Press. Bar |
|---|---|---|
| V-101 | 1.009 | 9.14 |
| V-102 | 0.997 | 9.10 |

*Safeguard System*
Hydrolic System ☑ Normal ☐ Abnormal
Fire tube System ☑ Normal ☐ Abnormal

**FLARE UNIT (2900L) & FUEL OIL (4200L)**

| | F/O per day | F/O sum. | eff % F-101 |
|---|---|---|---|
| VDU heater | 28.61 | 73396 | 87.79 |
| H/O heater | 74.79 | 45051 | 87.94 |
| Total F/O,TOP | 103.41 | 83.50 | |

F/O Tank No. ☐ T-202A ☑ T-202B ☑ V-102
F/O Strainer ☑ Normal ☐ Abnormal
Flame Detector ☑ Normal ☐ Abnormal

1. Cont. by pass F/G from TOP. (420L-PV-005-1)
2. Cont. crack CFO from T-202B to mix RFO with ratio 3 / 5.

**UTILITY CONSUMPTION**

| Utility | Start | End | Consumption | Spec. |
|---|---|---|---|---|
| Date/Time | 2/2/2008 8:00 | 2/2/2008 17:00 | | from DI |
| Raw Water | 99051.36 | 98783.43 | -17.86 | <25.6 |
| Nitrogen | 14749.24 | 14746.06 | -3.18 | 4.2 - 4.61 |
| Fuel Gas | 9475.76 | 9468.57 | -0.479 | <0.72 |
| Fuel Oil | 118494.34 | 118446.91 | -3.16 | <3.5 |
| Hydrogen | 8653.69 | 8650.58 | -0.21 | <0.17 |
| MPS | 1982.09 | 1456.79 | -35.02 | <36 |
| Condensate | 81041.66 | 80776.42 | -17.68 | >19.5 |

note. Utility consumption per 100 ton LR feed
new spec. from TT.

**UTILITY STEAM FLOW RATE**

| Unit | MPS. | LPS. | design |
|---|---|---|---|
| VDU | 10.092 | 2.385 | 10.8/3.3 |
| J-101 | 9.050 | | |
| J-102 | 0.897 | | |
| J-103 | 0.079 | | |
| J-104 | 0.066 | | |
| PDA | 0.563 | 3.067 | 0.1/2.9 |
| MPU | 1.182 | 2.124 | 1.4/1.35 |
| HFU | 1.387 | 0.430 | 1.2/0.3 |
| SDU | 5.719 | -3.389 | 0.0/1.8 |
| ADIP | | 1.402 | 1.4 |
| SWS | 2.553 | 0.018 | 2.0/0.03 |
| SRU | 0.830 | | >0.3/0.0 |
| BBU-1 | 0.002 | 0.000 | >0.2/0.1 |
| BBU-2 | 0.041 | 0.505 | 0.1/0.2 |
| Total | 22.368 | 6.542 | 28.910 |

*Figure14: Illustrate format of log sheet lead team operator before implemented*

**UTILITY CONDITION**

| | Flow (TPD) | Temp.(°C) | Press, PH | Level (%) | Chemical Dosing | Service | Rate % or kg/hr. |
|---|---|---|---|---|---|---|---|
| Acid Gas To Flare.2900L-V-103 | 201.85 | 26.25 | | 60.86 | 450L-P-104 | ☐ | |
| LP. Steam let down. 4000L | | 145.87 | 2.80 | | 450L-P-105 | ☐ | |
| Fuel Gas 4200L-V-101. | 16.08 | | 3.00 | | 450L-$Cl_2$ | ☐ | |
| Tempered water Supply. 4400L | 2503.47 | | 7.68 | 34.41 | 470L-P-102 | ☑ | 40.0 |
| Tempered water Return. 4400L | Intf Shut | 37.91 | | | 470L-P-103 | ☑ | 40.0 |
| Raw water make up. 4500L | 545.99 | | | 74.95 | 470L-P-104 | ☑ | 30.0 |
| Raw water to filter. 4500L | 9.15 | | | | 470L-P-106 | ☐ | |
| Potable water used. 4500L | 0.14 | | | 78.57 | 470L-P-107 | ☐ | |
| Cooling water Supply. 4700L | Intf Shut | 27.66 | 7.91 | 95.06 | 470L-$Cl_2$ | ☑ | 0.50 |
| Cooling water Return. 4700L | 72770.95 | 26.68 | | | Hypo-Chol | ☐ | |
| Instrument air System. 5500L | 21.66 | | 7.79 | | $H_2SO_4$ drip. | ☑ | |
| Plant air System. 5500L | 0.70 | | 7.82 | | Chge. pack | ☑ | 90 |
| Nitrogen Supply. 5700L | 7.08 | 26.81 | 5.97 | -0.06 | | | |

***Utility note.***

Normal condition

**Mov. / offsite Activities**

| | % | M. |
|---|---|---|
| AOC | 53.00 | 1.985 |
| COC | 62.71 | 1.590 |

1. Receiving RSO from TOP to 4200L-V-102.
2. Sending Wild Naphtha from VDU/HFU to TOP.
3. Receiving HCB from TOP to 3000L-T-101B.
4. Sending 60VGO from T-105A to TOP.
5. Close tank T-105A , T-119D
6. Blending bitumen feed to T-118B (ratio 880 / 116), transfering to T-103B and to product tank T-119A.
7. 12:00hr - 18:00hr. Cir T-119D.
8. 16:30hr. Start sending 500SLW T-106B to TOP.

**MAINTENANCE WORK**

On PACER

3000L-mov 025 can not full close.

Under repair

1. 3000L-T-116B Clean and inspection
2. 100L-K-103 Overload trip.
3. 030L-FV-068 Bounet valve leak.
4. 300L-MOV-002 can not full close
5. 300L-MOV-024 can not full close

*Figure15: Illustrate format of log sheet lead team operator before implemented*

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**Lead Team Operator Report** — *after implemented*

THAILUBE
THAIOIL GROUP

**Date** 2-Sep-08

**Shift** A B C **D** ☑ Day Shift ☐ Night Shift

Sawat Baothong — Lead Team Operator.

Adirek Sangaroon — Shift Superintendent.

New structured important item

## Safety & Environment

| Source | Value (PPM) | | Operateing Window | | |
|---|---|---|---|---|---|
| | NOX | SOX | | | |
| Stack 100L | 6.4 | 23.8 | Maximum | SOX ppm | < 950 |
| Stack 700L | 26.4 | 46.5 | Maximum | NOX ppm | < 200 |

data link from process

New structured important item

More details description

## Mintenance Complete

09.00-12.00 Instrument Engineer installed maximum stop of compbustion air flow to VDU heater to prevent over firring

*Note: See more details in Shift Sup. Logsheet*

## Maintenance in progress

1. 500L- P-110A Shaft is locked.
2. 100L-K-103 Over load trip checking
3. 3000L-T-118B Repairing tank due to collapsed.
4. 400L-P-110B Turbine is damaged.
5. 100L-P-110B Mech seal is leaking.

