

Analysis of Operation Monitoring Data

Analysis Operation Monitoring Data

Date: 7/12/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chih		Operated	Not operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	1197.35	No unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	Not set	Not set	Not set	Not set	Not set	Not set	
	Position No.	P2	Not set	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1199.59	Not set	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0.59	-	-	-	-	-	-	
3) loss	Discharge	2.605	0.000	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	139%	0%	0%	0%	0%	0%	0%	
4) Atmospheric Presser	Recorded head suction-side	4.00	0.00	0.00	0.00	0.00	0.00	0.00	By pressure gage
	Suction head	2.24	-	-	-	-	-	-	Part of mild steel
	Pump loss	0.142	-	-	-	-	-	-	Bend part of flexible
	Bend loss	0.868	-	-	-	-	-	-	Flexible hose
	Pipe length	8.00	0.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss	0.748	-	-	-	-	-	-	c=130
	f (Flexible pipe)	1.372	-	-	-	-	-	-	Part of flexible hose
5) Saturated vapor head	C (Flexible pipe)	83	-	-	-	-	-	-	11.1200
	Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	
6) NPSH	Temperature	14	no measurement	no measurement	no measurement	no measurement	no measurement	no measurement	
	head	0.164	-	-	-	-	-	-	
	S	1350	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(rq)*1	2.103	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
7) Cost	NPSH(av)*2	3.470	-	-	-	-	-	-	1.0 m
	Balance	1.367	-	-	-	-	-	-	(Margin head)
		kw/m ³	-	-	-	-	-	-	
		7.3	-	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date : 7/13/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Not operated	Operated 1196.80	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	No unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	Not set	No. 1	Not set	Not set	Not set	Not set	Not set	
	Position No.	Not set	P1	Not set	Not set	Not set	Not set	Not set	
	Pump center level	Not set	1200.58	Not set	Not set	Not set	Not set	Not set	
	Time (min)	-	1:01	-	-	-	-	-	
	Discharge m ³ /min/unit	0.000	2.430	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	0%	129%	0%	0%	0%	0%	0%	
3) loss	Recorded head suction-side	0.00	5.50	0.00	0.00	0.00	0.00	0.00	By pressure gauge
	Suction head h _s	-	3.78	-	-	-	-	-	Part of mild steel
	Pump loss	-	0.125	-	-	-	-	-	Band part of flexible
	Band loss	-	0.755	-	-	-	-	-	Flexible hose
	Pipe length	8.00	8.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss hf (m)	-	0.843	-	-	-	-	-	C=130
	f (Flexible pipe)	-	2.080	-	-	-	-	-	Part of flexible hose
	C (Flexible pipe)	-	72	-	-	-	-	-	Part of flexible hose
4) Atmospheric Presser	m	8.942	8.942	8.942	8.942	8.942	8.942	8.942	1.1. 1200
5) Saturated vapor head	Temperature °C	no measurement	15	no measurement	no measurement	no measurement	no measurement	no measurement	
	head m	-	0.174	-	-	-	-	-	
6) NPSH	S	Not applicable	1438	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _l (req) ^{*1}	Not applicable	1.845	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _l (av) ^{*2}	-	2.000	-	-	-	-	-	1.0 m
	Balance	-	0.155	-	-	-	-	-	(Margin head)
7) Cost	kw/m ³	-	7.3	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 7/14/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Operated	Not operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	1196.30	No unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	Not set	Not set	Not set	Not set	Not set	Not set	
	Position No.	P1	Not set	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1200.58	Not set	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0.59							
	Discharge	2.369	0.000	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	126%	0%	0%	0%	0%	0%	0%	
	Recorded head suction-side	5.50	0.00	0.00	0.00	0.00	0.00	0.00	134 pressure gage
	Suction head	4.28	-	-	-	-	-	-	Part of mild steel
	Pump loss	0.119	-	-	-	-	-	-	Bend part of flexible
3) loss	Bend loss	0.718	-	-	-	-	-	-	Flexible hose
	Pipe length	8.00	8.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss	0.386	-	-	-	-	-	-	Part of flexible hose
	f (flexible pipe)	0.442	-	-	-	-	-	-	C= 130
	C (flexible pipe)	108	-	-	-	-	-	-	Part of flexible hose
	Atmospheric Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	131.1200
	Temperature	14	no measurement	no measurement	no measurement	no measurement	no measurement	no measurement	
	vapor head	0.164	-	-	-	-	-	-	
	S	1.461	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH (req) ¹⁾	1.776	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
6) NPSH	NPSH (av) ²⁾	2.023	-	-	-	-	-	-	1.0 m
	Balance	0.247	-	-	-	-	-	-	(Margin head)
7) Cost		7.6	-	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date : 7/15/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1)	River water level at Chang Chiu	Operated 1198.10	Operated 1197.56	Not operated	Not operated	Not operated	Not operated	Not operated	
2)	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P3	P3	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1198.75	1198.75	Not set	Not set	Not set	Not set	Not set	
	Time (min)	1:01	1:02	-	-	-	-	-	
	Discharge	2.685	2.498	0.000	0.000	0.000	0.000	0.000	
	Ratio	143%	133%	0%	0%	0%	0%	0%	1.88 m ³ /min/unit
3)	Recorded head suction-side	2.20	3.40	0.00	0.00	0.00	0.00	0.00	by pressure gage
	Suction head	0.65	1.19	-	-	-	-	-	Part of mild steel
	Pump loss	0.150	0.131	-	-	-	-	-	Bend part of flexible
	Bend loss	0.664	0.799	-	-	-	-	-	flexible hose
	Pipe length	0.00	6.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss	0.738	1.282	-	-	-	-	-	c=130
	f (Flexible pipe)	2.256	3.729	-	-	-	-	-	Part of flexible hose
	C (Flexible pipe)	Not applicable	51	-	-	-	-	-	Part of flexible hose
4)	Atmospheric Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	1.1, 1200
5)	Saturated vapor head	14	14	no measurement	no measurement	no measurement	no measurement	no measurement	
	head	0.164	0.164	-	-	-	-	-	
6)	NPSH	1303	1412	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	S	2.248	1.925	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _l (req) ^{*1}	5.250	4.094	-	-	-	-	-	1.0 m
	NPSH _l (av) ^{*2}	3.002	2.170	-	-	-	-	-	(Margin head)
	Balance	7.3	8.0	-	-	-	-	-	
7)	Cost								

