
1	.....	1
1.1	.....	1
1.2	.....	2
1.3	.....	3
1.4	.....	4
1.5	.....	4
2	.....	5
2.1	.....	5
2.2	.....	9
2.3	.....	10
2.4	.....	12
2.5	.....	17
2.6	.....	23
2.7	.....	23
3	.....	26
3.1	.....	26
3.2	.....	30
3.3	.....	36
3.4	.....	37
3.5	.....	58
3.6	.....	63
4	.....	64
4.1	.....	64
4.2	.....	64
4.3	.....	70
4.4	.....	70
4.5	.....	72

4.6	.....	75
4.7	.....	77
4.8	.....	78
4.9	.....	78
5	.....	79
5.1	.....	79
5.2	.....	87
5.3	.....	98
5.4	.....	100
5.5	.....	126
6	.....	128
6.1	.....	128
6.2	.....	132
7	.....	135
7.1	.....	135
7.2	.....	138
7.3	.....	141
7.4	.....	148
7.5	.....	149
7.6	.....	154
8	.....	155
8.1	.....	155
8.2	.....	157
9	.....	184
9.1	.....	184
9.2	.....	191
9.3	.....	193
9.4	.....	200
9.5	.....	208

1

2

3

4

1

2

3

4

5

6

7

1

2

3

4

5

1

1.1

60%

“ ”

2016 12

9#
14000t/a

1

10000t/a

1

1#

15000t/a 3531.52m² 20400t/a 6000
6000

2015 1
2016 9
682
2021 “81”
398 ”

1.2

67# 63# 67# 103 63-1# 64# 77134.7m² 63#
66#
69# 70# 1 1
10000t/a

360t/a

2021 2 25

[2021]14

2

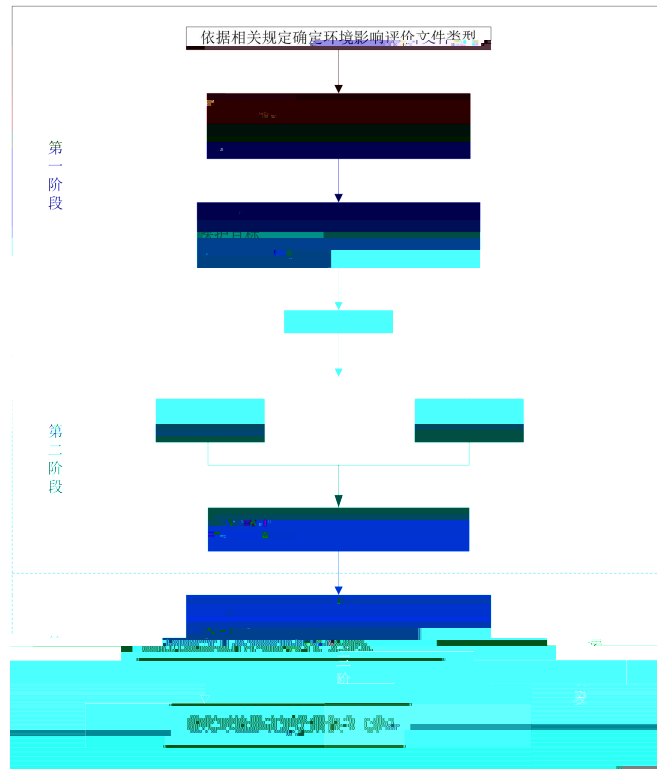
“

”

1.3

2021 8

2021 8 4



2

2.1

2.1.1

1		2015	1	1	
2			2018	12	29
3			2018	10	26
4			2018	1	1
5		2016	7	2	
6				2018	12 29
7					2020 9 1
8				2019	1 1
9			2011	3	1
10			2017		2017
682					
11				2021	
12		2021			
13		2019		2020	1 1
14					2012
7	3				
15					2005
11	28				
16					2005
11	28				
17					[2013]37
2013	9	10			
18					[2015]17

2015 4 2
19

[2013]77

4

2016-2020

[2015]53

5

2017 6 1

6

DB43/023-2005

7

[2016]176

8

[2006]23

9

[2014]22

10

2018 10 29

11

<

2018-2020

>

[2018]17

2018 6 18

12

<

>

([2017]4 2017 1 23)

13

“ ”

2016 25

14

15

16

2013 4 1

17

2017 1 1

18

<

>

2020 7

1

19

<

>

[2013]7 2013 1 22

20

“ ”

[2020]12 2020 6 30
21 < “ ”
>

2020 11 10

2.1.3

1 HJ2.1-2016
2 HJ2.3-2018
3 HJ610-2016
4 HJ2.2-2018
5 HJ2.4-2009
6 HJ 19-2011
7 HJ964-2018
8 HJ169-2018
9 [2001]199
10 HJ2000-2010
11 GB18218-2018
12 2017
43
13 HJ819-2017
14 HJ942-2018
15 HJ1035-2019

2.1.4

1
2
3 [2017]54
() ()

8000

23000

[2019]42

5

[2020]32

6 ()

7

2020 4

8

9

[2013]296

10

2.2

2.2.1

1

2

3

2.2.2

1

2

3

2.3-1

2.3.2

2.3-2

2.4

12	1,1-	3	9
13	1,2-	0.52	5
14	1,1-	12	66
15	-1,2-	66	596
16	-1,2-	10	54
17		94	616
18	1,2-	1	5
19	1,1,1,2-	2.6	10
20	1,1,2,2-	1.6	5.8
21		11	53
22	1,1,1-	701	840
23	1,1,2-	0.6	2.8
24		0.7	2.8
25	1,2,3-	0.05	0.5
26		0.12	0.43
27		1	4
28		68	270
29	1,2-	560	560
30	1,4-	5.6	20
31		7.2	28
32		1290	1290
33		1200	1200
34	+	163	570
35		222	640
36		34	76
37		92	260
38	2-	250	2256
39	[a]	5.5	15
40	[a]	0.55	1.5
41	[b]	5.5	15
42	[k]	55	151
43		490	1293
44	(a,h)	0.55	1.5
45	(1,2,3		

GB 73-2015 1

GB/T31962-2 1 A

GB8978-1996 4

2.4-8

mg/L

	pH	SS	COD	BOD ₅	NH ₃ -N	
	6~9	100	200	/	40	6
	2	0.5	1	1	400	500

B8901 -1011

G67-2		0.16363	0.08	325
G67-3		0.63987	0.07	333
		0.255948	0.28	
		0.127974	0.43	
G67-4		0.006122	0.000020	305
G63-1-1		4.1824	2.09	375
G63-1-2		0.87919	0.1	343
		0.351676	0.39	
		0.175838	0.59	
G63-1-3		0.012842	0.000043	365
G64-1		5.319	2.66	304
G64-2		0.51376	0.06	507
		0.205504	0.23	
		0.102752	0.34	
G64-3		0.005282	0.000018	25
63#		0.76068	0.38	46
		1.2678	0.14	
		0.50712	0.56	
		0.25356	0.85	
		0.025356	0.01	
67#		0.81738	0.41	49
		1.3623	0.15	
		0.54492	0.61	
		0.27246	0.91	
		0.207246	0.01	
63-1#		0.7296	0.36	49
		1.216	0.14	
		0.4864	0.54	
		0.2432	0.81	
		0.02432	0.01	
64#		0.67638	0.34	49
		1.1273	0.13	
		0.45092	0.5	
		0.22546	0.75	
		0.022546	0.01	
66#		0.088999	0.04	75
	VOCs	0.0445	0.000037	
		0.02225	0.04	

2

HJ2.2-2018

5km

2.5.2

1

HJ2.3-2018

2.5-3

Q(m³/d)

W()

Q 20000 W 600000

A

Q<200 W<6000

B

-

1

A

2

3

4

5

6

7

500 m³/d

8

A

500 m³/d

10	B	B
----	---	---

HJ2.3-2018

B

2

500m

4500m

5km

2.5.3

—

HJ610-2016

A—

“

”

“

”

2.5-4

/			

2.5.4

1

HJ2.4-2009

2.5-5

--	--

	3
	<3dB A

2

200m

2.5.5

1

2km²

HJ19-2011

2

200m

2.5.6

1

HJ/T169-2018

2.5-6

	IV IV+	III	II	I

HJ169-2018

II

5km

500m

4500m

5km

2.5.7

HJ964-2018

2.5-7

									——
								——	——
“——”									

— HJ964-2018 A
50hm²

“ ” “ ”

200m

2.6

1

2

3

4

5

2.7

1

2.7-1

	X	Y					
1	112.587488611	28.329421575			280m		GB3095-2012
2	112.592301723	28.340773160			1500~2300m	820	
	112.589038005	28.327847245			320~400m	80	
3	112.590399346	28.331410402			730 m	500	
4	112.595717629	28.332512205			420m~1300m	90	
5	112.65899294	28.321171100			1800m	300	
6	112.592033502	28.317191178			680~1400m	200	
7	112.600223740	28.315066392			1000m~2200m	180	
8	112.566020211	28.311686809			2400m	2400	
9	112.570140084	28.309068973			2150m	538	
10	112.575955113	28.328702743			520m~1500m	482	
11	112.579903324	28.339109714			1300~2000m	246	
12	112.591790875	28.333723838			730-900m	900	
					4500m		GB3838-2002 III
					500m		
					3200m	2.5 m ³ /d	-
							GB/T14848-2017
							GB36600-2018

3

3.1

			2016	12	26	2017	6			
								2017		
8	21				2017	54				
								2018		
12								1		
							2018	12	19	
			2018	4	30	12	4	4	1	
			2017	6		2018	9		2019	8
									2019	8
28					2019	3				
			2019	10	29				[2019]	42
									8000	
					23000				[2019]	43
			2020	7	31				[2020]	31
2020	7	31							[2020]	32
			2021	1	19				[2021]	4

2021 8

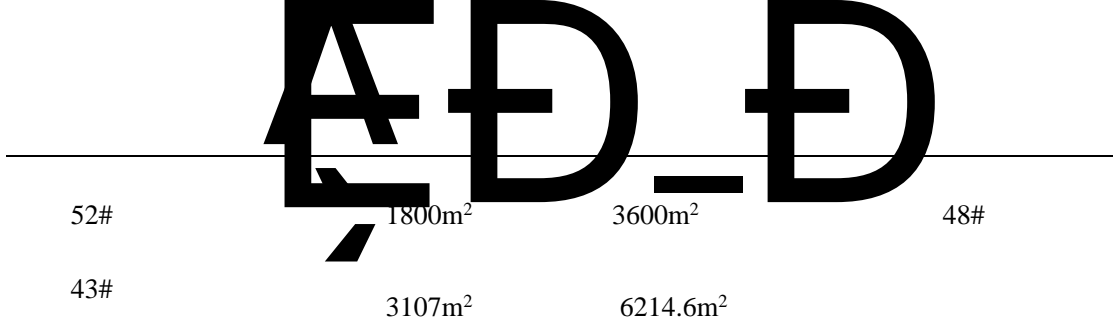
3.1-1

1G

300

300

32-2



			H1 H2 +15m H3 H4 + +15m	
	6000		H5 H6 +15m H7 H8 + +15m	
			H9 H10 +15m + + +15m	
			H11 H12	
	10000		H13 H14 +15m H15 H16 + +15m	
		MVR	H17 + +15m	
			GB/T19923-2005	
		MVR		
			120 m ³	
			1 2 530m ³ /d 21# 550m ³ /d 17# 530m ³ /d	

31#	32-1#	32-2#
32-3#	34#	31#
	pH	32-2#

		45#	47#	55#	1 200m ²
		45#	47#	55#	1 50m ²
	1	1000 m ³			
	2	5800m ³	4200m ³		1
			1	4000m ³	
			2	10000m ³	
		200m ³			
		100m ³			

3.3

3.3-1

		t/a		
1		30000		25kg/
2		10000		25kg/
3		1000		25kg/
4		2000		25kg/
		15000		25kg/
		16000		25kg/
8		162537.31		3500*5500
9		11174		3500*5500
10		4284.8		3500*5500
11		6000		
12		16000		
13		3912		

14	2220	
15	70000	25kg/
16	16040	25kg/
	36033	25kg/
	12840	25kg/
20	3283.59	25kg/
21	233	25kg/
22		

ገጽ 37

3.4.1

MVR

SO₂ NO_x

MVR

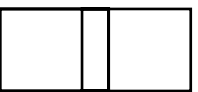
HCl

3.4-1

1#			G1-1	1	15m	0.7m	
	3		G1-2	3	15m	0.7m	
		+		G1-3	1	15m	0.7m
2#	6		G2-1 G2-2	6	20m	0.7m	
	2		G2-3	2	10m	0.7m	
		+		G2-4	2	10m	0.7m
				G2-5	2	10m	0.7m
9#	6		G9-1 G9-2	6	20m	0.7m	
	2		G9-3	2	20m	0.7m	
		+		G9-4	2	20m	0.7m
3#			G9-5	1	15m	4	
			G3-1	1	15m	4	

□

			+		+	1	15m	0.8m	
				G20-2					
20#					G20-3	1	15m	1.0m	
	3		+		+	1	15m	0.8m	
				G20-4					
21#					G21-1	1	15m	0.8m	
			+		G21-2	1	15m	0.6m	
					G17-1	1	15m	0.6m	
17#			+		G17-2	1	15m	0.6m	
			+		G15-1	1	18.5m	0.5m	
15#			+		G15-2	1	18.5m	0.5m	
					G23-1-1	G23-1-2	2	15m	0.8m
23-1#									
			+		G23-1-3	2	15m	0.6m	
				G23-1-4					
32-2#			+		G23-2-1	1	15m	0.6m	
6#					G6-1	1	15m	0.8m	
					G39-1	1	15m	1.0m	
					G40-1	1	15m	0.6m	
					G40-2	1	15m	0.3m	
					G54-1	G54-2	2	15m	0.8m

