



(LNG)

(LNG)

	I
	III
	IV
1	-1
2	-1
2.1	-1
2.2	-3
2.3	-3
2.4	-3
2.5	-3
2.6	-12
2.7	(Utilities & Facilities) -22
2.8	-28
2.9	-28
2.10	-33
2.11	-33
2.12	-40
2.13	-40

()

3		-45
	3.1	-45
	3.2	-49
	3.3	-50
	3.4	-52
4		-53
	4.1	-54
	4.2	-54
5		-56
6		-61
7		-61
	7.1	-61
	7.2	-61



-1		(LNG Plant)		-2
-2				-4
-3				-10
-4				-13
-5		Air Separation Unit		-14
-6				-17
-7				-19
-8				-21
-9	(Flare)			-25
-10	(Water Balance)			-27
-11				-36
-12				-37
-13				-38
-14				-39
-15				-41
-16				-44
-17		20%		-57
-18		100%		-58
-19			100%	-59
-20		(	)	-60
-21		Associated Gas	AG Compressor 20%	-62
-22		Associated Gas	AG Compressor 100%	-63
-23				-96



(SUMMARY REPORT)



(LNG)

(LNG)

1.

18 2547

(LNG)

Associated Gas () ()

(LNG)

2

2535

(EIA)

()

2

21

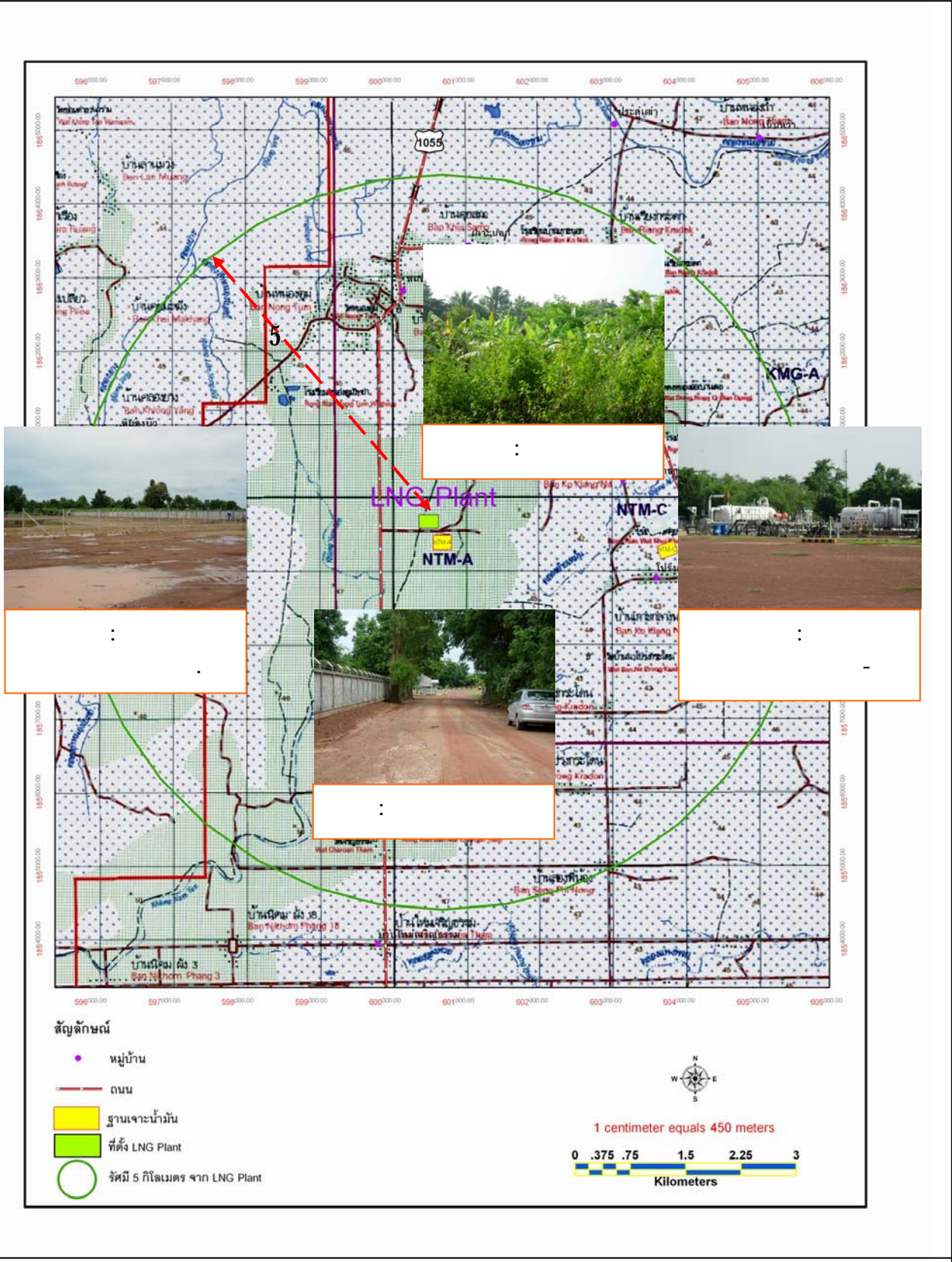
2

(-1)