New structured important item

## Abnormal/Technical Problem

1. 3" MP steam at the flare stack is leaking awaiting for shuting down repair
2. Tracing steam to Extract and Raffinate lines are colsed for energy conservation purpose

New structured important item

## Outstanding Item

Bitumen Storage tank T-118 B still mechanic hand for reparing

data link from process

## CONDITIONS OF VACUUM DISTILLATION UNIT (100L)

| | Flow T/D | Temp.°C, % | % Yield | Tank | Vis. Lab. | Vis. Online | FP, FBP | dis10%,CCR |
|---|---|---|---|---|---|---|---|---|
| Feed | 2747.28 | 366.64 | | T-101A | | | | |
| LVGO | 188.15 | 111.98 | 6.70 | T-104B | | | | |
| 60VGO | 229.99 | 211.07 | 8.50 | T-105A | n/a | 13.36 | n/a | n/a |
| 150VGO | 532.93 | 250.15 | 18.80 | T-108 | n/a | 5.435 | n/a | |
| LSL | Bad | 282.48 | #VALUE! | | | | | |
| 500VGO | 773.45 | 308.53 | 27.30 | T-110A | n/a | 15.22 | n/a | n/a |
| HSL | 0.23 | 335.70 | 0.01 | | | | | |
| VR to PDA | 802.51 | 177.89 | 33.70 | PDA | n/a | | | |
| VR to Tank | 152.55 | 177.89 | | T-102 | | | | |
| NAPHTHA | Tag not found | | | TOP | | | 327.10 | |
| HCB inject | 191.93 | 6.99 | | | | | | |

***VDU note*** 60VGO Vis 12.5-13.0cst, 150VGO Vis 5.4-5.6cst , 500VGO Vis 14.8-15.0cst.

Activities:

Adjusted F/O firing 6 burner , Stop no. 1, 7 to balance firring

More details description

11:30 Switched 150VGO product from T-108 to T-109 for balancing level

17:00 Adjusted Vac. Dist. column conditions for increasing 500 VGO product viscosity from 15.4 to15.0-15.2 Cst

*Figure16: Illustrate format of log sheet lead team operator after implemented*

**CONDITIONS OF PROPANE DE-ASPHALT UNIT** | **DAO Yield = 19 %, Aphalt Yield = 81 %**

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| | Tank | Flow T/D | Temp. °C | Press.bar | Level % | Vis. Online | Vis/Pen Lab | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | ☐ | K-101A |
| Feed | VDU / T-102 | 1011.38 | 67.58 | 4.50 | 55.09 | | 81.10 | Ratio,CCR | ☑ | K-101B |
| Pre-Dilution | | 506.84 | 37.74 | | | | | | ☐ | 100 % |
| Dilution | | 2430.32 | 40.50 | | | | | 0.50 | ☑ | 67 % |
| Upper Coil | | | 67.58 | | | | | 2.40 | ☐ | 50 % |
| Lower Coil | | | 56.46 | | | | | | | |
| V-101 | | 1313.88 | 83.03 | 35.51 | 27.93 | | | | | |
| V-102 | | 1767.83 | 37.74 | 15.90 | 26.90 | | | | | |
| DAO. Pro. | T-111A | 181.30 | 91.71 | | 29.44 | 40.85 | 40.93 | | | |
| Asp. Pro | T-103A | 824.57 | 170.19 | | 30.08 | | 23.00 | 1.47 | | |

***Note.*** DAO Vis. 40.5-41.5 cst, CCR < 1.5%wt

**PDA Activities:** None

**MP REFINING UNIT (300L)** | RAFF YIELD %wt. = 72.29

| | Flow. t/d | Temp. °C | Prees bar | Level % |
|---|---|---|---|---|
| Treating Feed rate | 1551.91 | 54.94 | 4.006 | 34.20 |
| Solvent rate | 1469.57 | 61.77 | 0.200 | 22.57 |
| Inter.cool rate | 1797.53 | 42.61 | | |
| Water injection. | 29.22 | 106.20 | | |
| Gradient. Temp. | | 12.91 | | |
| Solvent Ratio | 0.947 | | | |

| Solvent Tank Level (m) | |
|---|---|
| T-101 | 7.493 |
| T-102 | 0.815 |
| T-103 | 1.793 |

| | |
|---|---|
| C-109 Strip S. (t/h) | 0.449 |
| C-106 Strip S. (t/h) | 0.325 |

| Stream | Rate TPD | Unit Tank No | VI | Vis @40 °C | Vis @100 °C | Solvent Cont. PPM | RI Lab | RI Online |
|---|---|---|---|---|---|---|---|---|
| Feed | 1551.91 | T-109A | | n/a | n/a | | n/a | |
| Raff. | 1121.83 | HFU | n/a | n/a | 5.02 | 5.21 | 1.4614 | 1.4700 |
| Extract | 738.76 | T-107A | | | | 9.10 | 1.5656 | |
| OVHD-C-101 | | | | | | <0.01 | | |

***MPU note.*** 150N RI 1.4625-1.4635, VI >114, Solvent cont. Raff. < 20 ppm, Ext. < 20 ppm, OVHD < 50 ppm

1. Increased MPU feed from 1550 t/d to 1600 t/d refer to WOP.(weekly operation plan)
2. Decreased wash rate from 0.950 to 0.925 for reducing VI give away(optimization)

**HYDROFINISHING UNIT (500L)** | HTR YIELD %wt. = 106.56

| Reactor Condition | | |
|---|---|---|
| press.(bar) | temp. °C | diff.temp. °C |
| 70.06 | 303.64 | -8.81 |

| | |
|---|---|
| C-104 Strip S. (t/h) | 1.193 |
| C-102 Strip S. (t/h) | 0.055 |

| Stream | Rate TPD | Sulfur % Wt | flash point °C | Tank/Unit |
|---|---|---|---|---|
| Feed | 1194.37 | | | MPU |
| HT Raff. | 1272.72 | n/a | n/a | SDU |
| Distillate | 4.71 | | | |
| Naphtha | 0.001 | | | |
| $H_2$ make up | 7.355 | | | |
| $H_2$ to F/G | 12.458 | | | |

| $H_2$ mark up | Result | Spec. |
|---|---|---|
| $H_2$ recycle | 88.59 | >85 |
| | 87.88 | >85 |

***HFU note*** 150N HT Raff. Sulphur 0.19-0.47%wt, FP >200°C

1 Decreased reactor tmp from 302 to 300 oC for improving sulphur content in the product. Please follow up the result.

**ADIP UNIT 550L (Amine Treating)**

| | Flow t/d | | Top, BTM | Ratio | Level % |
|---|---|---|---|---|---|
| | Acid gas | Lean Adip | Temp °C | | |
| C-101 | 52.44 | 105.61 | | 2.007 | 49.89 |
| C-102 | 14.40 | Bad | | Bad | 49.78 |
| C-103 | | 316.29 | 103.17 | | 75.90 |
| C-104 | 35.00 | 13.07 | 35.79 | 0.373 | 49.81 |
| A/G to SRU | 7.66 | | 38.90 | | |
| | | | | T-101 | 17.61 |

| Solvent Qualities | | |
|---|---|---|
| Analysis | Result | Spec. |
| ATB | 22.30 | Dif. <3 |
| RFB | 26.82 | 26-28% |
| $H_2S$ | 881.33 | <900PPM |
| Foaming | 210.00 | <190 |
| PH | 10.82 | >10.5 |
| SS | 33.33 | <10 |
| Treated HP | 0.01 | <10 |
| Treated LP | 0.01 | <100 |

***ADIP Activities:.***

1. Maintain bleed water about 1.20 t/d for improve RFB(to ensure water not dilute the solvent).
2. Make up fresh ADIP from T-101 to the system 4% to improve RFB