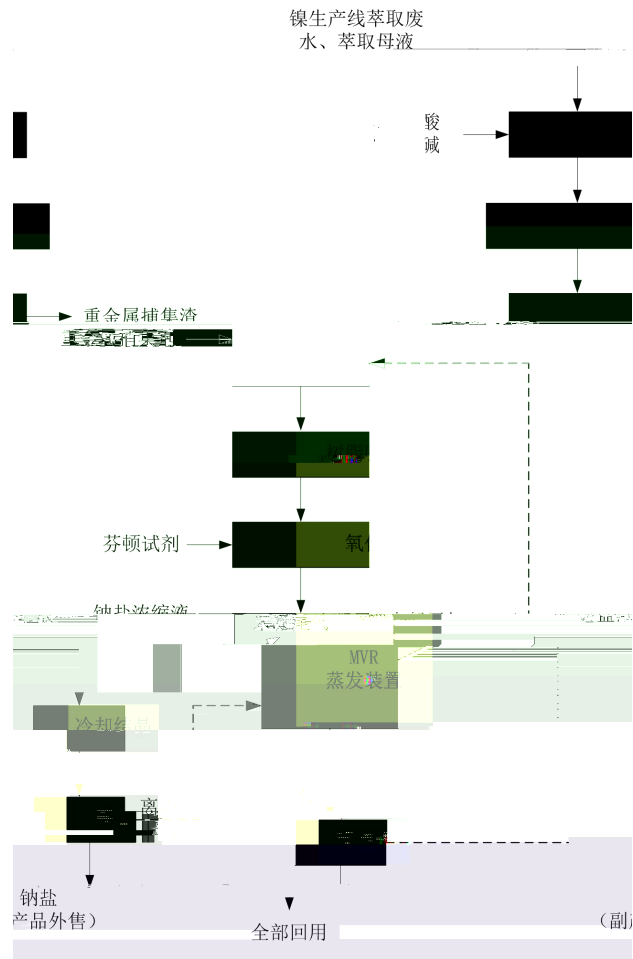


3.4-2

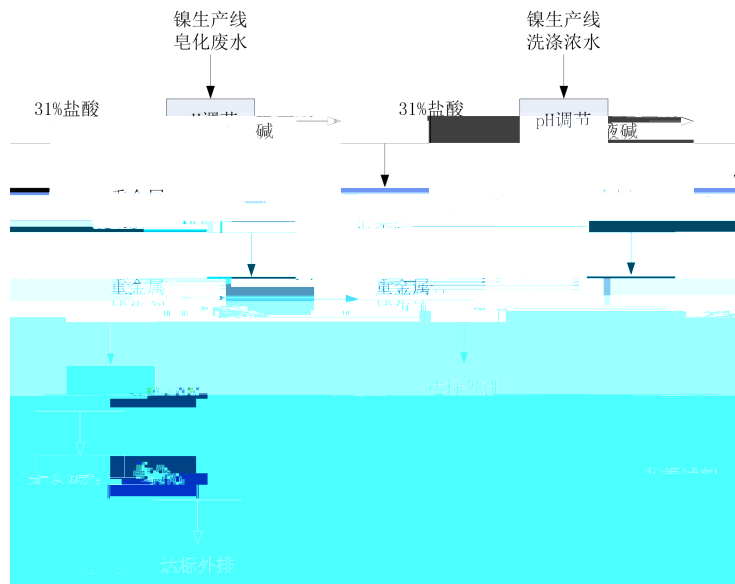
		98mg/m ³ ;17.3t/a	9.38mg/m ³ ;1.56t/a
		60mg/m ³ ;3.0t/a	7.2mg/m ³ ;0.30t/a
		9mg/m ³ ;0.47t/a	3.2mg/m ³ ;0.14t/a
		1000 mg/m ³	100 mg/m ³
		120mg/m ³ ;28.72t/a	15.8mg/m ³ ;1.88t/a
		86mg/m ³ ;11.60t/a	8mg/m ³ ;0.53t/a
		0.74mg/m ³ ;0.45t/a	0.326mg/m ³ ;0.06t/a
		2.63mg/m ³ ;0.34t/a	0.386mg/m ³ ;0.05t/a
		0.005mg/m ³ ;0.001t/a	0.0026mg/m ³ ;0.0006t/a
		500 mg/m ³	50 mg/m ³
		200mg/m ³ ;3t/a	8mg/m ³ ;0.21t/a
		231mg/m ³ ;19.44t/a	12.5mg/m ³ ;0.61t/a
		85mg/m ³ ;10.16t/a	8.5mg/m ³ ;0.22t/a
		2.30mg/m ³ ;16.56t/a	0.44mg/m ³ ;0.30t/a
		7.93mg/m ³ ;0.056t/a	7.93mg/m ³ ;0.056t/a
		14.6mg/m ³ ;2.02t/a	0.44mg/m ³ ;0.30t/a
		137.52mg/m ³ ;18.86t/a	137.52mg/m ³ ;18.86t/a
		155.62mg/m ³ ;26.62t/a	3.11mg/m ³ ;0.532t/a
20#		135.04mg/m ³ ;11.69t/a	1.34mg/m ³ ;0.116t/a
		2.0mg/m ³ ;8.58t/a	0.5mg/m ³ ;0.085t/a
		75mg/m ³ ;6.197t/a	0.75mg/m ³ ;0.062t/a
		135.04mg/m ³ ;11.69t/a	1.34mg/m ³ ;0.117t/a
20#		43.4mg/m ³ ;3.751t/a	0.44mg/m ³ ;0.038t/a
		17mg/m ³ ;1.51t/a	0.17mg/m ³ ;0.015t/a
		25mg/m ³ ;2.12t/a	0.25mg/m ³ ;0.021t/a
		134.23mg/m ³ ;11.62t/a	1.34mg/m ³ ;0.116t/a
		252mg/m ³ ;21.92t/a	2.53mg/m ³ ;0.22t/a
21#		81mg/m ³ ;7.033t/a	0.81mg/m ³ ;0.07t/a
		32mg/m ³ ;2.84t/a	0.32mg/m ³ ;0.028t/a
		50mg/m ³ ;3.98t/a	0.5mg/m ³ ;0.04t/a
		133mg/m ³ ;22.93t/a	2.67mg/m ³ ;0.46t/a
17#		133mg/m ³ ;11.17t/a	6.67mg/m ³ ;0.56t/a
15#	VOCs	0.5mg/m ³ ;0.036t/a	0.1mg/m ³ ;0.007t/a
23-1#		11.62	1.34mg/m ³ ;0.116t/a
		21.915	2.53mg/m ³ ;0.22t/a

7.033

0.81m



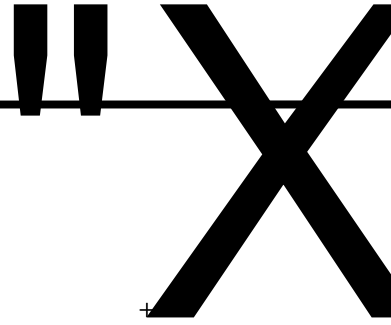
3.4-4



3.4-5

3.4-3

	1080m ³ /d			MVR	
	1605m ³ /d		pH		
	525m ³ /d		MVR		
	1080 m ³ /d		pH	RO	
	1000 m ³ /d			MVR	
	3340 m ³ /d		pH		
	1490m ³ /d		MVR		
	1850m ³ /d		pH	RO	
	15 m ³ /d			pH	
			pH B8 ⁺		
			+ +MVR	+ +	+ ù
	1 520m ³ /d				MVR
				17#	
				1000m ³ /d	



6000

3.7.2.2

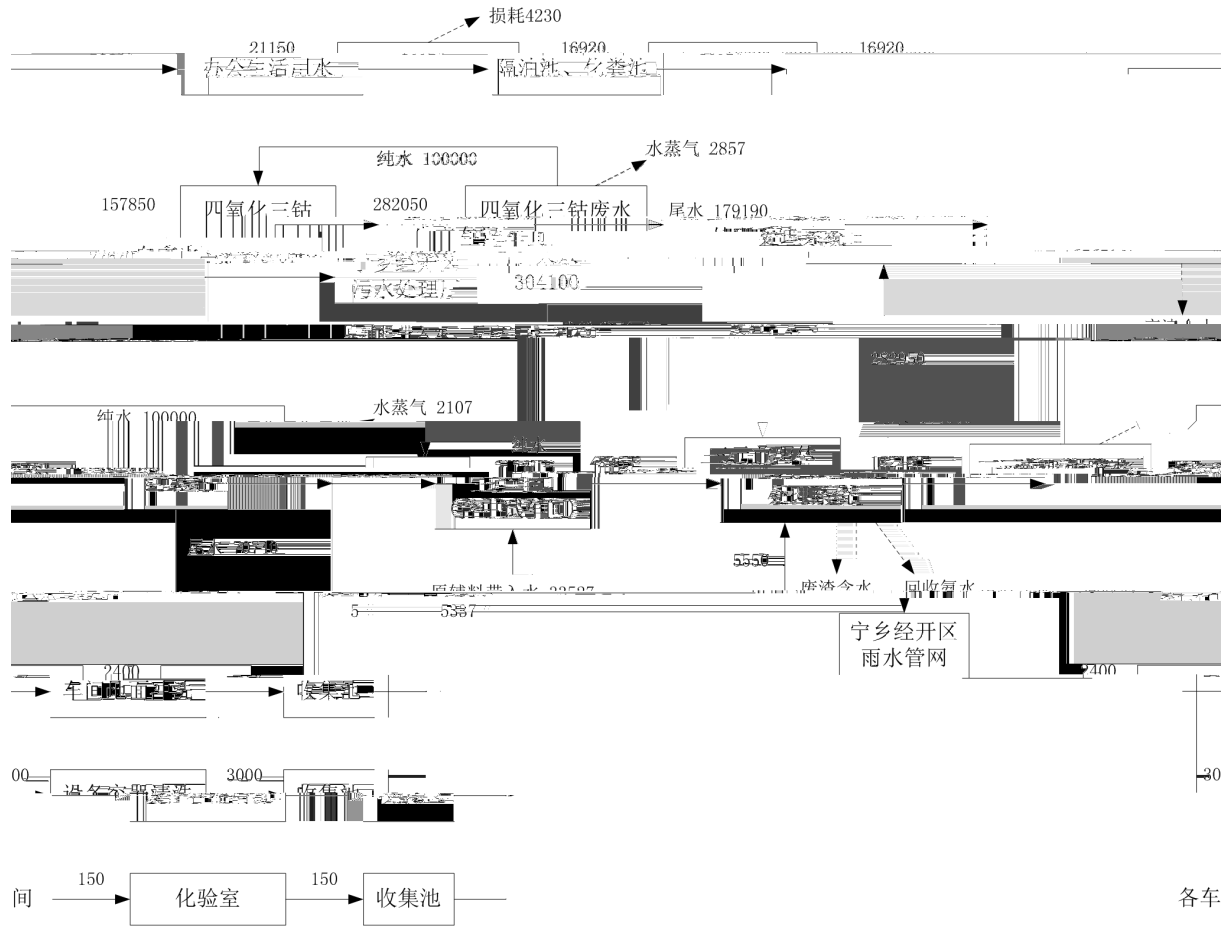
1

276701m³/a

179190m³/a

80591m³/a

16920 m³/a



3.4-6

2

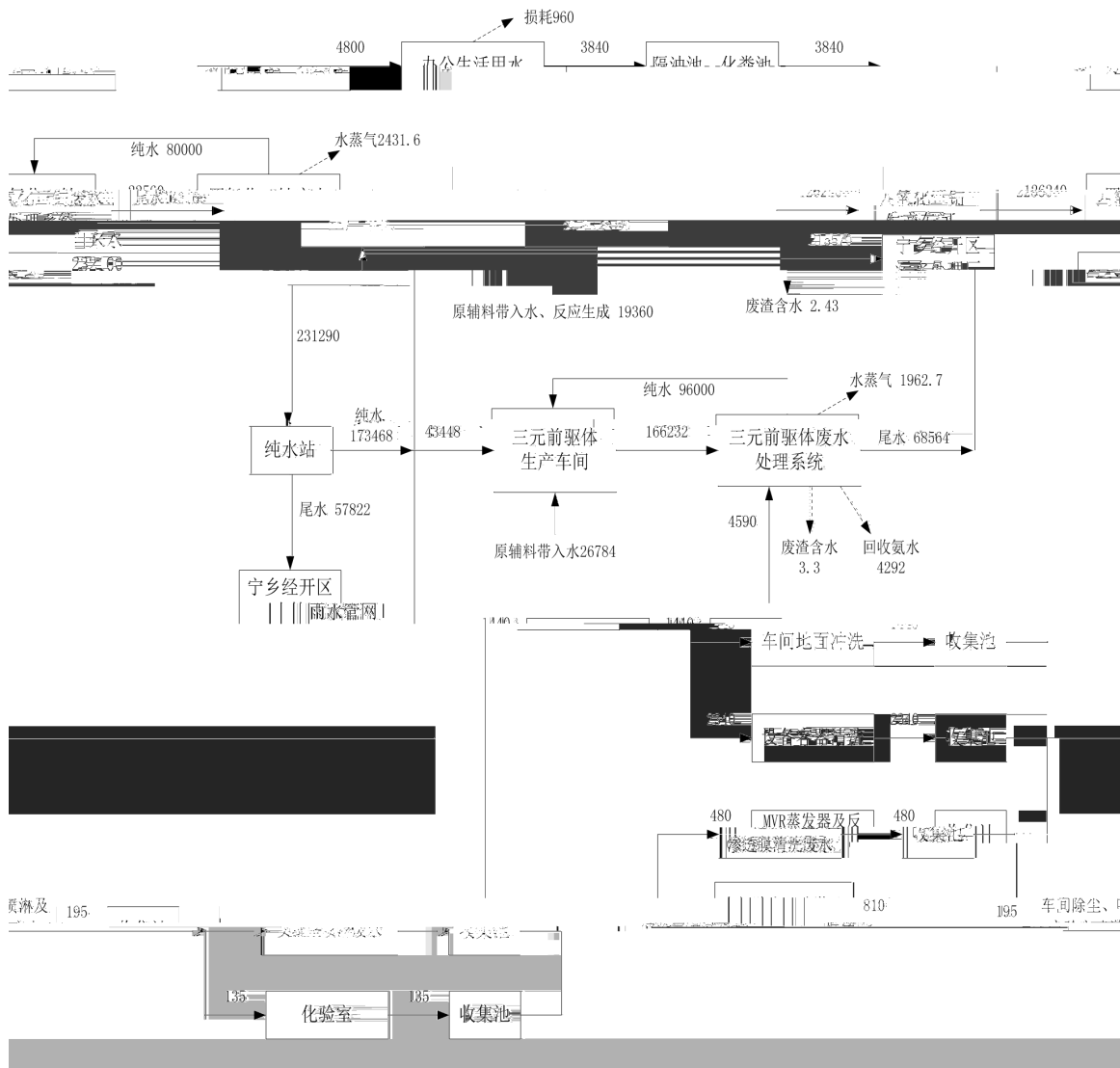
215570m³/a

143166m³/ a

63974m³/a

4590m³/a

3840m³/a



3.4-7

3	3.4-8	m ³ /a
7108.52m ³ /a	18586.2m ³ /a	1465.2m ³ /a
	10013m ³ /a	

mp

2845m³/a 6000 /

55200m³/a 10000 /

~~92200~~m³/a

10800m



3.4-10

3.7.2.3

()

