
1.1	.....	4
1.2	.....	8
1.3	.....	9
1.4	.....	10
1.5	.....	11
1.6	.....	16
1.7	.....	17
1.8	.....	18
1.9	“ ”	21
2.1	.....	28
2.2	.....	30
2.3	.....	36
2.4	.....	38
2.5	.....	40
2.6	.....	41
3.1	.....	42
3.2	.....	56
3.3	.....	64
3.4	.....	77
3.5	.....	82
4.1	.....	86
4.2	.....	90

4.3	.....	91
4.4	.....	157
5.1	.....	194
5.2	.....	196
5.3	.....	202
5.4	.....	203
5.5	.....	204
5.6	.....	207
5.7	.....	208
5.8	.....	214
5.9	.....	218
6.1	.....	222
6.2	.....	223
6.3	.....	224
6.4	.....	225
6.5	.....	226
6.6	.....	227
6.7	.....	228
6.8	.....	232
7.1	.....	234
7.2	.....	235
8.1	.....	238
8.2	.....	238
8.3	.....	242
8.4	.....	245
8.5	.....	248

8.6	.....	249
8.7	.....	249

1

2

3-1

[2019]23

3-2

4

[2009]43

[2011]30

5

[2013]199

[2015]7

6

7

8

[2021]80

9

10

11

12

13

14

I

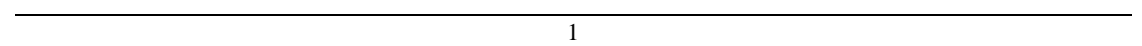
15

16

17



221 31.6km
 108 41km
 30km 15km
 33km 37km
 1994
 1994 10 11
 [1994]060
 11
 1#
 2006 7 24
 1#
 2006 8 2016 7 10 2007 5
 [2007]44
 2009 2
 [2009]43
 ()
 26 /
 16 / ()10 / 26
 8232 2011 7 25
 [2011]30
 2013 12
 [2013]199 -





37

2021 4

“

”

2021 6

2021 8 5



1 2015 1

2 2020 9 1

3 2018 12 29

4 2018 1 1

5 2018

6 2018

7 2009 08 27

9 2012 7 1

10 2018

11 2018 10 26

12 2009 8 27

13 2003 10 1

1 2017 10 1

2 592 2011 2

3 37

4 2019

29

5 [2010]46

6 [2000]38 2000.11.26

7 [2015]17

8 [2013]37

9 [2016]31
2016.5.28
10 2015.4.25
11 < >
2015.9.11
12 <
> 2017.2.7
13 < ” > [2016]65
2016.11.24
14 < >
[2016]81 2016 11 10
15 ([2013]101)
16
[2005]109
17
[2012]77
18 3
19
[2014]30
20 < “ ” >
[2016]151
21 < >
2015 61
22 2017 1 5
24 2017
45 2017 7 28
25 [2017]4
26
[2018]1

27				2021	1	1
1			2018	1	1	
2				2013	16	
3			2010	8		
4				2017	102	
5			(
29)					
6				2019		
7				1990	39	
8				2000	37	
9						(
2016	27)				
10						
		2006	1			
11		<			>	2013
78						
12						
2018	24					
13						2019
8						
1			—		HJ2.1-2016	
2			—		HJ2.2-2018	
3			—		HJ2.3-2018	
4			—		HJ610-2016	
5			—		HJ2.4 2021	
6			—		HJ19 2022	

7		HJ169	2018
8			HJ 964-2018
9		GB18218	2018
10		GB 5085.7-2019	
11	2021		
12		HJ 298-2019	
13			HJ 651-2013
14			HJ/T 394-2007
15			
16		HJ 61-2021	
1			
2			
		2008	12
3			
			[2009]43
4			
			[2011]30
5			
2013	12		
	6		
		[2013]199	
	7		
[2015]7			
	8		
		2021	2
	9		

2021 4

10 C5100002010125120093732

11

1

2008 3

1	2008-2011	1 26 / 2 26 3 1 119 m ³ 4 1 161 m ³
2	2013-2015	
3	2016 -2022 6	1 26 / 2 26 3 1 119 m ³ 4 1 161 m ³

2008 2022 6

2008 2022 6

2

1

2

3

1.3-1 1.3-2

		TSP PM ₁₀
	pH	17
	pH)	(24
	K ⁺ Na ⁺ Ca ²⁺ Mg ²⁺ CO ₃ ²⁻ HCO ₃ ⁻ Cl ⁻ SO ₄ ²⁺ 8	
		A
	pH	9
		TSP
		pH SS COD
		pH SS COD

		pH SS	COD
		A	

		^{222}Rn
		U Th ^{226}Ra
		U Th ^{226}Ra
		U Th ^{226}Ra
		U Th ^{226}Ra
		U Th ^{226}Ra
		U Th ^{226}Ra
		U Th ^{226}Ra
		^{238}U ^{232}Th ^{226}Ra

GB3096-2012

2018 29

GB/T 14848-2017

GB3096-2008

2

1			GB3095-2012	
2			GB3838 2002	
3			GB/T14848-93	GB/T14848-2017
4			GB3096-2008	
5			GB15618-1995	GB15618-2018

				GB36600-2018
6				
7			GB26451-2011	
8			GB26451-2011	
9			(GB12348 2008)2	
10			GB18599-2001 I	GB 18599-2020 I
11			GB/T14848-93	GB/T14848-2017
			GB26451-2011	

1

GB3095-2012

10 m		70	g/m ³
	24	150	
TSP		200	
	24	300	

2

GB3838 2002 III

(GB3838 2002) 3

(GB3838 2002) III	1	pH	6-9
	2	COD	20
	3	NH ₃ -N	1.0
	4		0.2
	5		0.2

	6		1.0	
	7		1.0	
	8		1.0	
	9		0.05	
	10		0.0001	
	11	Cd	0.005	
	12	Cr ⁶⁺	0.05	
	13	Pb	0.05	
	14		0.2	
	15		0.05	
	16		250	
	(GB3838 2002) 3	17		0.2
		18		0.005

3

GB/T14848-2017

	pH							
	6.5 8.5	1000	450	250	0.001	0.3	0.1	0.01

GB36600-2018

1		7440-38-2	20	60	120	140
2		7440-43-9	20	65	47	172
3		18540-29-9	3.0	5.7	30	78
4		7440-50-8	2000	18000	8000	36000
5		7439-92-1	400	800	800	2500
6		7439-97-6	8	38	33	82
7		7440-02-0	150	900	600	2000

GB15618-2018

1

			pH 5.5	5.5 pH 6.5	6.5< pH 7.5	pH>7.5
1			0.3	0.4	0.6	0.8
			0.3	0.3	0.3	0.6
2			0.5	0.5	0.6	1.0
			1.3	1.8	2.4	3.4
3			30	30	25	20
			40	40	30	25
4			80	100	140	240
			70	90	120	170
5			250	250	300	350
			150	150	200	250
6			150	150	200	200
			50	50	100	100
7			60	70	100	190
8			200	200	250	300

6

1

GB26451-2011

5

1

6

	50 mg/m ³	
	0.10 mg/m ³	
	300m ³ /t-	

	1.0mg/m ³
	0.0025 mg/m ³

2

2

pH	6~9	
	50	100
	8	10
	4	5
COD	70	100
	1	5
	30	70
	15	50
	1.0	1.5
	0.1	
	0.05	
	0.2	
	0.1	
	0.8	
	0.1	

3

	(GB12348 2008)2	60 50

4

I

GB 18599-2020 I

GB18597-2001

1

α

GB/T14848-2017

III

α 0.5 Bq/L

1.0Bq/L

2

GB26451-2011

1		0.1mg/m ³	
		0.0025mg/m ³	
2		0.1mg/L	

1.6-1

1-1

	2.5km	5km×5km	
		25.07 km ²	
	200m 200m	200m 200m	

	0.5km	0.5km	
	3km	3km	
	500m	500m 500m 2km	
		200m	
		5.0km	

1

2

3

4

5

6

7

1

2

3

		15m		GB3838-2002
		50m		
		100m		
		560m	35 210	GB3095-2012
		490m	200	
		400m	13 78	
	200m 5	100~200m	30	GB3096-2008 2
	1000m	/	/	

1

2021

9

1.8-2

1-1

		120	
		35 210	560m
		13 78	400m
		14 70	3.2km
		15 60	4.5km
		50 260	3.4km
		50 280	3.8km
		12 50	4.5km
		16 70	3.5km
		18 90	4.1km
		38 190	4.5km

			5	25	4.3km
			2	10	1.9km
			20	100	3.4km
					15m
					50m
					100m
	250m			360m	

2

128m

103m

423m

1-2

[2019]23

3-1

2115m

2.58 /

30m

0.0041

300m

0.3611

3-2

950m

1.8-3 1-1 1-3

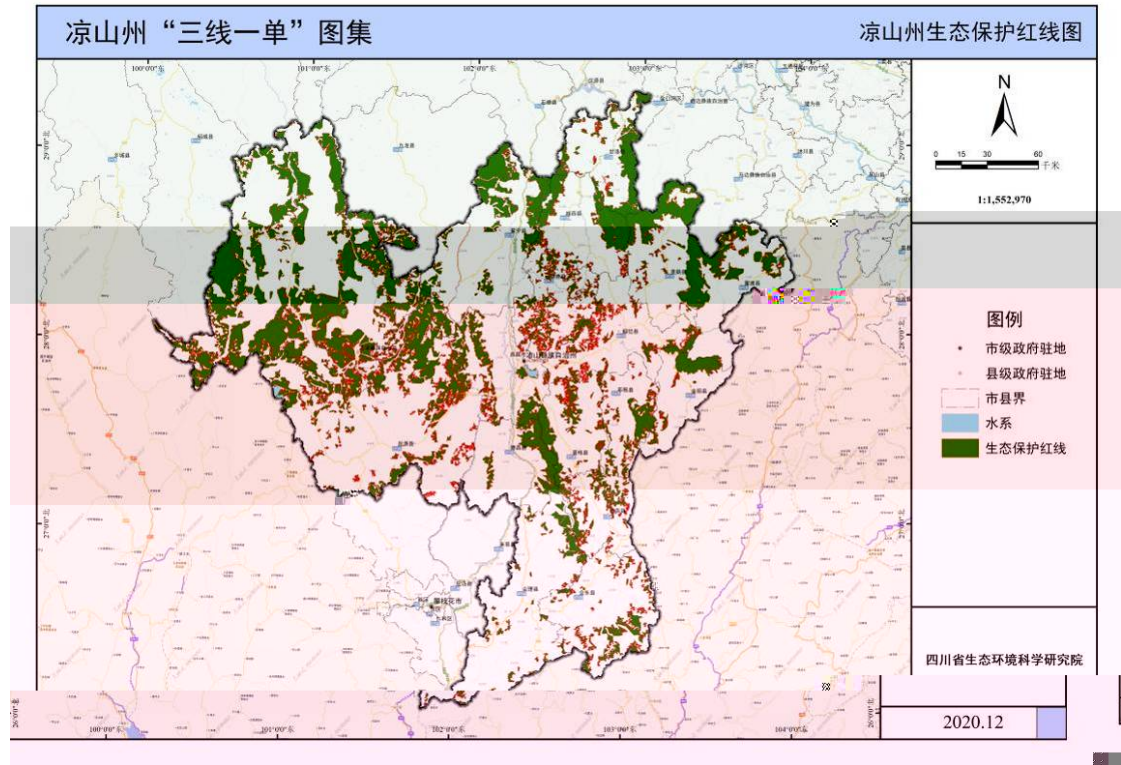
		15m				
		50m				
		100m			GB3838-2002	



<

>





	70		17
46.03%	36	4.9%	
17	17	2	17
49.07%			

			1	
			2	
			3	
			4	
			5	5
			1	
			2	
			1	
			2	
			3	

			1					
			2					
			3					
			1					
			2					
			3	2025			100%	
			4	85%				
			5	2025				
			6		90%	40%	30%	
			7		80%			
						90%		

		1 2 “ ” 3 4		
		1 2025 2 2025 1	0.508 25.15	
-ZH5134 2430001-				

				/	/
				/	/
-YS5134 24321000 2- -				/	/

			/	/	/
			/	/	/
-YS5134 24331000 1-					
				1	
				2	
			/	/	
			/	/	



1 1994

1 - 1

2 2007

3 2008-2009

[2009]43

4 2009-2010

(

) 26 / - -

26 1 119 m³ 1 161

m³

5 2011

[2011]30

6 2013

[2013]199

7 2013-2014

8 2015

[2015]7

9 2016

2016 10



26 /

10 2017

11 2019

2.1-1

1	1994		- 1 1
2	2007		—
3	2008-2009		[2009]43
4	2009-2010		() 26 / - - 26 1 119 m ³ 1 161 m ³
5	2011		[2011]30
6	2013		[2013]199
7	2013-2014		
8	2015		

			[2015]7
9	2016		2016 10 26 /
10	2017		
11	2018		2018 6 2018 10 11 20 11 27 2021 3 24
12	2019		
13	2020		2019 2020 6

2008

2009 2 1
[2009]43 4
1

85%

2

10 / 26 / 16 / 8232

1

2

3

4

5

6

2011

2011 7 25

[2011]30

5

1

2

2013

[2013]199

1

2

26 t/a
8232
REO70% - -
25 t/a 25 t/a

+

- - -
25 t/a 78.02% 22025.98t/a
53.14% 6986.27t/a REO21.2% +
65% 7836.84t/a
7960 80.5 1.01%

2011

27

2013 6

[51340013060702]0028

[2012]32

2014 10

[2014]100

[2015]02

[2015]28

9910t/a

2015

[2015]7

1



8000

693.4

8.67%

DO COD F
pH

GB3838-2002

GB26451-2011 6

GB12348-2008 2

2

2016 10

2016



	2 87.0 m ³ 32.0 m ³ m ³	1# 1# 119	m ³	75.21 2020 6 50cm	1
		1		1 20t	
		1	50m ³	1 70m ³	
			2m ³		
		2			
			10	10	

161 m³

		1.2m	
		2	
		150m ³	

		pH COD SS	
		Pb NH ₃ -N	
		7	
		SO ₂	
	1m		
		²³² Th	1
		²³² Th	

1

2015

2.4-2

2015 1 -2017 4		1500m	pH		1
			13		
			TSP		
2020 4 -2021		1m			1
			TSP		
2015 -2021				-238 -226 -232	2015 -2019 1 2020 2
			X-		
				-238 -232 -226 -40	
				-238 -232 -226 -40	
				-226 -40	
				-238 -232 -226 -40	
				-226 -40	
			1# 2# 3#	-238 -232 -226	

				-238	-232		
				-226	-40		

2

1

(HJ 819-2017)

HJ 1209-2021

[2018]1

HJ61-2021

2

1

2018

3

2015-2021

1

[2018]1

1

2008 10 25 -11 5

31

100%

2

2017 3 5

2017 9

[2017]12

1.2m

2

0.1496km²

- -

26 t/a

1994

2009

2013

2016

1

3.1-1

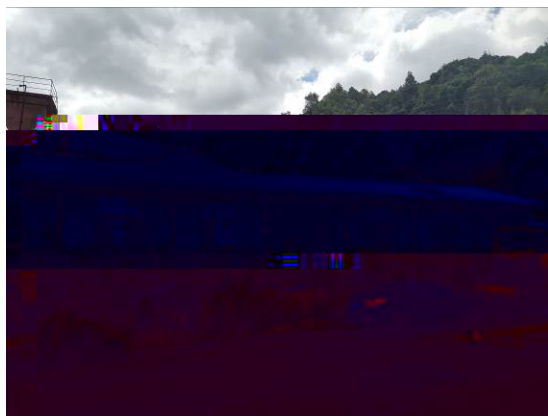
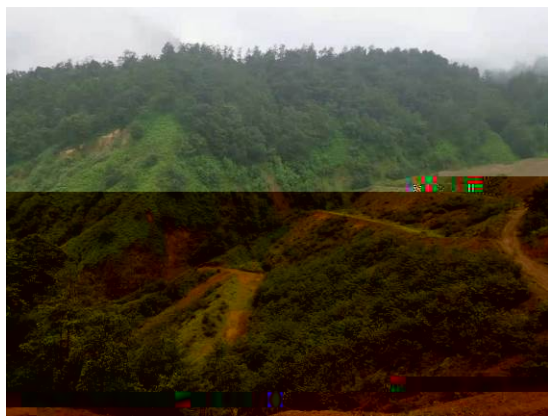
		0.1503km ² 2140m	2140m 26 t/a	0.1496km ²	26 t/a
		1		1	
			- -		1
					2
				- -	3
		2	3.52 hm ²	1	
		87.0 m ³	32.0 hm ² 32.0	75.21 m ³	2020 6
		m ³	119 m ³	50cm	