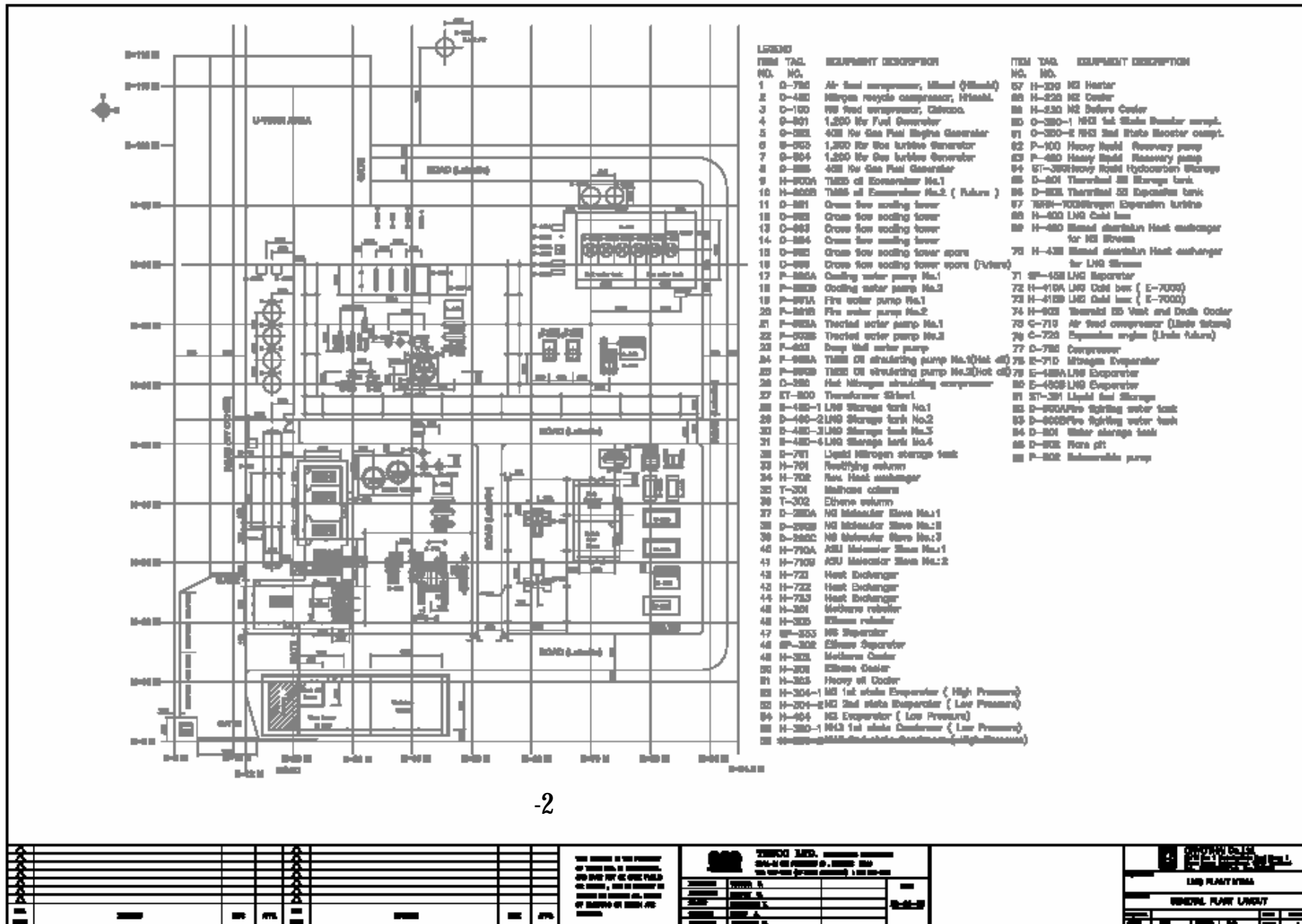
10

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7.7



(LNG)



-2-

-1 (-1)

-1 (-2)

-1 (-3)



-2

/

/				
1. Associated Gas	. /	560	- ()	8 200
2.	/	50,000		Air Separation Unit (ASU)
3.	/	400		200
4.	/5	11.7		25
5. Therminol 55 (Heat Transfer Media)	/10	3,000		Therminol 55 200 5 . . 1 3 x 4 x 3.5



(LNG)

-3



(LNG)

-3

1.	(LNG)	/	6,300	LNG	(LNG Storage)	2					
						4	2.6	x 11.34			
				39.6	..		1	5	14		
								LNG			
				LCNG				Trailer	2	/	
2.	(LN ₂)	/	2,800		LNG	1					
				3	22		60 psi	-190 °C			
3.	(LHC)	/	5,250	LHC	(LHC Storage)	2					
						2	2.6	11.34			
				39.6	..		1	5	10		
								LHC			
				Trailer		2	/				
4.		/	336		ST 390	ST 391	0.968	x 1.52			
				1.12	..						



(LNG)

26

261

	(CH ₄)	LNG	
		4	Joule Thomson Cycle, Nitrogen Refrigeration
Cycle	Nitrogen Recycle System, Cascade Cycle		Mixed-Refrigerant Cycle

	Nitrogen Recycle System (NRCS)	Nitrogen
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(Variation)

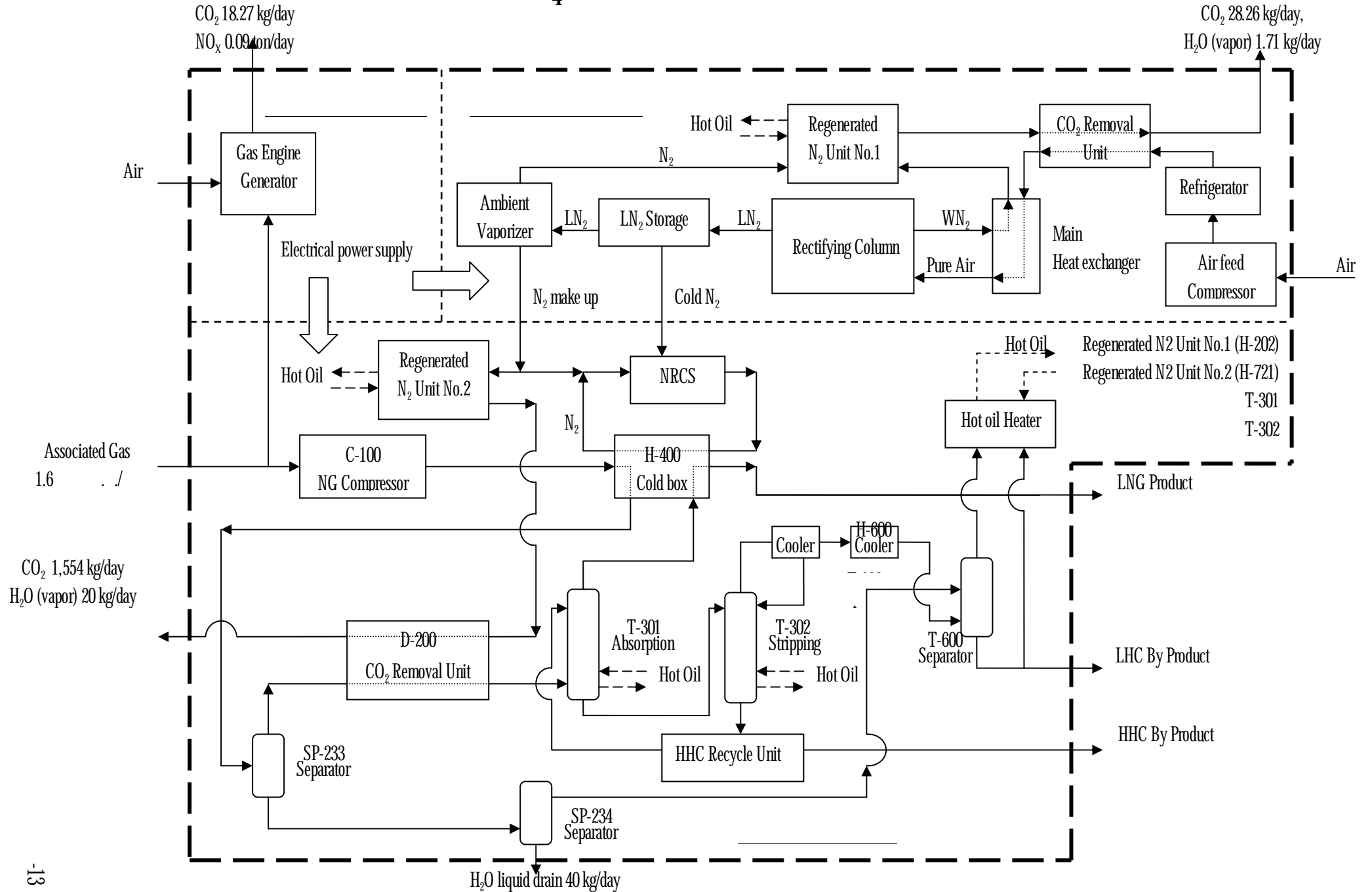
		3	(1)
(2)	(3)	(-4)