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date : 7/17/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Operated	Not operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated		1197.40							
Unit of Pump		1 unit	No unit	No unit	No unit	No unit	No unit	No unit	
Pump No.		No.1	Not set	Not set	Not set	Not set	Not set	Not set	
Position No.		P3	Not set	Not set	Not set	Not set	Not set	Not set	
Pump center level		1198.75							
Time (min)		0:53							
Discharge	m ³ /min/unit	2.578	0.000	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
Ratio		137%	0%	0%	0%	0%	0%	0%	
3) loss									
Recorded head suction-side		3.60	0.00	0.00	0.00	0.00	0.00	0.00	Hy pressure gage
Suction head	h _s	1.35							Part of mild steel
Pump	loss	0.139							1 bend part of flexible
Bend	loss	0.850							Flexible hose
Pipe length		6.00	0.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
Head loss	hf (m)	1.262							
f	(Flexible pipe)	3.391							C= 130
C	(Flexible pipe)	53							Part of flexible hose
4) Atmospheric Presser	m	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.1200
5) Saturated vapor head	°C	14	no measurement	no measurement	no measurement	no measurement	no measurement	no measurement	
head	m	0.164							
6) NPSH									
S		1.362	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH _(req) *1	m	2.062	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH _(av) *2	m	3.876							1.0 m
Balance		1.814							(Margin head)
7) Cost	kw/m ³	7.0							

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 7/18/95

	1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu	Operated 1197.36	Operated 1197.30	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated								
Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
Position No.	P1	P1	Not set	Not set	Not set	Not set	Not set	
Pump center level	1200.58	1200.58	Not set	Not set	Not set	Not set	Not set	
Time (min)	0.56	1.01	-	-	-	-	-	
Discharge	2.558	2.467	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
Ratio	1.36%	1.31%	0%	0%	0%	0%	0%	
3) loss								
Recorded head suction-side	5.00	5.00	0.00	0.00	0.00	0.00	0.00	By pressure gage
Suction head	3.22	3.28	-	-	-	-	-	
Pump loss	0.137	0.128	-	-	-	-	-	Part of mild steel
Band loss	0.837	0.779	-	-	-	-	-	Band part of flexible
Pipe length	6.00	6.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
Head loss	0.809	0.816	-	-	-	-	-	Part of flexible hose
f (Flexible pipe)	1.929	2.155	-	-	-	-	-	c=130
C (Flexible pipe)	67	64	-	-	-	-	-	Part of flexible hose
4) Atmospheric Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.1200
5) Saturated vapor head	Temperature head	15 0.174	no measurement	no measurement	no measurement	no measurement	no measurement	
6) NPSH	S	1372	1420	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _l (req) ^{*1}	2.032	1.894	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _l (av) ^{*2}	2.471	2.492	Not applicable	Not applicable	Not applicable	Not applicable	1.0 m
	Balance	0.439	0.598	-	-	-	-	(Margin head)
7) Cost	kw/m ³	6.9	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 7/19/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chihlu		Operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P2	P2	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1199.59	1199.59	Not set	Not set	Not set	Not set	Not set	
	Time (min)	101	046	-	-	-	-	-	
	Discharge	2.567	2.441	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	137%	130%	0%	0%	0%	0%	0%	
3) loss	Recorded head suction-side	4.50	4.50	0.00	0.00	0.00	0.00	0.00	By pressure gage
	Suction head	hs	2.09	-	-	-	-	-	
	Pump	loss	0.138	-	-	-	-	-	Part of mild steel
	Bend	loss	0.843	-	-	-	-	-	Bend part of flexible
	Pipe length	6.00	6.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
	Head loss	hf (m)	1.427	-	-	-	-	-	Part of flexible hose
	f	(Flexible pipe)	3.976	-	-	-	-	-	C=130
4) Atmospheric Presser	C	(Flexible pipe)	49	-	-	-	-	-	Part of flexible hose
		m	8.942	8.942	8.942	8.942	8.942	8.942	131, 1200
5) Saturated vapor head	Temperature	°C	14	no measurement	no measurement	no measurement	no measurement	no measurement	
	head	m	0.164	-	-	-	-	-	
6) NPSH	S		1372	1438	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _(req) *1	m	2.036	1.851	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _(av) *2	m	2.979	3.007	Not applicable	Not applicable	Not applicable	Not applicable	
	Balance		0.942	-	-	-	-	-	1.6 m (Margin head)
7) Cost		kw/hr	5.4	-	-	-	-	-	
			8.9	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date : 7/21/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chiu		Operated 1197.54	Operated 1197.36	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P2	P2	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1199.59	1199.59	Not set	Not set	Not set	Not set	Not set	
	Time (min)	1:00	0:59	-	-	-	-	-	
	Discharge	2.513	2.613	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	134%	139%	0%	0%	0%	0%	0%	
3) loss	Recorded head suction-side	4.50	4.50	0.00	0.00	0.00	0.00	0.00	By pressure gauge
	Suction head	2.05	2.23	-	-	-	-	-	Part of mild steel
	Pump loss	0.133	0.143	-	-	-	-	-	Bend part of flexible
	Bend loss	0.808	0.873	-	-	-	-	-	Flexible hose
	Pipe length	8.00	8.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss	1.508	1.252	-	-	-	-	-	c= 130
	f (Flexible pipe)	4.201	2.986	-	-	-	-	-	Part of flexible hose
	C (Flexible pipe)	55	63	-	-	-	-	-	Part of flexible hose
4) Atmospheric Pressur	m	8.942	8.942	8.942	8.942	8.942	8.942	8.942	EL. 1200
5) Saturated vapor head	Temperature °C	14	14	no measurement	no measurement	no measurement	no measurement	no measurement	
	head m	0.164	0.164	-	-	-	-	-	
6) NPSH	S	1404	1350	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(rq)*1	1.947	2.107	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(av)*2	2.991	2.968	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	1.0 m
	Balance	1.044	0.861	-	-	-	-	-	(Margin head)
7) Cost	kw/m ³	7.7	7.6	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 7/22/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P3	P3	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1198.75	1198.75	Not set	Not set	Not set	Not set	Not set	
	Time (min)	100	0:59	-	-	-	-	-	
	Discharge	2.364	2.553	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	126%	136%	0%	0%	0%	0%	0%	
	Recorded head suction-side	3.20	3.20	0.00	0.00	0.00	0.00	0.00	1 by pressure gauge
	Suction head	1.23	1.45	-	-	-	-	-	Part of mild steel
	Pump	0.119	0.137	-	-	-	-	-	Band part of flexible
3) loss	Band	0.715	0.834	-	-	-	-	-	Flexible hose
	Pipe length	8.00	8.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss	1.138	0.782	-	-	-	-	-	C=130
	f (Flexible pipe)	3.416	1.585	-	-	-	-	-	Part of flexible hose
	C (Flexible pipe)	60	79	-	-	-	-	-	Part of flexible hose
	4) Atmospheric Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	13.1200
	5) Saturated vapor head	15	15	no measurement	no measurement	no measurement	no measurement	no measurement	
	head	0.174	0.174	-	-	-	-	-	
	6) NPSH	1.468	1.383	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH (req) ¹⁾	1.762	2.008	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
7) Cost	NPSH (av) ²⁾	4.314	4.272	-	-	-	-	-	1.0 m (Margin head)
	Balance	2.552	2.264	-	-	-	-	-	
		7.6	7.8	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 7/24/95