*Figure17: Illustrate format of log sheet lead team operator after implemented*

| SOLVENT DEWAXING UNIT (400L) | DWO yield %wt. = | 43.94 | page 3/6 |
|---|---|---|---|

| | Flow(t/d) | Temp. °C | Ratio,Press |
|---|---|---|---|
| Feed to SDU. (TPD) | 1202.74 | 57.92 | |
| First dilution ratio (initial dilution) | 357.37 | 37.21 | 0.30 |
| Second dilution ratio | 240.46 | 21.39 | 0.20 |
| Third dilution ratio | 480.37 | 14.91 | 0.40 |
| Forth dilution ratio | 52.91 | 28.93 | 0.04 |
| Fifth dilution ratio (final dilution) | 905.03 | | 0.75 |
| Fitration Temp. (V-102) | | -17.18 | |
| Solvent Temp. | | -19.22 | |
| Cross over Temp. | | -1.37 | |
| Primary cold wash | 1030.04 | | |
| Repulp cold wash | 520.01 | | |
| Inject boot ratio | 440.22 | | |
| Vacuum Pump pressure | | | -0.684 |
| Dehydrate Pump pressure | 32.441 | | 1.799 |

| FILTERS | DPE/DPC |
|---|---|
| ☑ M-101 | ☑ E-121 |
| ☑ M-102 | ☑ E-122 |
| ☑ M-103 | ☑ E-123 |
| ☐ M-104 PRI. | ☑ E-124 |
| ☐ M-104 REP. | ☑ E-125 |
| ☑ M-105 | ☑ E-126 |
| ☑ M-106 | ☑ E-131 |
| | ☑ E-132 |
| ☐ M-109A | ☑ E-133 |
| ☐ M-109B | ☑ E-134 |
| | ☑ E-106A |
| | ☑ E-106B |
| | ☑ E-106C |

| K-401 Condition | | Flow t/d | Temp. °C | Press bar | Level % |
|---|---|---|---|---|---|
| 1st Suction | | 892.26 | -25.04 | 0.117 | -1.206 |
| 2nd Suction | | 359.16 | -6.03 | 2.903 | 32.149 |
| Discharge | | 1195.89 | 99.17 | 17.991 | 16.591 |
| Ampare | 159.61 | | | | |

| Tank No. | Level(m) |
|---|---|
| T-101 | 0.000 |
| T-102 | 0.441 |
| T-103 | 0.029 |
| T-104 | 0.214 |

| Stream | Rate TPD | Pour Pt. °C | VI, oil cont | vis@40°C | vis@100,FP | MEK cont | Tolu cont | RI,PPonline | Unit/Tank |
|---|---|---|---|---|---|---|---|---|---|
| Feed | | | | n/a | n/a | | | | HFU |
| DWO | 528.49 | -12.00 | 94.62 | 101.30 | 11.140 | n/a | n/a | -12.10 | T-115B |
| SLW | 228.41 | | 10.31 | | n/a | n/a | n/a | 1.4706 | T-106A |

***Note.*** 150N DWO PP -10°C to -11°C, VI 102.8-103.5 , Vis@40oC 29-31cst, Vis@100°C 5.0-5.25cst, Oil cont. <10%, FP >204°C.

Activities:

1. Hot wash filter = 13 times.
2. 09.00H Sample DWO check FP the result is 211 °C it on spec..
3 On servioed DMC to Auto mode

HOT OIL BELT UNIT (560L)

| | Flow t/d | Temp oC | Press bar | Level, $O_2$ % | Efficiecy % | Hot oil coil |
|---|---|---|---|---|---|---|
| Hot Oil Supply | 16291.33 | 351.04 | 15.97 | | | 3990.95 |
| Hot Oil Return | | 260.66 | | | | 4133.27 |
| V-101 | | 261.22 | 5.50 | 21.61 | | 4138.74 |
| F-101 | | | | 5.50 | 86.47 | 3835.48 |

***HOU note.*** F/O firing 18 burner , F/G firing no 5, 8, 17, 20, F/O stop no. 3, 21

1. Stopped F/O burner no. 3 to reduce coil skin temp.

SOUR WATER STRIPPER UNIT (600L) Page 4/6

| | Flow T/D | Temp. oC | Tank |
|---|---|---|---|
| Feed | 582.16 | 83.90 | VDU , PDA , Adip , HFU |
| Sour Gas | 0.285 | 129.03 | Flare |
| Stripper Water | 534.44 | 44.13 | ETP. |
| Steam-ratio | 2.832 | 121.13 | 0.117 |

| | Result | Spec |
|---|---|---|
| $H_2S$ | 0 | < 5 ppm |
| PH | 9.13 | 6.0-10.0 |
| SS | 20.80 | <100mg/l |
| Ammonia | 0.00 | < 50 mg/l |
| Oil content | 4.00 | < 100 mg/l |
| COD | 374.00 | < 1000 mg/l |

***SWS Activities***

1. Continue to skiming oil from C-101 to V-101. to ensure no oil contamination in stripped water

*Figure18: Illustrate format of log sheet lead team operator after implemented*

## SULPHUR RECOVERY UNIT (700L)

| | SRU-1 | | SRU-2 | |
|---|---|---|---|---|
| | Flow T/D | Temp. °C | Flow T/D | Temp. °C |
| Acid Gas | 7.677 | | 0.000 | |
| Sour Gas | 0.007 | | 0.000 | |
| Flue Gas | 0.000 | | 0.329 | |
| F-101/201 | | 1146.45 | | 1026.55 |
| F-102/202 | | 750.33 | | 700.71 |
| | R-101 | R-102 | R-201 | R-202 |
| Top Temperature. °C | 224.29 | 214.61 | 235.99 | 217.87 |
| Btm Temperature. °C | 295.89 | 242.23 | 220.80 | 208.94 |
| Diff Temperature. °C | 71.60 | 27.61 | -15.19 | -8.93 |

| | Tail Gas Treating(SCOT) | |
|---|---|---|
| | Flow T/D | Temp. °C |
| E-301 | | 245.31 |
| R-301 Top | | 249.06 |
| R-301 Btm. | | 263.42 |
| $H_2$ | 0.077 | |
| PH | 6.84 | level/ton/hr |
| T-101 % | 74.38 | 0.404 |

| | Analyzer % vol. |
|---|---|
| $H_2S/SO_2$ | 3.633 |
| $H_2$ | 3.17 |

***SRU note.*** SRU-1 run acid gas, SRU-2 keep hot stand by, keep 055L-PV-019-2 to closed, control C-301 PH 7-7.5

Acttivities:

1. Performed sulphur product loading 1 truck.

## BITUMEN BLOWING UNIT (800L,850L)

BBU-1 YIELD %wt. = -171.11

BBU-2 YIELD %wt. = #VALUE!