12

pH

7.75~7.88

\ 29mg/L

/
193% ANLO j 6LjÁ % " T 6LjÁ v%CT



3.4-4

				mg/L pH				
							/	
				1	2	3		
W2	2020.01.02	pH		7.81	7.84	7.75	7.75-7.84	6~9
	2020.01.03			7.88	7.84	7.73	7.73-7.88	
	2020.01.02			27	29	25	27	200
	2020.01.03			28	25	26	26	
	2020.01.02			8.13	8.35	7.96	8.15	-
	2020.01.03			8.25	7.84	8.08	8.06	
	2020.01.02 ^A			19	16	18	18	100
	2020.01.03			13	16	18	16	
	2020.01.02			1.23	1.33	1.56	1.37	40
	2020.01.03			1.45	1.41	1.37	1.41	
	2020.01.02			0.06L	0.06L	0.06L	0.06L	-
	2020.01.03			0.06L	0.06L	0.06L	0.06L	
	2020.01.02			13.7	13.8	12.5	13.3	60
	2020.01.03			12.5	12.1	12.7	12.4	
	2020.01.02			0.16	0.11	0.13	0.13	2
	2020.01.03			0.17	0.15	0.14	0.15	
	2020.01.02			0.03L	0.03L	0.03L	0.03L	0.5
	2020.01.03			0.03L	0.03L	0.03L	0.03L	
	2020.01.02			0.01L	0.01L	0.01L	0.01L	1
	2020.01.03			0.01L	0.01L	0.01L	0.01L	
	2020.01.02			0.01	0.01	0.01	0.01	1
	2020.01.03			0.01	0.01	0.01	0.01	
	2020.01.02			6.98	6.87	6.91	6.92	400
	2020.01.03			7.12	7.03	7.27	7.14	
2020.01.02			9.78	9.22	9.45	9.48	500	
2020.01.03			9.45	9.67	9.44	9.52		

3.4-5

3.0

		0.102	0.119	-	0.119
		0.051	0.059	-	0.059
		0.071	0.082	-	0.082

3.4.3

70 100dB(A)

3.4-7

		Leq		Leq	
1	2019.2.21	58.2		42.2	
	2019.2.22	57.9		42.6	
2	2019.2.21	61.4		45.5	
	2019.2.22	61.9		45.9	
3	2019.2.21	60.9		45.6	
	2019.2.22	62.5		44.2	
4	2019.2.21	62.6		43.7	
	2019.2.22	61.7		44.8	
5	2019.2.21	51.7		42.4	
	2019.2.22	51.3		42.1	
6	2019.2.21	50.4		41.8	
	2019.2.22	52.0		41.4	
		65dB(A)	55dB(A)		

(GB12348-2008) 3

3.4.4

3.4-8

t/a

16.8	20.24	0.5	-		
2.5	3.11	3	-		
50	50	6	3		HW46
75	38	25	-	600	
25	25	-	-	20	HW13
2	2	2	-	10	HW08
	2.39	-			HW06
-	1.03	=	-	50	HW49
-	-		3.3		HW49
-	-		3516.5		HW49
			9		
-			-	2868	
-			-	287	

COD	34.85
NH ₃ -N	1.74
	0.119
	0.059
	0.082
	8.286
	4.763
	0.3576
	0.768
	0.3706
SO ₂	0.38
	5.086
	1.93
VOCs	1.968
	2868
	287
	37.54
	8.61
	738
	109
	70
	16
	2.39
	51.03
	3.3
	3516.59
	44

()

()

3.5-1

[2020]32

1

© " > 9 U 7 4

(GB14554-93)

(031573-2015) 5

-

(DB12/524-2014) 2

(GB14554-93)

5

(GB12348-2008) 3

(GB12348-2008) 3

4

4

“

”

“

”

(GB18597-2001)

6

“

(GB18599-2001 2013

(GB16889-2008

	1 4200m ³	1 5800m ³		
8				
9	CD 35.580t/a VOCs 1.968t/a	1.780t/a 0.120t/a	S02 0.380t/a	
10	100m	50m	/	10000
	/		10000	
11				

3.6

4

4.1

	66#	3692.05m ²	6866.66m ²	
	69#	3383.47m ²	9290.18m ²	
	31#	4217.3m ²	9131.55m ²	
	32-2	4195.24m ² 336m ³ /d	7159.19m ² 1080m ³ /d MVR	
	34#	3090m ³ /d 4200m ³ /d 6m ³ /h	3035.57m ² MVR 1 5m ³ /h	6973.62m ² RO 1 1 1
	65#	3531.52m ² 1220m ³ /d	6230.20m ²	
	70#	1038.96m ²	1038.96m ²	
		0.30Mpa	MVR	
			10kv	1
	63#	+20m +20m	+ +	
		+20m	+20m +20m +	
		+20m	+20m +20m +	
	67#	+20m	+20m +20m +	
		+20m	+20m +20m +	
		+20m	+20m +20m +	
	63-1#	+20m	+20m +20m +	
		+20m	+20m +20m +	
		+20m	+20m +20m +	

4.2-3

1	37#	1 170m ³ 240m ³ 1400m ³	1 240m ³ 2 500m ³ 1 6	1 170m ³ 1 240m ³ 4 1400m ³	1 240m ³ 2 500m ³
2		40m ²		40m ²	
3		45# 50m ²	47# 55#	45# 50m ²	47# 55#
4					
5		31# 1 MVR 1220m ³ /d	32-2 960m ³ /d 65#	31# 32-2 336m ³ /d 65#	1080m ³ /d MVR 1220m ³ /d
6		1 2 5800m ³ 4000m ³ 3	2 10000m ³ 4200m ³	1 2 5800m ³ 4000m ³ 3	2 10000m ³ 4200m ³ 1 400m ³ 1 300m ³

		2020 3	2020 3	5800m ³ 4200m ³ 2 10000m ³	
--	--	--------	--------	---	--

4.3

4.3-1
4.3-1

			t/a			
1		8	10000		25kg/	8
2			15264		25kg/	5
3		5	10000		25kg/	
4			15082		25kg/	
5			1131.7032 120.86	--	--	--
6			918.3978 86.1388	--	--	--
7			1406.0342 132.43	--	--	--
8			189.9437 16.88	--	--	--

4.4

4.4-1

1	PPH	PPH 2500/12.5m ³		15
2	PPH	PPH 2000/7.5m ³		9
3	PPH	PPH 2500/10m ³ /		9
4	PPH	PPH 1400/2m ³		45
5	PPH	PPH 1400/2m ³ /		6
6	PPH	PPH 1200/1m ³		6
7	PPH	PPH 1800/5m ³ /		6
8	PPH	PPH 1800/5m ³		90
9	PPH	PPH 1400/2m ³		6
10	PPH	PPH 2200/10m ³		75
11	PPH	PPH 2500/20m ³		30
12	PPH	PPH 3000/30m ³		6
13	PPH	PPH 2500/10m ³		6
14	PPH	PPH 2500/30m ³		9

6		<p style="text-align: center;">H₂SO₄ 98.08</p> <p style="text-align: center;">(kPa) 0.13/145.8</p> <p>1.83 10.5 330</p>		<p style="text-align: center;">LD50</p> <p style="text-align: center;">2140mg/kg</p>

4.5-4

	Ni mg/L	Co mg/L
	55	600
MT/	11	110

4.5-5

	Co	Mn	Ni	Cu	Fe	Al	Ca	Mg	H ₂ O
%	71.62	0.01	0.34	0.0247	0.0031	0.495	0.1135	0.0315	0.125

4.5-6

Co Mn Ni Cu Fe Al Ca Mg Zn

%

4.6.2

10kV

10kV

S11

GCS

4.6.3

4.6.4

15m

DN200

4.6.5

70#

37#

4.6-1

t

1		1000			
2		800			

3		800			
4	32%	1400			37#
5	21%	240			37#
6	27.5%	195			37#
7	31%	240			37#
8	98%	500			37#
9		25			
10		25			
11		--		--	--
12	D116	--			
13		--			
14	P204	--			
15	P507	--			

4.6-2 37#

		× m		m ³	t	
	40%	5.8×6.5 304L	1	170	195	
		6.5×7.2	1	240	312	
		6.5×7.2	1	240	312	
	30%	6.5×7.2	1	240	265	
	21%	6.5×7.2	1	240	220	
	98%	8×10	2	500	990	
		8.5×12.5	2	700	910	
	30%	12×12.4	4	1400	1890	
		8.5×12.5	2	700	700	