	1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu	Operated 1197.12	Operated 1197.00	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated								
Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
Pump No.	No. 1	No. 1	Not set	Not set	Not set	Not set	Not set	
Position No.	PI	PI	Not set	Not set	Not set	Not set	Not set	
Pump center level	1200.58	1200.58	Not set	Not set	Not set	Not set	Not set	
Time (min)	0.54	0.59	-	-	-	-	-	
Discharge	2.630	2.386	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
Ratio	140%	127%	0%	0%	0%	0%	0%	
3) loss								
Recorded head suction-side	5.20	5.20	0.00	0.00	0.00	0.00	0.00	By pressure gage
Suction head	3.46	3.58	-	-	-	-	-	Part of mild steel
Pump	0.144	0.121	-	-	-	-	-	Bend part of flexible
Bend	0.885	0.728	-	-	-	-	-	flexible hose
Pipe length	8.00	8.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
Head loss	0.714	0.774	-	-	-	-	-	C=130
f (Flexible pipe)	1.219	1.925	-	-	-	-	-	Part of flexible hose
C (Flexible pipe)	86	75	-	-	-	-	-	11.1200
4) Atmospheric Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	
5) Saturated vapor head	14	14	no measurement	no measurement	no measurement	no measurement	no measurement	
Temperature	0.164	0.164	-	-	-	-	-	
6) NPSH								
S	1340	1461	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH _l (req) ¹⁾	2.136	1.784	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH _l (av) ²⁾	2.264	2.319	-	-	-	-	-	1.0 m
Balance	0.128	0.535	-	-	-	-	-	(Margin head)
7) Cost	6.8	7.6	-	-	-	-	-	
kw/m ³								

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 7/25/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No. 1	No. 1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P3	P3	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1198.75	1198.75	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0:59	0:59	-	-	-	-	-	
	Discharge	2.436	2.545	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	130%	135%	0%	0%	0%	0%	0%	
3) loss	Recorded head suction-side		3.50	0.00	0.00	0.00	0.00	0.00	By pressure gauge
	Suction head	hs	1.85	-	-	-	-	-	Part of mild steel
	Pump	loss	0.136	-	-	-	-	-	Head part of flexible
	Bend	loss	0.828	-	-	-	-	-	Flexible hose
	Pipe length		6.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss	hf (m)	0.928	-	-	-	-	-	C= 130
	f (Flexible pipe)	2.644	1.546	-	-	-	-	-	Part of flexible hose
4) Atmospheric Presser	C (Flexible pipe)	59	73	-	-	-	-	-	Part of flexible hose
	m	8.942	8.942	8.942	8.942	8.942	8.942	8.942	13.1200
5) Saturated vapor head	Temperature	13	14	no measurement	no measurement	no measurement	no measurement	no measurement	
	head	0.154	0.164	-	-	-	-	-	
6) NPSH	S	1438	1383	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(rq)*1	1.848	2.004	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(av)*2	4.018	3.984	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	Balance	2.170	1.980	-	-	-	-	-	1.0 m (Margin head)
7) Cost		kw/m ³	7.4	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 7/26/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Operated 1197.00	Operated 1196.86						
2) Operated	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No. 1	No. 1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P2	P2	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1199.59	1199.59	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0:58	0:58	-	-	-	-	-	
	Discharge	2.472	2.453	0.000	0.000	0.000	0.000	0.000	
	Ratio	132%	130%	0%	0%	0%	0%	0%	1.88 m ³ /min/unit
3) loss	Recorded head suction-side	4.50	4.50	0.00	0.00	0.00	0.00	0.00	By pressure gage
	Suction head	2.59	2.73	-	-	-	-	-	Part of mild steel
	Pump loss	0.129	0.127	-	-	-	-	-	Bend part of flexible
	Bend loss	0.782	0.770	-	-	-	-	-	Flexible hose
	Pipe length	6.00	6.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss	0.997	0.872	-	-	-	-	-	C=130
	f (flexible pipe)	2.796	2.393	-	-	-	-	-	Part of flexible hose
	C (flexible pipe)	58	62	-	-	-	-	-	Part of flexible hose
4) Atmospheric Presser		8.942	8.942	8.942	8.942	8.942	8.942	8.942	13.1200
5) Saturated vapor head	Temperature	14	14	no measurement	no measurement	no measurement	no measurement	no measurement	
	head	0.164	0.164	-	-	-	-	-	
6) NPSH	S	1420	1429	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(req)*1	1.897	1.872	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(av)*2	3.000	3.005	-	-	-	-	-	1.0 m
	Balance	1.104	1.133	-	-	-	-	-	(Margin head)
7) Cost	kw/m ³	7.5	7.3	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (h_f).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 7/27/95

1) River water level at Chang Chih		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
2) Operated	Unit of Pump	Operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
	Pump No.	1196.96	1196.79	No unit	No unit	No unit	No unit	No unit	
	Position No.	No. 1	No. 1	Not set	Not set	Not set	Not set	Not set	
	Pump center level	P1	P1	Not set	Not set	Not set	Not set	Not set	
	Time (min)	1200.58	1200.58	Not set	Not set	Not set	Not set	Not set	
3) loss	Discharge	0.56	1.01	-	-	-	-	-	1.88 m ³ /min/unit
	m ³ /min/unit	2.602	2.389	0.000	0.000	0.000	0.000	0.000	
	Ratio	1.38%	127%	0%	0%	0%	0%	0%	
3) loss	Recorded head suction-side		5.10	5.10	0.00	0.00	0.00	0.00	By pressure gage
	Suction head	hs	3.62	3.79	-	-	-	-	Part of mild steel
	Pump loss		0.141	0.121	-	-	-	-	Bend part of flexible
	Bend loss		0.866	0.730	-	-	-	-	Flexible hose
	Pipe length		6.00	6.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss	h _f (m)	0.476	0.462	-	-	-	-	C=130
	f (Flexible pipe)		0.755	0.983	-	-	-	-	Part of flexible hose
4) Atmospheric Presser	C (Flexible pipe)	91	84	-	-	-	-	-	1:1, 1200
	m	8.942	8.942	8.942	8.942	8.942	8.942	8.942	
5) Saturated vapor head	Temperature	°C	15	15	no measurement	no measurement	no measurement	no measurement	
	head	m	0.174	0.174	-	-	-	-	
6) NPSH	S		1.350	1.454	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _l (req) ¹	m	2.101	1.797	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _l (av) ²	m	2.361	2.409	-	-	-	-	1.0 m
	Balance		0.260	0.612	-	-	-	-	(Margin head)
7) Cost	kw/m ³	7.0	8.4	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (h_f).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date : 7/28/95