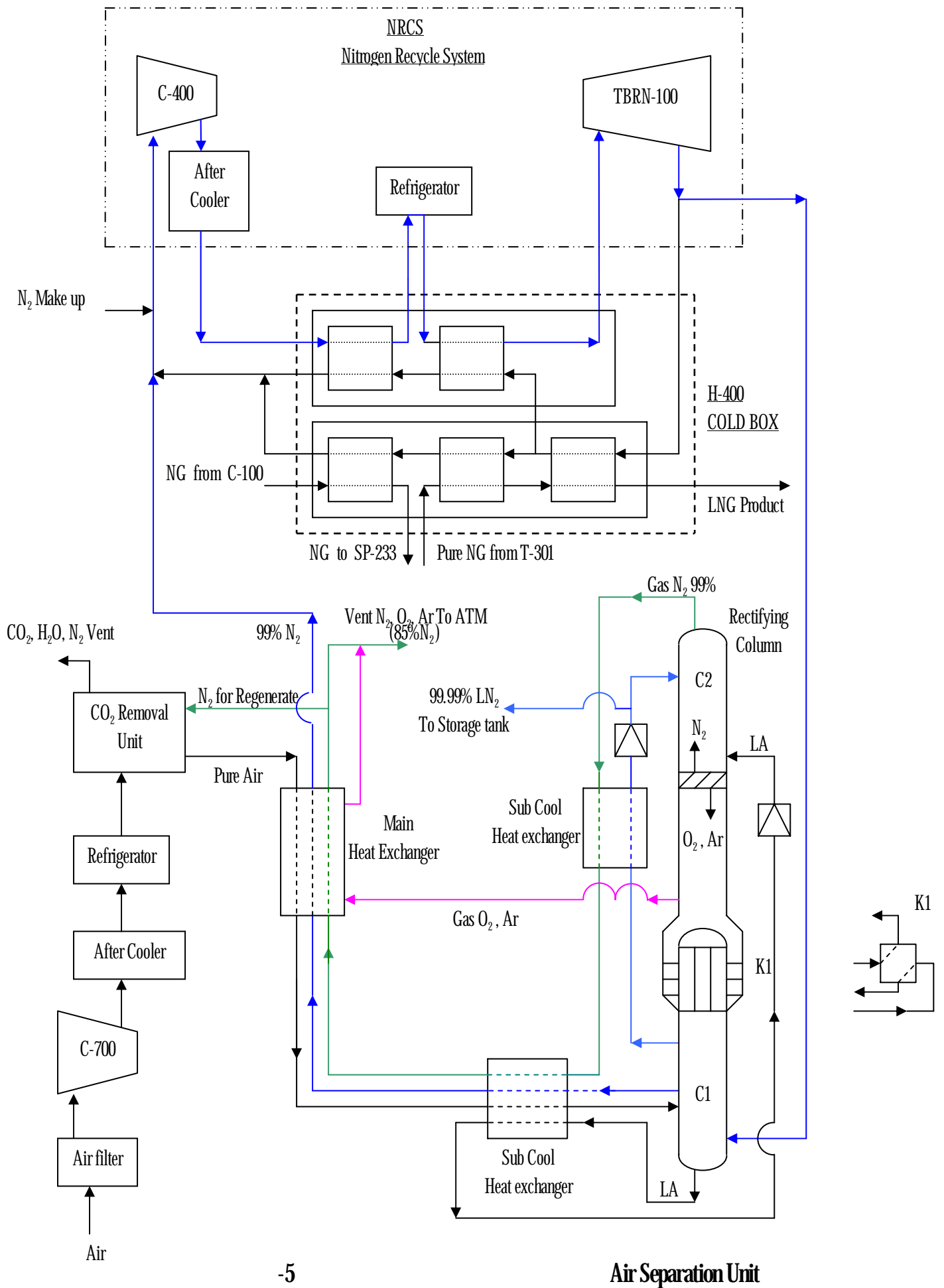
262

		4	2
	1 (1)	1,833	750
		1,250	6,600 50
137	Associated Gas	0.3 . /	
	1.6 . /	1.4	37°C
6.8			

263

			Operate
	2	(1) Make up	NRCS
(2)	Cold Box	LNG	NRCS
(	-5)		