				2021 6		
		1	32.5m ²			
		2	16m ³	2	16m ³	
		1	6666.7m ²	1	6400m ²	
		1	270m ²	1	270m ²	
		200mm	0.5km	PE	325mm 4	0.9 km 14m ³
		200mm	0.5km	PE	2.8km	150mm 2 155 m ³ /h

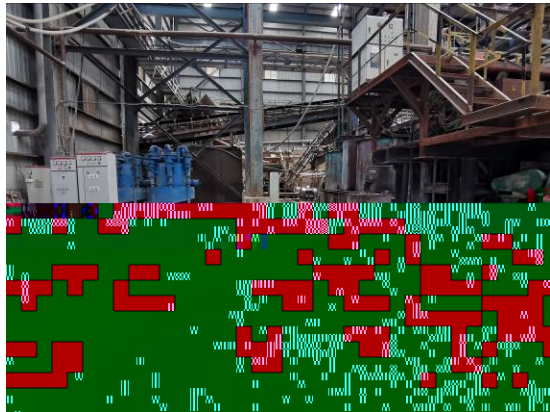
			161 m ³ 1	1	2018 6		
					2018 10		
					11 20 11 27		
				2			
			800m		800m		
			4m		4m		
			2 800m ³		1		
				1000m ³			
			1		1		
			255.14m ²	5666.7			

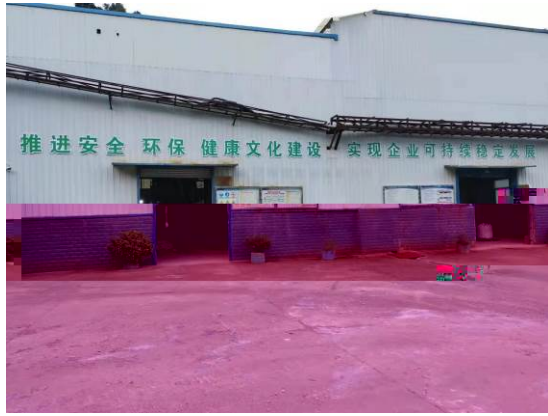
		m ²			
		1	1 20t 1		1
		1 +1	2 2 15m		2
		1			
		1 +1 5			
			1.2m 2		
			1 150m ³		
		1 10m ³	30m ³ 2 1		2 30m ³

			1 70m ³		
		2m ³			









		26 t/a		26 t/a
		8232t/a		9595 t/a
		22025.98t/a		
		6986.27 t/a		
		37244.25 t/a		

-232

1Bq/g

1Bq/g

3.1-4

1		PC360	1	
2		LX450	1	
3		SK260	3	
4		50CN	2	
5		30	1	
6		20	1	
7		15t	4	
8		15t	3	
9		15t	4	
10		16t	1	
11		16t	3	
12		TY—370GN	1	
13		XAXS600	1	

3.1-5

					1
	2		3		
	1		4		
	3		4	1	
	1		1		
	2		8		6
	30		32		2
	24		8		
	80				
	2		2		
	2		2		
			2		

	3	
--	---	--

2

6

	4000	
	20000	
	145	
	10	
	10	"

1

3-1

2

3 2

3

3-3

3-4

1

70m

2

3

4

5

SE

120

24h

300

1

2260m

2000m 2140m

2140m

2

12.0m

12.0m

45-55

30m

90m

3



-

-

- 50-70

- -

20%

20 %

40 %

60.11%

—

—

—

(

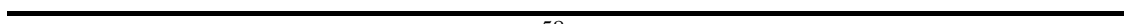
,

,

0.2 0.3mm

pH

Na₂SiO₃



3-6

- -

1

2

2

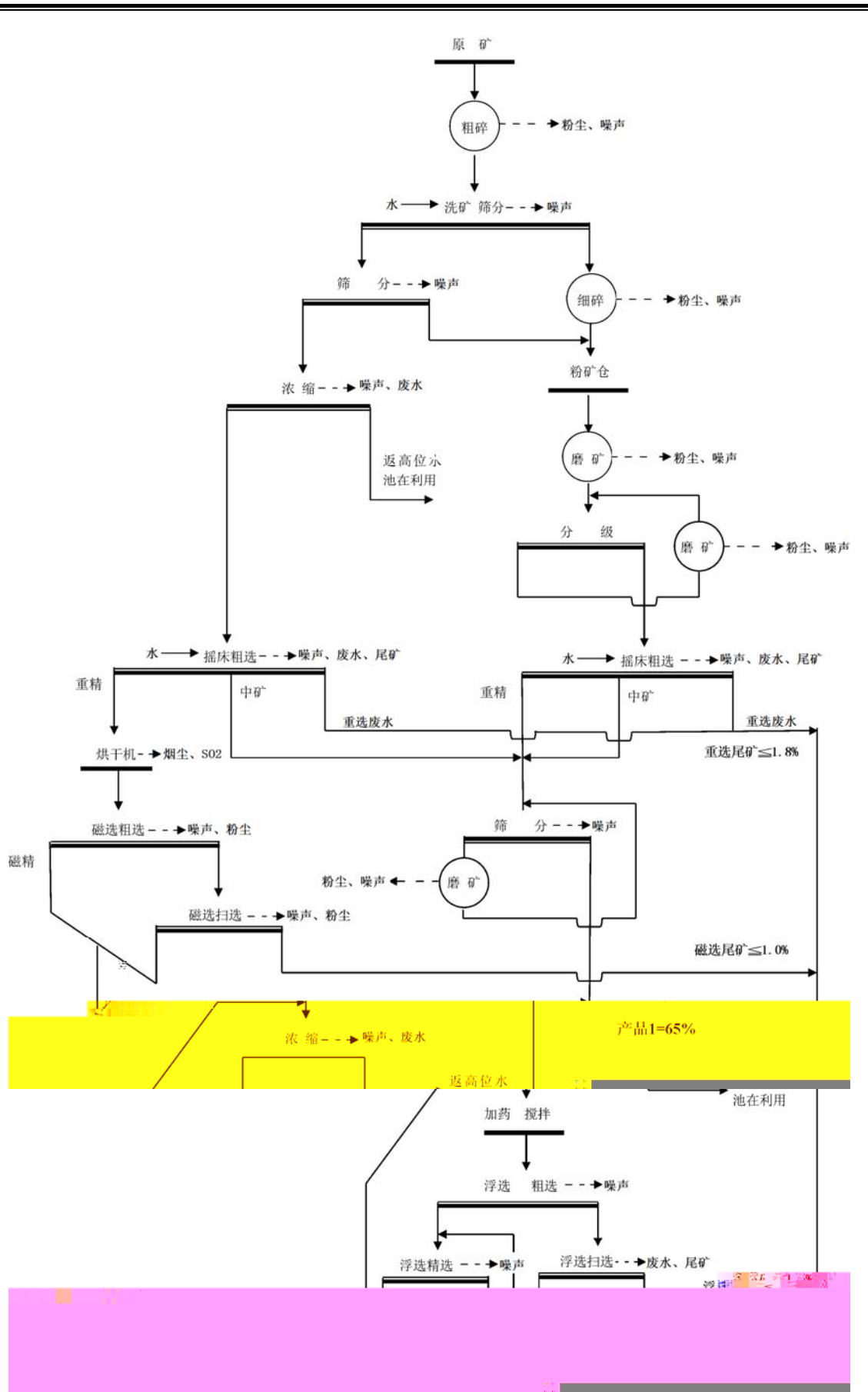
3

- -

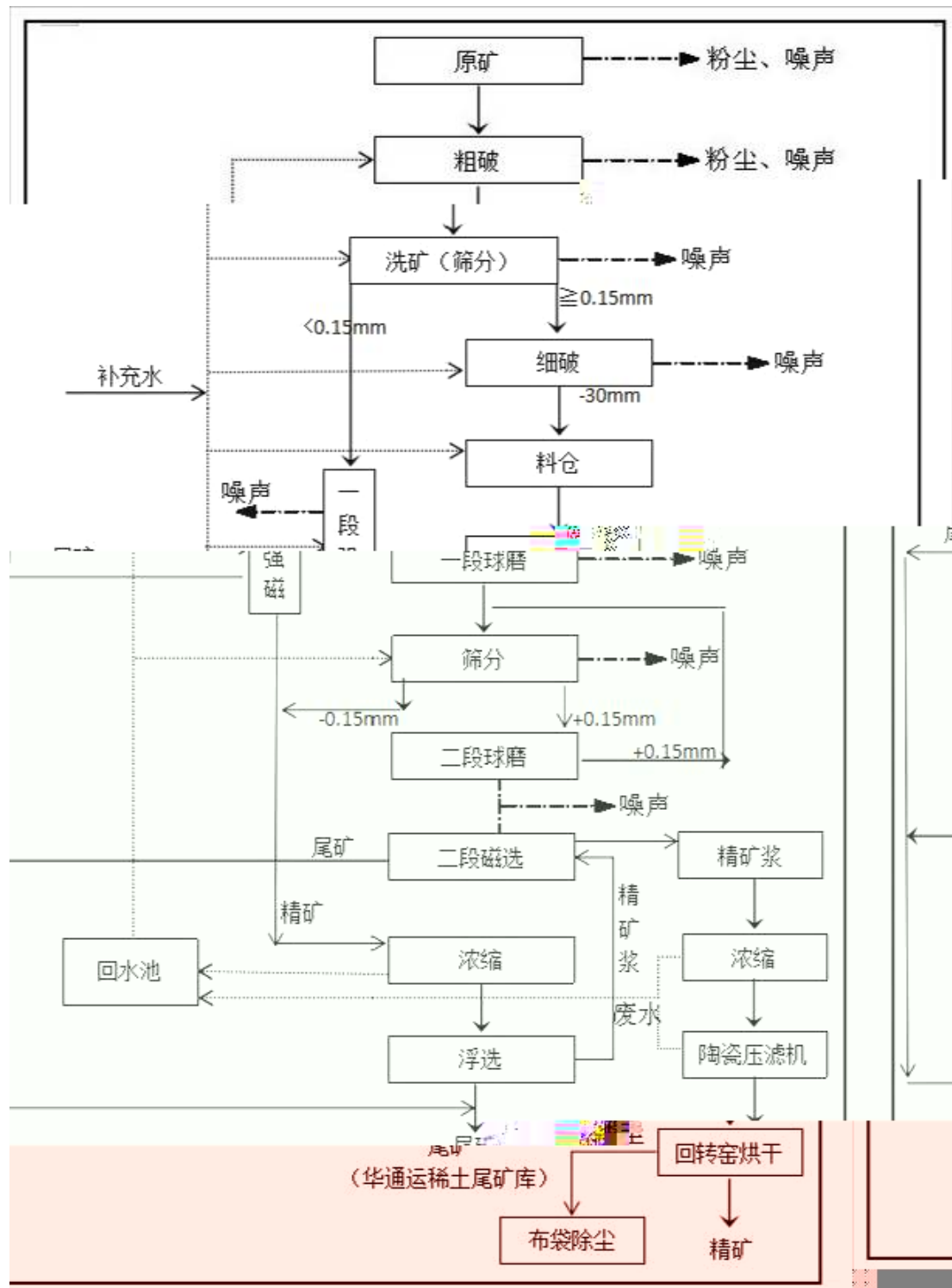
4

1.75km

3-7



3-6



3-7

1	26 t/a	TREO 3.52%	9595 t/a
TREO	65%	3.2-1	

	(t/a)	(%)	(%)	(%)
			TREO	TREO
	0.96	3.69	62	65
	25.04	96.31	1.28	35
	26.00	100.0	3.52	100.00

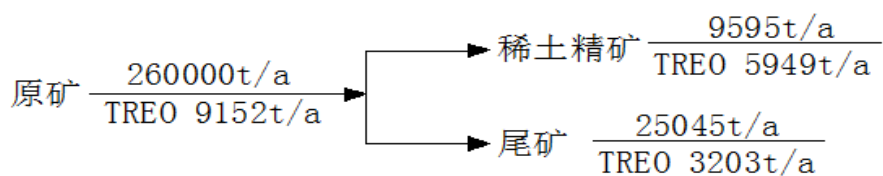
2 TREO

3.2-2

3-8

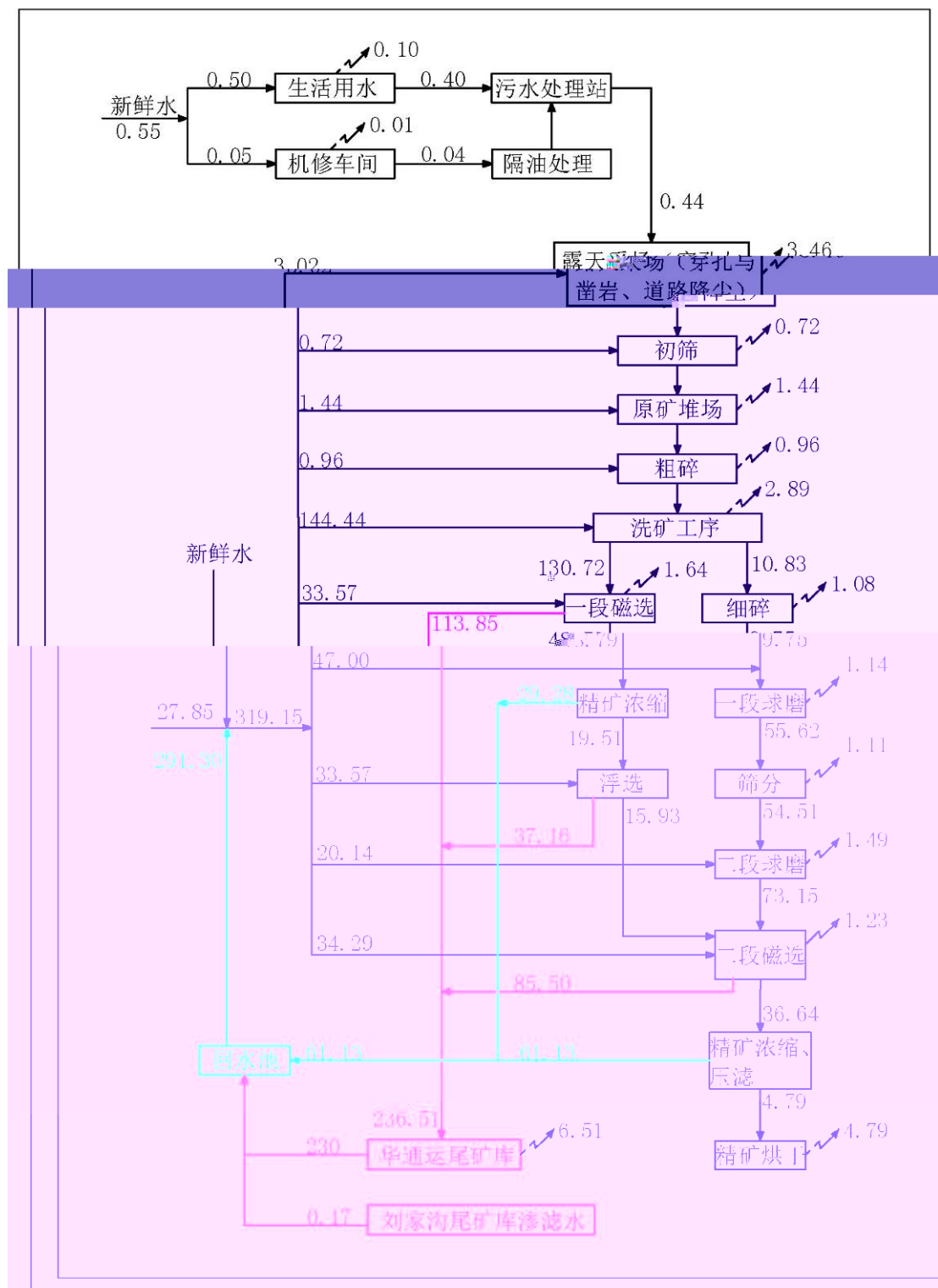
	t/a		t/a
	260000		9595
			250405
	260000		260000

	TREO t/a		TREO t/a
TREO 3.52%	9152	TREO 62%	5949
		TREO 1.28%	3203
	9152		9152



1

120 12m³/d 9.6m³/d 0.40
 m³/h 1 20m³/d



20%

1

2

2

3

2

1

2

1

1

3

4

1.2m

2

5

20%

200m

0 30m

20%

6

2

2

15m

7

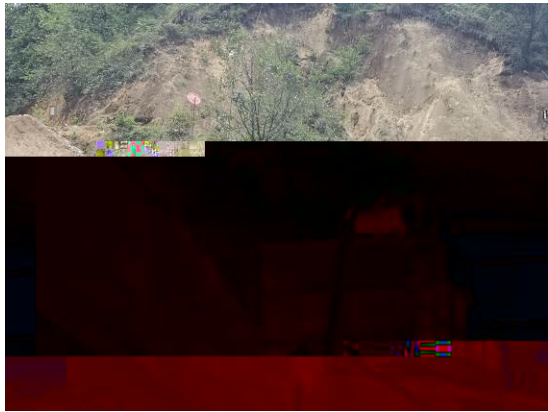
1

1

3.3-1

		TSP			
		TSP		1	
		TSP			
		TSP		1.2m	2
		SO ₂	1	+1	

	NO _x			
				2
		1	+1	
			5	
	SO ₂ NO _x	1		



2



1

120

9.6m³/d

2

291.13 m³/h

61.13m³/h

236.51 m³/h

230 m³/h

+

3

2018 11



120dB A

85-95dB(A)