	1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu	Operated 1197.20	Operated 1196.90	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated								
Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
Position No.	P3	P3	Not set	Not set	Not set	Not set	Not set	
Pump center level	1198.75	1198.75	Not set	Not set	Not set	Not set	Not set	
Time (min)	0.59	0.58	-	-	-	-	-	
Discharge	2.380	2.457	0.000	0.000	0.000	0.000	0.000	
Ratio	127%	131%	0%	0%	0%	0%	0%	1.88 m ³ /min/unit
3) loss								
Recorded head suction-side	3.50	3.50	0.00	0.00	0.00	0.00	0.00	By pressure gage
Suction head	1.55	1.85	-	-	-	-	-	Part of mild steel
Pump loss	-0.120	0.127	-	-	-	-	-	End part of flexible
Bend loss	0.724	0.772	-	-	-	-	-	Flexible hose
Pipe length	4.00	4.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
Head loss	1.108	0.753	-	-	-	-	-	C=130
f (Flexible pipe)	3.774	2.214	-	-	-	-	-	Part of flexible hose
C (Flexible pipe)	42	54	-	-	-	-	-	Part of flexible hose
4) Atmospheric Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.1200
5) Saturated vapor head	15	15	no measurement	no measurement	no measurement	no measurement	no measurement	
head	0.174	0.174	-	-	-	-	-	
6) NPSH								
S	1461	1429	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH(rq)*1	1781	1874	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH(av)*2	4,011	3,994	-	-	-	-	-	1.0 m
Balance	2,230	2,120	-	-	-	-	-	(Margin head)
7) Cost	7.6	7.4	-	-	-	-	-	
kw/m ³								

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 7/29/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1)	River water level at Chang Chlu	Operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2)	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P2	P2	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1199.59	1199.59	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0.54	0.57	-	-	-	-	-	
	Discharge	2.672	2.422	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	142%	129%	0%	0%	0%	0%	0%	
3)	Recorded head suction-side	4.50	4.50	0.00	0.00	0.00	0.00	0.00	By pressure gage
	Suction head	2.69	3.59	-	-	-	-	-	
	Pump	0.149	0.124	-	-	-	-	-	Part of mild steel
	Bend	0.913	0.750	-	-	-	-	-	Band part of flexible
	Pipe length	4.00	4.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
	Head loss	0.746	0.034	-	-	-	-	-	Part of flexible hose
	f (Flexible pipe)	1.775	-0.407	-	-	-	-	-	C=130
	C (Flexible pipe)	59	283	-	-	-	-	-	Part of flexible hose
4)	Atmospheric Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	13.1200
5)	Saturated	15	15	no measurement	no measurement	no measurement	no measurement	no measurement	
	vapor head	0.174	0.174	-	-	-	-	-	
6)	NPSH	1.303	1.446	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _(req) *	2.241	1.826	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _(av) *	2.944	3.002	-	-	-	-	-	1.0 m
	Balance	0.703	1.175	-	-	-	-	-	(Margin head)
7)	Cost	6.9	7.3	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 8/1/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chlang Chhu		Operated	Not operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	1 unit	No unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	Not set	Not set	Not set	Not set	Not set	Not set	
	Position No.	P3	Not set	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1198.75	Not set	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0:53	-	-	-	-	-	-	
3) loss	Discharge	2.608	0.000	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	1.39%	0%	0%	0%	0%	0%	0%	
	Recorded head Stationside	3.00	0.00	0.00	0.00	0.00	0.00	0.00	By pressure gage
4) Atmospheric Presser	Suction head	1.23	-	-	-	-	-	-	Part of mild steel
	Pump	0.142	-	-	-	-	-	-	Bend part of flexible
	Bend	0.870	-	-	-	-	-	-	Flexible hose
	Pipe length	2.00	6.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss	0.760	-	-	-	-	-	-	c= 130
5) Saturated vapor head	f	2.199	-	-	-	-	-	-	Part of flexible hose
	C	39	-	-	-	-	-	-	Part of flexible hose
	Temperature	15	no measurement	no measurement	no measurement	no measurement	no measurement	no measurement	13. 1200
6) NPSH	head	0.174	-	-	-	-	-	-	
	S	1350	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(trq)*1	2.104	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
7) Consumed power	NPSH(av)*2	4.459	-	-	-	-	-	-	1.0 m
	Balance	2.355	-	-	-	-	-	-	(Margin head)
	Power	6.9	-	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 8/2/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1)	River water level at Chang Chhu	Operated 1197.50	Operated 1197.00	Not operated	Not operated	Not operated	Not operated	Not operated	
2)	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P3	P3	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1198.75	1198.75	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0:58	0:54	-	-	-	-	-	
3)	Discharge	2.379	2.554	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	127%	136%	0%	0%	0%	0%	0%	
3)	Recorded head Suctionside	3.00	3.00	0.00	0.00	0.00	0.00	0.00	By pressure gauge
	Suction head	1.25	1.75	-	-	-	-	-	
	Pump	0.120	0.137	-	-	-	-	-	Part of mild steel
	Bend	0.724	0.834	-	-	-	-	-	Bend part of flexible
	Pipe length	2.00	2.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
	Head loss	0.908	0.281	-	-	-	-	-	Part of flexible hose
	f (Flexible pipe)	3.266	0.685	-	-	-	-	-	C=130
	C (Flexible pipe)	32	65	-	-	-	-	-	Part of flexible hose
4)	Atmospheric Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.120
5)	Saturated	15	16	no measurement	no measurement	no measurement	no measurement	no measurement	
	vapor head	0.174	0.187	-	-	-	-	-	
6)	S	1461	1383	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _(req) *1	1.781	2.009	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _(av) *2	4.511	4.459	-	-	-	-	-	1.0 m
	Balance	2.730	2.450	-	-	-	-	-	(Margin head)
7)	Consumed power	7.4	6.9	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date : 8/5/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Operated 1196.40	Operated 1196.10	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P2	P2	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1199.59	1199.59	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0.54	0.54	-	-	-	-	-	
	Discharge	2.578	2.554	0.000	0.000	0.000	0.000	0.000	
	m ³ /min/unit	1.37%	1.36%	0%	0%	0%	0%	0%	1.88 m ³ /min/unit
	Ratio								
3) loss	Recorded head Suctionside	4.80	5.00	0.00	0.00	0.00	0.00	0.00	By pressure gauge
	Suction head	3.19	3.49	-	-	-	-	-	-
	Pump loss	0.139	0.137	-	-	-	-	-	Part of mild steel
	Bend loss	0.850	0.834	-	-	-	-	-	1 bend part of flexible
	Pipe length	8.00	8.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
	Head loss	0.619	0.537	-	-	-	-	-	Part of flexible hose
	f (Flexible pipe)	0.994	0.755	-	-	-	-	-	c = 130
	C (Flexible pipe)	91	97	-	-	-	-	-	Part of flexible hose
4) Atmospheric Presser	m	8.942	8.942	8.942	8.942	8.942	8.942	8.942	131.1200
5) Saturated vapor head	°C	15	16	no measurement	no measurement	no measurement	no measurement	no measurement	
	m	0.174	0.187	-	-	-	-	-	
6) NPSH	S	1362	1383	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _l (req)*1	2.062	2.009	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _l (av)*2	2.666	2.459	-	-	-	-	-	1.0 m
	Balance	0.604	0.450	-	-	-	-	-	(Margin head)
7) Consumed power	kw/m ³	6.8	7.0	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 8/7/95