1)	(C-700 Compressor)		(Air Filter)			4.8-5.5
		-35	-20	.		
					38°C	After Cooler
2)	After Cooler					5-10 °C
3)	(CO ₂ Removal)					Molecular Sieve (MS)
	CO ₂		(Pure Air)			
4)	Main Heat Exchanger		Rectifying Column			-145
	-155 °C				5.0-5.5	
	2	1	(C1)			-165 °C
	2	(C2)			C1	0.35-0.5
		-193 °C				
5)			1 (C1)			2 (C2)
	C2		Pure Air		Main Heat Exchanger	
6)	Main Heat Exchanger				37.4	Nitrogen Circulate
	Compressor (C-400)		38°C		After Cooler	
7)	After Cooler				-19°C	Cold Box
8)	Cold Box				-40 °C	Refrigerator
9)	Refrigerator				-81 °C	Cold Box
10)	Cold Box				37.4	5.0-5.5
	Expansion Turbine				-81°C	-149°C
11)	Expansion Turbine				Rectifying Column	1
(C1)	Rectifying Column					
12)			(C1)			

264

	Associated Gas	1.3	.	/		
1.4		37°C				
	Associated Gas					
	(CH ₄)	90%				
		NRCS		Cold Box		
	LNG Product	By Product	2		LHC (Light Hydrocarbon	C ₂₊)
HHC (Heavy Hydrocarbon	C ₅₊)	-6			LNG	
	1) Associated Gas	1.3	.	/		
		69.53%				
8		37°C	1.4		LNG	
	2) Associated Gas				C-100	24.85
	Associated Gas	41°C				
	3) Associated Gas			C-100		
		NRCS				BAHX (Blazed
Aluminium Heat Exchanger)		Cold Box			15 °C	24.64
	4) Associated Gas	Cold Box				
	SP-233	Associated Gas	2	(1)		
		CO ₂	CO ₂ Removal Unit	(2)		
			CH ₄ 10%, C ₂ H ₆ 9.42%, C ₃ H ₈ 19.97%			12.18%
		SP-234			T-600	LHC
					40	/
	5) Associated Gas			(4(1))		CO ₂ Removal
Unit	Molecular Sieve	Alumino-Silicate Type 13X		1/16" Pellet		
CO ₂	1,554 /	20 /			CO ₂	15°C
	24.64					
	6)	CO ₂ Removal Unit			T-301	
	84°C	24.37		2	(1)	Pure NG
		-22 °C	24.23		Cold Box	Pure NG
	LNG	(2)	T-301			84 °C
24.30		T-302	(		157°C)	



(LNG)

-6

(LNG) (263)



(LNG)

-	C ₂₊	70 °C	17.89	C ₂₊	
	LHC				
-	C ₅₊	157 °C	17.89	C ₅₊	
	Recycle Heavy Hydrocarbon (HHC Recycle)			86,706	/
	85,878	/	-40 °C	24.78	
			T-301		828
	/		38 °C	17.89	
	HHC				
7)	Pure NG		T-301		
-149 °C	NRCS				BAHX (Blazed
Aluminium Heat Exchanger)	Cold Box		BAHX		
	Aluminum				Pure NG
					Pure NG
			LNG Product	-147 °C	24.09
18,509	/		3.48		
(LNG Storage Tank: D-480A,B,C,D)					
8)	LHC (Light Hydrocarbon)				
8.1)	C ₂₊	T-302	70°C	17.89	H-600
		5°C	17.89		T-600
8.2)	C ₂₊	H-600		Liquid Phase	Vapor Phase
	T-600				
-	Vapor Phase	5°C	17.89	3,811	/
-	Liquid Phase	5 °C	17.89		11,880 /
			2,613	/	
	9,267	/	3.48		
(By Product Storage Tank: D-490A,B)					
9)	(HHC : Heavy Hydrocarbon)			C ₅₊	
Recycle Heavy Hydrocarbon	828	/	17.89		38°C
3.48			ST-390	ST-391	(By Product
Storage Tank : ST-390, ST-391)					



(LNG)

-7

(LNG) (264)



(LNG)

-8

(265)



(LNG)

5)	Cold Box	37.4	5.0-5.5
Expansion Turbine			-81 °C -149 °C
6)	Expansion Turbine	5.0-5.5	-149 °C
Cold Box			
	Rectifying Column	(C1)	Rectifying Column

2.7

(Utilities & Facilities)

-4

2.7.1

(Compressor)

1.	(Air Compressor)			
		1		
			415.7	-35
-20			4,557 Nm ³ /hr	
2.	(N ₂ Compressor)			
		3	C-400, C250	C-750 C-400
			Nitrogen Recycle	LNG 482
	C-250		Regenerate	CO ₂
	LNG	68	C-750	Regenerate
	CO ₂		LN ₂	68
3.	(NG Compressor)			
	LNG		Associated Gas	-
	1		300 kW	403
Associated Gas		1,267 Nm ³ /hr		



(LNG)

-4 (Utilities)

				/	
1.	(Air Compressor)	Nm ³ /hr	4,557	310 kW	1 415.7 -35 -20 .
2.		MW	2.5	1,250 kW Associated Gas	Gas Engine 2 (1 1) Gas Engine 400 kW 2
3.					200 . .
3.1		m ³ /hr	734		
-		m ³ /hr	2.2		
3.2		m ³	200	200 . .	
3.3		m ³ /d	3.1		22
3.4		m ³ /d	1		2,254 . .



2.7.2

(Flare)

	(Flare)		API RP520, API RP521	ASME
Section VIII Division I		2 (1)		
	(2)	Start-up Process	Shut-down Process	
			0.03	
	)	60		(-9
Liquid Phase		Vapor Phase	DST1	Vapor Phase
LPG		Liquid Phase	DST2	DST1

- : 1,000 . / . (0.035 . / .)
- (Flare) : 1.20 x 6.50
- : 600-1,000 °C Methane
- : 0.39 /
- Emission Concentration from Flare stack : NO CO < 200 mg/Nm³, SO₂ TSP
< 50 mg/Nm³ HC < 20 mg/Nm³

Associated Gas CH₄
 70.43%, C₂H₆ 13.41%, C₃H₈ 8.54%, C₄H₁₀ 3.88%, C₅H₁₂ 1.08%, C₆H₁₄ 0.31%, CO₂ 0.73%, N₂ 1.62% O₂
 0.1% CO₂ 10.48%, CO 0.04%, N₂ 78.98%, O₂ 10.50%

2.7.3

(Power Supply System)

			2.50 MW	Gas Engine
2	(1	1)	1,250 kW	Gas Engine
	2		400 kW	Associated Gas
	Start Up	1	100 kW	150 /



(LNG)

-9

(Flare) (2.7-1)

2.7.4 (Water Supply System)**-10****5**

() 1

200 . .

1. _____ (Cooling Water System)

734 . / .