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| | BBU-1 | | | BBU-2 | | |
|---|---|---|---|---|---|---|
| | Flow T/D | Temp. °C | Tank | Flow T/D | Temp. °C | Tank |
| Bitumen Feed | 1.32 | 28.62 | T-118A | 0.00 | 28.03 | S/D |
| Bitumen Rundown | -2.25 | 30.63 | T-119D | Bad | 29.70 | S/D |
| Air- %op valve | 0.00 | 105.00 | | 0.00 | 100.00 | |
| Reactor | | 29.92 | | | 28.84 | |
| Incinerator | 0.01 | 31.62 | | | | |
| Feed Viscosity | 4032 | | | S/D | | |
| R/D Pen./softening | 65 | 47.00 | | S/D | S/D | |
| Grade | 60-70 | | | S/D | | |

***BBU note.*** Unit 800L, 850L on shut down Cont. by pass unit to R/D tank

1. Cont. to maintain preservation on unit 800L, 850L with $N_2$ about 0.2-0.40 bar.

## PROPANE STORAGE UNIT (3000L)

| | Level m. | Press. Bar |
|---|---|---|
| V-101 | 1.088 | 9.27 |
| V-102 | 0.487 | 9.82 |

*Activities:*

## FLARE UNIT (2900L) & FUEL OIL (4200L)

| | F/O per day | F/O sum. | eff % F-101 |
|---|---|---|---|
| VDU heater | 31.20 | 79473 | 84.15 |
| H/O heater | 0.00 | 63837 | 86.47 |
| Total F/O,TOP | 31.20 | 139.10 | |

## UTILITY CONSUMPTION

12 hour everage consumption T/D

| Utility | Actual | Target |
|---|---|---|
| Raw Water | 604.18 | 580.00 |
| Nitrogen | 10.07 | 7.80 |
| Fuel Gas | 8.56 | 0.50 |
| Fuel Oil | 123.80 | 145.00 |
| Hydrogen | 9.05 | 10.20 |
| MPS | 46.38 | 48.00 |
| Condensate | 500.30 | 420.00 |

## UTILITY STEAM FLOW RATE

| Unit | MPS. | LPS. | design |
|---|---|---|---|
| VDU | 11.288 | 2.248 | 10.20/2.8 |
| J-101 | 9.407 | | |
| J-102 | 1.730 | | |
| J-103 | 0.080 | | |
| J-104 | 0.072 | | |
| PDA | 0.271 | 3.829 | 0.65/3.20 |
| MPU | 1.038 | 0.787 | 1.40/1.40 |
| HFU | 1.408 | 0.026 | 1.40/0.40 |
| SDU | -0.011 | 1.595 | 5.60/1.8 |
| ADIP | | 1.195 | 1.4 |
| SWS | 2.832 | 0.006 | 2.80/0.03 |
| SRU | 1.207 | | >0.3/0.0 |
| BBU-1 | -0.001 | 0.000 | >0.2/0.1 |
| BBU-2 | 0.039 | 0.180 | 0.1/0.2 |
| Total | 18.071 | 9.866 | 27.937 |

*Figure19: Illustrate format of log sheet lead team operator after implemented*

**UTILITY CONDITION**

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Chemical Dosing

| | Flow (TPD) | Temp.(°C) | Press, PH | Level (%) | | Service | Rate % or kg/hr. |
|---|---|---|---|---|---|---|---|
| Gas To Flare. 2900L-V-103 | 2.94 | 27.46 | | 47.72 | | | |
| LP. Steam let down. 4000L | | 145.59 | 2.80 | | 450L-P-104 | ☐ | |
| Fuel Gas 4200L-V-101. | 8.14 | | 2.99 | | 450L-P-105 | ☐ | |
| Tempered water Supply. 4400L | 3349.57 | | 7.71 | 50.30 | 450L-$Cl_2$ | ☐ | |
| Tempered water Return. 4400L | Tag not found | 57.80 | | | 470L-P-102 | ☑ | 40.0 |
| Raw water make up. 4500L | 723.40 | | | 57.93 | 470L-P-103 | ☑ | 40.0 |
| Raw water to filter. 4500L | 756.90 | | | | 470L-P-104 | ☑ | 30.0 |
| Potable water used. 4500L | 0.57 | | | 72.23 | 470L-P-106 | ☐ | |
| Cooling water Supply. 4700L | Tag not found | 28.62 | 8.08 | 97.47 | 470L-P-107 | ☐ | |
| Cooling water Return. 4700L | 72211.10 | 27.48 | | | 470L-$Cl_2$ | ☑ | 0.50 |
| Instrument air System. 5500L | 22.25 | | 7.77 | | Hypo-Chol | ☐ | |
| Plant air System. 5500L | 0.14 | | 7.92 | | $H_2SO_4$ drip. | ☑ | |
| Nitrogen Supply. 5700L | 9.82 | 27.74 | 5.98 | -0.06 | Chge. pack | ☑ | 90 |

***Utility Activities***

None

**Mov. / offsite Activities**

1. Continue to receiving RSO from TOP to 4200L-V-102.
2. Continue to receiving HCB from HCU-2 to T-201.
3. Continue to sending Wild Naphtha from VDU/HFU to TOP.
4. Continue to sending 60VGO from T-105A to TOP.
5. Completed Marine loading Bitumen product from T-119D to MT. Shining star.
6. Performed Product tanks stock closing DAO (T-111B), 500SN (T-116A), 150BS (T-117A).
7. Blending bitumen T-103A+T-107D( 1100/147 ) to T-118A and product to T-119A. Please carry on

| Waste Water Tank | | |
|---|---|---|
| AOC | % | M. |
| COC | 41.96 | 2.406 |
| | 47.77 | 2.071 |

**MAINTENANCE WORK Raising**

On PACER

400L-E-122-2 sheer pin broken.

400L-E-123-2 sheer pin broken.

100L-P-112A Motor is noisy.

100L-P-104B The warm up pump block valve the wheel valve is loosing

100L-P-105A Seal oil leak into process side.

055L-PIDCA014 reading error.(043223)

*Figure 20: Illustrates format of log sheet lead team operator after implemented*

Shift Sup Logsheet before AnditingPproject

THAILUBE

Date 01-Feb-08

Shift **A** B C D **Day Shift** Night Shift

**HEALTH SAFETY AND ENVIRONMENT**

| | | | | | | |
|---|---|---|---|---|---|---|
| Hot Work | 8 | Jobs. | Community Complain : | 0 | Time. | 3. Other : |
| Cold work | 14 | Jobs. | | | | |
| Completed | 18 | Jobs. | | | | |
| Contractor | 212 | People | | | | |

No Details

**PROCESS CORRECTIVE ACTIONS AND OUTSTANDINGS**

| Unit | Plan (tpd.) | Actual(tpd) | REMARK |
|---|---|---|---|
| VDU feed | 2,600 | 2,785 | LR tank from T-101C, HOT= 368 deg_C. |
| PDA feed | Balance VR | 994 | Solvent dilution 0.50:1/2.3:1 |
| MPU feed | 1,550 | 1,376 | Grade 500SN; Feed intake from T-109A, Increase wash rate 1.275 to 1.150. |
| Extract product | N/A | 697 | |
| HFU feed | Raff.R/D | 900 | Reactor temperature has 325°C |
| SDU feed | HFU R/D | 863 | Filtration temperture -16.0°C. (V-102). |
| SDU product | N/A | 655 | |
| Wax product | N/A | 133 | |
| BBU #1#2 product | S/D | -1 | Unit S/D and Steam out on going. |

Not enough Details

**OFFSITE & LOADING & UTILITIES**

| Daily Road Loading | Amount | |
|---|---|---|
| | Trucks | Tons |
| Base oil | 0 | 0 |
| Bitumen | 0 | 0 |
| Extract | 0 | 0 |
| Sulfur | 0 | 0 |

| Daily Marine Loading | Amount | |
|---|---|---|
| | Ships | MTons |
| Base oil | 0 | 0 |
| Bitumen | 0 | 0 |
| Extract | 0 | 0 |
| LR feed receive | 0 | 0 |

AOC Water Ullage level = 1.790 metre // COC Water Ullage level = 1.697 metre

1. Naphtha ; 60VGO(T-105A) are sending to TOP.
2. HCB from TOP is receiving to T-101B.
3. Bitumen blending to T-118B( 880 + 117 t/d.). transfering T-118B to T-103B and then to product tank T-119D.
4. Co-firing CFO:RSO with ratio 3:5 as TC advised.
5. T-106C is circulating and heat up slack wax in tank.