1) River water level at Chang Chiu		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
Operated		Operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
Unit of Pump		1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
Pump No.		No. 1	No. 1	Not set	Not set	Not set	Not set	Not set	
Position No.		P3	P3	Not set	Not set	Not set	Not set	Not set	
Pump center level		1198.75	1198.75	Not set	Not set	Not set	Not set	Not set	
Time (min)		0.55	0.56	-	-	-	-	-	
Discharge		2.556	2.650	0.000	0.000	0.000	0.000	0.000	
Ratio		136%	141%	0%	0%	0%	0%	0%	1.88 m ³ /min/unit
Recorded head Suctionside		4.00	4.00	0.00	0.00	0.00	0.00	0.00	By pressure gauge
Suction head		2.55	2.65	-	-	-	-	-	
Pump		0.137	0.146	-	-	-	-	-	Part of mild steel
Bend		0.836	0.898	-	-	-	-	-	Bend part of flexible
Pipe length		4.00	4.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
Head loss		0.479	0.307	-	-	-	-	-	Part of flexible hose
f (Flexible pipe)		1.086	0.437	-	-	-	-	-	C= 130
C (Flexible pipe)		71	94	-	-	-	-	-	Part of flexible hose
Atmospheric Presser		8.942	8.942	8.942	8.942	8.942	8.942	8.942	PL 1200
Saturated		15	16	no measurement	no measurement	no measurement	no measurement	no measurement	
vapor head		0.174	0.187	-	-	-	-	-	
S		1383	1328	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH(rq)*1		2.010	2.174	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH(av)*2		3.471	3.436	-	-	-	-	-	1.0 m
Balance		1.461	1.262	-	-	-	-	-	(Margin head)
Consumed power		6.4	7.1	-	-	-	-	-	
kw/m ³									

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 8/8/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated		1197.10	1197.08	-	-	-	-	-	
Unit of Pump		1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
Pump No.		No.1	No.1	Not set	Not set	Not set	Not set	Not set	
Position No.		P2	P2	Not set	Not set	Not set	Not set	Not set	
Pump center level		1199.59	1199.59	Not set	Not set	Not set	Not set	Not set	
Time (min)		0.56	0.53	-	-	-	-	-	
Discharge		2.538	2.613	0.000	0.000	0.000	0.000	0.000	
Ratio		135%	139%	0%	0%	0%	0%	0%	1.88 m ³ /min/unit
3) loss									
Recorded head Suctionside		4.00	4.00	0.00	0.00	0.00	0.00	0.00	By pressure gage
Suction head	hs	2.49	2.51	-	-	-	-	-	Part of mild steel
Pump loss		0.135	0.143	-	-	-	-	-	Band part of flexible
Bend loss		0.824	0.874	-	-	-	-	-	Flexible hose
Pipe length		4.00	4.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
Head loss	h _f (m)	0.549	0.472	-	-	-	-	-	c= 130
f (Flexible pipe)		1.349	0.994	-	-	-	-	-	Part of flexible hose
C (Flexible pipe)		66	73	-	-	-	-	-	Part of flexible hose
4) Atmospheric Presser	m	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.1200
5) Saturated vapor head	°c	15	18	no measurement	no measurement	no measurement	no measurement	no measurement	
head	m	0.174	0.212	-	-	-	-	-	
6) NPSH									
S		1.393	1.340	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH(rq)*1	m	1.980	2.126	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH(av)*2	m	3.476	3.420	-	-	-	-	-	1.0 m
Balance		1.495	1.293	-	-	-	-	-	(Margin head)
7) Consumed power	kw/m ³	8.3	8.2	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (h_f).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 8/9/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1)	River water level at Chiang Chhu	Operated 1196.30	Operated 1196.30	Not operated	Not operated	Not operated	Not operated	Not operated	
2)	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P3	P3	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1198.75	1198.75	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0.53	0.52	-	-	-	-	-	
	Discharge	2.672	2.781	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	142%	148%	0%	0%	0%	0%	0%	
3)	Recorded head Suctionside	5.00	5.00	0.00	0.00	0.00	0.00	0.00	By pressure gage
	Suction head	2.45	2.45	-	-	-	-	-	
	Pump	0.149	0.160	-	-	-	-	-	Part of mild steel
	Bend	0.913	0.989	-	-	-	-	-	Bend part of flexible
	Pipe length	8.00	8.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
	Head loss	1.490	1.403	-	-	-	-	-	Part of flexible hose
	f (Flexible pipe)	3.548	2.951	-	-	-	-	-	C=130
4)	C (Flexible pipe)	59	63	-	-	-	-	-	Part of flexible hose
	Atmospheric Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.1200
5)	Temperature	15	16	no measurement	no measurement	no measurement	no measurement	no measurement	
	vapor head	0.174	0.187	-	-	-	-	-	
6)	S	1303	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _(req) ¹⁾	2.240	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _(av) ²⁾	2.444	-	-	-	-	-	-	1.0 m
	Balance	0.204	-	-	-	-	-	-	(Margin head)
7)	Consumed power	8.0	7.5	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