0.3%

2.2 . / . (52.8 . /)

2.2 . / .

2. _____ (Fire Fighting Facilities)

200 . . 1

3. _____ (Potable Water)

140 / /

3.1 . / (ดร.เกรียงศักดิ์ อุดมสิน

22

โรจน์, การออกแบบระบบท่ออาคารและสิ่งแวดล้อมอาคาร เล่ม 2 ,2542)

4. _____

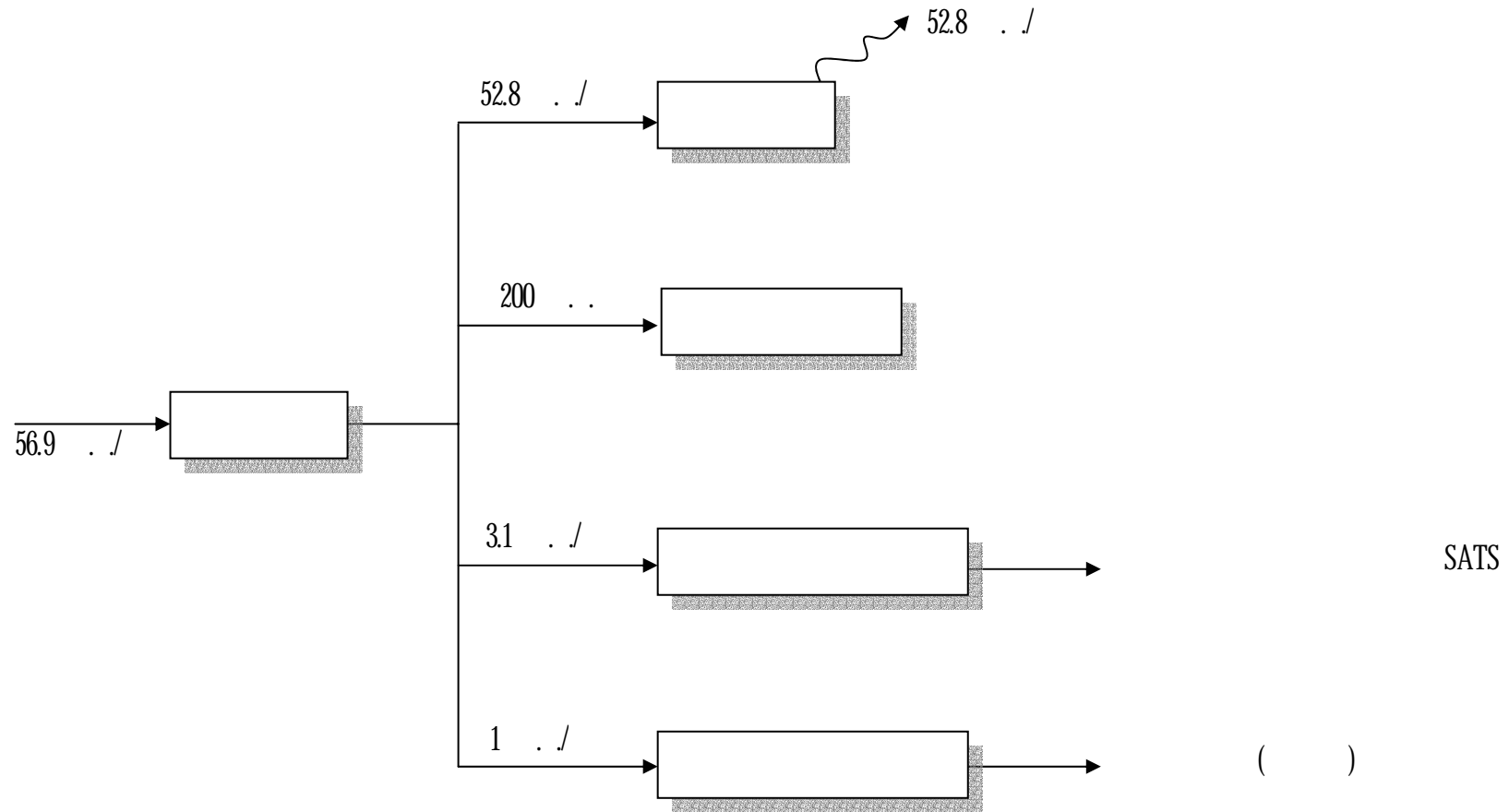
1 . /

2,254 . .

2.7.5

(Sump Pit)

(LNG)



-10 (Water Balance)



(LNG)

276 (Wastewater Treatment System)

2.5 . / SATs
BOD 20 /

28

281

Gas (Gas Engine) Associated
-5

282

(Hazardous Waste)
. . 2548 2
(Non-Hazardous Waste) -6

283

3 (1)
SP-234 (2)
(3)

-7

29

(Hot Line) (E-mail) /



(LNG)

-5

/			/	
1. (Gas Engine)	/	6,394.5	Associated Gas 0.3 . /	
2. (CO ₂ Removal Unit)	/	553.791	/) LNG (543.9 LN ₂ (9.891 /)	
3. (Flare)	/60 . .	0.03	- 3.892 / - 0.0014 0.0096 /	C ₁ -C ₅



(LNG)

-6 /
(283)

-6()



(LNG)

-7

(284)

210

22

20

50

211

211.1

22

211.2

-8

211.3

/

NFPA . NFPA 10 Standard for Fire Extinguisher, NFPA 14 Standard for Installation of Standpipe and Hose System, NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection

108

217

10

2534

-8

(211-

1)



(LNG)

1. _____
 (Gas Detector) 14
 (-11) (Heat Detector)
 200°F 200 . . (Smoke
 Detector) (Fire
 Alarm Control Panel)

(Fire Alarm Devices) (Alarm Bell)

2. _____
 (Fire Extinguisher) (ABC)
 23 (-12) (Fire Water Reserve)
 200 . . (Fire Pump)
 1,000 / (227 . / .) 120 psig
 1 (Fire Hydrant)
 (Fire Hose Cabinet) 7

Hi-expansion Foam

30 13,500 90 . .