Not enough Details

**SUGGESTIONS/OTHER**

1. Hot oil heater used F/G No. 2,5,8,14 and 17.
2. Fuel gas supply from TOP still opening by pass of control valve a little.

Not enough Details

***La-ong Sriauem***

**( Shift Superintendent)**

*Figure 21: Illustrates format of log sheet for Shift Superintendent before implemented*

Shift Sup. Logsheet after Implementing

Date 02-Sep-08

THAILUBE THAIOIL GROUP

Shift A B C **D** | **Day Shift** | Night Shift

## Safety&Environment

Note: Please be awared tahat *Hot work and Confined space* activity still carry on at Bitument product tank T-118B

## Maintainance Completed

1. Electrician has repaired motor air purge of K-401. Function tested is ok
2. Steam traps around VDU have been checked they are work well.
3. Mechanical changed filter element of M-104 unit 550L and put inservice
4. Mechanical completed modify N2 make up line to Hot Oil Surge drum and put on line
5. 3000L T-108 has calibrated temperature indicator it is OK now. ( 2° C diviated)
6. 700L Sox/Nox at Incinerator stack has calibrated and put in service.

## Maintainance Inprogress

1. Cable installation of motorise valve at the area 200,500 will be carred on tomorrow
2. Ladder installtion at tank 3000L T-110 will be carried on tomorrow
3. Pipe lines insulation at unit 800 is 20% progression and will carry on tomorrow.
4. CCTV under MCB still under installtion and will carry on tomorrow

## Abnormal/Technical Problem

1. 3" MP steam at the Flare tip still leaking. Wait for shuting down repair.
2. Unable to introduced sour water gas to SRU due to thermal reactor temperature < 1250 ° C (cannot decomposed $NH_3$)
3. Tracing steam to Extract and Raffinate rundown lines are closed for energy conservation purpose

## Outstanding Item

1. Bitument product Tank T-118 B still in mechanial hand for overhaul. ***Caution! this a hot work***
2. Low -low level safeguarding system Fuel Oil storage tanks T-202 A/B are in overring (MOS) position to prevent fuel oil pump trip (these tank are now used for storing Extracr products)

## PROCESS CORRECTIVE ACTIONS AND OUTSTANDINGS

| UNIT | PLAN (tpd.) | ACTUAL(tpd) | REMARK |
|---|---|---|---|
| VDU feed | 2,750 | 2,764 | Mainatin feed 2750 t/d from T-101A. Inject HCB= 190TPD. Heater out let =367 °C, as planned (WOP) |
| PDA feed | VR R/D | 995 | Feed rate as vacuum residue product rundown and balance feed tank T-102. Dilution rate 0.5:1/ 2.4:1 as instructed. |
| MPU feed | 1,650+ | 1,371 | Production grade is changing to 150SN aimed at 1650 T/D as planned. Solvent wash rate at 0.9:1 as instructed. |
| Extract product | 631 | 716 | |
| HFU feed | 864 | 900 | Feed grade 150 SN from MPU product rundown. Maintain reactor temperature 295 °C as instructed. |
| SDU feed | 855 | 867 | Feed grade is being changed to 150 SN from HFU product rundown aimed max >1250 T/D as instructed. |
| SDU product | 745 | 742 | DMC: Off mode due to unit is under grade change |
| Wax product | 121 | 133 | DMC: Off mode due to unit is under grade change |
| BBU #1#2 product | S/D | -3 | Process plant/Equipment are preserved by $N_2$ pressure. |
| Bitumen Blending | 1,050 | 938 | Blending bitumen feed from T-103A+T-107B rate 1,100+ 148TPD via T-118A into T-119D |

## OFFSITE & LOADING & UTILITIES

| Daily Road Loading | Amount | |
|---|---|---|
| | Trucks | Tons |
| Base oil | 0 | 0 |
| Bitumen | 0 | 0 |
| Extract | 0 | 0 |
| Sulfur | 0 | 0 |

| Daily Marine Loading | Amount | |
|---|---|---|
| | Ships | MTons |
| Base oil | 0 | 0 |
| Bitumen | 0 | 0 |
| Extract | 0 | 0 |
| LR feed receive | 0 | 0 |

## OFFSITE & MOVEMENT

| | | | | | |
|---|---|---|---|---|---|
| AOC Water Ullage level = | 1.820 | metre | // COC Water Ullage level = | 1.709 | metre |
| 6300L-M-101 Level = | 41.99 | % | // 6300L-V-101 level (LI-005) = | 4.24 | % |

1. Wild naphtha and 60VGO(T-105A) are sending to Thai oil as instructed.
2. Still receiving SRO from Thai oil to fuel oil surge drum 4200L-V-102 as instructed.
3. Still receiving Hydrocracker bottom product to T-201 as planned
4. 12.00 hrs Complete loading of Bitumen product 600 MT from T-119D 600MT to MT Shining Star as shipping program .
5. Sample T-111B and T-116A and T-117A have taken to lab for stock closing as instructed.
6. 16.00 hrs complete transfering 150 Extract from T-107A 118MT to T-107B as instructed
7. 18.30 hrs Complete transfering BS Extract from T-107C 270MT to T-107B.

***Adirek Sangaroon***
**(Shift Superintendent)**

*Figure 22: Illustrates format of log sheet for Shift Superintendent after implemented*

## 5.4 Improving Communication at Shift Handover

A model of effective shift handover communication was derived from the psychology of effective communication, shift handover communication research in UK and French safety-critical process industries, analysis of industrial accidents and best industry practice. This model was used to assess current practice in a large oil refinery and make measurable improvements. We describe the process and outcomes of the initiative.

Shift handover is regarded as important in many shifts -working occupations. Discontinuity of tasks and personnel give rise to risk of non-transmission or miscommunication of critical information. The importance of shift handover is confirmed by a number of recent industrial accidents where failures of communication or misunderstanding at shift handover have been identified as causal or contributory factors.

Shift handover communication has received little attention in the human factors literature. There is only one known published account of how shift handover is conducted. Shift handover is regarded as problematic under certain conditions. The "UK Health and Safety Executive" state that places particular emphasis on the importance of shift handover during abnormal plant conditions. Handover is also viewed as problematic following a lengthy absence from work.

## 5.5 Developing guidance on shift handover

Regarding to UK Health and Safety Executive's guidance on human factors in industrial safety recognizes the importance of shift handover and asks managers to consider "what arrangements (e.g. written logs, formal handover procedures) are there for conveying information between shifts on matters such as maintenance in progress, plant out of service, process abnormalities?". Similarly, human factors guidelines for nuclear power generation stations recommend that "proper shift turnover methods" be incorporated to ensure that the next shift has received and understands the current operating status of all plant systems and equipment.

### 5.5.1 Information, knowledge and understanding: definitions

Information channels have been categorized in terms of their richness. Face-to-face communication is the richest channel for information. It provides immediate feedback thus allowing understanding to be checked and corrected. It is argued that face-to-face communication is most effective for mitigating ambiguity and creating shared understanding. In contrast, written information is lower in richness, lacking the capacity for rapid feedback.