*2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date : 8/10/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chiu		Operated	Not operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	1196.40	-	-	-	-	-	-	
	Pump No.	1 unit	No unit	No unit	No unit	No unit	No unit	No unit	
	Position No.	No. 1	Not set	Not set	Not set	Not set	Not set	Not set	
	Pump center level	P3	Not set	Not set	Not set	Not set	Not set	Not set	
	Time (min)	1198.75	Not set	Not set	Not set	Not set	Not set	Not set	
	Discharge m ³ /min/unit	0.56	-	-	-	-	-	-	
3) loss	Ratio	2.559	0.000	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
		136%	0%	0%	0%	0%	0%	0%	
	Recorded head suction-side	4.00	0.00	0.00	0.00	0.00	0.00	0.00	By pressure gauge
	Suction head	2.35	-	-	-	-	-	-	
	Pump loss	0.137	-	-	-	-	-	-	Part of mild steel
	Bend loss	0.838	-	-	-	-	-	-	Hard part of flexible
	Pipe length	2.00	0.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
	Head loss	0.677	-	-	-	-	-	-	Part of flexible hose
	f (Flexible pipe)	2.014	-	-	-	-	-	-	C=130
	C (Flexible pipe)	41	-	-	-	-	-	-	Part of flexible hose
4) Atmospheric Pressur	m	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.1200
5) Saturated vapor head	°C	16	no measurement	no measurement	no measurement	no measurement	no measurement	no measurement	
6) NPSH	head	0.187	-	-	-	-	-	-	
	S	1372	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH (req)*1	2.032	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH (av)*2	3.458	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
7) Consumed power	Balance	1.426	-	-	-	-	-	-	1.0 m (Margin head)
	kw/m ³	8.2	-	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Not Positive Suction Head Requirement

4) *2 Not Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 8/11/95

	1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chihu	Operated 1196.50	Operated 1196.40	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated								
Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
Pump No.	No. 1	No. 1	Not set	Not set	Not set	Not set	Not set	
Position No.	P2	P2	Not set	Not set	Not set	Not set	Not set	
Pump center level	1199.59	1199.59	Not set	Not set	Not set	Not set	Not set	
Time (min)	0:54	0:53						
Discharge	2.669	2.687	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
Ratio	142%	143%	0%	0%	0%	0%	0%	
Recorded head Suctionside	4.50	4.50	0.00	0.00	0.00	0.00	0.00	by pressure gage
Suction head	3.09	3.19						
Pump loss	0.148	0.150						Part of mild steel
Bend loss	0.911	0.923						Band part of flexible
Pipe length	8.00	8.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
Head loss	0.349	0.234						Part of flexible hose
f (Flexible pipe)	0.026	-0.336						C=130
C (Flexible pipe)	128	160						Part of flexible hose
4) Atmospheric Pressor	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.1200
5) Saturated vapor head	15	15	no measurement	no measurement	no measurement	no measurement	no measurement	
Temperature	0.174	0.174						
6) NPSH								
S	1315	1303	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH _l (req) ¹⁾	2.211	2.249	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH _l (av) ²⁾	2.945	2.940	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	1.0 m
Balance	0.733	0.691						(Margin head)
7) Consumed power	7.5	7.3						
kw/m ³								

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date : 8/15/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chiu		Operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P3	P3	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1198.75	1198.75	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0.53	0.56	-	-	-	-	-	
	Discharge	2.664	2.723	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	142%	145%	0%	0%	0%	0%	0%	
3) loss	Recorded head Suctionside	4.50	5.00	0.00	0.00	0.00	0.00	0.00	by pressure gage
	Suction head	2.55	2.65	-	-	-	-	-	Part of mild steel
	Pump loss	0.148	0.154	-	-	-	-	-	Bend part of flexible
	Bend loss	0.908	0.949	-	-	-	-	-	flexible hose
	Pipe length	8.00	8.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss	0.896	1.249	-	-	-	-	-	C=130
	f (Flexible pipe)	1.729	2.663	-	-	-	-	-	Part of flexible hose
4) Atmospheric Presser	C (Flexible pipe)	77	66	-	-	-	-	-	11.1200
5) Saturated vapor head	Temperature	15	15	no measurement	no measurement	no measurement	no measurement	no measurement	
	head	0.174	0.174	-	-	-	-	-	
6) NPSH	S	1315	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(rq)*1	2.209	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(av)*2	2.946	-	-	-	-	-	-	1.0 m
	Balance	0.737	-	-	-	-	-	-	(Margin head)
7) Consumed power	kw/m ³	7.2	6.7	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date : 8/19/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1)	River water level at Chang Chlu	Operated 1196.60	Operated 1196.60	Not operated	Not operated	Not operated	Not operated	Not operated	
2)	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P2	P2	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1199.59	1199.59	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0:55	0:54	-	-	-	-	-	
3)	Discharge	2.658	2.454	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	141%	131%	0%	0%	0%	0%	0%	
3)	Recorded head Suctionside	4.50	4.50	0.00	0.00	0.00	0.00	0.00	By pressure gauge
	Suction head	2.99	2.99	-	-	-	-	-	
	Pump	0.147	0.127	-	-	-	-	-	Part of mild steel
	Bend	0.904	0.770	-	-	-	-	-	Bend part of flexible
	Pipe length	6.00	6.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
	Head loss	0.457	0.611	-	-	-	-	-	Part of flexible hose
	f (Flexible pipe)	0.635	1.436	-	-	-	-	-	c=130
4)	C (Flexible pipe)	95	75	-	-	-	-	-	Part of flexible hose
	Atmospheric Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.1200
5)	Saturated vapor head	Temperature	15	no measurement	no measurement	no measurement	no measurement	no measurement	
6)	head	0.174	0.174	-	-	-	-	-	
	S	1315	1429	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(req)*1	2.206	1.872	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(av)*2	2.947	2.995	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
7)	Balance	0.741	1.122	-	-	-	-	-	1.0 m (Margin head)
	Consumed power	5.9	7.9	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date : 8/21/95