70-95dB(A)

	224 t/a		2.8km
	25.04 t/a		1.75km

	18t/a			
	0.05 t/a	200L	11	HW08

1 2008 6

2008 6

2 2013 6

2013

2014



[2021]1

2

3976.06 m³

198.37m

116.15 m³/a 0.75

25.7

2020

2021 8

5

[2021]80 8

9 10

224 t

195 t

8140 t

2.1t/m³

3876.19 m³

4017.92 m³

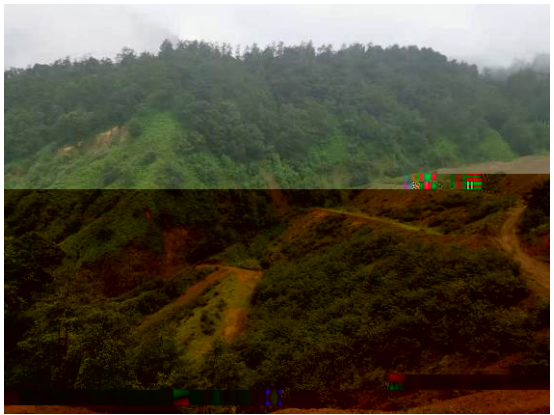
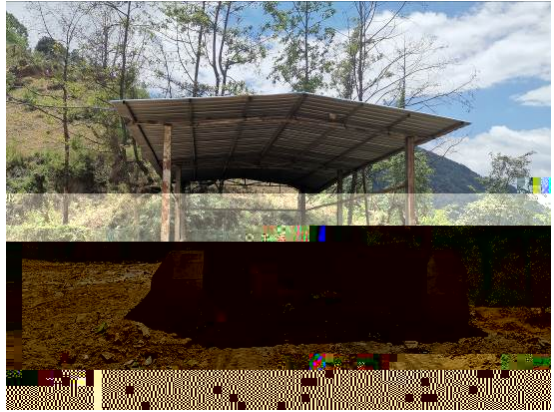


			21.25		3876.19
					m^3

A

			3976.06		m^3	
		26	t/a	25.04	t/a	19.26
m^3/a		20	t/a	25.04	t/a	18.98
m^3/a		38.24	m^3/a			

150	t/a	116.15	m^3/a			0.75
				25.7		





		-238		1	
		-226			
		-232		1.2m	
				2	

			2	

		-238 -226 -232		1 4m ³

3.1-3

1Bq/g

2.8km

1.75km

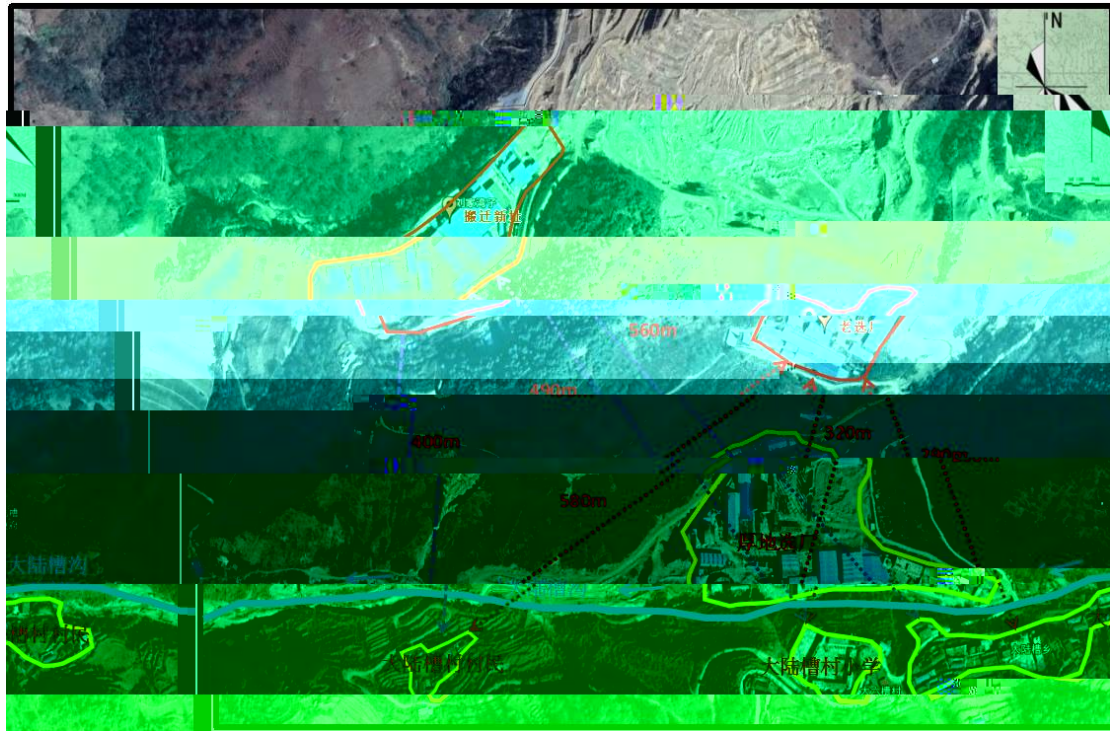
2020 688

26 /a

2016

2016 10

200m



		400m/98m	580m/84m	13
		560m/30m	290m/6m	35
		490m/26m	320m/2m	200
	2096m	2082m		
2			2020	

3.2.2

1

2

3

NO_x SO₂

4

- -

2

1

NO_x SO₂

2

2

1

2

3

2.8km

1.75km

1 10m³

1 30m³

4 14m³

2016 34

5 3

2016 10

1

2

26 /a

3

4

NO_x SO₂

5

6

7

8

2020 688

2016

31

2016

2016

3.5-1

	20000 /	500 /	9595t/a REO 5948.9 t/a 5000 /	26 t/a 62% REO
	GB26451-2011		1 2 3	2
	GB29435 2012			
	75%	10%	65%	5% 5%
	85%	75%	90%	65% 91.3% 85%

[2015]109	GB26451-2011	1 2 3 4 5	6 GB26451-2011 [2015]109
		1 2 3	2

	<p>GB18599 2001</p> <p>GB14500 2002</p>	<p>1</p> <p>2020</p> <p>2021 8 5</p> <p>[2021]80</p> <p>2 -232 1Bq/g -238 -226</p>	
		7	

3.5-1

2016



101°54 -102°29

2288.35km²

27°05 -27°36

58km

4-1

-

2400

1900

(F1)

310° 340°

45° 75°

I

60°

()

I

1





	(Q4 ^{el+dl})	(Q4 ^{al+pl})	(T3	J1bg)
		(O ₂)	()	
I		(Q4 ^{el+dl})		
			2	30m
	60-80	15	30	
	0	5m		
II		(Q4 ^{al+pl})		
			0.30	1.5m
				0.5
1.5m				
III		(T3-J1bg)		
			2	
I		(SO ₄)		
				(58 60)
	(18 25)	(10 20)	(0 5)	1 4mm
		SiO ₂ 54.81	CaO7.29	K ₂ O+Na ₂ O >3
SiO ₂				K ₂ O>Na ₂ O
II	(§)			

	SiO ₂ 60.28	TiO ₂ 0.34	Al ₂ O ₃ 17.64	Fe ₂ O ₃ 2.59
FeO 1.77	CaO 2.88	BaO 0.59	SrO 1.15	K ₂ O 5.99
Na ₂ O 4.68				
REO 0.11				
III	(Xc)			

—

,

—

1900m 2300m

400m



			-		
	70	100	330	59.9%	
10.8%			384		
					66
					100



1.8-1 1.8-2

	3	1997 2006	
		20 /	
		2015	38
		/	
		2015 2017	
		2021 8 5	
		[2021]80	

4-2

2

480m

2

4.3-1

4-3

1		TSP PM ₁₀	7	
2		TSP PM ₁₀	7	

PM₁₀

2021 5 27 -6 3 7 TSP PM₁₀

4.3-2

				mg/m ³
		GB/T 15432-1995	CRM0119705	0.001
PM ₁₀	PM ₁₀ PM _{2.5}	HJ 618-2011	CRM0119705	0.010

4.3-3

		TSP	PM ₁₀
		40—68	28—52

	%	22.67	34.67
		0	0
		56—86	32—45
	%	28.67	30.00
		0	0

TSP PM₁₀ 24

GB3096-2012

4 TSP

		9 17	9 18	9 19	%
1	TSP	198	193	185	66.00
2	TSP	221	218	205	73.67
3	TSP	188	206	162	68.67
4	TSP	229	239	212	79.67

TSP 24

GB3096-2012

2013 9 20 26

TSP

		TSP	%
		175~190	63.33
		208~231	77.00

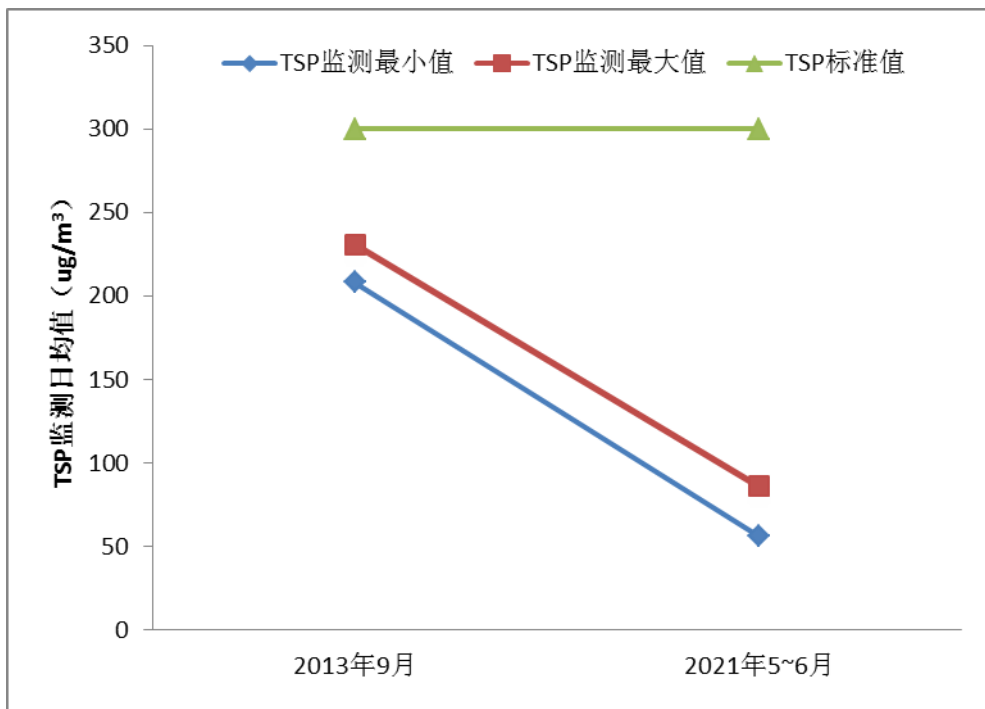
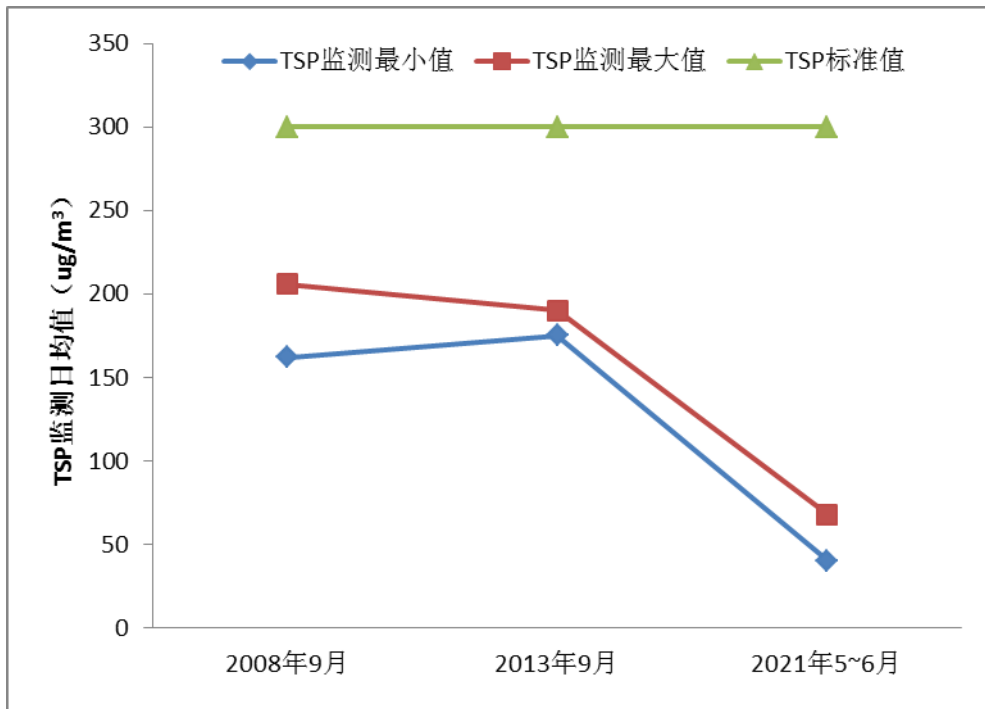
TSP 24

GB3096-2012

TSP

4-4

TSP



2

TSP

3

TSP PM₁₀

7

7

4.3-6

4-3

W1		pH	3	1
W2				
W3				
W4				
W5	500m			
W6	500m			
W7	500m	18		

pH

18

2021 6 3 5 3

4.3-7

				mg/L
		GB/T 13195-1991		/
pH	pH		pH 03410109101	/
		HJ 535-2009	10010946	0.025
				0.01
	-	HJ 823-2017	01C-1712096	0.001
F ⁻		HJ 84-2016	170221041	0.006
SO ₄ ²⁻		HJ 84-2016	170221041	0.018
		GB/T 16489-1996	10010946	0.005
		HJ 828-2017	COD 121703084	4
	()	HJ 970-2018		0.01
	65	HJ 700-2014	SN02334R	0.00008
	65	HJ 700-2014	SN02334R	0.00067
	-	HJ 694-2014	3000/214228	0.0003
		GB/T 7467-1987	10010946	0.004
	65	HJ 700-2014	SN02334R	0.00005
	-	HJ 694-2014	3000/214228	0.00004
	65	HJ 700-2014	SN02334R	0.00009

4.3-8

	W1	W2	W3	W4	W5	W6	W7	
	12.8-14.7	14.1-14.9	13.3-14.7	13.7-18.5	12.9-19.1	14.3-18.2	13.9-18.7	/
pH	7.52-7.90	7.76-7.82	7.43-7.87	7.85-8.28	7.86-8.17	8.10-8.16	7.64-7.73	6 9
	0.047-0.088	0.047-0.153	0.033-0.047	0.030-0.058	0.028-0.068	0.038-0.079	0.096-0.129	1.0

	0.02-0.03	0.02-0.04	0.02-0.03	0.03-0.05	0.02	0.08-0.10	0.15-0.17	0.2
	ND	ND	ND	ND	ND	ND	ND	0.2
	0.027-0.040	0.090-0.229	0.074-0.085	0.384-1.43	0.081-0.093	0.668-0.838	3.70-6.33	1.0
SO ₄ ²⁻	3.39-3.65	5.19-40.1	9.80-10.2	25.1-90.8	4.42-8.64	6.22-61.6	189-200	250
	0.008-0.017	0.022-0.026	ND	0.036-0.068	0.005-0.008	0.022-0.061	0.050-0.075	0.2
COD	8-16	5-15	ND-6	5-7	4-7	ND	7-8	20
	ND	ND	ND	ND	ND	ND	ND	0.05
	0.00032-0.00079	0.00021-0.00050	0.00032-0.00040	0.00052-0.00063	0.00023-0.00036	0.00034-0.00064	0.00146-0.00170	1.0
	0.00090-0.00280	0.00089-0.00229	0.00070-0.00572	0.00177-0.00191	0.00354-0.00527	0.00246	0.00109-0.00196	1.0
	ND	0.0003-0.0004	ND	ND	ND	ND	0.0005-0.0011	0.05
	ND	ND	ND	ND	ND	ND	ND	0.05
	ND	ND	ND	ND	ND	ND	0.00037-0.00040	0.005
	ND	ND	ND	ND	ND	ND	ND	0.0001
	0.00016-0.00045	0.00017-0.00054	0.00012-0.00092	0.00030-0.00068	0.00017-0.00069	0.00054-0.00095	0.00192-0.00477	0.05

pH mg/L ND

4.3-9

	W1	W2	W3	W4	W5	W6	W7	
pH	0.45	0.41	0.435	0.64	0.585	0.58	0.365	/
	0.088	0.153	0.047	0.058	0.068	0.079	0.129	
	0.15	0.2	0.15	0.25	0.1	0.5	0.85	
	0.04	0.229	0.085		0.093	0.838		
	0.0146	0.1604	0.0408	0.3632	0.03456	0.2464	0.8	
	0.085	0.13		0.34	0.04	0.305	0.375	