4.7



12

7200

2

200

4.8

1

2021 12

2022 9

10

20

2

3

4

4.9

63#

67#

63#

67#

63-1#

64#

66#

69#

70#

1

1

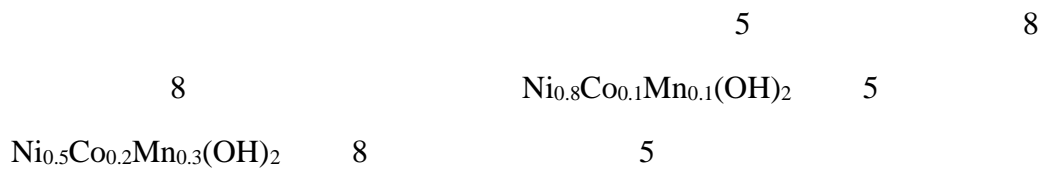
3

5

5.1

5.1.1

1



2

NaOH

2

5.1-1

110g/L

	8	8:1:1
5	5:2:3	

32%

21%

50 90

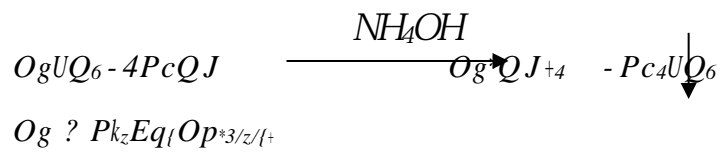
99.5%

OH⁻

80ppm

10 20h

pH



98%

0.5 ~1h

50 60

5.1.2

1

D116

D116

15%

45%



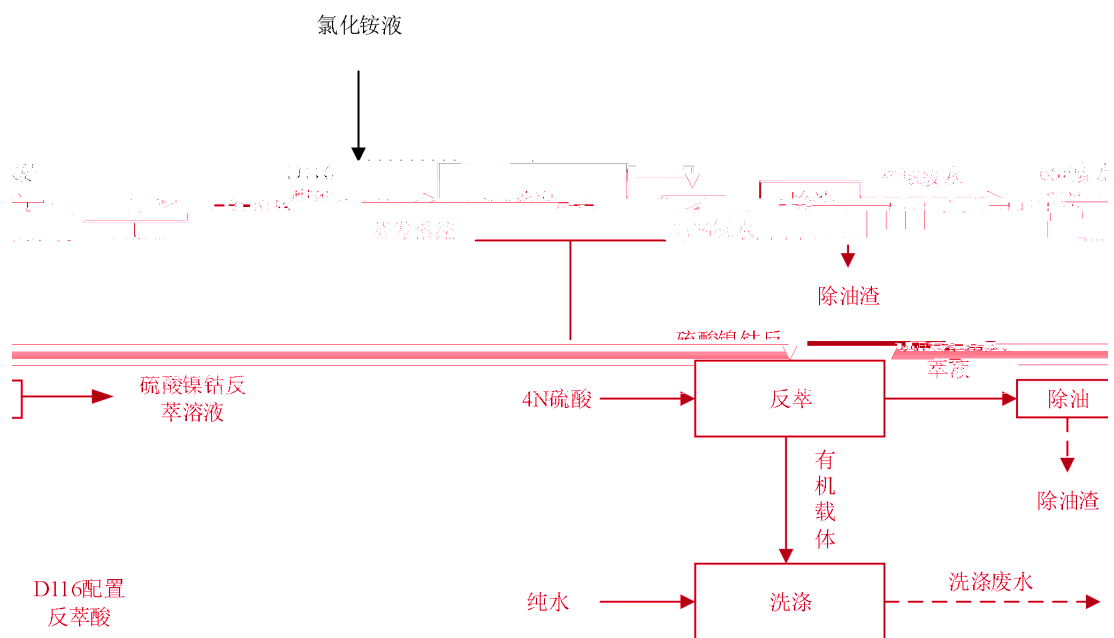
Ni Co Co



4N



2



5.1-2

5.1.3

1

pH 2.0

pH 4.5~5.0

$2Hg^2$ J_2Q_2 $2J$ $2He^3$ $2J_2Q$ 3

Hg^3 $2J_2Q$ $HeQQJ$ $3J$ 4

Hg^3 $3J_2Q$ $He(QJ)_3$ $3J$ 5

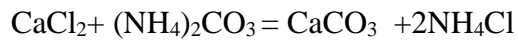
NaOH H H₂O Na 6

P204 P204 P204

Na⁺ H⁺

30

Ca²⁺ Zn²⁺ Na⁺



P204 P204

Na⁺

H⁺ P204 30

Mn²⁺ Na⁺

4N

P507 P507

Na⁺ H⁺

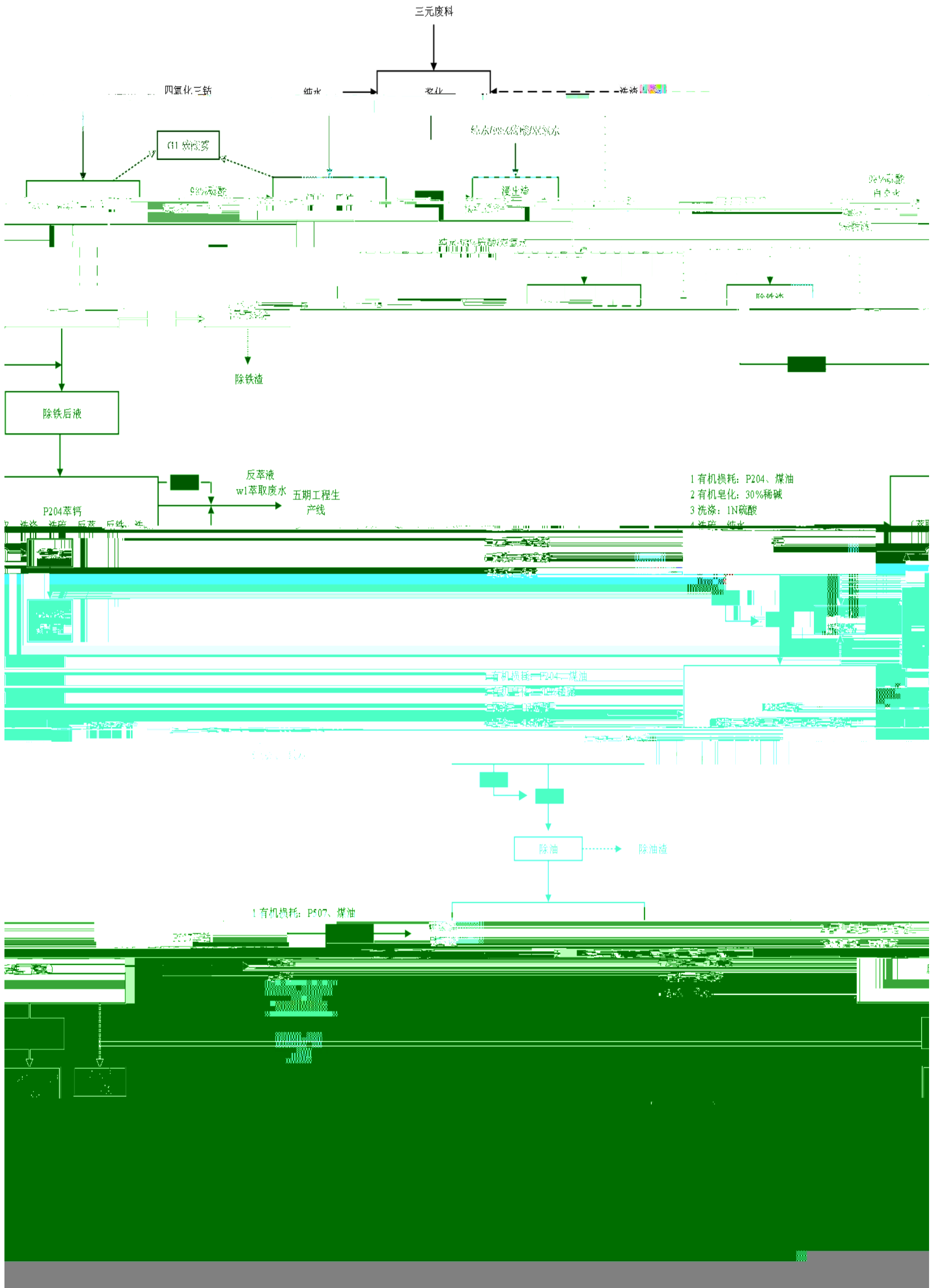
P204 30

Co²⁺ Ni²⁺ Na⁺

5

MHP P507

P204	Ca Zn	Ca	
	$2 \overline{\text{RNa}} + \text{Ca}^{2+}$	$\overline{\text{R2Ca}}$	2Na 7
	$\overline{\text{R2Ca}} + 2\text{H}^{2+}$	$2\overline{\text{RH}}$	Ea^2 8
	$\overline{\text{RH}} + \text{Na}^+$	$\overline{\text{RNa}}$	H 9
P204	Mn	Cu	
	$2 \overline{\text{RNa}} + \text{Mn}^{2+}$	$\overline{\text{R2Mn}}$	2Na 10
	$\overline{\text{R2Mn}} + 2\text{H}^{2+}$	$2\overline{\text{RH}}$	Mn^2 11
	$\overline{\text{RH}} + \text{Na}^+$	$\overline{\text{RNa}}$	H 12
P507	Co		
	$2 \overline{\text{RNa}} + \text{Co}^{2+}$	$\overline{\text{R2Co}}$	2Na 13
	$\overline{\text{R2Co}} + 2\text{H}^{2+}$	$2\overline{\text{R J}}$	Eq^2 14
	$\overline{\text{RH}} + \text{Na}^+$	$\overline{\text{RNa}}$	H 15



5.1-2

5.2

5.2.1

1

8

8

5.2-1 8

	t/t-	t/a		t/a
	2.28	22800	8	10000.00
	0.31	2100		22.18
	0.1835	1835		15263.67
	4.13	41300	21%	6846.67
	3.10	31000		72146.45
21%	0.69	6900		37.04

MVR

2

5.2-3

	t/a		t/a
	220000		221342
D116	0.33		1132
	1.87		0.878
21%	1344		0.322
98%	123		
	1006		
	222475.2		222475.2

3

5.2-4

	t/a		t/a
	242.5		918.39
	167.55		1406.03
98%	806		189.94
27.5%	144		11032
32%	1094		727.155
31%	13		0.345
	9583		
	2219		
P204	0.48		
P507	0.72		
	3.61		
	14273.86		14273.86

5.2.2

1

8

1

	22800		
22.34%	8	Ni _{0.8} Co _{0.1} Mn _{0.1} (OH) ₂	10000t/a
	50.85%	8	
	5.2-5	8	
	t/a		t/a
	5093.52		5085
			0.048
			8.472
	5093.52		5093.52

32.09%

5

5.2-8 5

t/a		t/a	
	3216.96		3209
			0.048
			7.912
	3216.96		3216.96

2

6200

20.98%

5

$\text{Ni}_{0.5}\text{Co}_{0.2}\text{Mn}_{0.3}(\text{OH})_2$

10000t/a

12.95%

5

5.2-9 5

t/a		t/a	
	1300.76		1295
			0.02
			5.74
	1300.76		1300.76

3

5600

32.54%

5

$\text{Ni}_{0.5}\text{Co}_{0.2}\text{Mn}_{0.3}(\text{OH})_2$

10000t/a

18.15%

5

5.2-10 5

t/a

1822.24

t/a

1815

2

			109.5
			0.4
	110		110

2

5.2-12

t/a		t/a	
	11		0.04
			10.46
			0.5
	11		11

3

1

5.2-13

	t/a		t/a
9 [Jä	16.1		0
	120		132.43
			0
			3.31
			0.36

			16.88
			0.22
			0.11
	17.21		17.21

5.2.3

5.2.2.1

1

MVR

54000m³/a

72147m³/a

42.81%

5.2-16

t/a		t/a		
	47028		72147	
	54000		54000	
	33086		5367	
			2600	
	134114		134114	

2

MVR

5.2-17

t/a		t/a		
	1006		1006	--
	210399		210399	--

	211405		211405	
--	--------	--	--------	--

3

5.2-18

t/a		t/a		
	11802		1892	--
	1122		11032	
	1440		1440	
	14364		14364	--

5.2.2.2

1

4m³/d

2 MVR

MVR

MVR

60m³/

2m³/d

MVR

2m³/d

3

3m³/d

8

1%

33.3m³/d

1 /

80m³/

800m³/a

5.2.3.3

MVR

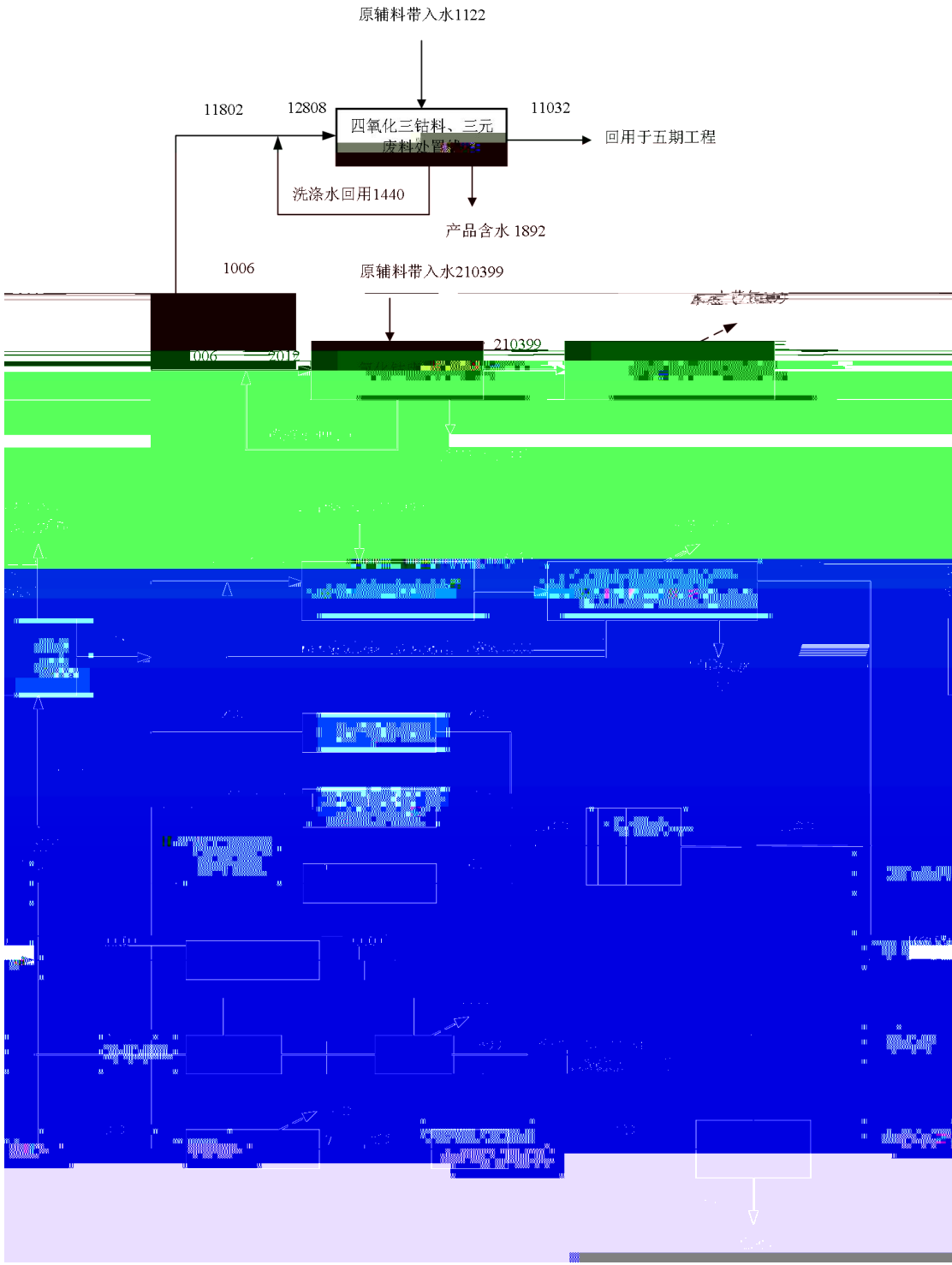
82447m³/a

72147m³/a

3100m³/a

7200m³/a

5.2-1



5.2-1

m³/a

5.2.2.5

282251m³/a

64400m³/a

215570m³/a

63974m³/a 8000t/a

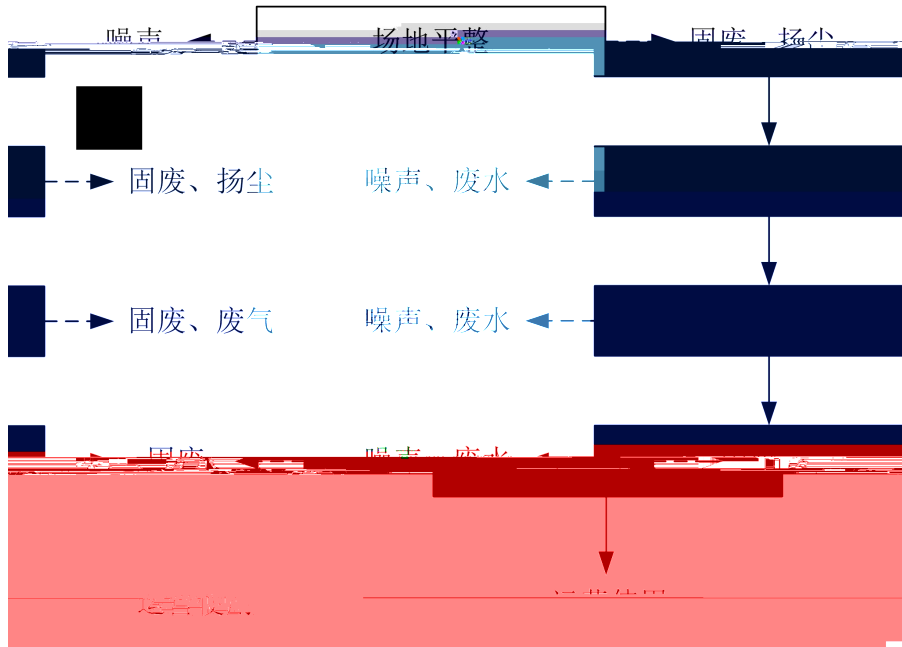
22200

m³/a

18586.2m³/a

394598m³/a

5.3



5.3-1

5.3.1

1

a

G1

63-1#

NH₃

363t/a

G1

NH₃

0.5%

NH₃

1.815t/a

b

G2

63#

NH₃

2142t/a 63-1#

G2

NH₃

0.05%

NH₃

0.182t/a





0.09%

12.93

(m

G3

203t/a Co

486t/a

0.

+

20m

26580m³/h

95%

85%

99%

3.713t/a 0.516kg/h

22.615mg/m³

a	G1				
	63-1#		NH ₃	363t/a	G1
	NH ₃	0.5%	NH ₃	1.815t/a	
b	G2				
	63#		NH ₃	2142t/a	63-1#
	G2		NH ₃	0.05%	NH ₃
					0.182t/a
				99%	
	7900m ³ /h				2600m ³ /h
					MVR
			15m		
			90%		
				1.797t/a	0.275kg/h
31.59mg/m ³					3.159mg/m ³
0.025kg/h		1.095t/a			
	GB31573-2015	3		20 mg/m ³	
			GB14554-93	2	
				0.18t/a	0.025kg/h
9.625mg/m ³					0.963mg/m ³
0.003kg/h		0.018t/a			
	GB31573-2015	3		20 mg/m ³	
			GB14554-93	2	
					1000
			100		
	GB14554-93	2			15m
					2000

0.01mg/m³

0.0001kg/h

0.0005t/a

GB31573-2015 3

20mg/m³

5.4-2 66#

		t/a	kg/h				
				m ²	m	m	m
	66#	0.003	0.0004	3692.05	148	24	18
VOCs		0.002	0.0002				
		0.001	0.0001				
		0.003	0.0003				

5.4.1.6

5.4-3

				t/a	kg/h			mg/m ³	kg/h	t/a	mg/m ³	kg/h	
	G66-1			0.279	0.039	+	D-0.8m h-18m T-30	0.185	0.004	0.028	20	--	
		VOCs		0.043	0.006			21000m ³ /h	0.057	0.001	0.009	40	1.2
	G66-2			0.005	0.0007	+	D-0.45m h-18m T-30	0.01	0.0001	0.0005	20	--	
				0.004	0.0004			6800m ³ /h	0.006	0.00004	0.0004	10	--
		VOCs		0.095	0.013			0.39	0.003	0.019	40	1.2	
	G66-3			0.453	0.057		D-0.5m h-18m T-30	0.42	0.005	0.004	20	--	
	G63-1			1.977	0.275		D-0.8m h-20m T-30	1.204	0.027	0.198	20	4.9	
	G63-2			3.713	0.516	+	D-0.9m h-20m T-30	0.226	0.005	0.037	10	-	
			1.191	0.165	26580m ³ /h			0.062	0.002	0.012	4	-	



						800m ³ /h	T-30						
	G63-1-1			1.977	0.275	22800m ³ /h	D-0.8m h-20m T-30	1.204	0.027	0.198	20	4.9	
	G63-1-2			3.713	0.516	+ 26580m ³ /h	D-0.9m h-20m T-30	0.226	0.005	0.037	10	-	
			1.191	0.165	0.062			0.002	0.012	4	-		
			0.481	0.067	0.025			0.001	0.005	5	-		
			0.674	0.094	0.035			0.001	0.007	5	-		
	G63-1-3			0.01	0.001	800m ³ /h	D-0.2m h-20m T-30	0.18	0.0001	0.001	20	--	
	G64-1			1.977	0.275	22800m ³ /h	D-0.8m h-20m T-30	1.204	0.027	0.198	20	4.9	
	G64-2			3.713	0.516	+ 26580m ³ /h	D-0.9m h-20m T-30	0.226	0.005	0.037	10	-	
			1.191	0.165	0.062			0.002	0.012	4	-		