Knowledge can be defined as the body of information possessed by an individual. Two types of knowledge can be distinguished: procedural and declarative Procedural knowledge refers to practical operational knowledge about how to do something. Such knowledge may be implicit and difficult to verbalize. Declarative knowledge consists of facts about the world, which are accessible consciously.

The understanding or comprehension via communication relates to the use of information from a dialogue, in combination with existing knowledge, to arrive at a shared meaning. In their attempt to reach shared understanding, dialogue participants must each assess the mental world or mental state of their conversational counterpart to determine what information is required to achieve understanding. Having distinguished between information, knowledge and understanding, we now return to the notion of "effective communication" of information.

### 5.5.2 Feedback

Shift handover communication is a task-oriented interaction occurring between two or more individuals. Talk of "conveying information" via "procedures" implies a unidirectional flow and neglects the importance of mutual interaction. Interpersonal communication involves a circular rather than linear pattern of interaction. Person A communicates with person B, who in turn communicates with person A, a phenomenon known as feedback.

The role of feedback in accurate communication has also been emphasized in a recent cognitive theory of reliable communication. This theory also provides a possible explanation of why shift handover communication may be problematic under certain conditions.

First, there is the mental model held by those attempting to communicate with each other. When their mental models are largely compatible (e.g. under stable plant conditions, between experienced operators or when both handover participants have been on duty for a number of consecutive shifts) communication is unlikely to be problematic. In other words, shared understanding aids communication.

However, where the respective mental models are not compatible (e.g. under abnormal plant conditions, following a long absence from work or between experienced and inexperienced workers) the role of communication becomes crucial in enabling the differing models to be aligned. The second factor identified as holding the key to effective communication is feedback.

Under normal conditions, with shared mental models or shared understanding, largely one-way transmission of information can prove adequate. Shared models enable assumptions to be made about the meaning of the information conveyed. It is not necessary for the receiver of the information to feed back their understanding, as the sender's meaning is implicit.

Under abnormal conditions, where the mental models are not compatible, feedback becomes important for both the sender and receiver. Feedback enables:

a) The receiver to confirm they have received, correctly interpreted and have understood the message

b) The sender to confirm that the communication has been successfully transmitted and clarify any misunderstandings.

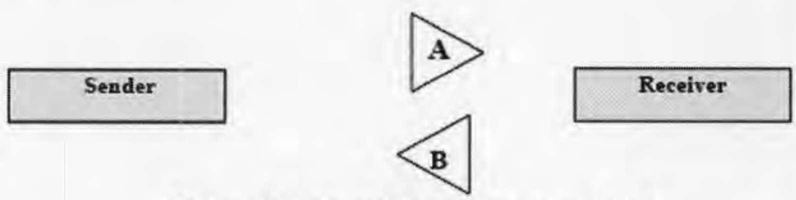


*Figure 23. Ideal Communication Cycle*

Note that:

A: Receiver registers and understands sent information
B: Sender knows that receiver has registered and understands sent information
*(Source: http://www.hse.gov.uk/humanfactors/comah/standards.pdf)*

### 5.6 Criteria of communication at shift handover

- **Shift Handover - Related Accidents and Error Rates**

Accidents, incidents, and errors are related to shift handovers in many high-risk domains. Many other shifts - related accidents have to accumulate in oil refinery, errors and accidents occur disproportionately after shift handovers.

- **Two-way Communication, Preferably Face-to-Face**

Face-to-face handover is a best practice that is agreed upon in all guidelines and reviews of the literature and is aimed for in most domains studied. The reason is that handover errors are due to differences in the mental models of the outgoing worker and the incoming worker. Two-way communication enables the incoming worker to ask questions and rephrase the material to be handed over, so as to expose these differences. Face-to-face handovers enable gestures, eye contact, tones of voice, degrees of confidence, and other redundant and rich aspects of personal communication to be utilized in conveying possible different mental models.

- **Face-to-Face Handovers with Written Support**

Face-to-face handovers are improved if they are supported by structured written material for instance a checklist of items to convey, and/or a position log to review. Written material introduces redundancy in the verbal handover, which, as Lardner points out, reduces the risk of erroneous communication. It also allows one to specify ahead of time those aspects of the communication that are most important and should not be left out.

Face-to-face handovers with written support have been shown to reduce errors in aviation maintenance Compared to written handovers with verbal communication filtered through a supervisor.

- **Content of Handover Captures Intent**

Handover communication works best if it captures problems, hypotheses, and intent, rather than simply lists what occurred. Recent research indicates that perception and memory are organized by hierarchical goal representations and that these representations in turn drive narrative comprehension, memory and planning.

## 5.7 Key areas to examine

Safety critical communication situations, which could be examined, include:

- Shift handover
- Communications during emergencies
- Any form of remote communication between control room and outside operators e.g. during shutdowns
- Permit-to-work procedures, particularly if the work continues over a shift change
- Communication of hazards and risks to contractors
- Use of radios
- Plant labeling and identification
- Communication of changes to procedures.

Problems with communication leading to major accidents/incidents are well known, for example in early chapter.

Effective communication is important in all organizations when a task and its associated responsibilities are handed over to another person or work team. Critical times when good communication must be assured include: at shift changeover, between shift and day workers, between different functions of an organization within a shift (e.g. operations and maintenance) and during process upsets and emergencies. Although the importance of reliable communication may be recognized, guidance for personnel on how to communicate effectively may be lacking.

## 5.8 Items might go wrong during shift handover

Unreliable communications can result from a variety of problems including:

- Missing information,
- Unnecessary information,
- Inaccurate information,
- Poor or variable quality of information,
- Misunderstandings,
- Failing to carry forward information over successive shifts.

Miscommunications and misunderstandings are most likely to occur when the parties communicating have a different understanding of the current state of the process. More time will be needed to communicate when such differing 'mental pictures' exist.

### 5.9 Improving communications during shift change

From the previous section that have mention on the effectiveness of safe communication it can then be summarize as the list below.

A number of simple steps can improve communications during the shift change are:

- Carefully specify what key information needs to be communicated
- Aim to cut out the transmission of unnecessary information
- Use aids (such as logs, computer displays) based on the key information needs to help accurate communication
- Aim to repeat the key information using different mediums, e.g. use both written and verbal communication
- Allow sufficient time for communication, particularly at shift handover
- Encourage two-way communication with both the giver and recipient of the information taking responsibility for accurate communication
- Encourage the asking of confirmation, clarification and repetition;
- Encourage face-to-face communication wherever feasible
- Try to develop the communication skills of all employees
- Aim to set standards for effective and safe communication.

Also, once the condition of the plant has become too abnormal. There will be some awareness for operator to be alert and concerned to their role on the time. So whenever, there is a situation of awareness has come then some action need to be taken and response it quickly.

### 5.10 Situation Awareness

Situation Awareness as the name implies is the ability of the operator to be aware of the systems in their operating environment. They consist of the Control and Instrumentation system that provides feedback to the console operator on the plant equipment, the process variables, and the instrumentation system.

The interface is usually via DCS graphics so the design of the User Interface is critical to successful awareness. The second system is communication with the unit field operators who are the eyes, ears and hands of the console operator.

Communication is usually via radio, phone and face-to-face. It is important that the tools used are reliable; free from distortion and that the operators are trained on radio protocols and team building techniques so as to be aware of the needs of the team and not just personal goals.