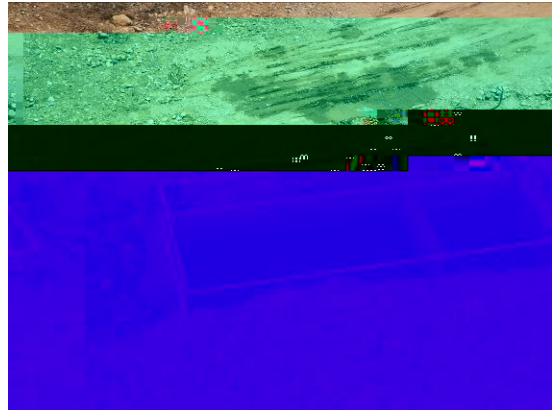
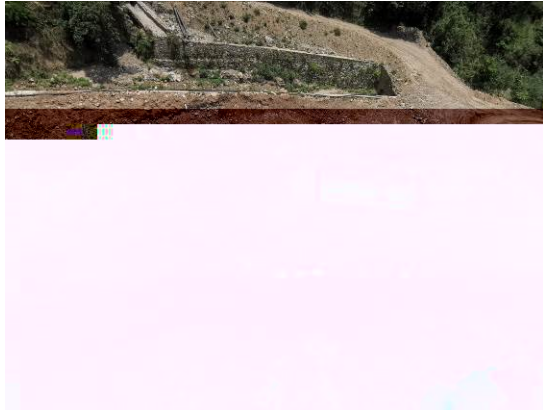
COD	0.8	0.75	0.3	0.35	0.35		0.4	
	0.00079	0.0005	0.0004	0.00063	0.00036	0.00064	0.0017	
	0.0028	0.00229	0.00572	0.00191	0.00527	0.00246	0.00196	
		0.008					0.022	
							0.08	
	0.009	0.0108	0.0184	0.136	0.0138	0.19	0.0954	

“ ”

1 W4 W7 W4
66.7% 0.43 W7 100%
5.33
2
GB3838-2002

1 W4
W4
W4

1
15m 5m 3.5m 262m³



2 W7

W7

2021 6



2#

III
 2 (GB3838 2002)
 3

19 5 2008 9 18
 pH SS CODcr
 F⁻ As Pb Cd 8

	7.72-7.83	22-24	5.6-6.2	0.0105-0.0195	ND	0.19-0.23	0.00030-0.00035	ND	
	0.36-0.42	-	0.28-0.31	0.21-0.39	/	0.19-0.23	0.006-0.007	/	
%	0	-	0	0	0	0	0	0	0
	7.77-7.79	20-24	4.8-5.2	0.0109-0.0233	ND	0.73-0.78	0.00033-0.00038	ND	
	0.39-0.40	-	0.24-0.26	0.22-0.47	/	0.73-0.78	0.007-0.008	/	
%	0	-	0	0	0	0	0	0	0

	%	0	-	0	0	0	0	0	0
--	---	---	---	---	---	---	---	---	---

Hg	ND	ND	ND	ND	ND	0.0001
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4.3-14

/						
pH	0.360	0.365	0.390	0.510	0.460	
COD	0.400	0.375	0.390	0.525	0.560	
DO	0.206	0.272	0.356	0.366	0.384	
NH ₃ -N	0.102	0.086	0.086	0.132	0.142	
F ⁻	0.150	0.150	0.200	0.220	0.250	
	0.030	0.030	0.030	0.030	0.030	
As	0.0009	0.0009	0.0009	0.0009	0.0009	
Cr ⁶⁺	0.120	0.080	0.100	0.120	0.120	
Cd	0.002	0.002	0.002	0.002	0.002	
Pb	0.0006	0.0006	0.0006	0.090	0.066	
Hg	0.025	0.025	0.025	0.025	0.025	

pH

GB3838-2002

4

4.3-15

	2008 9	7.72-7.83	5.6-6.2	0.0105-0.0195	ND	0.19-0.23	0.00030-0.00035	/	/
	2013 9	7.68~7.72	7.6~8.0	ND	ND	0.11~0.15	ND	0.096~0.102	ND~0.006
	2021 6-12	7.43-7.87	ND~6	ND	0.00012- 0.00092	0.073-0.119	ND	0.033-0.047	ND
	2008 9	7.47-7.50	15.4-16.0	ND-0.0067	ND	0.30-0.36	0.00169-0.00173	/	/
	2013 9	7.74~7.78	7.2~7.8	ND	ND	0.17~0.20	ND	0.087~0.096	ND~0.005
	2021 6-12	7.85-8.28	5~7	ND	0.00030-0.0068	0.656-0.726	ND	0.030-0.058	ND
	2008 9	7.77-7.79	4.8-5.2	0.0109-0.0233	ND	0.73-0.78	0.00033-0.00038	/	/
	2013 9	7.67~7.73	6.9~7.5	ND	ND	0.13~0.15	ND	0.089~0.096	ND~0.004
	2021 6-12	7.86-8.17	4~7	ND	0.00017-0.00069	0.084-0.108	ND	0.028-0.068	ND
	2008 9	7.80-7.83	9.2-9.7	0.0056-0.0073	0.0477-0.0483	ND	ND	/	/
	2013 9	7.95~8.02	9.8~10.5	ND	0.0038~0.0045	0.19~0.22	ND	0.129~0.132	ND~0.006
	2021 6-12	8.10-8.16	ND	ND	0.00054-0.0095	0.334-0.378	ND	0.038-0.079	ND
	/	6~9	20	0.05	0.05	1.0	0.05	1.0	0.05

pH

GB3838-2002

1

Pb

W3 W4 W5 3

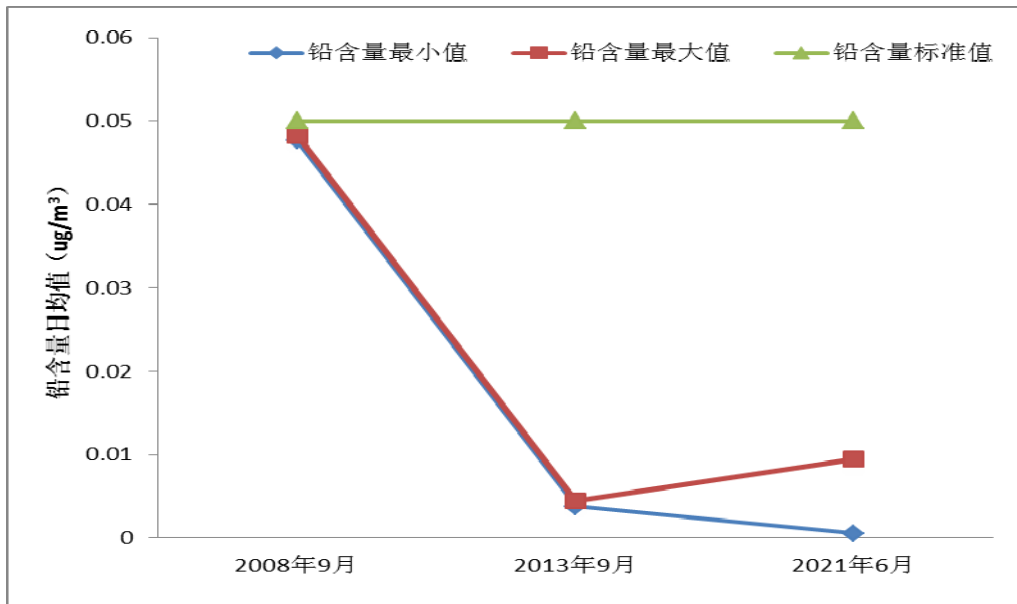
Pb

Pb

3

W6

4-6



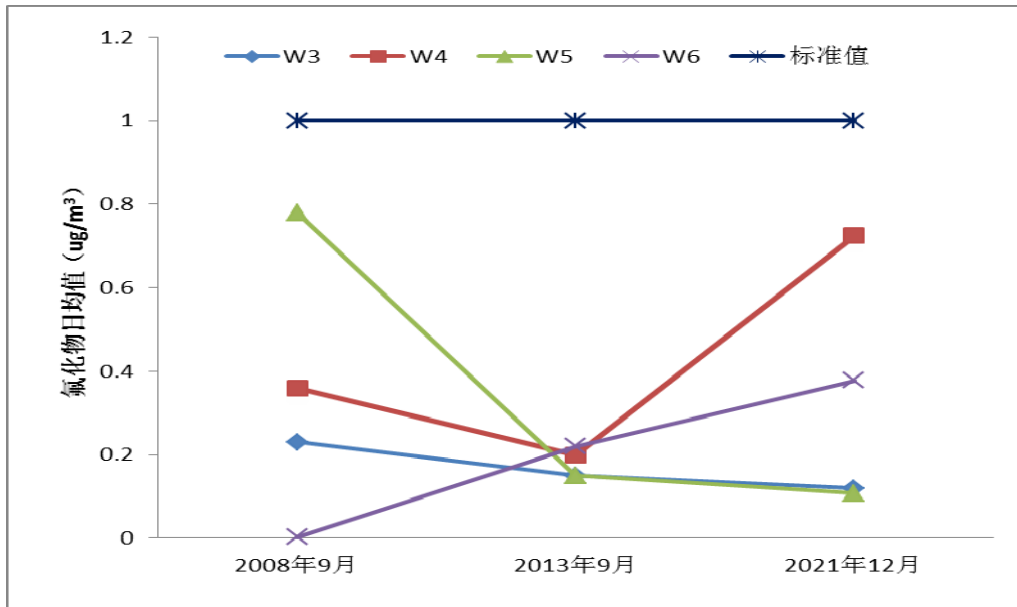
2

4

W3 W5

W4 W6

4-7



4

4.3-16

4-3

1	1	CO_3^{2-}	HCO_3^-	K^+	Na^+	Ca^{2+}	Mg^{2+}		
2	2			Cl^-	SO_4^{2-}				
3				pH				1	1
4									

K⁺ Na⁺ Ca²⁺ Mg²⁺ CO₃²⁻ HCO₃⁻ Cl⁻ SO₄²⁻
pH

2021 6 4 1

4.3-17

				mg/L
pH	pH	DZ/T 0064.5-1993	pH B0029631	/
		DZ/T 0064.49-93	SD25-8	/
		DZ/T 0064.49-93	SD25-8	/
CaCO ₃	EDTA	GB/T 7477-1987	SD25-3	5
		DZ/T 0064.9-1993	B330601301	/
		HJ 535-2009	10010946	0.025
N		HJ 84-2016	170221041	0.004
N		HJ 84-2016	170221041	0.005
		HJ 823-2017	01C-1712096	0.001
F ⁻		HJ 84-2016	170221041	0.006
Cl ⁻		HJ 84-2016	170221041	0.007
SO ₄ ²⁻		HJ 84-2016	170221041	0.018
		GB 11892-1989	SD25-6	0.5

	()	HJ 970-2018	23-1901-01-0270	0.01
	-4-	HJ 825-2017	01C-1712096	0.002
	32	HJ 776-2015	IC63DU134301	0.12
	32	HJ 776-2015	IC63DU134301	0.02
	32	HJ 776-2015	IC63DU134301	0.05
	32	HJ 776-2015	IC63DU134301	0.02
	65	HJ 700-2014	SN02334R	0.00011
	32	HJ 776-2015	IC63DU134301	0.01
	32	HJ 776-2015	IC63DU134301	0.01
	65	HJ 700-2014	SN02334R	0.00008
	65	HJ 700-2014	SN02334R	0.00067
	-	HJ 694-2014	3000/214228	0.0003
		GB/T 7467-1987	10010946	0.004
	-	HJ 694-2014	3000/214228	0.00004
	65	HJ 700-2014	SN02334R	0.00009
		HJ 1000-2018	140373	1cfu/mL
		GB/T 5750.12-2006	140373	20MPN/L

4.3-18

	1#	2#	3#	4#	
pH	7.59	7.31	7.45	6.72	6.5 8.5

	199	193	186	128	/
					/
	294	321	192	160	450
	0.047	0.037	0.071	0.317	0.5
					1.0
	0.606	0.884	0.498	0.923	20
					0.05
	2.81	2.22	2.08	1.39	1.0
	1.37	1.03	0.842	1.52	250
	169	194	73.2	64.5	250
	1.0	1.9	1.0	1.5	3
	0.05	0.04			/
					0.002
	444	480	275	253	1000
	23.1	18.1	14.8	7.57	200
			0.28	0.01	0.1
			0.01	0.02	0.3
	0.00084	0.00083	0.00042	0.00130	1.0
	0.0127	0.0102	0.00250	0.0136	1.0
		0.0003			0.01
					0.05
					0.001
	0.00064	0.00045	0.00242	0.0118	0.01
	84	35	56	49	100
					3.0

pH	0.39	0.21	0.3	0.56	/
CaCO ₃	0.65	0.71	0.43	0.36	
	0.094	0.074	0.142	0.634	
N	/	/	/	/	
N	0.0303	0.0442	0.0249	0.04615	

	/	/	/	/	
Cl ⁻	0.00548	0.00412	0.003368	0.00608	
SO ₄ ²⁻	0.676	0.776	0.2928	0.258	
CODmn	0.33	0.63	0.33	0.5	
	/	/	/	/	
	0.444	0.48	0.275	0.253	
	0.1155	0.0905	0.074	0.03785	
				0.1	
	/	/	0.033	0.067	
	0.00084	0.00083	0.00042	0.0013	
	0.0127	0.0102	0.0025	0.0136	
	/	0.03	/	/	
	/	/	/	/	
	/	/	/	/	
	0.064	0.045	0.242		
	0.84	0.35	0.56	0.49	
	/	/	/	/	

3#

4#

GB/T14848-2017

1

4
4.3-20

1
4-3

5

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1								
2		1		K ⁺	Na ⁺	Ca ²⁺		
3		Mg ²⁺	CO ₃ ²⁻	HCO ₃ ⁻	Cl ⁻	SO ₄ ²⁻		
4		2		pH			1	1
5								

K⁺ Na⁺ Ca²⁺ Mg²⁺ CO₃²⁻ HCO₃⁻ Cl⁻ SO₄²⁻
pH

2021 12 25 1

4.3-21

pH							
	7.1	7.2	7.3	7.2	7.1	6.5	8.5
	80	225	214	195	145	/	
	ND	ND	ND	ND	ND	/	
	58.5	218	296	192	130	450	
	0.049	0.057	0.063	0.066	0.056	0.5	
	ND	ND	ND	ND	ND	1.0	
	0.174	0.905	0.285	0.176	0.352	20	
	ND	ND	ND	ND	ND	0.05	
	0.242	3.82	2.12	2.37	1.63	1.0	
	1.70	3.13	1.94	2.32	13.0	250	
	8.40	49.7	127	53.0	60.5	250	
CODmn	0.98	0.88	0.96	0.80	0.96	3	
	ND	ND	ND	ND	ND	/	

	ND	ND	ND	ND	ND	0.002
	75	277	370	237	226	1000
	ND	ND	ND	ND	ND	0.1
	ND	0.04	0.03	0.04	0.05	0.3
	ND	ND	ND	ND	ND	1.0
	ND	ND	ND	ND	ND	1.0
	ND	ND	ND	ND	ND	0.01
	ND	ND	ND	ND	ND	0.05
	ND	ND	ND	ND	ND	0.001
	ND	ND	ND	ND	1.6×10^{-4}	0.01
	ND	ND	ND	ND	7×10^{-5}	
MPN/L						
CFU/L						

4.3-22

	/	/	/	/	/	
	/	/	/	/	/	
	/	/	/	/	0.02	
	/	/	/	/	0.01	

1

GB/T14848-2017

2021 6

2 5

1#

4

2021 6

2022 12 1

5

4.3-23

4-3

1				
2				
3			1 1	
4				
5				

4.3-24

	1#	2#	3#	4#	5#	
	0.213					1.0

1#

2#

3# 5#

2021 6

2021 12

1 Ä./°`CX

Ä1 Ä./ f(© ± ú./#2« »