					0.481	0.067			0.025	0.001	0.005	5	-
					0.674	0.094			0.035	0.001	0.007	5	-
		G64-3			0.01	0.001	800m ³ /h	D-0.2m h-20m T-30	0.18	0.0001	0.001	20	--

5.4-4

	t/a	kg/h	m	m	m	t/a	kg/h	mg/m ³
	0.02	0.003				0.02	0.003	0.3
	0.038	0.005				0.038	0.005	1.0
63#	0.012	0.002	80	45	18	0.012	0.002	0.02
	0.005	0.001				0.005	0.001	0.005
	0.007	0.001				0.007	0.001	0.015
	0.0005	0.0001				0.0005	0.0001	0.3
	0.02	0.003				0.02	0.003	0.3
67#	0.038	0.005	83	34	18	0.038	0.005	1.0
	0.012	0.002				0.012	0.002	0.02
	0.005	0.001				0.005		

		0.007	0.001				0.007	0.001	0.015
		0.0005	0.0001				0.0005	0.0001	0.3
63-1#		0.02	0.003	89	45	18	0.02	0.003	0.3
		0.038	0.005				0.038	0.005	1.0
		0.012	0.002				0.012	0.002	0.02
		0.005	0.001				0.005	0.001	0.005
		0.007	0.001				0.007	0.001	0.015
		0.0005	0.0001				0.0005	0.0001	0.3
64#		0.02	0.003	72	64	18	0.02	0.003	0.3
		0.038	0.005				0.038	0.005	1.0
		0.012	0.002				0.012	0.002	0.02
		0.005	0.001				0.005	0.001	0.005
		0.007	0.001				0.007	0.001	0.015
		0.0005	0.0001				0.0005	0.0001	0.3
66#		0.003	0.0004	148	24	18	0.003	0.0004	0.3
	VOCs	0.002	0.0002				0.002	0.0002	10.0
		0.001	0.0001				0.001	0.0001	0.03
		0.003	0.0003				0.003	0.0003	0.3

5.4.2

1
180m³/d
72147m³/a 240.49m³/d
126147m³/a
54000³/a

GB/T19923-2005

2
8.15m³/d
72147m³/a
11032m³/a 36.77m³/d
223877m³/a
2446m³/a
210399m³/a 701.33m³/d

MVR
2 MVR
2m³/d
MVR
600m³/a
+

3

1200m³/a 4m³/d

+

4

1000m³/a 3.3m³/d

+

5

300m³/a 1m³/d

+

6

24m³/d 7200m³/a

SS COD BOD₅ NH₃-N

7

5.4-5

		m ³ /a	(mg/L)	(t/a)			m ³ /a	(mg/L)	(t/a)	(mg/L)		
	72147	pH	11~12	—	pH + + +MVR +	72147	pH	6~9	—	6~9		
		COD	40	2.886			COD	40	2.886	200		
		SS	100	7.215			SS	20	1.443	100		
		NH ₃ -N	11000	793.617			NH ₃ -N	5	0.361	40		
		Ni	40	2.886				10	0.721	400		
		Co	30	2.164								
		Mn	10	0.721								
			112000	8080.464								
	54000	pH	11~12	—	+ + + MVR							
		COD	40	2.16								
		SS	50	2.7								
		NH ₃ -N	1200	64.8								
		Ni	10	0.54								
		Co	7	0.378								
Mn		3	0.162									
		10000	540									
210399	pH	7~8	--	MVR	0					MVR		
	COD	300	63.120									
	SS	200	42.080									
	NH ₃ -N	24000	5049.576									

Ni	50	10.520
Co	20	4.208
Mn	0.5	0.105
Cu	0.15	0.032
Zn	0.02	0.004
	30	6.312
	60000	12623.94

		60000	661.92					
		78000	860.496					
	pH	7~8	--			pH		
	SS	200	0.288			SS		
	Ni	2	0.003			Ni		
1440	Co	0.2	0.0003		0	Co	--	
	Mn	0.2	0.0003	o		Mn		
		400	0.576					
		500	0.72					
	pH	8~10	—			pH	6~9	— 6~9

3100

3100

+

		/	
GB8978-1996	GB31573-2015	1 GB/T31962-2015	1A

5.4-6

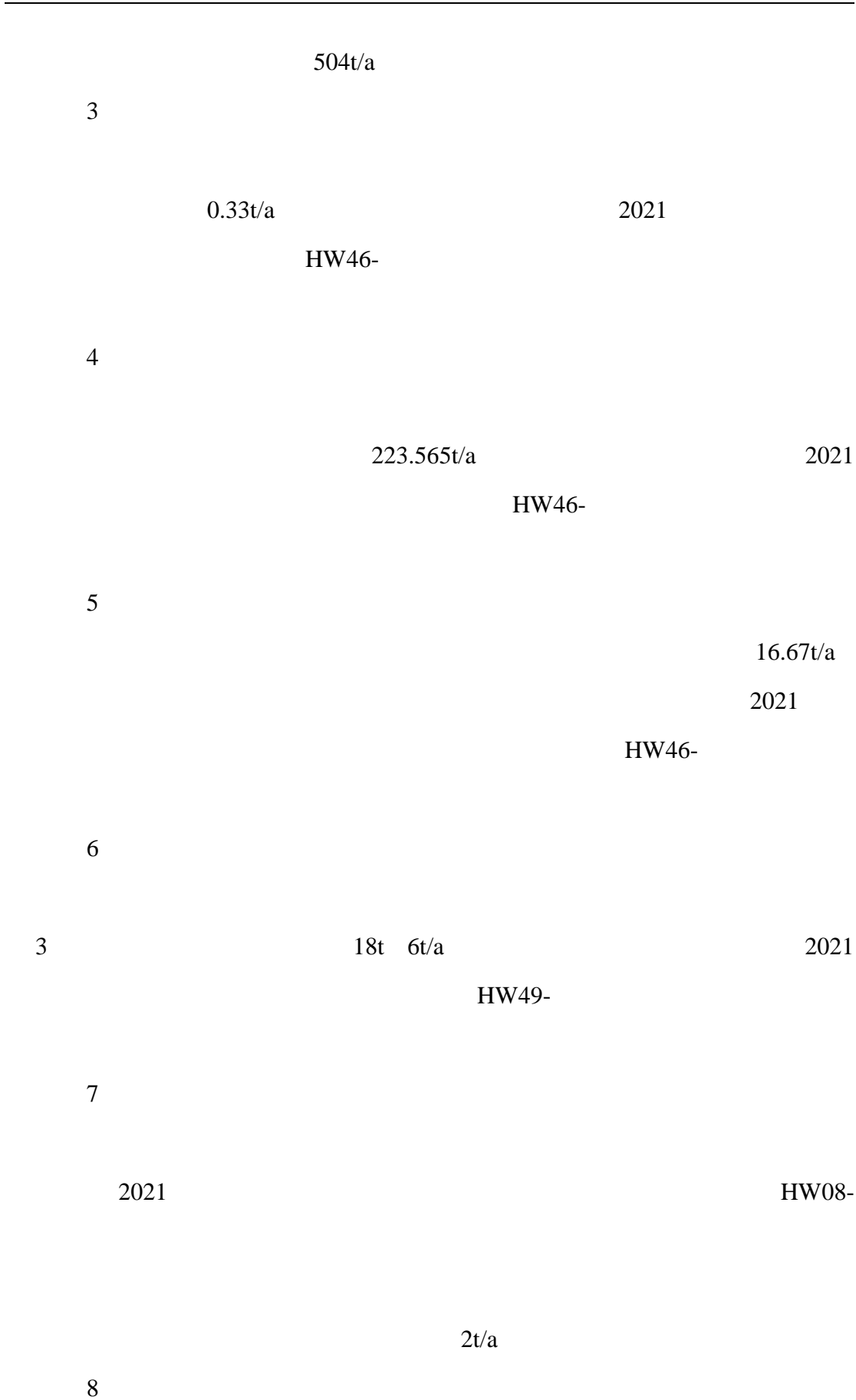
			mg/L		
	mg/L	t/a		mg/L	t/a
	82447m ³ /a				
COD	53.974	4.45	200	30	2.473
NH ₃ -N	7.017	0.5785	40	1.5	0.124
	9.109	0.751	400	-	0.751
GB3838-2002 GB31573-2015 1 GB/T31962-2015 1A 					

5.4.3

70 100dB(A)

5.4-7

	dB(A)		dB(A)	dB(A)
1	90~95		20~30	65
2	90 95		20~30	65
3	80 85		15~25	60
4	80 85		15~25	60
5	80 85		15~25	60
6	80 85		15~25	60
7	75 80		15~25	55



1t/a

HW49-

		4	/	
		60	/	

5.4.5

5.4.9

		6	6	0
		1	1	0
		2	2	0
		2	2	0
		4	4	0
		60	60	0

5.4.6 “ ”

“ ”

5.4-10

t/a

“ ”

m3/a	116.17	8.24	0	124.41	+8.24
COD	34.85				

		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0

5.5

5.5.1

“ ”

COD NH₃-N

SO₂ NO_x

5.5.2

5.5-1

“ ”

5.5-2

COD	34.85	2.473	12.05	25.273
	1.74	0.124		

6.1.3

			20		16.8
	40.6		-12.0	1	4.5
7		29.9		276	10
5300.3		1362.3		1384.2	
81%	1714.7	10		107.78-112.3	/
				2.4m/s	24m/s

16.8

101216.7Pa

1362.3mm

NNW

S

2.4m/s


26.4

35kg/m²

6.1.4

		144km		98km		2447km ²
	46.6m ³ /s		6.0	6.5m ³ /s		
					DB43/023-2005	
				26.4km		
		GB3838-2002				
	2.0km					
GB3838-2002						
				4.5km		
			GB3838-2002			
		53.8km				200
				GB3838-2002		
6.1.5						
		5	14	52	142	
				58.8	2.1	
27.1		2.2			4	
		1.21 /			34.9 /	
1.29 /			1.23 /		17.63 /	
	4.38 /			97.1 /		
7.44 /100						956.24
		1267.02		190.13		
43.6%						

6.1-1

		23#		
		2020.10		
		28.320381		
		112.591892		
		0 0.5m	0.5 1.5m	1.5 3m
		10%	10%	10%
pH		7.67	4.51	6.78
	cmol+/kg	10.3	8.3	9.4
	mV	663	559	589
	/ cm/s	0.0010	0.0011	0.0009
	/ kg/m ³	910	868	895
	%	54.1	55.9	53.8
				

6.1.6

6.2

6.2.1

319

45km

25km

6.2.2

1998

2002

10km²

2006

11.11km²

21.11km²

2007

2008 6

[2008]71

2010 11

“

”

2013

21.11km²

60km²

2013 1

2013 12

[2013]296

6.2.3

“ ”

60km²

10mg/L

7.1-3

		mg/m ³	mg/m ³	%	%
HCl	1	0.05	0.02	-	0
	1	0.3	0.005-0.008	2.67	0
VOCs	8	0.6	0.046-0.052		

	1	2	3	4	
	0.11	0.23	0.25	0.27	
2019.2.25	0.12	0.21	0.28	0.30	0.30
	0.14	0.28	0.20	0.21	
	0.12	0.20	0.21	0.25	
2019.2.26	0.10	0.23	0.27	0.22	0.27
	0.15	0.27	0.24	0.27	
	1.3ug/m ³	2.7ug/m ³	2.2ug/m ³	3.8ug/m ³	
2019.2.25	1.4 ug/m ³	2.8 ug/m ³	2.6 ug/m ³	2.8 ug/m ³	3.8ug/m ³
	1.3 ug/m ³	2.1 ug/m ³	2.5 ug/m ³	3.0 ug/m ³	
	0.9 ug/m ³	1.8 ug/m ³	1.4 ug/m ³	1.6 ug/m ³	
2019.2.26	0.7 ug/m ³	1.3 ug/m ³	1.5 ug/m ³	1.7 ug/m ³	1.8 ug/m ³
	0.8 ug/m ³	1.8 ug/m ³	1.6 ug/m ³	1.2 ug/m ³	
	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³	
2019.2.25	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³
	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³	
	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³	
2019.2.26	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³
	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³	<0.2ug/m ³	
	0.064ug/m ³	0.914ug/m ³	0.854ug/m ³	0.943ug/m ³	
2019.2.25	0.224ug/m ³	0.853ug/m ³	0.974ug/m ³	0.608ug/m ³	1.09ug/m ³
	0.141ug/m ³	1.09ug/m ³	0.690ug/m ³	0.538ug/m ³	
	0.228ug/m ³	1.10ug/m ³	0.394ug/m ³	0.713ug/m ³	
2019.2.26	0.327ug/m ³	3.69ug/m ³	0.221ug/m ³	0.670ug/m ³	3.69ug/m ³
	0.231ug/m ³	2.96ug/m ³	0.302ug/m ³	0.289ug/m ³	
	<0.02	<0.02	<0.02	<0.02	
2019.2.25	<0.02	<0.02	<0.02	<0.02	<0.02



		7.1-6			mg/m ³			
		0.125	17.4µg/m ³	<0.2µg/m ³ *	481ng/m ³	<0.005*	<0.02*	0.12
	2019.	/	/	/	/	<0.005*	<0.02*	0.19
	2.23	/	/	/	/	<0.00*5	<0.02*	0.15
		/	/	/	/	/	/	0.13
		0.120	16.2µg/m ³	<0.2µg/m ³ *	678ng/m ³	<0.005*	<0.02*	0.12
5	2019.	/	/	/	/			
	2.24							

		2500m	
--	--	-------	--

2

2020 5 9 ~11

3

1

3

7.2-2

3

pH COD NH₃-N

GB3838-2002 1

GB3838-2002 2 3

GB5084-2005 1

		7.2-2																
		mg/L											pH					
		pH	COD															
GB3838-2002		6-9	20	1.0	0.2	1.0	0.05	1.0	0.005	0.05	0.05	0.0001	0.02	1.0	0.1	250	250	1000
		7.35	15	0.894	0.13	0.00134	0.00024	0.00362	<0.00005	0.00506	<0.004	<0.00002	0.00150	<0.02	0.09	29	24.8	286
		7.18	13	0.839	0.12	0.00127	0.00020	0.00346	<0.00005	0.00480	<0.004	<0.00002	0.00144	<0.02	0.09	26	22.8	263
		-	14	0.866	0.13	0.00132	0.00022	0.00353	<0.00005	0.00493	<0.004	<0.00002	0.00147	<0.02	0.09	27	23.7	274
W1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2		7.41	12	0.678	0.08	0.00131	0.00054	0.00246	<0.00005	0.00285	<0.004	<0.00002	0.00111	<0.02	0.07	24	14.4	224
		7.24	11	0.642	0.07	0.00111	0.00049	0.00215	<0.00005	0.00265	<0.004	<0.00002	0.00100	<0.02	0.07	21	12.9	210
		-	12	0.655	0.08	0.0012	0.00052	0.00232	<0.00005	0.00277	<0.004	<0.00002	0.00107	<0.02	0.07	23	13.6	216
	(%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W3		7.48	14	0.174	0.07	0.00172	0.00052	0.00294	<0.00005	0.00369	<0.004	<0.00002	0.00190	<0.02	0.03	41	15.8	214
		7.32	12	0.144	0.05	0.00166	0.00049	0.00283	<0.00005	0.00342	<0.004	<0.00002	0.00173	<0.02	0.03	39	15.1	200
		-	13	0.159	0.06	0.00170	0.00050	0.00287	<0.00005	0.00358	<0.004	<0.00002	0.00180	<0.02	0.03	40	15.4	208
	(%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7.3