211.4

2 (1) (2)

3

-13 -14

211.5



(LNG)

-11

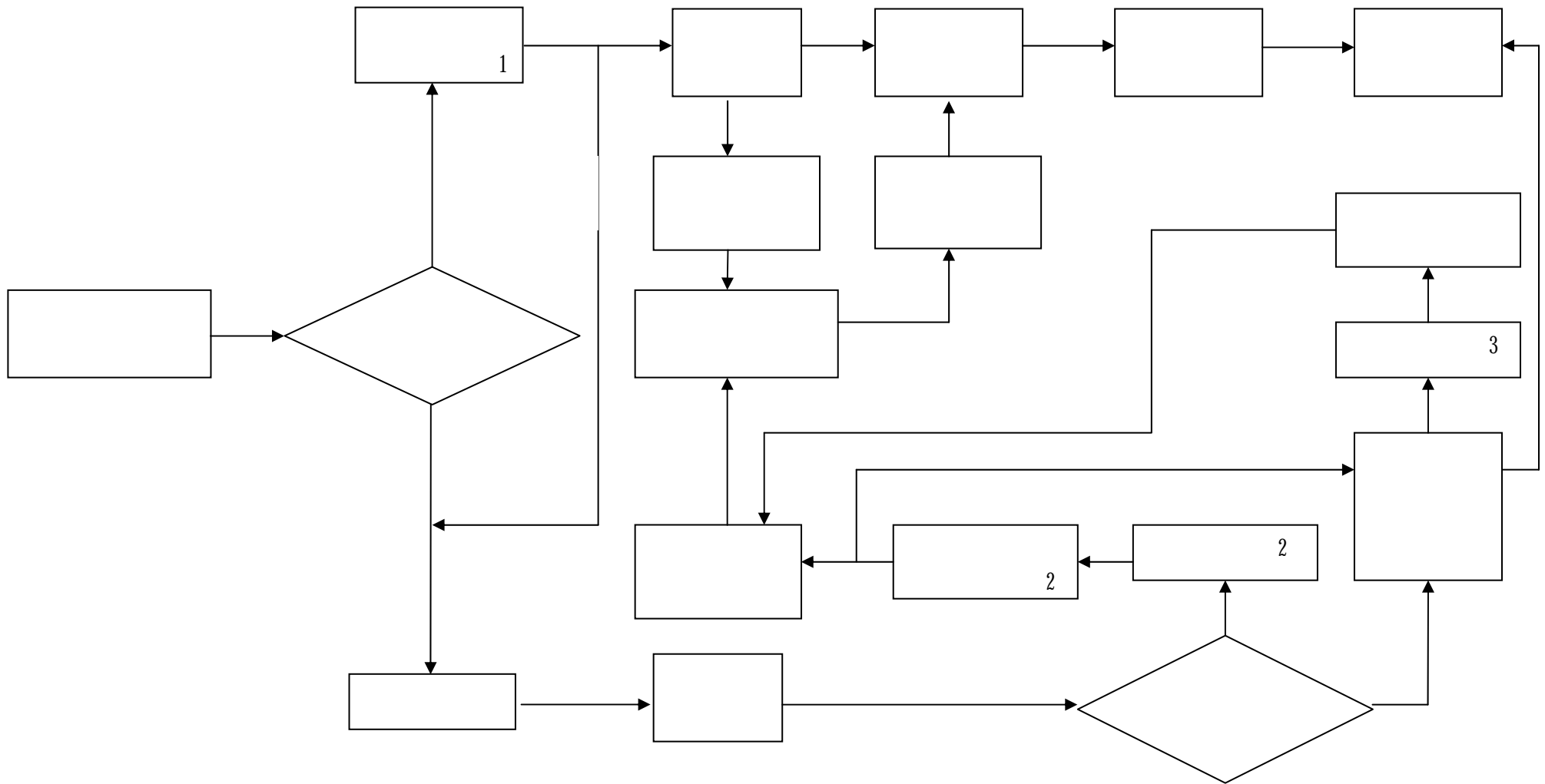
(211-1)