N©- ./j./ f+a Ê W,´./79 f ú! T x,´4ö5•794ô @ Ä W79]pG +a4ö5•79
 r“K` Ü »00 O./#4ô @ ÄÄW./79 j.äg“- F [MCE¹:T.#KfGý!.# »00 O./# È
 ! @ j./ f h ó x T x,´4ö79 V j4ö5•79 r“K` Ü »00 O./# F AGý4ö5•79 \$' 8
 .#9!L K` Ü »00 O./ È4ÿ.d.¾ úNp F#û% ÈJñ E³ j&ø Ä

N©- 00 O./#2« »+a:T.#Gý!.# »00 O./# r4ö5•79 »00 O./# È00 O./ (™
 "O.ãJø./ j k È REOñ }+aQ F@\$@L} ~ Ä

Ä2 Ä.Ä./ d+O:T.#

IN©- 00 O./ (™ "O.ãJø./ j k È d+O 9:T.#./ È ./.#] F [GýEî` 19.00%Ä
 >~ 4.3-25 DL01ÄDL02 'B gÄ./F – @ 6

./g 5F'	6 Ä 5 ìÄ Wt% Ä											
	REO	BaO	SrO	F	Pb	Zn	SiO	TiO ₂	AL ₂ O ₃	Fe ₂ O ₃	FeO	MnO
DL01	8.41	7.16	14.52	19.8	0.29	0.04	5.52	0	0.73	1.18	0.06	0.197
DL02	5.88	7.21	24.12	9.58	0.16	0.032	6.85	0.005	0.212	0.074	0.707	0.218

./g 5F'	6 Ä 5 ìÄ Wt% Ä											
	CaO	MgO	NaO	K ₂ O	P ₂ O ₅	S	CO ₂	ThO ₂	U	H ₂ O ⁺	H ₂ O ^F	kgÿ
DL01	30.44	0.7	0.094	0.13	0.26	4.43	4.19	0.001	0.01	1.46	0.29	99.9622
DL02	33.42	0	0.09	0.13	0.043	7.79	2.55	0.002	0.0029	0.9	0.22	99.981

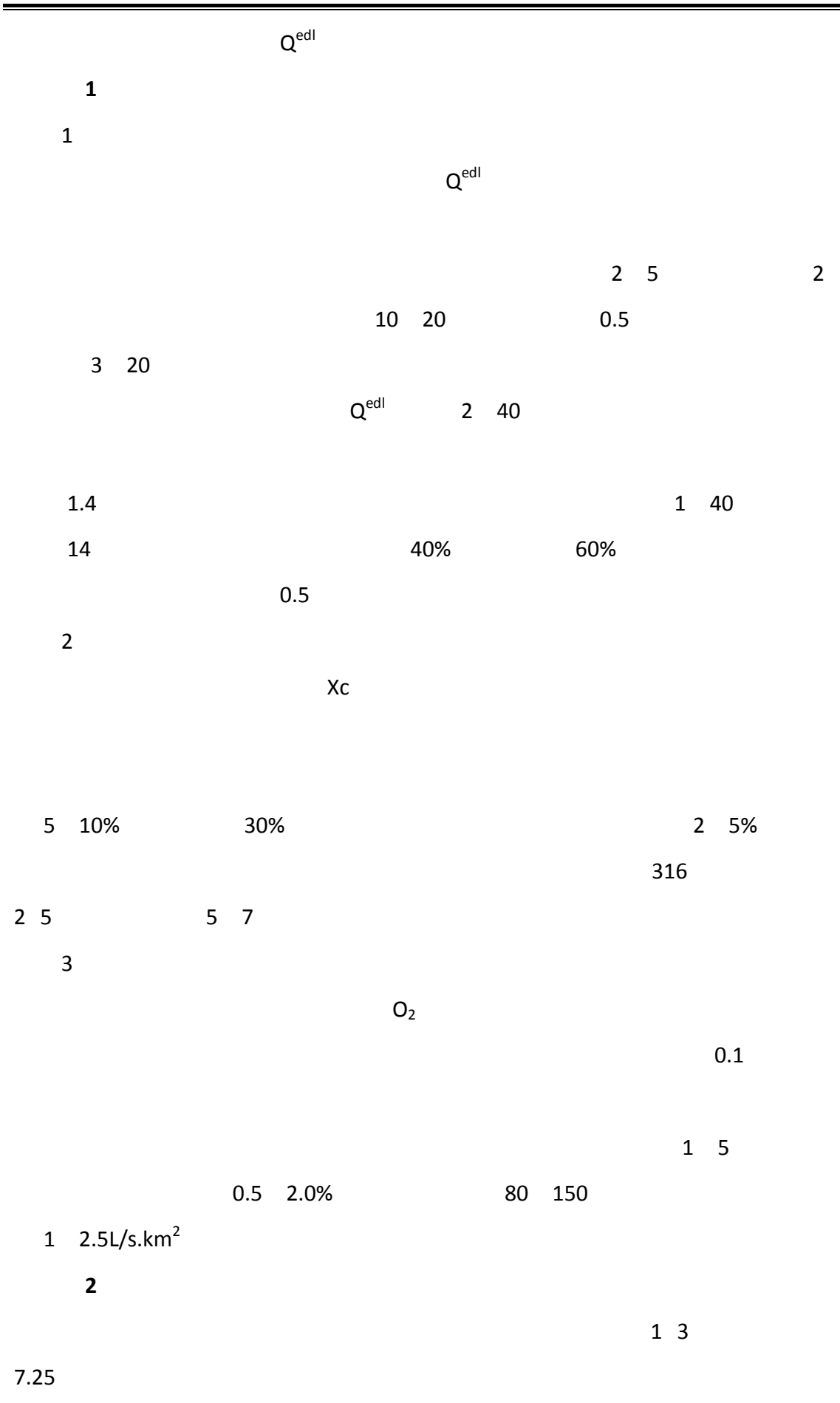
Ä3 Ä./.#, 'Np F0; Ö

IN©- 00 O./ °, 'Np F œ+X j&ø ÈNp F\$! Ö X 200m ; Ä `>~ 0 ü30m W
 G 6 _2' [(œ./.# Ä =1Ñ _./.#./ (™ F79.#./ (™ wF• = <0; Ö, 'Np F#û% œ+X
 ¼ s3P, 'Eñ0+ üLö œ+X È(© [_MCE¹.# ÄU Áý ÄQL .#1yJñKq Ç8ç./ (™ J>ÛNp
 F xU 8ç+ç ® O(œ (™ Ä

"O.ãJø./ (™*6Np F j k È X"W F V µ x.¾2Ä Ä2é2¹(œ Ä:T.# J>ÛNp F.d.¾
 x W ? =1y,´.¾2Ä(œ ÈMCE¹.# X `>~ j&øNp F ' @+ç ®,´?@U 8çJñK` O ÄTôJñ
 ./"W F @?@Jñ./ Ä+a ¾./.#Np F j&ø È8\$`./## F)-Eî 20% : Ä

2 Ä./j"d`CX

i ž È -1 ç < i WLv '00 O./j ž `CX Ö z È Ä ` p 0 O •
 `CXLO Ä È./j 6 3 ` r k?± 9\$' 8.#9!L K` Ü ¥ O₂ Ä á W! "K` Ü ` È.äg“- F



4 8 80%

1902.12

3

40 50m 80 90m

3

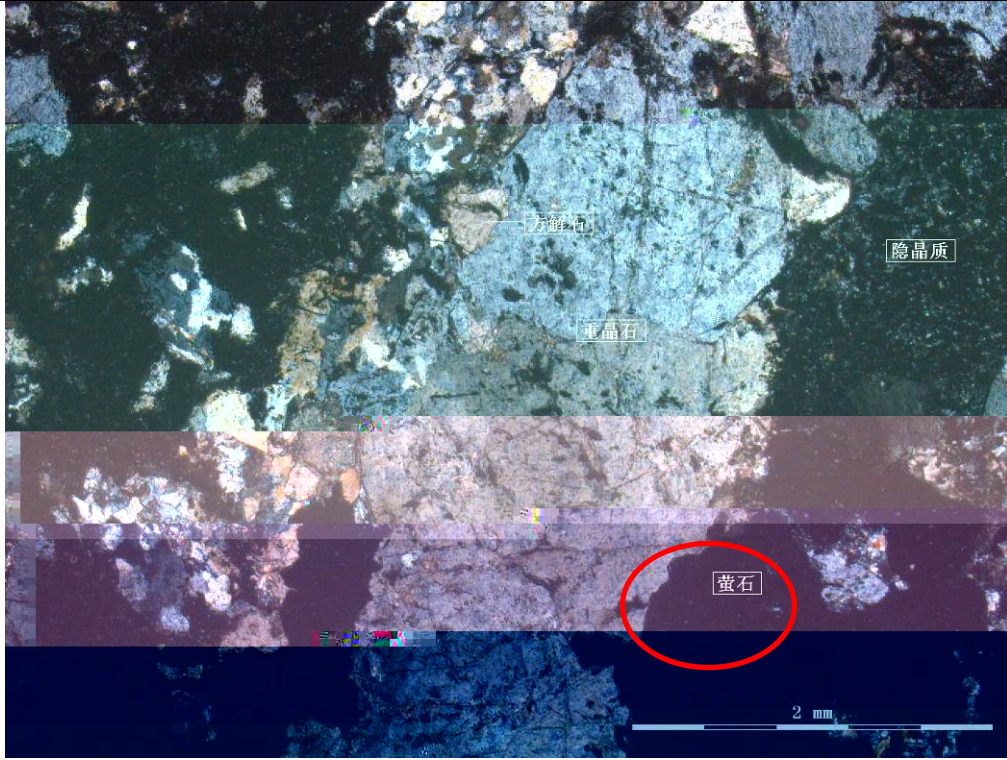
2022 5 6

3

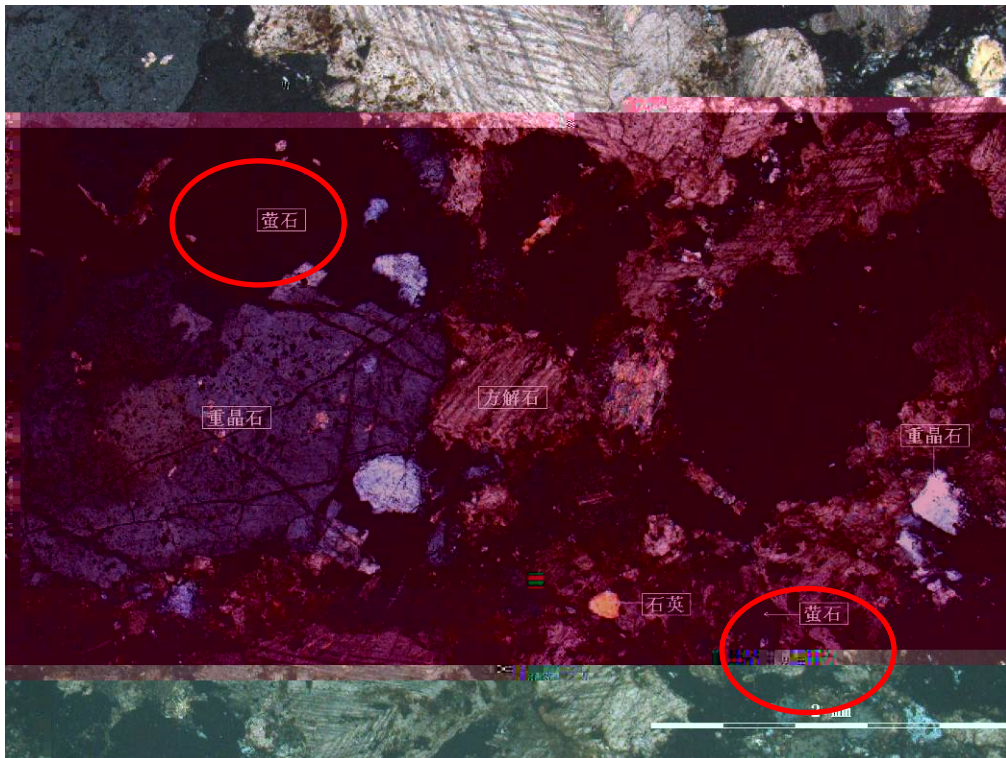
17

		2022 5	2022 6
1		5mm 60	
2			
3			

			60 6mm
--	--	--	-----------



4-8 2022 5



4-9 2022 6

19.00%

200m

2013 9 20 22

pH

pH	7.72~7.78	7.83~7.87	6.5~8.5
	208~225	198~212	450
	9.47~9.56	8.95~9.07	250
	0.032~0.036	0.035~0.038	/
	0.10~0.12	0.10~0.13	1.0
	ND	ND	0.05
	ND	ND	0.01
	ND	ND	0.05
	ND	ND	0.001
	ND	ND	0.05

ND

pH	0.520	0.580
	0.500	0.471

	0.038	0.036
	0.12	0.13
	0.0006	0.0006
	0.001	0.001
	0.0009	0.0009
	0.003	0.003
	0.040	0.040

1

2013 9

1

GB/T14848-2017

2

2

7

200m

7

4.3-29

4-3

1	1m	2	A 1
2	1m		
3	1m		
4	1m		
5	1m		
6	1m		
7	1m		

A

2021 5 25 -5 26 1

GB 12348-2008

4.3-30

				dB(A)

1		46.0	37.4
2		47.0	37.5
3		49.2	36.9
4		42.2	37.1
5		44.1	38.1
6		45.9	40.1
7		45.5	41.9
8		41.7	38.5

GB3096-2008 2

2013 9 20 21

1#	1m	52.0	41.5	51.6	40.9	60	50
2#	1m	51.6	40.9	52.2	41.6		
3#	1m	52.4	42.3	53.0	40.8		
4#	1m	53.2	41.8	51.8	42.0		
5#		51.8	41.2	52.3	40.9		

GB3096-2008 2

1

GB 12348-2008 2

2



1#		45	GB36600-2018	1	0~0.5m
					0.5~1.5m 1.5~3m
2#			pH		

2

pH

3

2021 12 24 1

4

4.3-35

		HJ/T 166-2004	\	\
pH	pH	HJ 962-2018	PHSJ-4F CDYDFX030	
	/	HJ 680-2013	AFS-8220 CDYDFX042	0.01 mg/kg
	12 -	HJ 803-2016	ICAP RQ CDYDFX050	0.07 mg/kg
	12 -	HJ 803-2016	ICAP RQ CDYDFX050	2 mg/kg
	-	HJ 1082-2019	ICE-3500 / CDYDFX041	0.5 mg/kg
		HJ 491-2019	ICE-3500 / CDYDFX041	1 mg/kg
		HJ 491-2019	ICE-3500 / CDYDFX041	1 mg/kg
	12 -	HJ 803-2016	ICAP RQ CDYDFX050	2 mg/kg
	/	HJ 680-2013	AFS-8220 CDYDFX042	0.002 mg/kg
		HJ 491-2019	ICE-3500 / CDYDFX041	3 mg/kg

	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0013 mg/kg
	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0011 mg/kg
	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0010 mg/kg
1,1-	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0012 mg/kg
1,2-	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0013 mg/kg
1,1-	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0010 mg/kg
-1,2-	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0013 mg/kg
-1,2-	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0014 mg/kg
	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0015 mg/kg
1,2-	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0011 mg/kg
1,1,1,2-	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0012 mg/kg
1,1,2,2-	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0012 mg/kg
	/	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0014 mg/kg
1,1,1-		HJ 605-2011	Trace1300-ISQ QD	0.0013 mg/kg

	- /		CDYDFX046	
1,1,2-	- /	HJ 605-2011	Trace1300-ISQ QD CDYDFX046	0.0012 mg/kg

	-		CDYDFX046	
	-	HJ 834-2017	Trace1300-ISQ7000 CDYDFX051	0.09 mg/kg
	-	HJ 834-2017	Trace1300-ISQ7000 CDYDFX051	0.03 mg/kg
2-	-	HJ 834-2017	Trace1300-ISQ7000 CDYDFX051	0.06 mg/kg
[a]	-	HJ 834-2017	Trace1300-ISQ7000 CDYDFX051	0.1 mg/kg
[a]	-	HJ 834-2017	Trace1300-ISQ7000 CDYDFX051	0.1 mg/kg
[b]	-	HJ 834-2017	Trace1300-ISQ7000 CDYDFX051	0.2 mg/kg
[k]	-	HJ 834-2017	Trace1300-ISQ7000 CDYDFX051	0.1 mg/kg

	2021	12	24
	1#		
	20cm		
		9.40	
		0.26	
		52	
		340	
		0.116	
		22	
		ND	
		ND	
		ND	
1,1-		ND	
1,2-		ND	
1,1-		ND	
-1,2-		ND	
-1,2-		ND	
		ND	
1,2-		ND	
1,1,1,2-		ND	
1,1,2,2-		ND	
		ND	
1,1,1-		ND	
1,1,2-		ND	
		ND	
1,2,3-		ND	
		ND	
		ND	
		ND	
1,2-		ND	
1,4-		ND	
		ND	
		ND	
		ND	
+		ND	