7.3.1

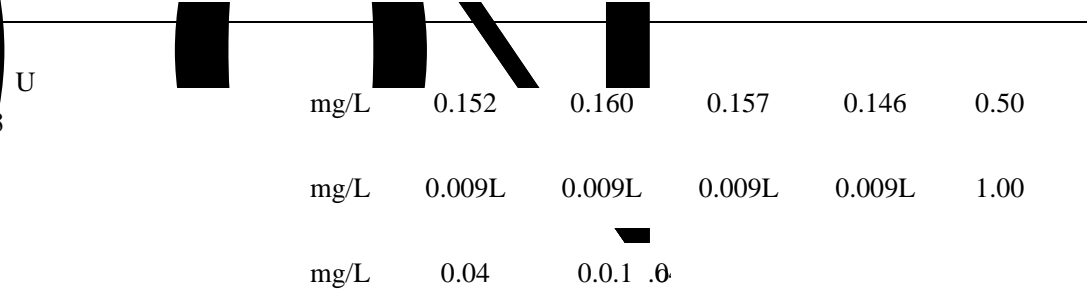
1			4	0
2	pH			1~ 4
3	2 /	2		
4				

1# U 1	7.3-1	mg/L				6.5-8.5
		2020.02.14		2020.02.15		
		1	2	1	2	
	pH	7.28	7.23	7.27	7.35	
	mg/L	1.24	1.30	1.18	1.26	3.0
	mg/L	0.136	0.141	0.131	0.144	0.50
	mg/L	0.009L	0.009L	0.009L	0.009L	1.00
	mg/L	0.001	0.001	0.001	0.001	1.00
	mg/L	0.086	0.086	0.088	0.084	0.10
	mg/L	$3.00 \times 10^{-4}L$	$3.00 \times 10^{-4}L$	$3.00 \times 10^{-4}L$	$3.00 \times 10^{-4}L$	0.01
	mg/L	0.004L	0.004L	0.004L	0.004L	0.05
	mg/L	$5.0 \times 10^{-4}L$	$5.0 \times 10^{-4}L$	$5.0 \times 10^{-4}L$	$5.0 \times 10^{-4}L$	

	mg/L	2.5×10^{-3} L	2.5×10^{-3} L	2.5×10^{-3} L	2.5×10^{-3} L	0.05
	mg/L	5.76	5.45	5.52	5.68	250
	mg/L	148	155	146	159	450
	mg/L	3.16	3.85	3.92	4.08	250
pH		7.06	7.11	7.08	7.10	6.5-8.5
	mg/L	1.04	1.12	1.08	1.10	3.0
	mg/L	0.110	0.122	0.115	0.104	0.50
	mg/L	0.009L	0.009L	0.009L	0.009L	1.00
	mg/L	0.03	0.03	0.03	0.03	1.00
	mg/L	Γ 0.087	0.090	0.091	0.092	0.10
	mg/L	3.00×10^{-4} L	3.00×10^{-4} L	3.00×10^{-4} L	3.00×10^{-4} L	0.01
						0.05
2# U 2	mg/L	5.0×10^{-4} L	5.0×10^{-4} L	5.0×10^{-4} L	5.0×10^{-4} L	0.005



0



mg/L 0.152 0.160 0.157 0.146 0.50

mg/L 0.009L 0.009L 0.009L 0.009L 1.00

mg/L 0.04 0.01 0.0

g/L

			L	L	L	L	5	
	mg/L	2.5×10^{-3}	2.5×10^{-3}	2.5×10^{-3}	2.5×10^{-3}	2.5×10^{-3}	0.01	
	mg/L	0.006L	0.006L	0.006L	0.006L	0.006L	0.02	
	mg/L	2.5×10^{-3}	2.5×10^{-3}	2.5×10^{-3}	2.5×10^{-3}	2.5×10^{-3}	0.05	
	mg/L	7.33	7.14	7.23	7.28	7.28	250	
	mg/L	186	175	172	182	182	450	
	mg/L	5.83	5.54	5.63	5.68	5.68	250	
GB/T 14848-2017 1								
GB/T 14848-2017 2								

GB/T 14848-2017 III

7.3.2

1
pH

2

4

7.3-

7.3-3

mg/L pH

		pH															
GB14848-2017		6.5~8.5	3.0	0.50	250	250	1.00	0.01	1.00	0.005	0.01	0.02	0.05	0.1	0.05	0.0001	
D1		6.76	0.87	0.03	57	19.4	0.00925	0.00211	0.0319	<0.00005	0.00019	0.00261	<0.02	0.03	<0.004	<0.00002	
		6.72	0.80	0.02	11	17.8	0.00919	0.00207	0.0305	<0.00005	<0.00012	0.00255	<0.02	0.02	<0.004	<0.00002	
		-	0.84	0.03	27	18.4	0.00921	0.00209	0.0313	<0.00005	0.00014	0.00258	<0.02	0.03	<0.004	<0.00002	
	(%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D2		6.71	0.46	0.03	11	18.4	0.00045	<0.00009	0.0396	0.00006	<0.00012	0.00210	<0.02	0.04	<0.004	<0.00002	
		6.52	0.41	<0.02	9	16.8	0.00039	<0.00009	0.0378	0.00006	<0.00012	0.00207	<0.02	0.04	<0.004	<0.00002	
		-	0.44	0.02	10	17.6	0.00042	<0.00009	0.0384	0.00006	<0.00012	0.00208	<0.02	0.04	<0.004	<0.00002	
	(%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D3		6.65	1.22	0.15	12	16.6	0.00733	<0.00076	0.0336	0.00006	0.00026	0.00189	<0.02	0.07	<0.004	<0.00002	
		6.60	1.14	0.12	9	15.1	0.00695	<0.00070	0.0333	0.00006	<0.00012	0.00180	<0.02	0.07	<0.004	<0.00002	
		-	1.17	0.13	10	15.8	0.00720	<0.00073	0.0335	0.00006	0.00020	0.00184	<0.02	0.07	<0.004	<0.00002	
	(%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D4		6.58	0.02	0.02	8	15.8	0.0249	0.00122	0.0905	0.000011	<0.00012	0.00303	<0.02	0.06	<0.004	<0.00002	
		6.55	<0.02	<0.02	7	13.6	0.0242	0.00120	0.0886	0.000011	<0.00012	0.00291	<0.02	0.06	<0.004	<0.00002	
		-	0.02	0.02	7	14.5	0.0244	0.00121	0.0898	0.000011	<0.00012	0.00298	<0.02	0.06	<0.004	<0.00002	



7.4

1	5		
2		A	L _{Aeq}
3			
	2021	7	27~28
			2
2			
(GB3096-2008)3			(GB
3096-2008)2			
5			

7.4-1

dB

		2020-5-9	2020-5-10		
1m N1		56	55	65	
		45	46	55	
1m N2		57	54	65	
		43	45	55	
1m N3		56	55	65	
		46	44	55	
1m N4		53	55	65	
		45	46	55	
1m N5		57	56	60	
		45	44	50	

7.5

7.5.1

8000

23000

1

7.5-1

T323#	0m-0.6m
T5	0m-0.2m
T6	0m-0.2m

2

pH *
 1,1- 1,2- 1,1- -1,2- -1,2-
 1,2- 1,1,1,2- 1,1,2,2-
 1,1,1- 1,1,2- 1,2,3-
 1,2- 1,4- +
 2- a a b
 k a,h 1,2,3-cd
 2018 07 20

3

GB 36600-2018 1

GB 36600-2018

2

7.5-2

mg/kg

35		1.3×10 ⁻³ L	1.3×10 ⁻³ L	1.3×10 ⁻³ L	640
36		0.09L	0.09L	0.09L	76
37		ND	ND	ND	260
38	2-	0.06L	0.06L	0.06L	2256
39	[a]	0.1L	0.1L	0.1L	15
40	[a]	0.1L	0.1L	0.1L	1.5
41	[b]	0.2L	0.2L	0.2L	15
42	[k]	0.1L	0.1L	0.1L	151
43		0.1L	0.1L	0.1L	1293
44	(a,h)	0.1L	0.1L	0.1L	1.5
45	(1,2,3-cd)	0.1L	0.1L	0.1L	15
46		0.09L	0.09L	0.09L	70
47	pH	6.17	6.35	6.56	—

7.5.2

1 Å#6 X\$ P 2...Yc P 0 4

7.5.3

T1	63#	pH	
T2	67#		
T3	66#		
T4	63#		1 45 pH

2

pH .g Ñ *

1,1-

k

a,h

1,2,3-cd

2021 07 27

3

GB 36600-2018

4

GB36600-2018

7.5.4

mg/kg

			0-0.5m	0.5-1.5m	1.5-3.0m			
2021.7.27	63#	pH	7.5	7.8	7.9	--	--	
			0.084	0.075	0.045	38		
			25.2	13.6	18.8	60		
			67	54	64	800		
			31	24	25	18000		
			0.5L	0.5L	0.5L	5.7		
			95	51	41	900		
			0.23	0.14	0.23	65		
			121	103	102	--	--	
			165	117	99	--	--	
			845	458	444	--	--	
			15.9	13.3	13.5	--	--	
		43.2	42.4	45.5	--	--		
		427	426	429	--	--		
		67#	pH	7.2	7.3	7.4	--	--
				0.038	0.080	0.054	38	
				27.6	32.7	22.3	60	
				64	71	65	800	
				30	29	30	18000	
				0.5L	0.5L	0.5L	5.7	
				43	40	46	900	
				0.15	0.18	0.14	65	
				93	90	98	--	--
				232	149	223	--	--
			214	232	233	--	--	
			2.61	1.18	6.91	--	--	

		41.1	42.7	43.8	--	--
		398	424	415	--	--
	pH	7.8	7.6	7.8	--	--
		0.130	0.102	0.035	38	
		25.3	19.8	21.0	60	
		84	65	91	800	
		33	35	32	18000	
		0.5L	0.5L	0.5L	5.7	
66#		130	66	108	900	
		0.19	0.17	0.24	65	
		106	116	114	--	--
		213	165	191	--	--
		712	914	546	--	--
		7.89	11.7	13.8	--	--
		41.8	41.7	38.8	--	--
		401	403	411	--	--

			0.009L	2.8	
		1,2,3-	0.02L	0.5	
			0.26	0.43	
			0.01L	4	
			0.005L	270	
		1,2-	0.02L	560	
		1,4	0.008L	20	
			0.006L	28	
			0.06	1200	
		/	0.01	570	
		+	0.02L	640	
			0.09L	76	
			0.09L	260	
		2-	0.06L	2256	
		[a]	0.1L	15	
		[a]	0.1L	1.5	
		[b]	0.2L	15	
		[k]	0.1L	151	
		[a,h]	0.1L	1.5	
		[1,2,3-cd]	0.1L	15	
			0.1L	1293	
			0.09L	70	
			16.8	/	--
			38.2	/	--
			427	/	--

7.6

8

65#

8.1

8.1.1

1

20mg/m³~50mg/m³

0.487mg/m³

50m

TSP

150m

2

10 20m

8.1.2

1

COD

SS

25 200mg/L 10 30mg/L 500

4000mg/L

5m³/d

SS

2

2m³/d

COD

BOD5 SS

GB18918-2002 A

8.1.3

75 100dB

A

8.1-1

dB A

8.1.5

1

2

3

8.2

8.2.1

8.2-1

			m ³ /h	kg/h	m	m	K
	G66-1	VOCs	21000	0.004 0.073	18	0.8	303
	G66-2		6800	0.0001	18	0.45	303

				0.00004			
		VOCs		0.003			
	G66-3	10000	0.005	18	0.5	303	
	G63-1	22800	0.027	20	0.8	303	
			0.005				
			0.002				
63#	G63-2	26580	0.001	20	0.9	303	
			0.001				
	G63-3	800	0.0001	20	0.2	303	
	G67-1	7900	0.025	20	0.45	303	
	G67-2	2600	0.003	20	0.25	303	
			0.005				
			0.002				
67#	G67-3	26580	0.001	20	0.8	303	
			0.001				
	G67-4	800	0.0001	20	0.2	303	
	G63-1-1	22800	0.027	20	0.8	303	
			0.005				
			0.002				
63-1#	G63-1-2	26580	0.001	20	0.9	303	
			0.001				
	G63-1-3	800	0.0001	20	0.2	303	
	G64-1	22800	0.027	20	0.8	303	
			0.005				
			0.002				
64#	G64-2	26580	0.001	20	0.9	303	
			0.001				
	G64-3	800	0.0001	20	0.2	303	

8.2-2

	m	m	m	t/a	kg/h	mg/m ³
63#	80					



8.2-4

		$\mu\text{g}/\text{m}^3$	%	m
G66-1		0.2757	0.09	382
	VOCs	0.068925	0.01	
G66-2		0.005508	0.002	79
		0.002203	0.000044	
	VOCs	0.165243	0.01	
G66-3		0.21946	0.07	79
G63-1		4.1254	2.06	379
G63-2		0.72692	0.08	398
		0.290768	0.32	
		0.145384	0.48	
G63-3		0.012026	0.000040	453
G67-1		2.7922	1.4	357
G67-2		0.16363	0.08	325
G67-3		0.63987	0.07	333
		0.255948	0.28	
		0.127974	0.43	
G67-4		0.006122	0.000020	305
G63-1-1		4.1824	2.09	375
G63-1-2		0.87919	0.1	343
		0.351676	0.39	
		0.175838	0.59	
G63-1-3		0.012842	0.000043	365
G64-1		5.319	2.66	304
G64-2		0.51376	0.06	507
		0.205504	0.23	
		0.102752	0.34	
G64-3		0.005282	0.000018	25
63#		0.76068	0.38	46
		1.2678	0.14	
		0.50712	0.56	
		0.25356	0.85	
		0.025356	0.01	
67#		0.81738	0.41	49
		1.3623	0.15	
		0.54492	0.61	
		0.27246	0.91	

7	G67-1	3.159	0.025	0.18
8	G67-2	0.963	0.003	0.018
		0.226	0.005	0.037
9	G67-3	0.062	0.002	0.012
		0.025	0.001	0.005
		0.035	0.001	0.007
10	G67-4	0.18	0.0001	0.001
11	G63-1-1	1.204	0.027	0.198
		0.226	0.005	0.037
12	G63-1-2	0.062	0.002	0.012
		0.025	0.001	0.005
		0.035	0.001	0.007
13	G63-1-3	0.18	0.0001	0.001
14	G64-1	1.204	0.027	0.198
		0.226	0.005	0.037
15	G64-2	0.062	0.002	0.012
		0.025	0.001	0.005
		0.035	0.001	

8.2-7

1.0	0.038
0.02	0.012
0.005	0.005
0.015	0.006 6 ³

5
1000

	0	MVR
	0	
	1200	+
MVR	600	
	1000	
	300	
	7200	
	-	
	82447	

8.2.2.2

\$ê 4.