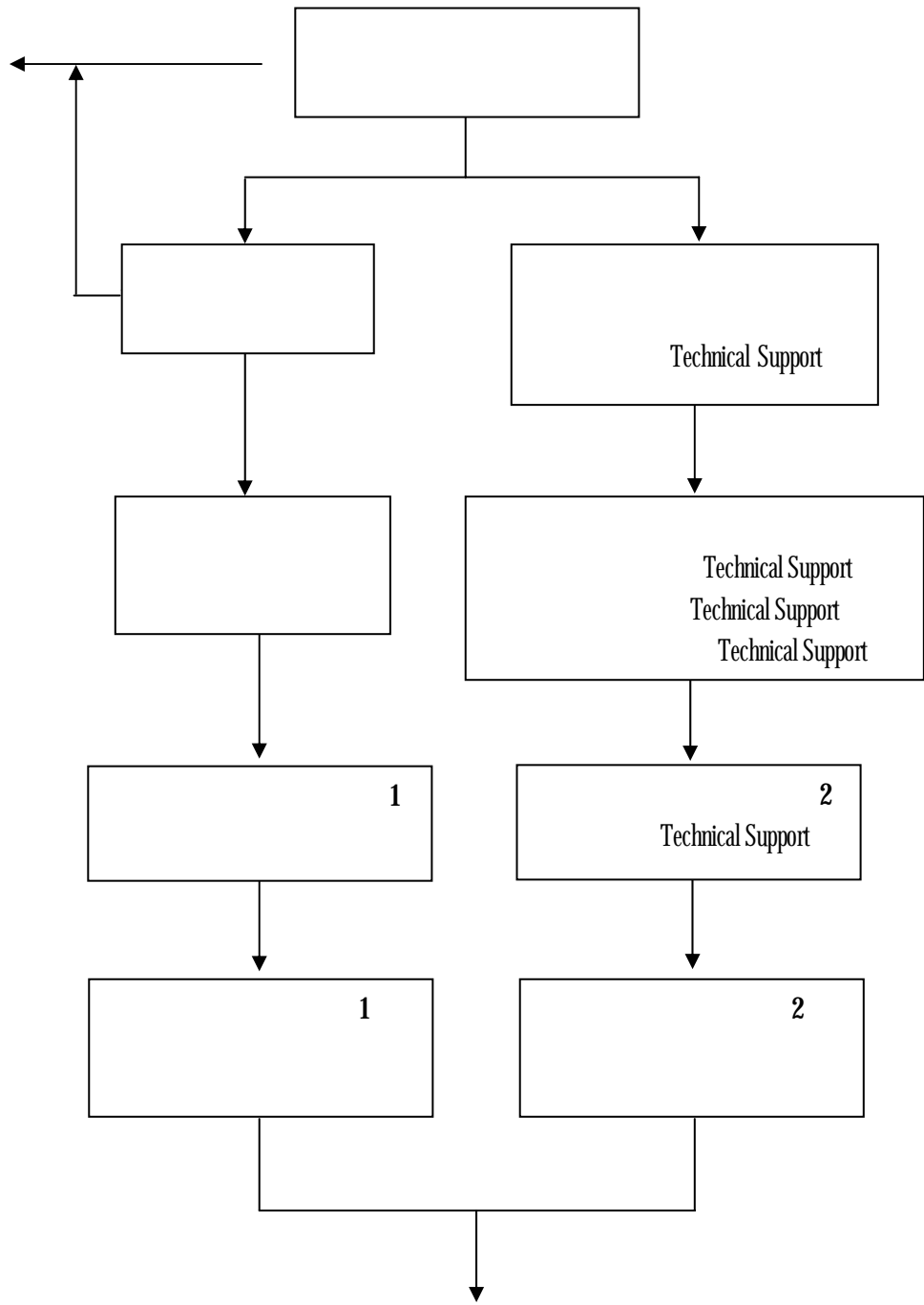


(LNG)

-12

(211-2)







(LNG)

1. _____
Molecular Sieve

2. _____
2.1) Therminol 55
4 3.5

5 . . 3

2.2) 200
/

2.3) Cryogenic 2
(Stainless Steel)
(Carbon Steel)

2.4) Cryogenic 2

2.5) 2
(Perlite)

Division I

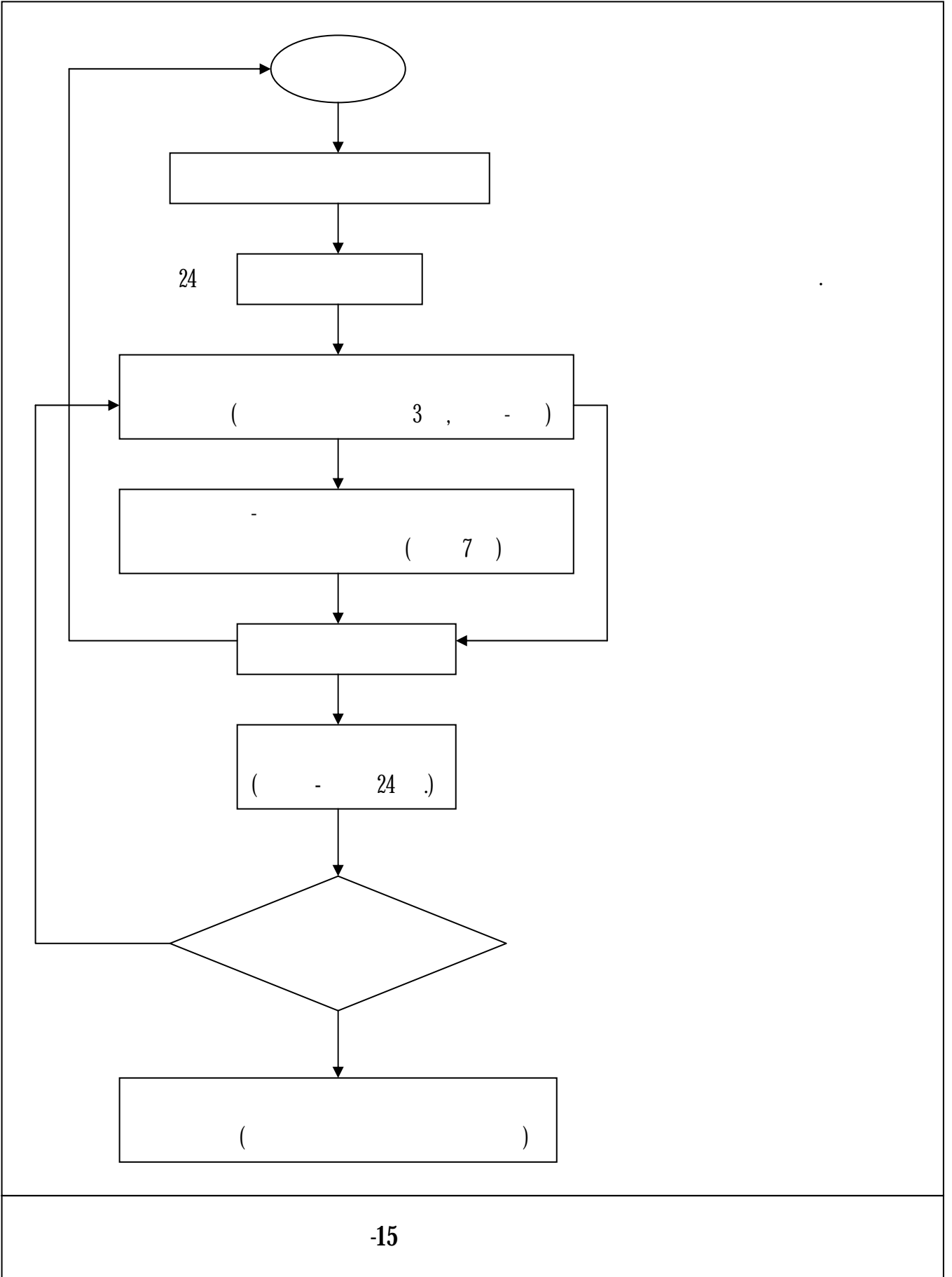
ASME Boiler and Pressure Vessel Code Section VIII,
250 psig

212

3 24
-15
(-1) -9

213

2,254 . .