	1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chihu	Not operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated								
Unit of Pump	No unit	1 unit	No unit	No unit	No unit	No unit	No unit	
Pump No.	Not set	No.1	Not set	Not set	Not set	Not set	Not set	
Position No.	Not set	P2	Not set	Not set	Not set	Not set	Not set	
Pump center level	Not set	1199.59	Not set	Not set	Not set	Not set	Not set	
Time (min)	-	0.56	-	-	-	-	-	
Discharge	0.000	1.968	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
Ratio	0%	105%	0%	0%	0%	0%	0%	
3) loss								
Recorded head Suctionside	0.00	4.50	0.00	0.00	0.00	0.00	0.00	By pressure gauge
Suction head	-	2.99	-	-	-	-	-	Part of mild steel
Pump loss	-	0.084	-	-	-	-	-	Bend part of flexible
Bend loss	-	0.495	-	-	-	-	-	Flexible hose
Pipe length	6.00	6.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
Head loss	-	0.928	-	-	-	-	-	C=130
f (Flexible pipe)	-	4.455	-	-	-	-	-	Part of flexible hose
C (Flexible pipe)	-	48	-	-	-	-	-	Part of flexible hose
4) Atmospheric Pressur	8.942	8.942	8.942	8.942	8.942	8.942	8.942	1.1, 1200
5) Saturated vapor head	no measurement	16	no measurement	no measurement	no measurement	no measurement	no measurement	
head	-	0.187	-	-	-	-	-	
6) NPSH								
S	Not applicable	1547	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH(req)*1	Not applicable	1.453	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH(av)*2	-	3.079	-	-	-	-	-	1.4 m
Balance	-	1.626	-	-	-	-	-	(Margin head)
7) Consumed power	-	10.8	-	-	-	-	-	
kw/m ³	-	-	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 8/22/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Not operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	No unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	Not set	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	Not set	p3	Not set	Not set	Not set	Not set	Not set	
	Pump center level	Not set	1198.75	Not set	Not set	Not set	Not set	Not set	
	Time (min)	-	0:59	-	-	-	-	-	
3) loss	Discharge	0.000	2.408	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	0%	128%	0%	0%	0%	0%	0%	
	Recorded head Suctionside	0.00	4.50	0.00	0.00	0.00	0.00	0.00	By pressure gauge
4) Atmospheric Pressur	Suction head	-	2.25	-	-	-	-	-	
	Pump loss	-	0.123	-	-	-	-	-	Part of mild steel
	Bend loss	-	0.742	-	-	-	-	-	Bend part of flexible
	Pipe length	6.00	6.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
	Head loss	-	1.387	-	-	-	-	-	Part of flexible hose
5) Saturated vapor head	f (Flexible pipe)	-	4.468	-	-	-	-	-	C=130
	C (Flexible pipe)	-	47	-	-	-	-	-	Part of flexible hose
6) NPSH	Pressur	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.1200
7) Consumed power	Temperature	no measurement	17	no measurement	no measurement	no measurement	no measurement	no measurement	
	head	-	0.260	-	-	-	-	-	
6) NPSH	S	Not applicable	1446	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH (req)*1	Not applicable	1819	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH (av)*2	-	2.979	-	-	-	-	-	1.0 m (Margin head)
	Balance	-	1.160	-	-	-	-	-	
7) Consumed power		-	7.7	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 8/23/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chiang Chhu		Operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No. 1	No. 1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P3	P3	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1198.75	1198.75	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0:52	0:52	-	-	-	-	-	
	Discharge	2.813	2.762	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	150%	147%	0%	0%	0%	0%	0%	
3) loss	Recorded head Suctionside	4.50	4.50	0.00	0.00	0.00	0.00	0.00	11y pressure gauge
	Suction head	2.45	2.45	-	-	-	-	-	Part of mild steel
	Pump	0.164	0.158	-	-	-	-	-	Bend part of flexible
	Bend	1.013	0.976	-	-	-	-	-	flexible hose
	Pipe length	8.00	8.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Lead loss	0.876	0.918	-	-	-	-	-	c= 130
	f (Flexible pipe)	1.394	1.606	-	-	-	-	-	Part of flexible hose
4) Atmospheric Presser	C (Flexible pipe)	82	79	-	-	-	-	-	
	Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11. 1200
5) Saturated vapor head	Temperature	15	15	no measurement	no measurement	no measurement	no measurement	no measurement	
	head	0.174	0.174	-	-	-	-	-	
6) NPSH	S	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _(req) *1	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _(av) *2	-	-	-	-	-	-	-	1.0 m
	Balance	-	-	-	-	-	-	-	(Margin head)
7) Consumed power	kw/m ³	6.5	8.1	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf)

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 8/24/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chlu		Operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated		1196.50	1196.60	-	-	-	-	-	
Unit of Pump		1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
Pump No.		No.1	No.1	Not set	Not set	Not set	Not set	Not set	
Position No.		P3	P3	Not set	Not set	Not set	Not set	Not set	
Pump center level		1198.75	1198.75	Not set	Not set	Not set	Not set	Not set	
Time (min)		0:53	0:54	-	-	-	-	-	
Discharge	m ³ /min/unit	3.094	1.833	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
Ratio		165%	98%	0%	0%	0%	0%	0%	
3) loss		4.50	4.50	0.00	0.00	0.00	0.00	0.00	Hy pressure gage
Recorded head Suctionside	hs	2.25	2.15	-	-	-	-	-	Part of mild steel
Suction head	loss	0.195	0.074	-	-	-	-	-	band part of flexible
Pump	loss	1.225	0.430	-	-	-	-	-	Flexible hose
Bend	loss	4.00	4.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
Pipe length	hf (m)	0.832	1.848	-	-	-	-	-	C=130
Head loss	f (Flexible pipe)	1.400	11.558	-	-	-	-	-	Part of flexible hose
f	C (Flexible pipe)	G4	25	-	-	-	-	-	Part of flexible hose
C		8.942	8.942	8.942	8.942	8.942	8.942	8.942	131, 1200
4) Atmospheric Presser	m	16	16	no measurement	no measurement	no measurement	no measurement	no measurement	
5) Saturated vapor head	°C	0.187	0.187	-	-	-	-	-	
Temperature	m	Not applicable	1544	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
6) NPSH	S	Not applicable	1.391	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH _(req) *1	m	Not applicable	3.102	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	1.0 m
NPSH _(av) *2	m	-	1.712	-	-	-	-	-	(Margin head)
Balance		-	-	-	-	-	-	-	
7) Consumed power	kw/m ³	5.9	11.0	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date : 8/25/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Operated	Not operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated		1196.60							
Unit of Pump		1 unit	No unit	No unit	No unit	No unit	No unit	No unit	
Pump No.		No.1	Not set	Not set	Not set	Not set	Not set	Not set	
Position No.		P3	Not set	Not set	Not set	Not set	Not set	Not set	
Pump center level		1198.75	Not set	Not set	Not set	Not set	Not set	Not set	
Time (min)		0.54							
Discharge	m ³ /min/unit	2.537	0.000	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
Ratio		135%	0%	0%	0%	0%	0%	0%	
3) loss									
Recorded head Suctionside		5.00	0.00	0.00	0.00	0.00	0.00	0.00	By pressure gage
Suction head	hs	2.15							
Pump	loss	0.135							Part of mild steel
Bend	loss	0.823							Bend part of flexible
Pipe length		6.00	0.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
Head loss	hf (m)	1.894							Part of flexible hose
f	(Flexible pipe)	5.687							C=130
C	(Flexible pipe)	42							Part of flexible hose
4) Atmospheric Presser	m	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.1200
5) Saturated vapor head	°C	15	no measurement	no measurement	no measurement	no measurement	no measurement	no measurement	
head	m	0.174							
6) NPSH									
S		1393	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH (req) ^{*1}	m	1.980	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
NPSH (av) ^{*2}	m	2.476							1.0 m
Balance		0.496							(Margin head)
7) Consume power	kw/m ³	6.9							