4	NH ₃ -N	45	5.64
5		400	10
			GB/T31962-2015 1A

$2.5 \times 10^4 \text{m}^3/\text{d}$
 $274.823 \text{m}^3/\text{d} \quad 82447 \text{m}^3/\text{a}$

8.2.2.3

8.2-11

	mg/L	t/a	mg/L	mg/L	t/a
			$82447 \text{m}^3/\text{a}$		
COD	53.974	4.45	200	30	2.473
NH ₃ -N	7.017	0.5785	40	1.5	0.124
	GB31573-2015	1			
	GB/T31962-2015	1A			
	GB3838-2002				

8.2-12

8.2-13

		m ³ /a /					
							/ mg/L
1	DW01	7.21			-	SS	10
						COD	30
2	DW03	0.72			-	NH ₃ -N	1.5

8.2-14

					mg/L
1		pH			6~9
2		COD			200
3	DW01	SS	GB31573-2015	1	100
4		NH ₃ -N			40
5			GB/T31962-2015	1A	400
6		pH			6~9
7	DW02	COD		GB8978-1996	500
8		SS			400
9		NH ₃ -N			—

0.432m/d

0.05

X M L

X

M

L

0.0216m/d

2

5%

1

100 1000 10 50m 100m 150m 200m 300

2

82447m³/a

5%

8.2-16

		(m ³ /d)	(mg/L)		
		16	10	50	1

6.69m²/d

1.52m²/d

3

$$\begin{matrix} X & & Y \\ \blacksquare & & \\ (, ,) & \frac{v}{4 \sqrt{N v}} & \frac{zW}{2F} [2 \phi() - \left(\frac{W^2 v}{4F_N} \right)] \end{matrix}$$

	mg/L	%	mg/L	%	mg/L	%
50m	0.00536	53.60%	0.008988	89.88%	0.010601	106.01%
100m	0.003638	36.38%	0.005372	53.72%	0.00689	68.90%
150m	0.000751	7.51%	0.003112	31.12%	0.004743	47.43%
200m	0.000289	2.89%	0.001824	18.24%	0.003254	32.54%
300m	0	0.00%	0.000158	1.58%	0.001257	12.57%

100

50

1000

10

GB/T14848-2017

Ni Co Mn

0.02 mg/L

0.05mg/L

0.1mg/L



Li— i

LA—

ON- C

8.2-22

1	g	96000	40000
2	m ²	240000	
3	m/s)	0.007	
4		30	
5	kg	64800000	

8.2.6.5

8.23

mg/kg

	95	0.45	95.45	900	
	15.9	0.02	15.92	70	

30

GB36600-2018

HJ964-2018

2017

2019

GB36600-2018

9

9.1

9.1.1

9.1.1.1

P

1

Q

HJ169-2018

B

Q

$$S \frac{s_1}{S_1} \frac{s_2}{S_2} \dots \frac{s_p}{S_p}$$

q_1, q_2, \dots, q_n

t

Q_1, Q_2, \dots, Q_n

t

$Q < 1$

$Q \geq 1$ Q

$1 < Q < 10$

$10 < Q < 100$

$Q \geq 100$

8

5

HJ169-2018

B.1

Q

9.1-1 Q

		CAS	q _n /t	Q _n /t	Q
1		-	7	0.25	28
2		-	164	0.25	656
3		-	256	0.25	1024
4		7786-81-4	220	0.25	880
5		-	2	2500	0.0008
6	31%	7647-01-0	240	7.5	32
7	98%	7664-93-9	500	10	50
8	20%	1336-21-6	240	10	24
Q					2694.0008

Q=2694.0008 Q 100

2

M

M

9.1-2

		10/		0
		5/		0
		5/		0
/	/	10		0
		10		0
		5		0

9.1-3

M			
M 20		M1	
10 M 20		M2	
5 M 10		M3	

9.1-6

F1	24h
F2	24h
F3	

F3

9.1-7

S1	10km
S2	10km
S3	10km

1

2

10km

S1

S2

S3

9.1-8

	F1	F2	F3
S1	E1	E1	E2
S2	E1	E2	E3
S3	E1	E2	E3

F2

S3

E3

3

9.1-9

G1	
G2	
G3	

G3

9.1-10

D3	Mb 1.0m K 1.0×10^{-6} cm/s
D2	0.5m Mb 1.0m K 1.0×10^{-6} cm/s Mb 1.0m 1.0×10^{-6} cm/s K 1.0×10^{-4} cm/s
D1	“D2” “D3”

0.5m Mb < 1.0 1.0×10^{-6} cm/s < K 1.0×10^{-4} cm/s

D2

9.1-11

	G1	G2	G3
D1	E1	E1	E2
D2	E1	E2	E3
D3	E1	E2	E3

G3

D2

E3

9.1.1.3

HJ169-2018

9.1-12

E	P			
	P1	P2	P3	P4
E1	+			
E2				
E3				
+				

9.1-13

	E	P	
	E2	P3	
	E3	P3	
	E3	P3	

9.1.2

1

HJ169-2018

9.1-14

	+			

2

5km

500m

5000m

5.5km

9.1-15

5km

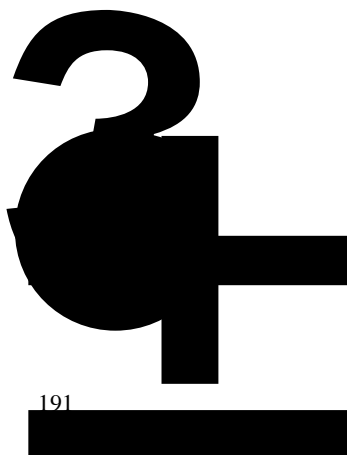
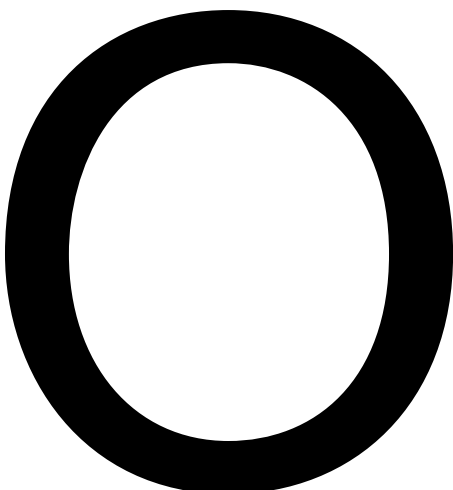
m

1	130m	-
2	1300~2100m	820
3	110~600m	80
4	520 m	500
5	120~1000m	90
6	1500m	300
7	300~1000m	200
8	600~1800m	180
9	2200m	2400
10	1930m	538
11	920~1900m	482
12	1400~2200m	246
13	520-720m	900
14	3200~4240m	316
15	4000m	3200
16	4550m	100
17	3900~4400m	2850
18	3500~3900m	2000

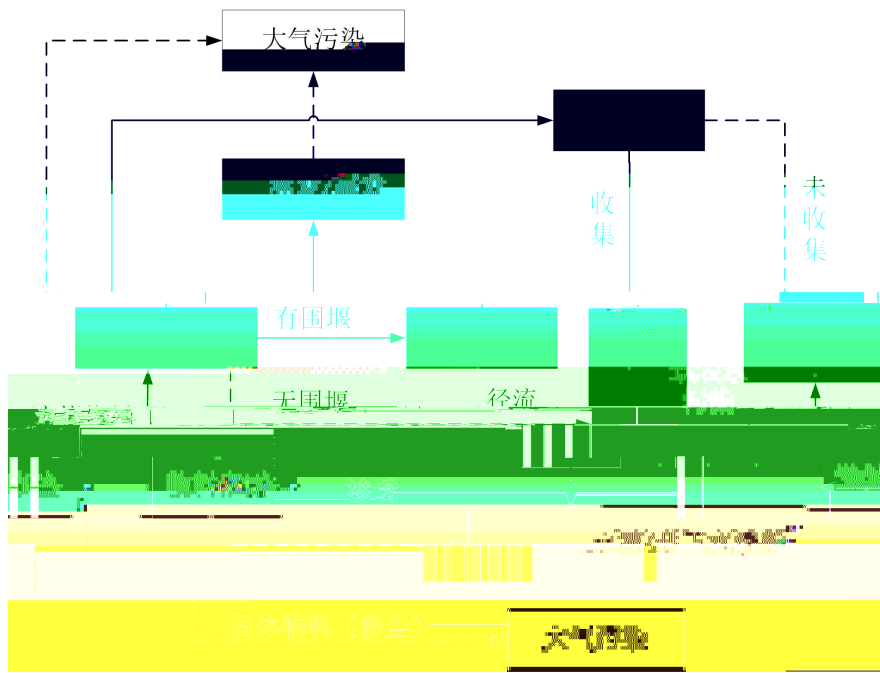
		500 m			370
		5 km			1744
		E			
■	1		S3		45
■	2		S3		800
		E			E3
					/m
	1			D3	-
		E			E3

9.2

- 1
- 0.50 μm
- 2
- 3



				/	1B	
				/	1	
5	31%	2507	7647-01-0		-	3
					-	2
6	98%	1302				



9.2-1

/

/

/

/

SO₂ CO

9.3

9.3.1

1

2

3

HCI

4

9.3.2

xü

1

\$ P SAß DÉE
äv

HJ169-2018

E

9.3-1

ReferenceManualBeviRiskAssessments
 * InternationalAssociationofOil&GasProducers
 RiskAssessmentDataDirectory(2010,3)

9.3-2

		min	max
1		5.0×10^{-6}	5.0×10^{-5}
2		1.0×10^{-6}	1.0×10^{-4}
3		9.5×10^{-6}	9.0×10^{-5}
4		5.5×10^{-7}	1.0×10^{-5}
5		5.5×10^{-6}	5.0×10^{-5}
6		7.0×10^{-7}	1.0×10^{-5}

1949-1982 13440 17
 19
 13440 261 (1.94%) 1056 (7.86%)
 505 (3.76%) 828 (6.16%) 6165
 (45.87%) 1076 (8.00%) 651 (4.84%)
 784 (5.83%) 138 (1.03%) 40 (0.29%)
 57 (0.42%)
 95 1987 20--25
 47.8% 27.6% 18.8%
 8.2% 33.0% 23.1%
 34.2% 34.2% 22.8%
 90

Q₃

$$Q = r \frac{O}{T - V_0} w^{(2-p)(2-p)} t^{(4-)/(2-)}$$

Q₃— kg/s

n—

p— Pa

R— J/mol·K

T₀— K

u— m/s

r— m

19.82kg/s

0.0209kg/s

17.84kg/s

0.066kg/s

3

HJ169-2018

H 1 2

1

1h

2

1h

-1 770mg/m³

-2 110mg/m³

HJ169-2018

G

9.3-3

	25	1.5m/s
	50%	F
60		7.5686E+01
160		2.7486E+01
260		1.5226E+01
360		1.0375E+01
460		7.4621E+00
560		5.4678E+00
660		4.2135E+00
760		3.3022E+00
2.302E+00	U	F

9.4.2

9.4.2.1

1

2

1

2

9.4.2.2

1 4200m³

1 5800m³

U » u" • > G x Ä U » u" • FJ
)àÓ À 2

10000m³

1 200m³

1 1800m³

1 300m³

1

2 /

3 /

4

5

6

7

8

9

10

11

12

9.4.3.2

1

2

11

9.5

10

10.1

10.1.1

1

2

3

$\hat{e} \circ \tilde{o}$

4

5

10.1.2

1

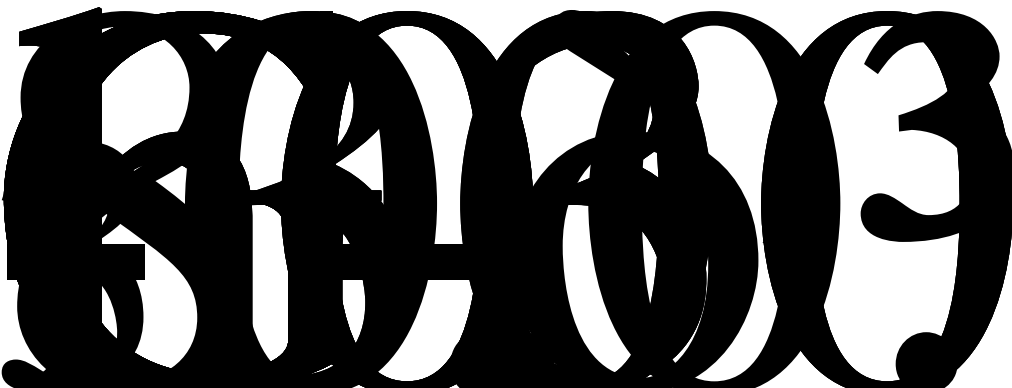
10.2.1

10.2.1.1

VOCs

10.2-1

G66-1	⁺ 21000m ³ /h	D-0.8m h-18m T-30
G66-2	⁺ 6800m ³ /h	D-0.45m h-18m T-30
G66-3	10000m ³ /h	D-0.5m h-18m T-30
G63-1	22800m ³ /h	D-0.8m h-20m T-30



	G63-1-3	800m ³ /h	D-0.2m h-20m T-30	
	G64-1	22800m ³ /h	D-0.8m h-20m T-30	
	G64-2	+ 26580m ³ /h	D-0.9m h-20m T-30	
	G64-3	800m ³ /h	D-0.2m h-20m T-30	