	ND
	ND
	ND
2-	ND
[a]	ND
[a]	ND
[b]	ND
[k]	ND
	ND
[ah]	ND
[1,2,3-cd]	ND
	ND
pH	5.60
C ₁₀ -C ₄₀	20
	204
	ND

2021 12 24

	1.13	0.38	0.24
	ND	ND	ND
	162	182	224
	421	550	381
	430	474	226
	0.006	0.009	0.010
	24	18	15
C ₁₀ -C ₄₀	8	9	23
	pH	mg/kg	

	2021 12 24			2021 12 23	
	6#			7#	8#
	31cm	102cm	226cm	15cm	15cm
pH	7.79	7.71	7.16	7.22	7.86
	4.98	1.95	1.56	3.40	2.27
	0.24	0.17	0.22	0.11	0.51
	ND	ND	ND	ND	ND
	53	62	56	32	96
	151	168	186	93	168
	40	34	91	36	86
	0.049	0.029	0.025	0.014	0.009
	14	9	13	11	19
C ₁₀ -C ₄₀	17	12	12	21	23
	pH	mg/kg			

	2021 12 24			2021 12 23	
	9#			10#	11#
	38cm	76cm	160cm	17cm	18cm
pH	7.91	7.86	7.85	7.62	7.68
	3.67	4.03	4.05	2.34	7.12
	0.74	0.67	0.72	0.44	0.28
	ND	ND	ND		
				60	94
	88	81	86	50	52

	216	212	202	169	122
	699	583	506	158	122
	0.023	0.018	0.021	0.021	0.067
	21	27	29	20	42
C ₁₀ -C ₄₀	19	11	20	—	—
	pH			mg/kg	

1	pH	/	/	/	/	/	/	/	/
2		0.157	0.134	0.050	0.058	0.527	0.895	0.678	60
3		0.004	0.005	0.005	0.009	0.017	0.006	0.004	65
4		/	/	/	/	/	/	/	5.7
5		0.003	0.003	0.003	0.005	0.009	0.010	0.012	18000
6		/	/	/	/	/	/	/	/
7		0.425	0.829	0.505	0.866	0.538	0.593	0.283	800
8		0.003	0.003	0.001	0.000	0.000	0.000	0.000	38
9		0.024	0.022	0.029	0.029	0.027	0.020	0.017	900
10	C ₁₀ -C ₄₀	0.004	0.004	0.003	0.004	0.002	0.002	0.005	4500

1	pH	/	/	/	/	/	/		/
2		0.083	0.033	0.026	0.061	0.067	0.068		60

3		0.004	0.003	0.003	0.011	0.010	0.011		65
4		/	/	/	/	/	/		5.7
5		0.003	0.003	0.003	0.005	0.005	0.005		18000
6		/	/	/	/	/	/		/
7		0.050	0.043	0.114	0.874	0.729	0.633		800
8		0.001	0.001	0.001	0.001	0.000	0.001		38
9		0.016	0.010	0.014	0.023	0.030	0.032		900
10	C ₁₀ -C ₄₀	0.004	0.003	0.003	0.004	0.002	0.004		4500

						GB15618-2018	
1	pH	/	/	/	/	/	/
2		0.11	0.09	0.09	0.28		
3		0.37	0.85	0.73	0.47		
4		—	—	0.24	0.38		
5		0.32	0.96	0.5	0.52		
6		0.37	0.56	0.56	0.41		
7		0.30	0.50	0.93	0.72		
8		0.006	0.003	0.006	0.02		
9		0.11	0.1	0.10	0.22		

1# 2# 3# 4# 5# 6# 9#

GB36600-2018

7# 8# 10# 11#

GB15618-2018

2013 9

1

	mg/kg	GB36600-2018	
pH	5.78		/
Pb	112	800	0.14
Zn	147		
As	17.2	60	0.29
Hg	0.15	38	0.004
Cr	88.4		

GB36600 2018

1

2013

1

1

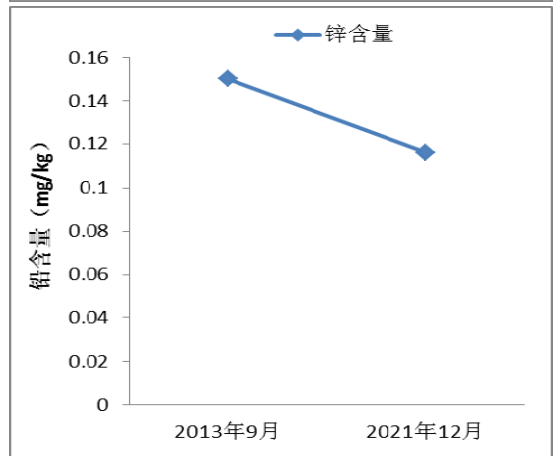
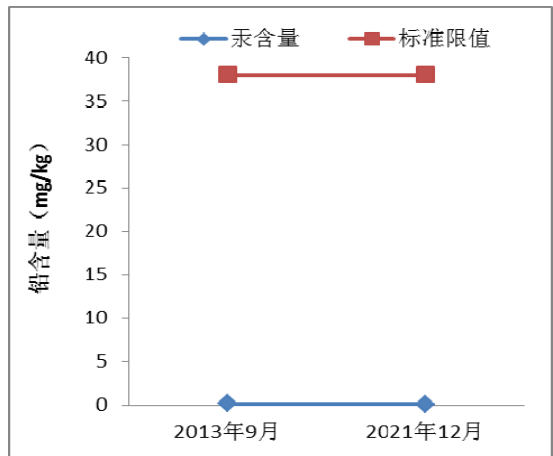
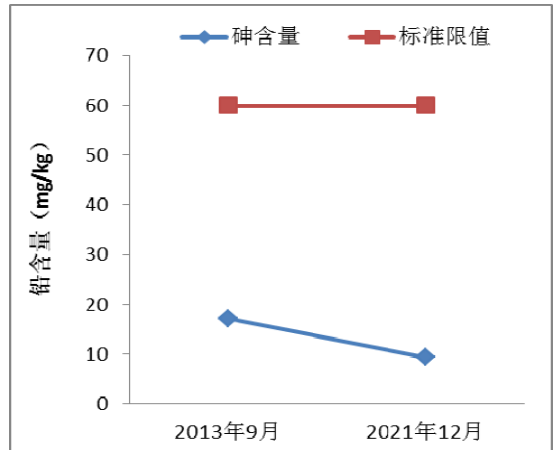
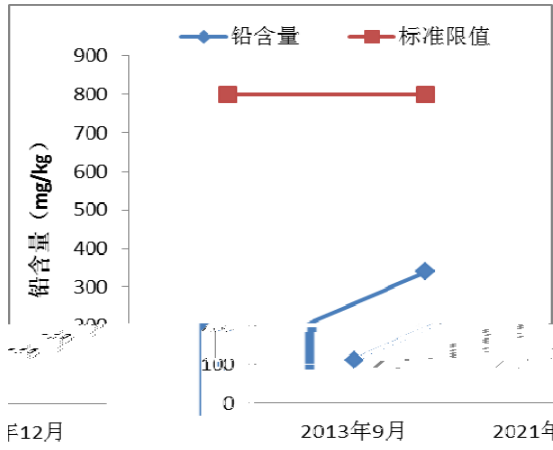
GB36600-2018

2

2013

2013

3



7

4.3-6

4-3

pH

9

2021

6

3

5

3

4.3-34

4.3-39

	2021 06 03						
	W1	W2	W3	W4	W5	W6	W7
		104	178	123	71	95	61	20
	28	19	30	27	46	28	11
	49	33	28	60	28	55	28
	258	108	112	179	73	169	223
	12.5	5.54	2.25	3.46	2.55	3.19	2.44
	0.78	0.17	0.22	0.47	0.11	0.49	0.90
	0.006	0.016	0.030	0.033	0.014	0.009	0.007
	450	68.3	48.2	622	37.3	572	539
pH	7.26	8.19	6.97	8.04	7.50	8.28	8.55
	pH			mg/kg			

1 W1 W2

2 W3 W4

3 W5 W6 W7

2013 9

30m	8.02	616	122	0.392	6.35	23.8
500m	8.41	2785	145	0.465	7.85	20.5

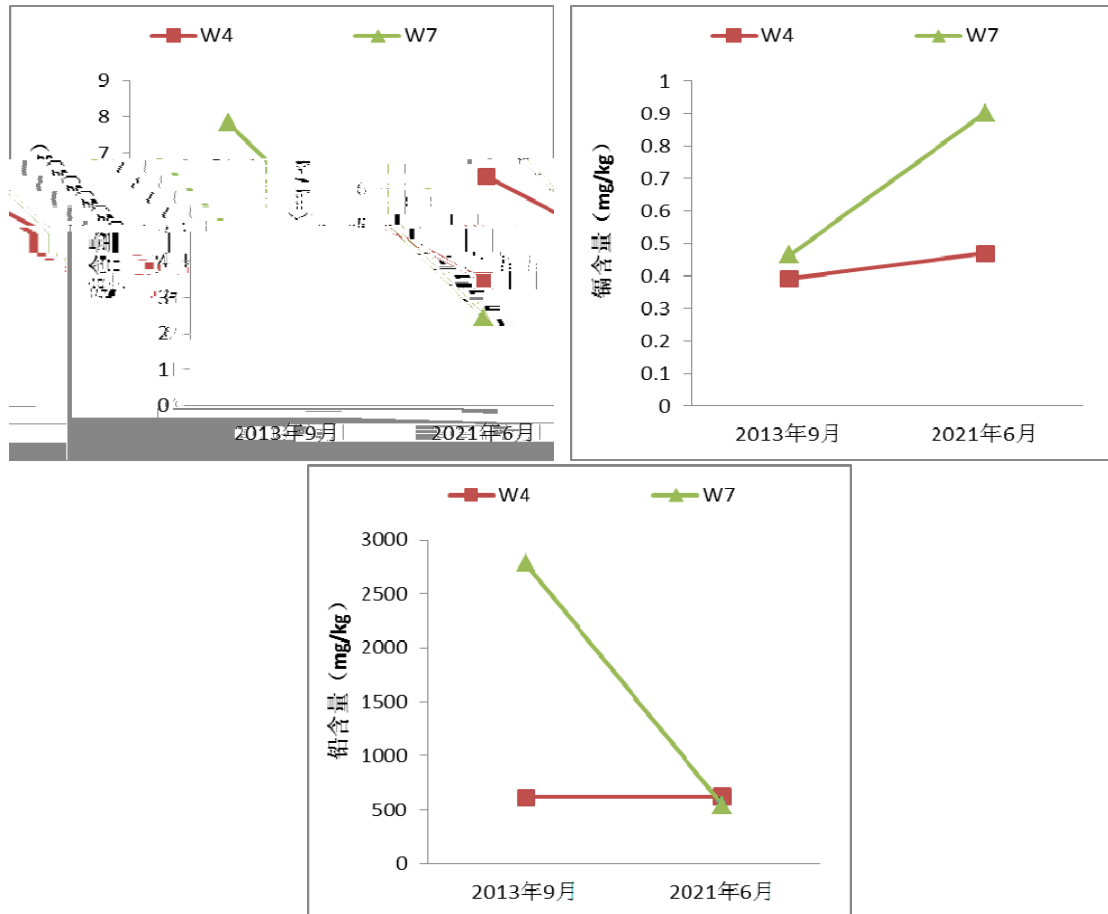
2013 9

W4 W7

1

2







2

1)

2)

()

2021 15

3

()



4

GIS

GPS

RS

“3S”

2021 10

2.1m

GIS

1

4.3-41

4-12

	()	(hm ²)	(%)
	11	16.75	5.04
	40	107.82	32.42
	57	50.78	15.27
	60	109.37	32.89
	18	2.39	0.72
	6	3.56	1.07
	5	1.39	0.42
	11	11.82	3.55
	7	28.66	8.62
	215	332.53	100.00

109.37

hm² 32.89%

107.82 hm²

32.42%

3.55% 8.62%

2

284.71
109.37hm²
85.62 %
32.89 %
78.45hm²
23.59 %
46.43hm²
13.96%
4-13

70%

	<i>Pinus yunnanensis</i>		
	<i>Pinus armandii Franch</i>		
	<i>Cunninghamia Lanceolata</i>		
	<i>Cryptomeria fortunei</i>		
	<i>Corylus yunnanensis</i>		
	<i>Pterocarya stenoptera</i>		
	<i>Alnus nepalensis</i>		
	<i>Alnus ferdinandicoburgii</i>		
	<i>Betula luminifera</i>		
	<i>Castanopsis orthacantha</i>		
	<i>Castanea mollissima</i>		
	<i>Castanopsis delavayi</i>		
	<i>Cyclobalanopsis glaucoides</i>		
	<i>Quercus franchetii</i>		
	<i>Quercus acutissima</i>		
	<i>Ficus tikoua</i>		
	<i>Broussonetia papyrifera</i>		
	<i>Morus mongolica</i>		
	<i>Pilea fasciata</i>		
	<i>Pellionia radicans</i>		

	<i>Debregeasia edulis</i>		
	<i>Rumex hastatus</i>		
	<i>Rumex nepalensis</i>		
	<i>Polygonum sp.</i>		
	<i>Chenopodium album</i>		
	<i>Stellaria media</i>		
	<i>Ranunculus sceleratus</i>		
	<i>Clematis sp</i>		
	<i>Mahonia sp</i>		
	<i>Phoebe chinensis</i>		
	<i>Neocinnamomum delavayi</i>		
	<i>Machilus yunnanensis</i>		
	<i>Litsea mollis</i>		
	<i>Capsella spp</i>		
	<i>Cotoneaster dielsianus</i>		
	<i>Cotoneaster horizontgalis</i>		
	<i>Potentilla Kleiniana</i>		
	<i>Pyracantha fortuneana</i>		
	<i>Rubus ellipticus var. obcordatus</i>		
	<i>Millettia nitida</i>		
	<i>Pueraria lobata</i>		
	<i>Oxalis corniculata</i>		
	<i>Phyllanthus emblica</i>		
	<i>Euphorbia helioscopia</i>		
	<i>Coriaria nepalensis</i>		
	<i>Dodonaea viscose</i>		

	<i>Pistacia weinmannifolia</i>		
	<i>Rhus chinensis</i>		
	<i>Euonymus yunnanensis</i>		
	<i>Euonymu przewalskii</i>		
	<i>Euonymu microcarpus</i>		
	<i>Dryopteris championi</i>		
	<i>Pteris spp.</i>		
	<i>Adiantum sp.</i>		
	<i>Acer paxii</i>		
	<i>Ampelopsis delavayana</i>		
	<i>Urena lobata</i>		
	<i>Schima argentea</i>		
	<i>Eurya sp</i>		
	<i>Camellia pitardii</i>		
	<i>Hypericum hookerianum</i>		
	<i>Viola philippica</i>		
	<i>Rhododendron spinuliferum</i>		
	<i>Rhododendron sp</i>		
	<i>Rhododendron yunnanense</i>		
	<i>Vaccinium fraicana</i>		
	<i>Myrsine Africana</i>		
	<i>Diospyros lotus</i>		
	<i>Buddleia davidii</i>		
	<i>Herba verbenae</i>		
	<i>Hedychium spicatum</i>		

Scutellaria amoena

	<i>Galium aparine</i>		
	<i>Paederia yunnanensis</i>		
	<i>Lonicera sp</i>		

	()	(hm ²)	(%)
	40	107.82	32.42
	57	50.78	15.27
	60	109.37	32.89
	11	16.75	5.04
	5	1.39	0.42
	42	46.43	13.96
	215	332.53	100.00

109.37

hm² 32.89%107.82 hm² 32.42%46.43 hm² 13.96%

4

32 7 22

147 11 30

20 6 14

		<i>Amphibia</i>
I		<i>Salientia</i>

i		<i>Bufo</i>
1		<i>Bufo andrewsi</i>
ii		<i>Rana</i>
2		<i>Rana hui</i>
		Reptilia
I		<i>Squamata</i>
i		<i>Scincidae</i>
1		<i>Scincella potanini</i>
ii		<i>Colubridae</i>
2		<i>Dinodon</i>
		Aves
I		<i>Columbiformes</i>
i		<i>Columbidae</i>
1		<i>Streptopelia orientalis</i>
ii		<i>Cuculidae</i>
2		<i>Cuculus poliocephalus</i>
		<i>Alcedinidae</i>
3		<i>Alcedo atthis</i>
		<i>Upupidae</i>
4		<i>Upupa epops</i>
		<i>Alaudidae</i>
5		<i>Alauda gulgula</i>
		<i>Hirundinidae</i>
6		<i>Hirundo rustica</i>
7		<i>Hirundo daurica</i>
		<i>Oriolidae</i>
8		<i>Oriolus chinensis</i>
		<i>Corvidae</i>
9		<i>Pica pica</i>