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 8/26/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Not operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	No unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	Not set	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	Not set	P3	Not set	Not set	Not set	Not set	Not set	
	Pump center level	Not set	1198.75	Not set	Not set	Not set	Not set	Not set	
	Time (min)	-	0:59	-	-	-	-	-	
	Discharge	0.000	2.695	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
		0%	14.3%	0%	0%	0%	0%	0%	
3) loss	Recorded head Suctionside	0.00	4.50	0.00	0.00	0.00	0.00	0.00	By pressure gage
	Suction head	-	2.25	-	-	-	-	-	Part of mild steel
	Pump	-	0.151	-	-	-	-	-	Hard part of flexible
	Bend	-	0.929	-	-	-	-	-	Flexible hose
	Pipe length	6.00	6.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss	-	1.172	-	-	-	-	-	C=130
		-	2.767	-	-	-	-	-	Part of flexible hose
		-	58	-	-	-	-	-	Part of flexible hose
4) Atmospheric Presser	m	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.1200
5) Saturated vapor head	Temperature	no measurement	17	no measurement	no measurement	no measurement	no measurement	no measurement	
	head	-	0.200	-	-	-	-	-	
6) NPSH	S	Not applicable	1292	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _(req) *1	Not applicable	2.280	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _(av) *2	-	2.913	-	-	-	-	-	1.9 m
	Balance	-	0.632	-	-	-	-	-	(Margin head)
7) Consumed power	kw/m ³	-	7.8	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date : 8/28/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Operated	Not operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	-1196.30	No unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No. 1	Not set	Not set	Not set	Not set	Not set	Not set	
	Position No.	P1	Not set	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1200.58	Not set	Not set	Not set	Not set	Not set	Not set	
	Time (min)	1:00							
	Discharge	2,407	0.000	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
		Ratio	0%	0%	0%	0%	0%	0%	
3) loss	Recorded head Suctionside	5.50	0.00	0.00	0.00	0.00	0.00	0.00	By pressure gage
	Suction head	4.28							
	Pump	0.122							
	Bend	0.741							Part of mild steel
	Pipe length	8.00	0.00	0.00	0.00	0.00	0.00	0.00	Bend part of flexible
	Head loss	0.360							Flexible hose
4) Atmospheric Presser	f (Flexible pipe)	0.299							Part of flexible hose
	C (Flexible pipe)	114							C= 130
5) Saturated vapor head	Temperature	15	no measurement	no measurement	no measurement	no measurement	no measurement	no measurement	Part of flexible hose
	head	0.174							EL. 1200
6) NPSH	S	1446	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _l (req) ^{*1}	1,818	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH _l (av) ^{*2}	2,005							
	Balance	0.187							1.6 m (Margin head)
7) Consumed power		7.4							

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 8/30/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chang Chhu		Operated	Operated	Not operated	Not operated	Not operated	Not operated	Not operated	
2) Operated	Unit of Pump	1 unit	1 unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	No.1	Not set	Not set	Not set	Not set	Not set	
	Position No.	P3	P3	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1198.75	1198.75	Not set	Not set	Not set	Not set	Not set	
	Time (min)	0.59	0.54	-	-	-	-	-	
	Discharge	2.305	2.537	0.000	0.000	0.000	0.000	0.000	
	m ³ /min/unit			0%	0%	0%	0%	0%	1.88 m ³ /min/unit
	Ratio	12.3%	13.5%	0%	0%	0%	0%	0%	by pressure gage
	Recorded head Suctionside	3.50	4.00	0.00	0.00	0.00	0.00	0.00	
	Suction head	2.05	2.25	-	-	-	-	-	Part of mild steel
3) loss	Pump	0.113	0.135	-	-	-	-	-	Part of mild steel
	Bend	0.680	0.823	-	-	-	-	-	Part of flexible hose
	Pipe length	4.00	4.00	0.00	0.00	0.00	0.00	0.00	Flexible hose
	Head loss	0.659	0.794	-	-	-	-	-	Part of flexible hose
	f (Flexible pipe)	2.196	2.186	-	-	-	-	-	C=130
	C (Flexible pipe)	54	54	-	-	-	-	-	Part of flexible hose
	Atmospheric Pressure	8.942	8.942	8.942	8.942	8.942	8.942	8.942	11.1200
	Temperature	16	16	no measurement	no measurement	no measurement	no measurement	no measurement	
	vapor head	0.187	0.187	-	-	-	-	-	
	S	1487	1393	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
6) NPSH	NPSH (req)*1	1.703	1.980	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH (av)*2	4.014	3.463	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	Balance	2.311	1.483	-	-	-	-	-	1.0 m (Margin head)
7) Consumed power		kw/m ³	7.0	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available

Analysis Operation Monitoring Data

Date: 8/31/95

		1st operation	2nd operation	3rd operation	4th operation	5th operation	6th operation	7th operation	Remark
1) River water level at Chiang Chiu		Operated	-	-	-	-	-	-	
2) Operated	Unit of Pump	1 unit	No unit	No unit	No unit	No unit	No unit	No unit	
	Pump No.	No.1	Not set	Not set	Not set	Not set	Not set	Not set	
	Position No.	P3	Not set	Not set	Not set	Not set	Not set	Not set	
	Pump center level	1198.75	Not set	Not set	Not set	Not set	Not set	Not set	
	Time (min)	1.01	-	-	-	-	-	-	
3) loss	Discharge	2.623	0.000	0.000	0.000	0.000	0.000	0.000	1.88 m ³ /min/unit
	Ratio	140%	0%	0%	0%	0%	0%	0%	
3) loss	Recorded head Suctionside	4.00	0.00	0.00	0.00	0.00	0.00	0.00	13W pressure gage
	Suction head	1.95	-	-	-	-	-	-	Part of mild steel
	Pump loss	0.144	-	-	-	-	-	-	Bend part of flexible
	Bend loss	0.880	-	-	-	-	-	-	Flexible hose
	Pipe length	2.00	0.00	0.00	0.00	0.00	0.00	0.00	Part of flexible hose
	Head loss	1.028	-	-	-	-	-	-	C=130
	f (Flexible pipe)	3.029	-	-	-	-	-	-	Part of flexible hose
	C (Flexible pipe)	33	-	-	-	-	-	-	13L 1200
	Atmospheric Presser	8.942	8.942	8.942	8.942	8.942	8.942	8.942	
	Saturated vapor head	16	no measurement	no measurement	no measurement	no measurement	no measurement	no measurement	
6) NPSH	Temperature	0.187	-	-	-	-	-	-	
	head	1340	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(rq)*1	2.132	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	
	NPSH(av)*2	3.443	-	-	-	-	-	-	1.0 m (Margin head)
7) Consumed power	Balance	1.311	-	-	-	-	-	-	
	kw/m ³	7.7	-	-	-	-	-	-	

1) Coefficient of head loss (f) is calculated applying coefficient of flow rate C=130.

2) Coefficient of flow rate (C) is calculated applying head loss (hf).

3) *1 Net Positive Suction Head Requirement

4) *2 Net Positive Suction Head Available