1

90%

HCl

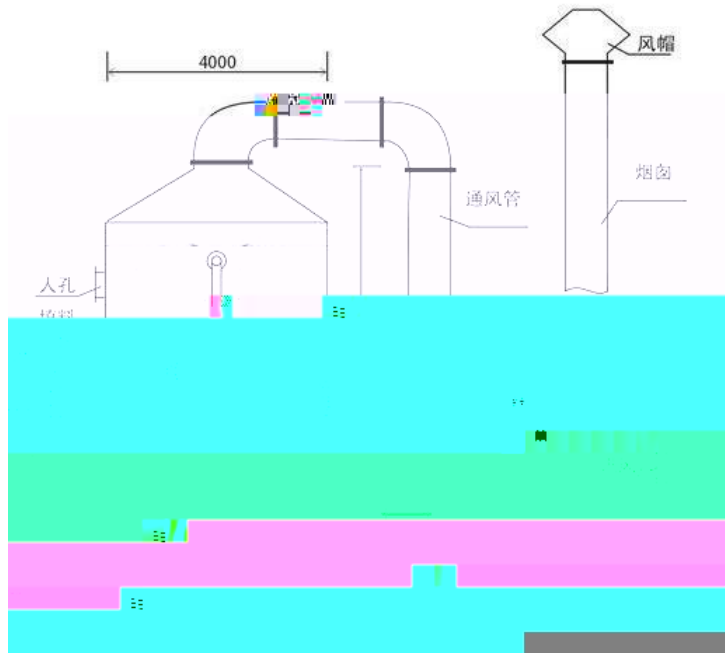
GB31573-2015 3

HCl

2

90%

GB14554-93 2



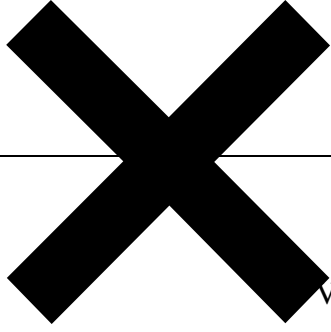
10.2-1

3

/VU

10.2-2

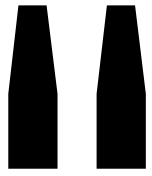
VU



DB12/524-2020

-

VOCs



+

VOCs

4

80%

1 μ m

a

\$ HPi 100%

0.1 μ m

b

99.9%

c

99.9%

0.1μm

0.05μm

10.2-3

	%							
	99							
	99					300		
	99							
-								

5μm

+

80%

1μm

+

+

GB31573-2015

4

10 mg/m³

/ +

10.2.2

10.2.2.1

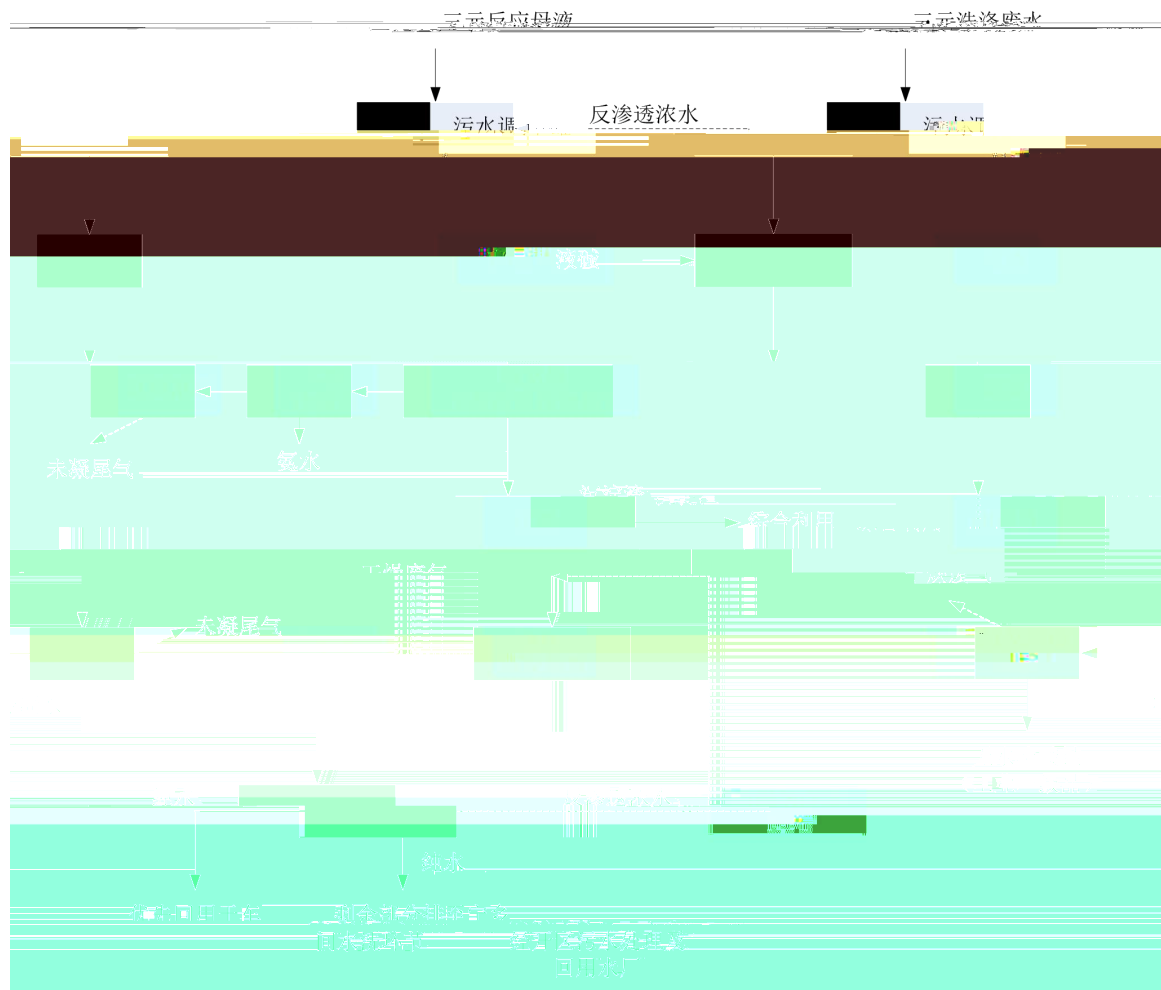
10.2-3

10.2.2.2

1

10.2-5

	pH			%
	11 12	9000-11000 mg/L	Ni Co Mn 80ppm	15 20
	11 12	600-1500 mg/L	Ni Co Mn 20ppm	0.6 1.5



10.2-2

1 pH

50~80ppm

pH

pH

12

2

NH₃-N

NH₄⁺

NH₃⁺

PH

PH

PH

PH

PH

3

5ppm

4

MVR

27%

5 MVR

MVR

TDS

200ppm

80%

TDS<5ppm

6

pH

MVR

10.2-6 MVR

MVR

1

m³/h

2

pH

-

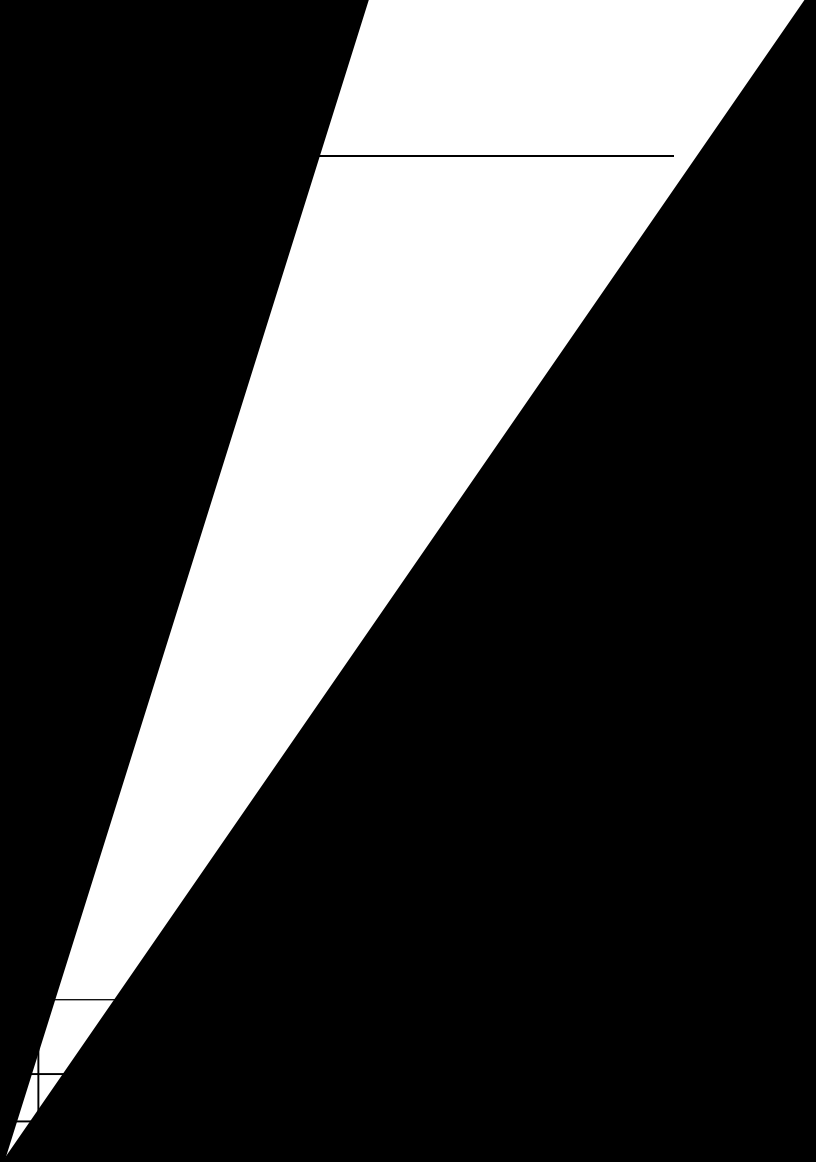
bH

JFD

GB31573-2015

10.2-8

												mg/L	pH	
		pH												
2019. 2.21	D	8.68	15	56	11.7	35.9	39.0	0.62	0.50	<0.05	0.05	0.0336	2.52	1.91
		8.88	19	63	13.1	35.3	39.3	0.64	0.51	<0.05	0.05	0.0329	2.55	1.91
		8.54	21	59	12.3	35.5	38.1	0.62	0.49	<0.05	0.07	0.0284	2.49	1.94
		8.28	16	61	12.7	36.2	39.5	0.63	0.50	<0.05	0.06	0.0273	2.53	1.89
		/	18	60	12.5	35.7	39.0	0.63	0.50	<0.05	0.06	0.0306	2.52	1.91
1					I	I								
		8.52	18	57	11.9	36.1	38.3	0.66	0.51	<0.05	0.06	0.0297	2.54	1.92
		8.47	16	66	13.8	35.9	39.6	0.61	0.51	<0.05	0.04	0.0329	2.52	1.95
2019. 2.22		8.66	19	65	13..									



GB31573-2015 6

HJ/T91-2002

GB/11912-89

0.05mg/L

HJ957-2018

0.05mg/L

GB/T11906-89

0.05mg/L

2

GB31573-2015 1

“ ”

“ ”

10.2.2.4

1

300m³

1 4200m³

2 10000m³

2

50m³

10.2.3

“

”

2

40m² 30m²

GB18597-2001

1

2

3

4

5

6

7

8

9

-

GB15562.2

10

”

“

”

1

2

“

”

11.5

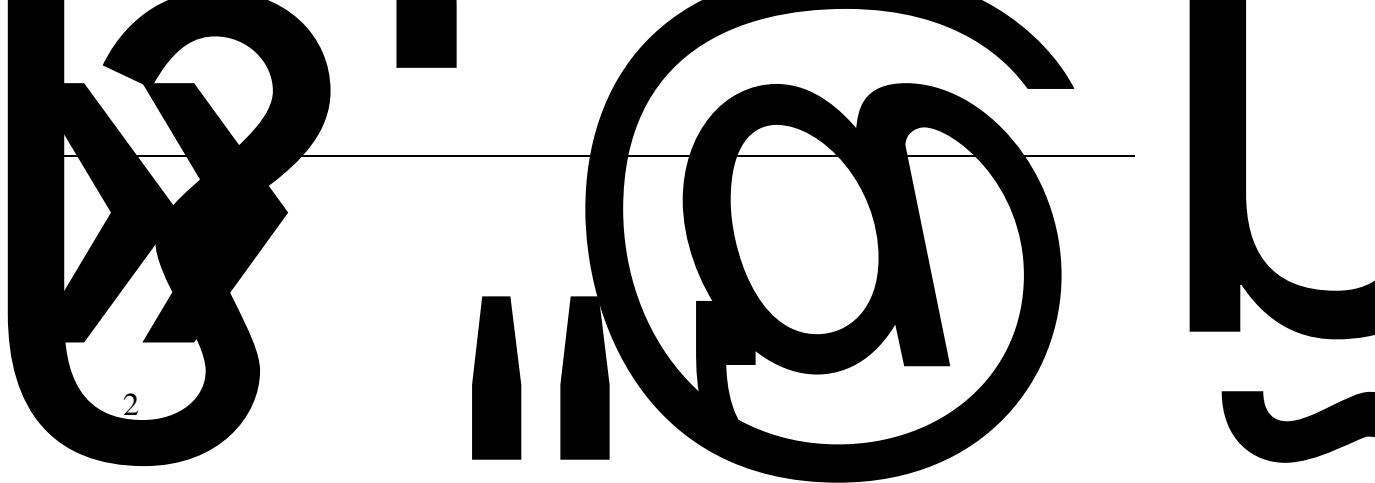
“

”

“

”

2020 11



2

3

4

ΕΙΣ ΤΟ ΠΑΡΟΝ

“ ”

11.6

ΕΣΤΙΝ Λ.Β. ΔΙ.Υ

12

12.4

“ ”

13.1

13.1.1

“ ”

13.1.2

1

13.1.3

1

“ ”

2

3

13.2

13.2-1

	1 2		

13.3

13.3.1

1

2

3

4

13.3.2

1

13.3-1

		HCl NH ₃ VOCs		GB14554-93
		pH SS COD		GB31573-2015
		A		GB12348-2008 3

2

13.3-2

	G1					
	G2	500m	HCl NH ₃ VOCs			
	T1 63#		pH			
	T2 66#					
	T3					
	D1		pH			
	D2					
	D3					
	D4					
	D5					

13.3.3

1

Ã

2

3

13.3.4

31
[2013]81

13.4

—

“

”

1

100mm

2

3

150mm

3

13.5

[2017]4

“

13.3-1

	63#	+20m +20m	+ +
	67#	+20m +20m	+ +
	63-1#	+20m +20m	+ +
	64#	+20m +20m	+ +
	66#	+ +18m +18m	+ +

		+18m	
			--
		300m ³ 50m ³	400m ³

14

14.1

14.1.1

67# 63# 67# 103 63-1# 64# 77134.7m² 63#
66#
70# 1 1
10000t/a
360t/a

14.1.2

1

2020

HCl

GB 31573-2015 5

HCl VOCs

HJ2.2-2018 D

2

			3		pH	COD	NH ₃ -N
GB3838-2002	1						
		GB3838-2002	2	3			
					GB5084-2005		1
	3						
						GB/T14848-2017	
	4						
GB3096-2008	3						
	5						
					GB36600-2018		
						GB15618-2018	
	6						
14.1.3							
	1						
HCl		NH ₃	VOCs				
	2						



MVR

14.1.4

HJ169-2018 B

Q Q 100

14.2

1

“ ”

2

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3

4

5

6

7

8