The third system involves understanding what is happening on connected units or utility suppliers. This is achieved via monitoring their data through screens or Large Off-Workstations in the control room.

Information is sometimes collected casually through overhearing radio conversations or discussion with supervisors, but ideally one-on-one between the operators.

The fourth system is business information that consists of laboratory results of sampling, management communications through emails describing plant changes, operating targets and potential problems. This is normally delivered electronically through a pc located on the operating console but may be re-in forced by shift supervision.

## 5.11 Monitoring and evaluation

A detailed evaluation should be carried out. This could include repeating the original survey of staff for their feelings about the new shift system and problems and benefits, including effects on health, wellbeing and their social and family life.

It should also analyze the results of the surveillance of the working environment, with a view to identifying and implementing measures to improve that environment and the health and safety of workers.

This analysis should consider organizational criteria such as accident/injury rates, near misses, and levels of overtime, absenteeism, after introduction of the new system, error rates, productivity measures, journey accidents and other changes in work organization.

## 5.12 Shift handover meeting

The handover should be formal and consistent; it should be held at specific times. Most of all, it must be valued by those in attendance, not considered a waste of time or a ritual. The interview should be a brief exchange of information encompassing not just immediate problems but identifying threats to production and quality. Side issues such as potential environmental excursions and safety issues should be included, or may be handled in separate meetings.

## 5.13 Shift team meeting

This meeting usually takes longer that the handover meeting and requires participation at the tactical and strategic level. It should take place early in the shift. The purpose of the shift team meeting is sharing information between line supervisors, upper managers and staff functions.

Sometimes, operators or technicians are included for discussing particular problems. Sometimes, consultants, sales, public relations, or other corporate staff should take part. If the people are located in separate buildings, or travel time is too great for a single meeting, consider networked electronic white boards to allow sharing information and video conferencing.

The meeting will have to be adapted for days with managers and engineers and nights for just supervisors. The meeting should begin with a review of the previous shift for each product, or department.

This is the tactical section of the meeting. It is best to follow the same outline for each meeting. Begin this segment with a summary of each product or department, with topics in order of importance: safety, environment, quality, production, and reliability. Unlike the handover meeting, the shift meeting should address more details of a strategic nature.

The tactical section should cover the threats, limitations and potential opportunities. The meeting should address staffing issues, ongoing maintenance repair, and preparation for maintenance, lockout and tag out, test results, special permit preparation and implementation.

Shipping and material movement plans may be presented. Shift monitoring requirements should be periodically reviewed for operator coverage.

The strategic element, which follows, should address complex issues. These include: training and education needs, planning and preparation for future work, updating and reviewing procedures, safety and environmental education, research and development, process testing, changes in sampling, vibration monitoring testing, product inventories, interactions within the corporate venue, planned outages, and long-term goals.

Work instruction procedure can be seen in APPENDIX 3

**Workflow structure of Shift Handover System before implemented**

Shift handover workflow can be described as figure below:

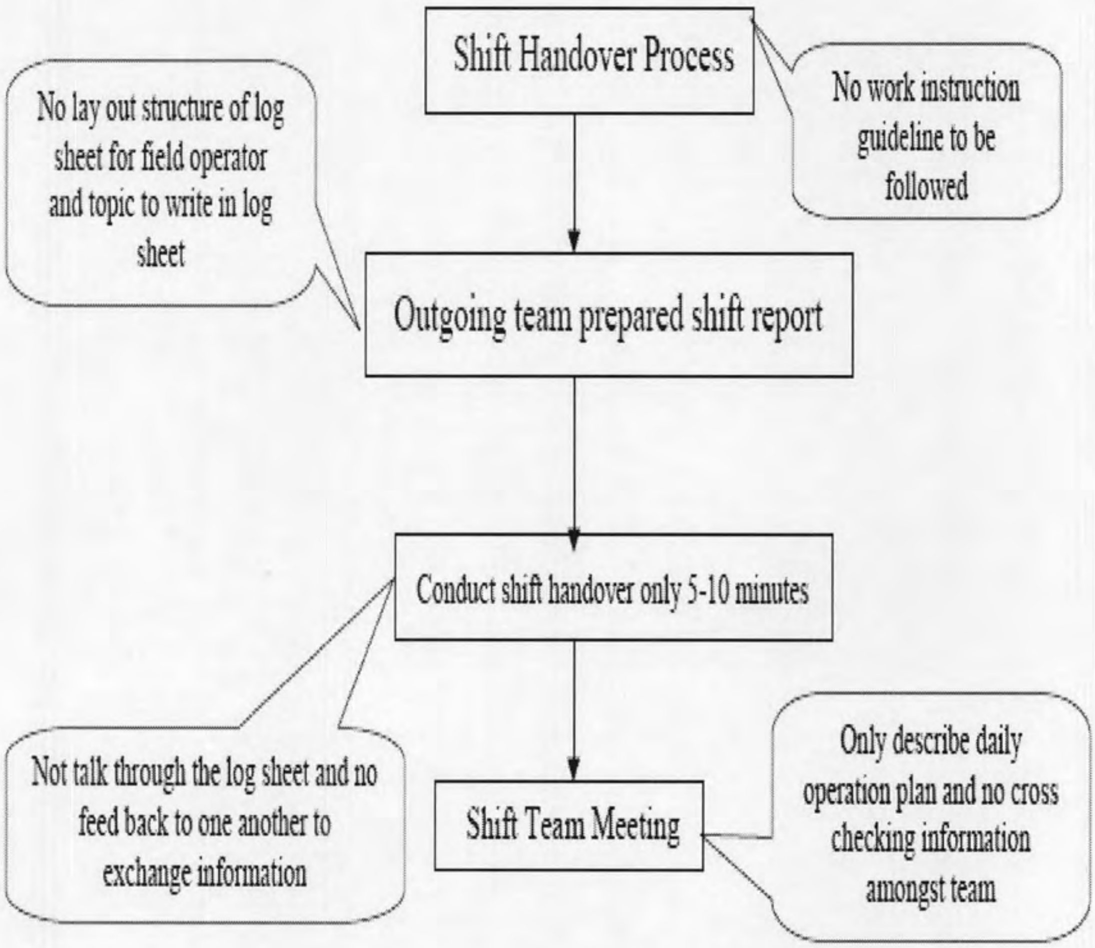


*Figure 24: Illustrated the workflow structure of shift handover system before implemented*

**Workflow structure of Shift Handover System after implemented**

Shift handover workflow can be described as figure below:

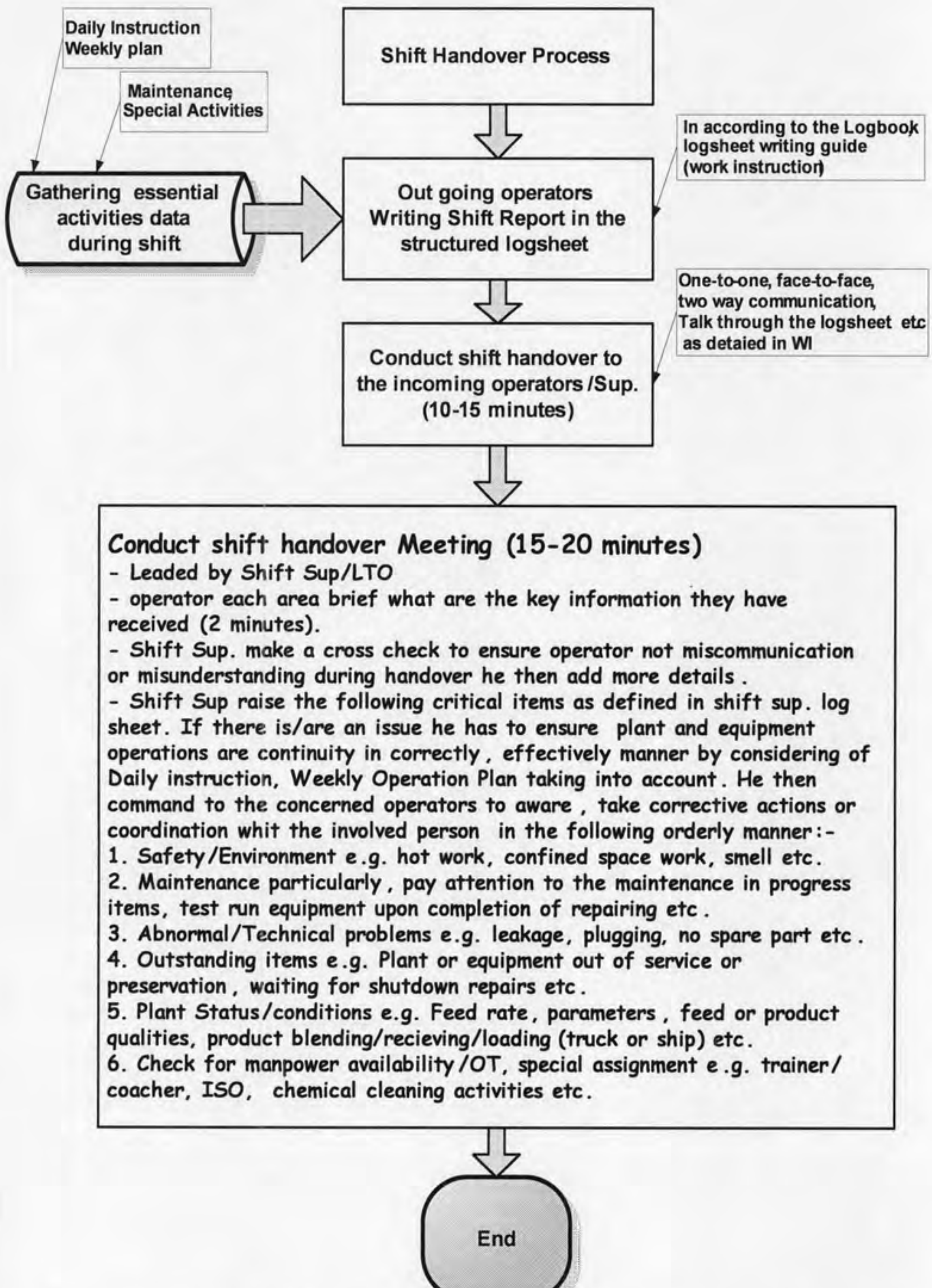


*Figure 25: Illustrated the workflow structure of new shift handover system*

From the workflow structure, it can be seen that out going operator must prepared essential data such as:

- Non-routine works such as collect special sample
- Isolate system in prior to prepare to handover to Maintenance
- Test running performance on equipment for each unit
- Tank calibration
- Special cleaning on site, for instant Column chemical cleaning, High pressure jet cleaning
- Daily instruction
- Operation plan
- Maintenance activity

Moreover, he then must follow the step of writing a logbook as per working instruction provided.

Therefore, conduct shift handover to incoming operator must be using the method as per working instruction provided. Such as;

- Face-to-face communication
- Two-way communication
- Use aid of visual to support shift handover
- Talk though the log book as priority has been set up

First thing for incoming shift superintendent must receive are:

1. Daily operation plan
2. Weekly operation plan

Then follow through the logbook as priority.

1. Safety and Environment issue
2. Maintenance activities
3. Technical problem such as; leakage, fouling condition and plugging etc.
4. Outstanding items such as maintenance progressing or equipment out of service
5. Plant status condition such as feed rate, product quantities and product loading and receiving.

Once outgoing team have conduct shift handover to incoming team finish. Shift superintendent will conduct a shift handover meeting or all incoming team.

- Shift superintendent would call operator each area to brief what is the key information they have received from out going operators.
- Shift superintendent make a crosscheck to ensure operator not miscommunication or misunderstanding during handover he then add more details.
- Shift superintendent raise the following critical items as defined in shift superintendent's log sheet. If there is/are an issue he has to ensure plant and equipment operations are continuity in correctly, effectively manner by considering of Daily instruction, Weekly Operation Plan taking into account. He then commands to the concerned operators to aware; take corrective actions or coordination whit the involved person in the following orderly manner:

1. Safety/Environment e.g. hot work, confined space work, smells etc.
2. Maintenance particularly, pays attention to the maintenance in progress items, test run equipment upon completion of repairing etc.
3. Abnormal/Technical problems e.g. leakage, plugging, no spare part etc.
4. Outstanding items e.g. Plant or equipment out of service or preservation, waiting for shutdown repairs etc.
5. Plant Status/conditions e.g. feed rate, parameters, feed or product qualities, product blending/receiving/loading (truck or ship) etc.
6. Check for manpower availability and over time request, special assignment e.g. trainer/coacher, ISO, chemical-cleaning activities etc.

| Pont of view | Additional item need to be improved |
|---|---|
| 1. Observation of shift sup<br>During handover | None of handovers observed had all of the safe communication e.g. face-to-face, feedback, but still some 5 % there was no evidence of collation of information or making note in preparation for handover.<br>Most of them talk through the log items.<br>Following the handover, all incoming operators read back of handover previous logs to check their understanding. |
| 2. Handover Guideline<br>80% had express<br>(20 % Not given opinion ) | Work instruction are well constructed and understandable and also suggested that this procedure working instruction need to put in ISO 9000:2000 to keep the system surveillance and maintain set of standard of shift handover by Auditing from internal auditors of ISO system |
| 3. Effectiveness of the new logs<br>90 % of shift sup and LTO | Their opinion foreseen this must be surely improved because the key information had included, mandatory categories e.g.<br>safety, maintenance, technical problems, outstanding work are now included very logs<br>discretionary categories e.g. environment, plant status/conditions, product & qualities, action taken, and routine duties are included |
| | Suggested that Log sheet of LTO /Shift Sup. Should be linked the key Plant Conditions/parameters from the PI program into the log sheet . This provided the reader option to selected the real time or the process plant conditions at the report time. |
| 80%<br>Field operators<br><br><br><br><br><br>Logs improvement from field operators 70% | Structure logs were generally though of as useful memory aids on information to be included in handover. They were deemed useful for cutting down unnecessary details and only relevant information was passed between shifts.<br><br>They had claimed that activities were not cleared regarding the routine and non-routine activities and suggested that this should be listed for the routine activities so that they can record the non-routine activities in the log sheet. To this matter a working team was set up and generated the routine checklist for each working area. |
| During training | The participants had expressed their opinion that this training very useful on the way to conduct the shift handover and the effective way of writing log sheet |
| Operation Manager | Had advised that the training program for new operator this subject should be included and also develop competency criteria for assessment of this matter. |
| 60% of personnel involved | New structured log sheet is quite good to made them up to date the process plant conditions by using the PI program<br>There is more information for the person coming in<br>What happen now is that major problems are pointed out- it is high light more<br>Safety issues are now being recorded discussed |

*Table 6.1: Result from feedback after implemented*