10		<i>Corvus macrorhynchos</i>
		<i>Paridae</i>
11		<i>Parus major</i>
		<i>Frinfillidea</i>
12		<i>Passer montanus</i>
		<i>Mammalia</i>
I		<i>Carnivora</i>
i		<i>muridae</i>
1		<i>Rattus nitidus</i>
ii		<i>microtiniae</i>
2		<i>Proedromys liangshanensis</i>
2		<i>Eothenomys custos</i>

5

4.3-47 4-16

	()	(hm ²)	(%)
	24	78.45	23.59
	16	29.37	8.83
	57	50.78	15.27
	60	109.37	32.89
	5	1.39	0.42
	11	16.75	5.04
	18	2.39	0.72
	24	44.04	13.24
	215	332.53	100.00

109.37 hm²

32.89%

78.45 hm²

23.59 %

44.04 hm²

13.24%

6

-

1049mm

10

5760

2008

1

2

-

2400m

1900m

3

90

2008 7

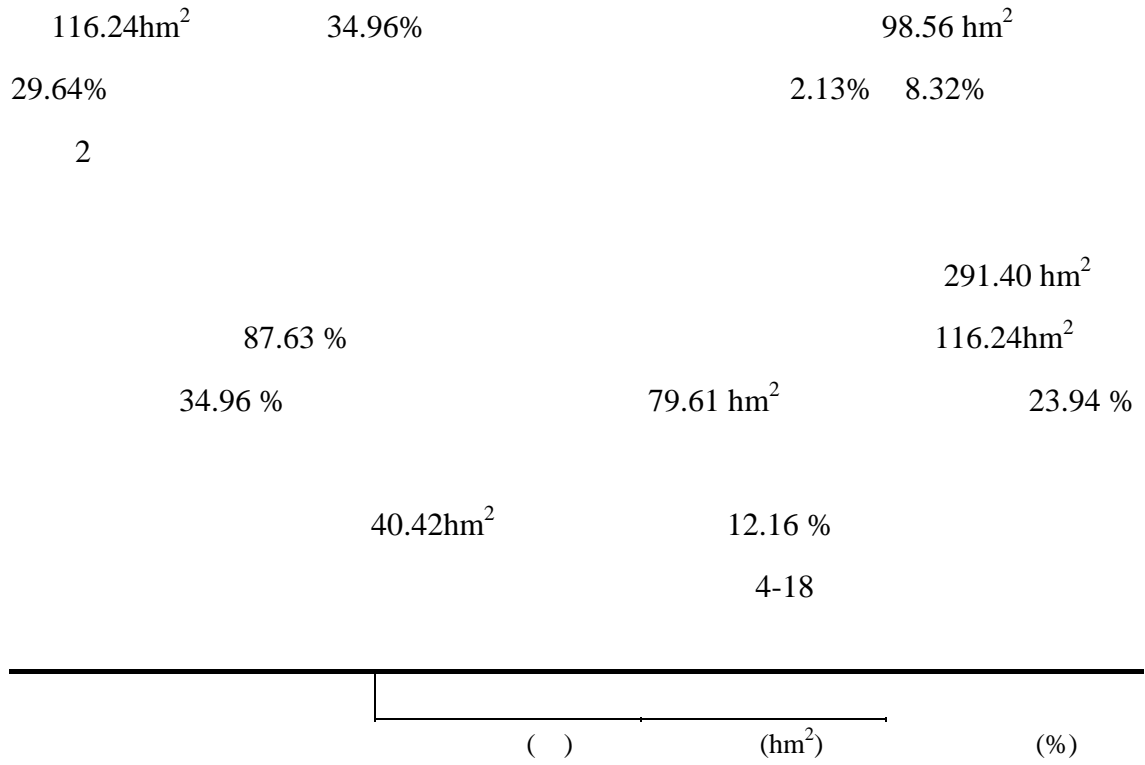
1

4.3-48

4-17

	()	(hm ²)	(%)
	12	21.39	6.43
	37	98.56	29.64
	63	55.21	16.60
	54	116.24	34.96
	18	2.40	0.72
	5	3.28	0.99
	3	0.70	0.21
	8	7.08	2.13
	11	27.67	8.32

	211	332.53	100.00
--	-----	--------	--------



98.56	29.64
332.53	100.00

9

98.56 hm²

12.37 %

7

hm ²)	(%)
56	29.64
21	16.60
24	34.96
39	6.43
0	0.21

	63	55.21	16.60
	54	116.24	34.96
	3	0.70	0.21
	12	21.39	6.43
	18	2.40	0.72
	24	38.03	11.44
	211	332.53	100.00

116.24hm² 34.96% 79.61 hm²
23.94% 38.03 hm² 11.44%

1

4.3-53

	2008		2021			
	(hm ²)	(%)	(hm ²)	(%)	(hm ²)	(%)
	21.39	6.43	16.75	5.04	-4.64	-1.39
	98.56	29.64	107.82	32.42	9.26	2.78
	55.21	16.60	50.78	15.27	-4.43	-1.33
	116.24	34.96	109.37	32.89	-6.87	-2.07
	2.40	0.72	2.39	0.72	-0.01	0.00
	3.28	0.99	3.56	1.07	0.28	0.08
	0.70	0.21	1.39	0.42	0.69	0.21
	7.08	2.13	11.82	3.55	4.74	1.42
	27.67	8.32	28.66	8.62	0.99	0.30
	332.53	100.00	332.53	100.00		

6.01 hm²
1.80 % 9.26 hm² 2.78 %
0.69 hm² 0.21%

		11.30 hm ²	3.40%
4.64hm ²		1.39 %	
	2008	2021	
6.87 hm ²		2.07%	
6.01 hm ²		1.80 %	
2			
1			
			4.3-54

	2008		2021			
	(hm ²)	(%)	(hm ²)	(%)	(hm ²)	(%)
	79.61	23.94	78.45	23.59	-1.16	-0.35
	18.95	5.70	29.37	8.83	10.42	3.13
	55.21	16.60	50.78	15.27	-4.43	-1.33
	116.24	34.96	109.37	32.89	-6.87	-2.07
	21.39	6.43	16.75	5.04	-4.64	-1.39
	0.70	0.21	1.39	0.42	0.69	0.21
	40.42	12.16	46.43	13.96	6.01	1.80
	332.53	100.00	332.53	100.00		

		10.42 hm ²	3.13 %
6.01 hm ²		1.80 %	0.69 hm ²
0.21 %			
		17.10 hm ²	
5.14%			
	2008	2021	6.70
hm ²		2.01%	
			6.87 hm ²

2.07% 6.01
 hm² 1.80 %

2

	2008		2021			
	(hm ²)	(%)	(hm ²)	(%)	(hm ²)	(%)
<10%	41.12	12.37	47.82	14.38	6.70	2.01
10%-30%	116.24	34.96	109.37	32.89	-6.87	-2.07
30%-50%	21.39	6.43	16.75	5.04	-4.64	-1.39
50%-70%	55.21	16.60	50.78	15.27	-4.43	-1.33
>70%	98.56	29.64	107.82	32.42	9.26	2.78
	332.53	100.00	332.53	100.00		

6.70 hm² 2.01 %
 9.26 hm² 2.78 %
15.94
 hm² 4.79 %

2008 2021

6.87 hm² 2.07%
 6.70 hm² 2.01 %

3

4.3-56

	2008		2021			
	(hm ²)	(%)	(hm ²)	(%)	(hm ²)	(%)
	98.56	29.64	107.82	32.42	9.26	2.78
	55.21	16.60	50.78	15.27	-4.43	-1.33

	116.24	34.96	109.37	32.89	-6.87	-2.07
	21.39	6.43	16.75	5.04	-4.64	-1.39
	0.70	0.21	1.39	0.42	0.69	0.21
	40.42	12.16	46.43	13.96	6.01	1.8
	332.53	100.00	332.53	100.00		

9.26hm² 2.78%

6.01hm² 1.8%

15.94hm²

4.79%

2008 2021

6.87 hm²

2.07%

6.01 hm²

1.8%

2.78%

4

4.3-57

	2008		2021			
	(hm ²)	(%)	(hm ²)	(%)	(hm ²)	(%)
	79.61	23.94	78.45	23.59	-1.16	-0.35
	18.95	5.70	29.37	8.83	10.42	3.13
	55.21	16.60	50.78	15.27	-4.43	-1.33
	116.24	34.96	109.37	32.89	-6.87	-2.07
	0.70	0.21	1.39	0.42	0.69	0.21
	21.39	6.43	16.75	5.04	-4.64	-1.39
	2.40	0.72	2.39	0.72	-0.01	0.00
	38.03	11.44	44.04	13.24	6.01	1.80

	332.53	100.00	332.53	100.00		
--	--------	--------	--------	--------	--	--

10.42hm² 3.13%

6.01hm² 1.8%

17.10 hm² 5.14 %

2008 2021

6.87 hm²

2.07%

6.01 hm² 1.8%

5

2008 2021

6.87 hm²

2.07%

6.01 hm²

1.80 %

2008 2021

6.70 hm² 2.01%

6.87 hm²

2.07%

6.01 hm² 1.80 %

2008 2021

6.87 hm²

2.07%

6.70 hm² 2.01 %

2008 2021

11		1m	0.260
12		1m	0.249
13		1m	0.129
14		1m	0.133
15		1m	0.109
16		1m	0.108
17		1m	0.111
18		1m	0.128
19		1m	0.131
20		1m	0.124
21		1m	0.120
22	G1	1m	0.126
23	G2	1m	0.127
24	G3	1m	0.119
25	T22	1m	0.182
26	T23	1m	0.163
27	T24	1m	0.155
28	T25	1m	0.146
29	T26	1m	0.159
30	T27	1m	0.172
31	T28	1m	0.185
32	T29	1m	0.180
33	T30	1m	0.147
34	T31	1m	0.137
35	T32	1m	0.121
36	T33	1m	0.129
37		1m	0.120
38		1m	0.119
39		2.7km 1m	0.105
40		1m	0.250

1 2 3 X-

2021 072301101

4.4-1

1	X-	0.097~0.273
$\mu\text{Gy/h}$	0.119~0.127 $\mu\text{Gy/h}$	2.7km
	0.105 $\mu\text{Gy/h}$	
	X-	
2		1995
	17.1~127.4 nGy/h	2019
4		64.9~179.1 nGy/h
	X-	
		X-

		X- ($\times 10^{-8}\text{Gy/h}$)		
	1	2200m	32.52	0.36
	2	5m 2185m	29.03	0.36
	3	10m 2185m	46.07	0.44
	4	10m 2155m	30.67	0.56
	5	2050m	30.01	0.40
	6	2050m	47.05	0.47
	8		22.57	0.41
	9		16.21	0.34
	10		20.38	0.41
	11		32.47	0.29
	12		21.31	0.44
	13		25.85	0.57

	14		25.03	0.44	
	15		25.37	0.43	
	16		18.17	0.50	
	7		15.87	0.29	
	17		22.11	0.51	

1 0.1817~0.4705
 μGy/h

2 0.1587~0.2211 μGy/h

2017

		X-	
	2017 07 18	0.16	0.03
	2017 07 18	0.24	0.03
	2017 07 18	0.33	0.03
	2017 07 18	0.30	0.04
	2017 07 18	0.14	0.02
	2017 07 18	0.15	0.02
	2017 07 18	0.12	0.03

μSv/h

1 0.14~0.33μSv/h

2 0.12μSv/h

	2018 12 13	X-	
		0.12	0.01
	2018 12 13	0.26	0.01
	2018 12 13	0.17	0.01
	2018 12 13	0.30	0.01
	2018 12 13	2.21	0.12
	2018 12 13	0.10	0.01
	2018 12 13	0.07	0.01
$\mu\text{Sv/h}$			

0.12~2.21 $\mu\text{Sv/h}$

0.07 $\mu\text{Sv/h}$

	2019 11 18	
	X-	
	0.18	0.03
	0.25	0.02
	0.34	0.02
	0.32	0.03
	0.16	0.01
	2.45	0.13
	0.15	0.02
	0.10	0.02
$\mu\text{Sv/h}$		

0.18~2.45 $\mu\text{Sv/h}$

0.10 μ Sv/h

	2020 06 17	
	X-	
	0.28	0.04
	0.06	0.01
	0.28	0.02
	0.15	0.01
	0.05	0.01
	0.29	0.02
1#	0.17	0.02
2#	0.18	0.02
1#	0.12	0.02
2#	0.10	0.01
μ Sv /h		

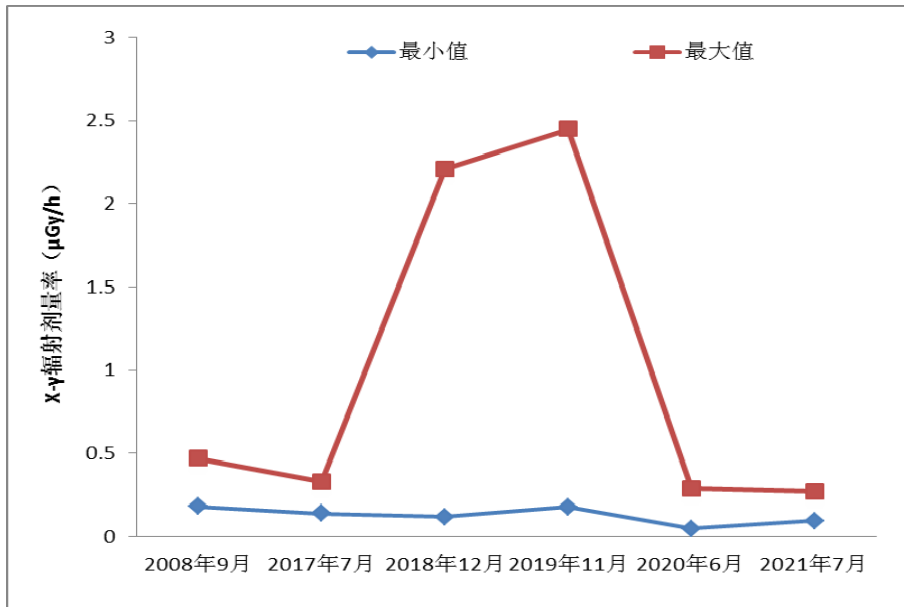
0.05~0.29 μ Sv/h

0.28 μ Sv/h

0.06 μ Sv/h

X-

4-23



1	2021 6			X-
	0.097~0.273 μGy/h	2008 9		X-
	0.1817~0.4705 μGy/h			X-
2	2021 6			X-
	0.119~0.127μGy/h	2.7km		0.105 μGy/h
	2008 9	0.1587~0.2211μGy/h		
3				
	2021 05 25~28			
		4-21		4.4-7

1		2021 05 25 2021 05 28	/	1.11×10^{-6}	6.00×10^{-5}
2		2021 05 25 2021 05 28	/	1.05×10^{-6}	6.00×10^{-5}
1		2021 05 26	30	/	/
		2021 05 27	30	/	/
		2021 05 28	30	/	/
2		2021 05 26	30	/	/
		2021 05 27	30	/	/
		2021 05 28	30	/	/
Bq/m^3					

1
1995
3.3~40.6 Bq/m^3
30 Bq/m^3
20

2
 $6.00 \times 10^{-5} \text{ Bq/m}^3$
 $1.05 \sim 1.11 \times 10^{-6} \text{ Bq/m}^3$

1 2008 9

		Bq/m^3	
1	10m(2155m)	114.66	
2	(2050m)	142.17	
3		99.54	
4		104.57	

99.54 142.17

Bq/m^3

GB 18871-2002 “

500Bq/m³ ”
 2 2017 7
 2017

	2017 07 18	38.9
	2017 07 18	50.2
	2017 07 18	26.8

Bq/m³
 4.4-9 3

GB 18871-2002 “

500Bq/m³ ”

	2017 07 18	<LLD: 1×10 ⁻⁵	3.0×10 ⁻⁴
	2017 07 18	<LLD: 1×10 ⁻⁵	4.0×10 ⁻⁴
-238	2017 07 18	<LLD: 9.20×10 ⁻⁴	<LLD: 9.41×10 ⁻⁴
-232	2017 07 18	<LLD: 2.08×10 ⁻⁴	<LLD: 2.22×10 ⁻⁴
-226	2017 07 18	<LLD: 1.77×10 ⁻⁴	4.07×10 ⁻⁴
-40	2017 07 18	3.38×10 ⁻⁴	3.40×10 ⁻⁴