-9()

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(LNG)

-16

(2131)



3

31

31.1

(5)

31.2

Dry Climate Aw-climate) (-) (Tropical Wet and
 (-) 30 (-)
 27.2 35.6 19.3 °C

79

97 45

0.9-3.8

40

31.3

1. _____

(Sensitive Area)

-10 . . 2546 2548
 0.215 / . . 10 (PM-10) (SO₂)
 (NO₂) (CO) (O₃) 0.107, 0.01,
 0.017 / . . , 5.46 0.043 ppm
 10 (. . 2538) 21 (. . 2544)

(LNG)

-10
1921 2546 46 2548

			(mg/m ³)	(mg/m ³)	SO ₂ (mg/m ³)	NO ₂ (mg/m ³)	CO (ppm)	O ₃ (ppm)	Pb (mg/m ³)
	19	2546	0.116	0.084	0.005	0.007	1.71	0.011	0.000067
	20	2546	0.149	0.106	0.004	0.010	5.46	0.015	0.000059
	21	2546	0.149	0.075	0.004	0.017	1.76	0.023	0.000075
	19	2546	0.123	0.101	0.005	0.007	0.95	0.019	0.000058
	20	2546	0.215	0.107	0.003	0.006	1.08	0.015	0.000031
	21	2546	0.121	0.089	0.003	0.006	0.88	0.043	0.000036
11 .3 .	4	2548	0.044	0.038	0.004	0.003	0.56	0.026	0.0005
	5	2548	0.049	0.041	0.006	0.003	0.57	0.025	0.0003
	6	2548	0.098	0.065	0.010	0.005	0.48	0.045	ND
1/			0.330^{2/}	0.120^{2/}	0.300^{2/}	0.320^{3/}	30^{3/}	0.100^{3/}	0.01^{4/}

1/ :
2/ 24
3/ 1
4/ 24 0.01 2 (. . 2524)
(2546 2548)

112 42



(LNG)

2. _____

24 (Leq 24 hrs.) (L_{max})

4 ()

15 (. .2540) 12 . .2540

Leq 24 hrs. 70 () L_{max}

115 ()

11 3 . . .

47.4-60.7 78.0-95.4 ()

31.4

(Basement)

Fan and Alluvial Plain)

(Alluvial
(Alluvial Plain)
(Alluvial Plain and Alluvial Fan)

31.5

5

(Riverine Alluvium) 5

3,

4, 5, 7, 15, 21, 33 38

33/33b

1

31.6

1. _____



(LNG)

2. _____

-11

8 (. . 2537)

. . 2535

4

(1)

(2)

2544-2548

3

4

8 (. . 2537)

BOD

-11

()

			2
Temperature	°C	35.2	N ^{1/}
pH	-	7.61	5.0-9.0
Suspended Solids	mg/l	10.0	-
Total Dissolved Solids	mg/l	118.0	-
Dissolved Oxygen	mg/l	4.8	≥ 2.0
Biochemical Oxygen Demand	mg/l	3.7	≥ 4.0
Chemical Oxygen Demand	mg/l	80.0	-
Oil & Grease	mg/l	< 0.1	-
Conductivity	mg/l	116.3	-
Turbidity	NTU	12.7	-
Nitrate	mg/l	0.327	≥ 5.0
Total Coliform Bacteria	MPN/100 ml	2,700	-
Fecal Coliform Bacteria	MPN/100 ml	< 2.2	-

: 1/

3

2/

8 (. . 2537)

. . 2535

4"

111

16

24

2537

-

31.7

1. _____

	(Porous Rocks)	(Extensive but Moderate Productive (Qcr)	(Chiang Rai
Aquifers)			
Aquifer)			
100		200	

2. _____

- 7 2548

12

(. .2542)

32**321**

(<i>Oroxylum indicum</i>)	(<i>Samanea saman</i>)	(<i>Ficus racemosa</i>)
	(	5)

52

(*Azadirachta indica*) (*Pterocarpus indicus*)(*Eucalyptus carmaldulensis*) (รายงานการวิเคราะห์ผลกระทบสิ่งแวดล้อมโครงการขุดเจาะ

สำรวจและผลิตปิโตรเลียมแหล่งหนองตมใต้, 2548)

322

2548

55

4

63.0

31

1

(Endemic Species)

33

331

97.62

0.51

0.76

0.06

1.05

332

60

. /

2547

100

. /

333

2 ()
 400/230 3 2546 22 3
 19.72 /
 594.093
 /

334

1303 (), 1293 (-), 1055 (-), 1065
 (-), 1278 (-), 12 (-), 115 (-)
 -) 1(-)
 ()
 (V/C Ratio) . . 2547
 2.6-28.4 1303, 1293, 1055, 1065 1278
 5

335

()

336

34

341

-

-

5

16

4

2

3.75 /

270

22-23

2548

55.19

.

54.44

65.19

30.74

4.07

342

.. 2546

1:7,014

1:3,597

9

.. 2545

1:6,000

สำนักงานสาธารณสุขอำเภอองไกรตาศ, 2548 และ สำนักงานสาธารณสุข
อำเภอบางระกำ, 2548)

343

344

()
(5)

()

4

. .2548

(.)
159

2

41

42

127

1. _____

6 “การประชุม

ครั้งนี้ไม่ใช่การลงมติเห็นชอบต่อโครงการแต่เป็นการรับฟังความคิดเห็นและข้อเสนอแนะ นำมาประกอบการศึกษาผลกระทบสิ่งแวดล้อมให้สมบูรณ์ยิ่งขึ้น”

-12



		()		
				/
1	-	88.19	0.00	11.81
2		85.83	0.79	13.39
3	.	52.76	7.09	40.16
4		80.31	7.09	12.60
5		64.57	5.51	29.92
6		94.49	3.15	2.36
7		80.31	5.51	14.17

2. _____

/

/

/



(LNG)

5

(Major Hazard Assessment)

(LNG)

Associated Gas

Associated Gas

69.5% 13% 8.8% 4.1%

WHAZAN (World Bank

Hazard Analysis)

DNV Technica Ltd.

1. _____ (LNG Storage Tank)

20% 100%
Pool Fire

-17 -18

Cloud)

(LEL/LFL)

(Vapor

-19

2. _____ (LN₂ Condenser)

100%

ERPG-1, ERPG-2

ERPG-3

-20

875

-



(LNG)

-18

100%

(567)



(LNG)

-19
100% **(568)**



(LNG)

-20

() (569)



(LNG)

3. Associated Gas Compressor (C-100)					
(C ₂ -C ₅)	Associated Gas		(4)		
	20%	100%			
	Jet Dispersion	Jet			7.131
35.66		Ignition Source			
	Jet Flame				
Source		(<10 kg)	-21	-22	Ignition
6					
		(1)		(2)	(3)
		(4)			
	(	-13	-14		
7.					
7.1					
			-15	-16	
7.2					
			-17	-18	



(LNG)

-21		Associated Gas	20%
	AG Compressor (	5.6-10)	



(LNG)

-22		Associated Gas	100%
	AG Compressor (	5.6-11)	



(LNG)

-13

(LNG)

-13()



(LNG)

-14

(LNG)

-14()