Bq /m³

238U 12350 Bq/g U 232 Th

4046 Bq/g Th

0.00007mg/m³

0.00008mg/m³

GB26451-2011 0.0025 mg/m³

2 2018 12
 2018

	2018 12 13	32.4

	2018	12	13	52.8
--	------	----	----	------

Bq/m³

4.4-11

	2.12×10^{-5}	4.67×10^{-4}
	6.90×10^{-3}	3.59×10^{-3}
	0.00039	0.00840
	0.00232	0.0526
g/m^3	Bq/m^3	

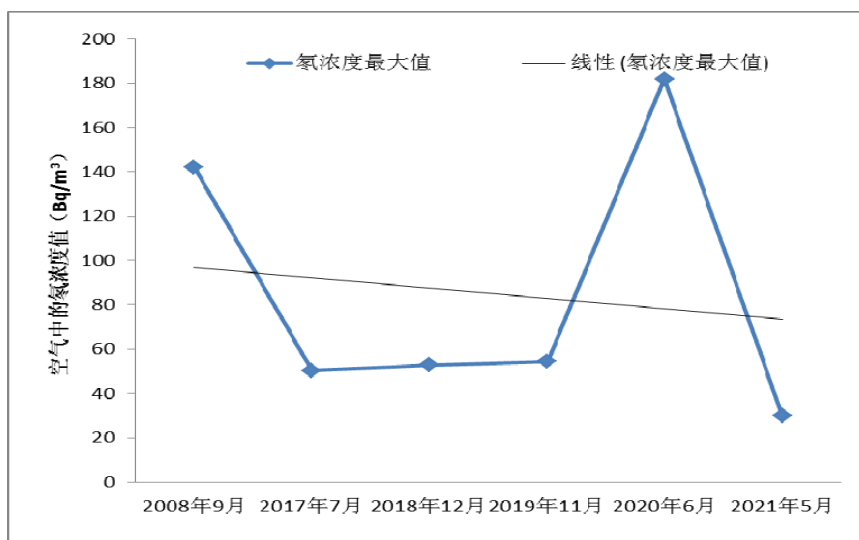
0.0000027mg/m³

0.000061mg/m³

GB26451-2011

0.0025mg/m³

4-24



4-24

1995

20

3.3~40.6 Bq/m³

2021 05 25

-226

7

4.4-17

4-3

	U ($\mu\text{g/L}$)	Th ($\mu\text{g/L}$)	(Bq/L)	(Bq/L)	-226 (Bq/L)
	0.155	0.16	0.0303	0.1015	0.0485
	2.07	2.91	0.1431	0.170	0.067
100m	1.635	2.21	0.12	0.1723	0.0465
	25.115	11.255	0.662	0.5558	0.15
	24.905	11.15	0.780	0.565	0.1345

1 5 0.155~25.115 $\mu\text{g/L}$ 2019

1995

2 5 0.16~11.255 $\mu\text{g/L}$ 2019

1995

3 5 -226 46.5~134.5 mBq/L 2019

1995

4 5 0.0303~0.780 Bq/L 2019

5 2 0.1015~0.565 Bq/L

2019

2017

4.4-19

		2017 07 18	
		11.5	7.01
		8.42	4.65
-226		4.60×10^{-2}	4.30×10^{-2}
-40		8.34×10^{-2}	7.15×10^{-2}
		0.43	0.28
		0.36	0.26
		g/L	Bq/L

1	2		7.01~11.5µg/L	2019
		1995		
2	2		4.65~8.42µg/L	2019
		1995		
3	2	-226	43~46 mBq/L	2019
		1995		
4	2		0.28~0.43 Bq/L	2019
5	2		0.26~0.36 Bq/L	2019

4.4-20

		2018 12 13	
		1.71	0.83
		0.50	1.04
-226		4.22×10^{-2}	4.90×10^{-2}
-40		6.60×10^{-2}	3.71×10^{-2}

	0.148	0.158
	0.128	8.81×10^{-2}
	g/L	Bq/L

1 2 0.83~1.71µg/L 2019

1995

2 2 0.50~1.04µg/L 2019

1995

3 2 -226 42.2~49.0 mBq/L

2019

1995

4 2 0.148~0.158 Bq/L

0.0881~0.128 Bq/L 2019

4.4-21

	2019	11	18
	0.00143		0.00234
	0.00261		0.00024
-226	LLD: 5.01×10^{-1}		LLD: 3.74×10^{-1}
-40	LLD:2.39		LLD:1.70
	1.34×10^{-1}		1.40×10^{-1}
	2.40×10^{-1}		1.19×10^{-1}
	mg/L		Bq/L

1 2 1.43~2.34µg/L 2019

1995
 2 2 0.24~2.61µg/L 2019

1995
 3 2 -226 42.2~49.0 mBq/L
 2019

1995
 4 2 0.134~0.140 Bq/L
 0.119~0.240 Bq/L 2019

4.4-22

	2020 06 17	
	2.10	4.26
	1.72	3.55
-238	<LLD:1.64	<LLD:1.69
-226	<LLD:2.76×10 ⁻¹	<LLD:2.83×10 ⁻¹
-232	<LLD:2.64×10 ⁻¹	<LLD:2.74×10 ⁻¹
	9.92×10 ⁻²	2.07×10 ⁻¹
	8.26×10 ⁻²	1.30×10 ⁻¹
	g/L	Bq/L

1 2 2.10~4.26µg/L 2019

1995

2 2 1.72~1.72µg/L 2019

1995

3 2

0.0992~0.207 Bq/L

0.0826~0.130 Bq/L

2019

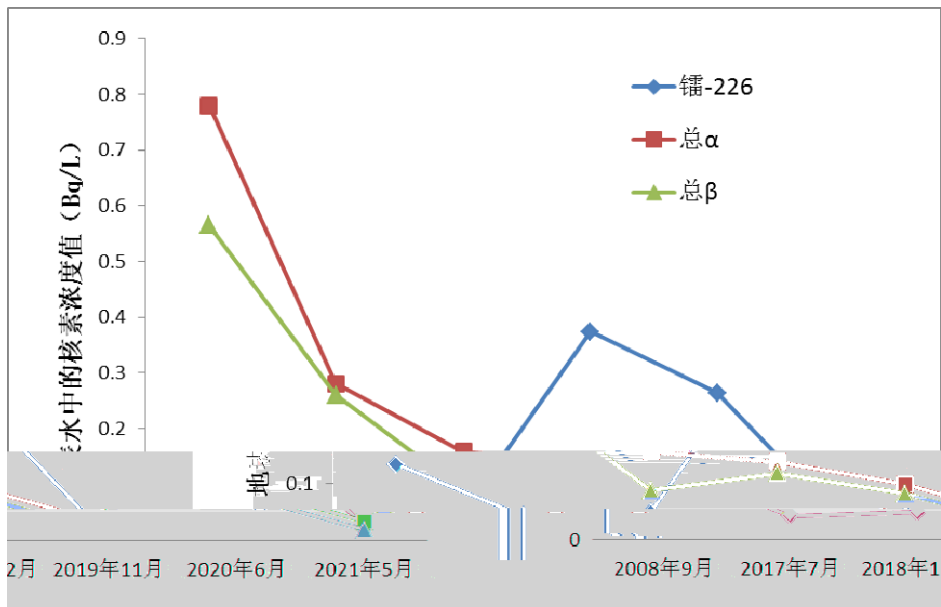
4.4-23

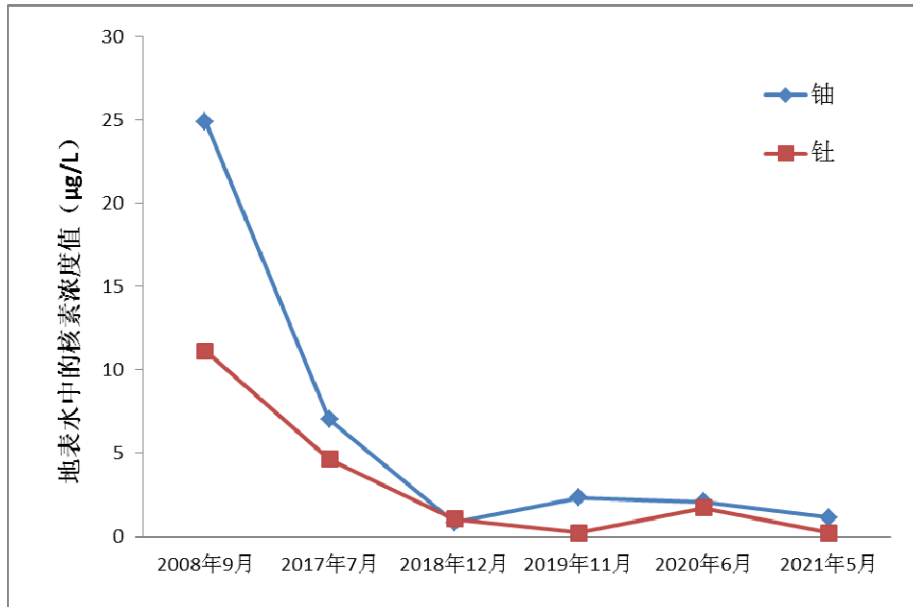
-226

4-25

4-26

		-226 Bq/L	g/L	g/L	Bq/L	Bq/L
2008	9	0.1345	24.905	11.15	0.78	0.565
2017	7	4.30×10^{-2}	7.01	4.65	0.28	0.26
2018	12	4.90×10^{-2}	0.83	1.04	0.158	8.81×10^{-2}
2019	11	3.74×10^{-1}	2.34	0.24	1.40×10^{-1}	1.19×10^{-1}
2020	6	2.64×10^{-1}	2.1	1.72	9.92×10^{-2}	8.26×10^{-2}
2021	5	2.62×10^{-2}	1.14	0.24	0.0344	0.0194





1 2017 2021

2 2018

1995

2021 05 26

-226

4.4-24

4-3

	2021 05 26				
	-226				
	6.80×10^{-2}	0.0144	0.00013	0.411	0.255
3.04×10^{-2}	0.00205		0.0533	0.0425	
3.88×10^{-2}	0.00286	0.00011	0.0498	0.0751	
6.35×10^{-2}	0.00038		0.0771	0.0726	
mg/L	Bq/L				
	2021N-122				

4.4-24			
1	-226	30.4	68 mBq/L
2019		-226	1.5 25
mBq/L			1995
	-226	0.50~250mBq/L	
2		0.38	14.4 g/L 2019
			0.03 16 g/L
			1995
	0.060~9.7 g/L		
3		0.11	0.13 g/L 2019
			0.02 1.3 g/L
			1995
	0.071~2.3 g/L		
4		0.0498	0.411Bq/L
	0.0425	0.255 Bq/L	GB/T14848-2017
III	0.5 Bq/L	1.0Bq/L	“ 2019
			0.01 0.20 Bq/L ”
GB/T14848-2017	III		-226

	2017 07 18
	0.16
	0.14
-226	0.053

		0.0453	
		0.1357	
		g/L	Bq/L

4.4-25

1 -226 53mBq/L 2019

1995

2 0.16 g/L 2019

1995

3 0.14 g/L 2019

1995

4 0.0453 Bq/L

0.1357 Bq/L GB/T14848-2017 III

0.5 Bq/L 1.0Bq/L 2019

2017

4.4-26

		2017 07 18	
		0.10	
		0.05	
-226		3.60×10^{-2}	
-40		3.85×10^{-2}	
		0.06	
		0.05	
		g/L	Bq/L

4.4-26

1 -226 36 mBq/L 2019

1995

3

0.05 g/L

2019

1995

4

0.021 Bq/L

0.0491 Bq/L

GB/T14848-2017

III

0.5 Bq/L

1.0Bq/L

2019

2019

4.4-28

	2019 11 18
	0.00008
-226	LLD: 3.84×10^{-1}
-40	LLD:1.71
	3.37×10^{-2}
	3.42×10^{-2}
	mg/L Bq/L

1

0.08 g/L

2019

1995

2

0.0337 Bq/L

0.0342 Bq/L

GB/T14848-2017

III

0.5 Bq/L

1.0Bq/L

2019

2020

4.4-29

	2020 06 17
	0.08
	0.08
-238	<LLD:2.84
-226	<LLD:4.67×10 ⁻¹
-232	<LLD:4.68×10 ⁻¹
	1.13×10 ⁻²
	1.47×10 ⁻²
	g/L Bq/L

1 0.08 g/L 2019

1995

2 0.08 g/L 2019

1995

3 0.0113 Bq/L

0.0147 Bq/L GB/T14848-2017 III

0.5 Bq/L 1.0Bq/L 2019

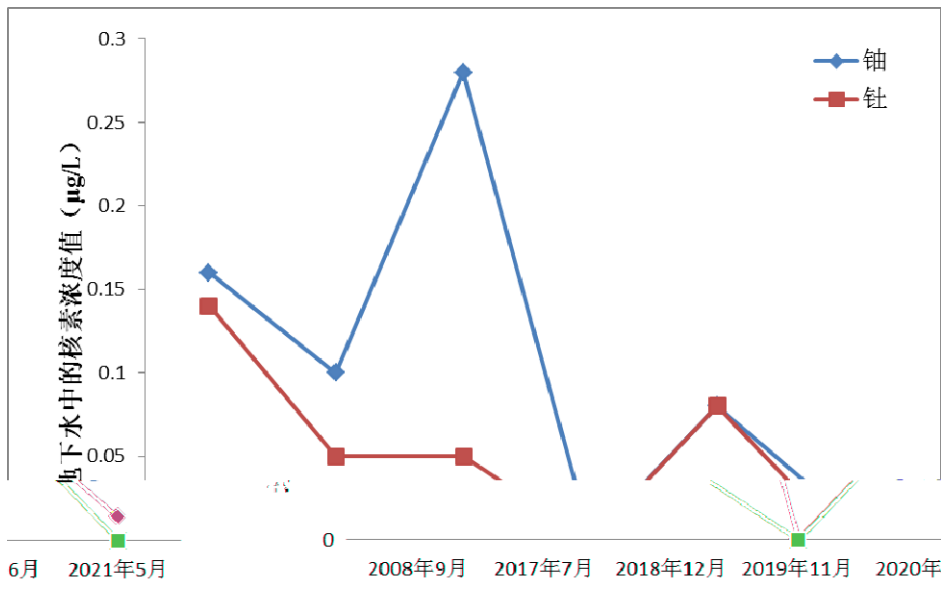
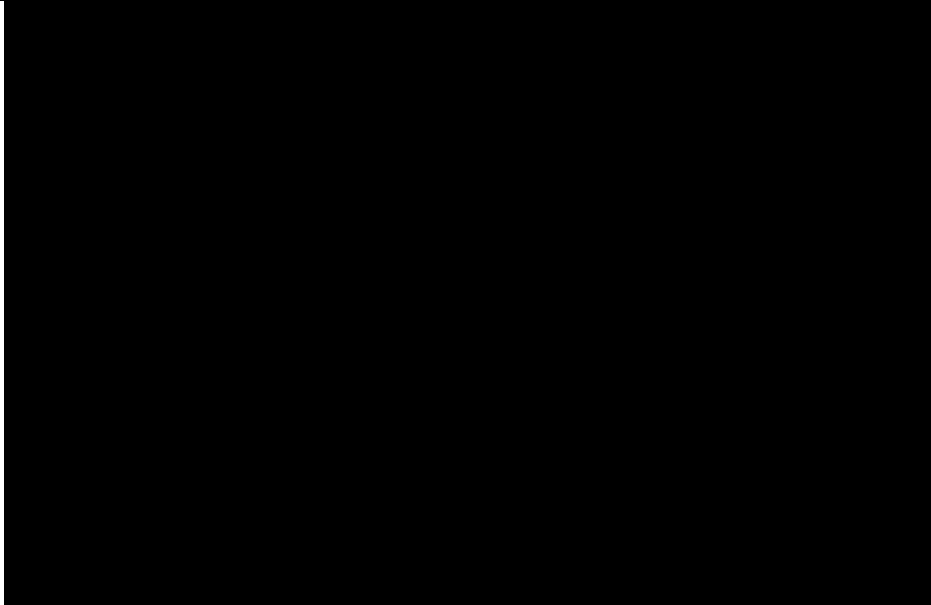
4.4-30 -226

4-27

4-28

		g/L	g/L	-226 Bq/L	Bq/L	Bq/L
2008	9	0.16	0.14	0.053	0.0453	0.1357
2017	7	0.1	0.05	3.60E-02	0.06	0.05
2018	12	0.28	0.05	0.11	2.10E-02	4.91E-02
2019	11	0.00008		3.84E-01	3.37E-02	3.42E-02

2020	6	0.08	0.08	4.67E-01	1.13E-02	1.47E-02
2021	5	0.0144	0.00013	6.80E-02	0.411	0.255



1

2017 2020

“ 2019 ”

“

1995

”

-226

“ 2019 ”

”

2

GB/T14848-2017

III

-226

2021 05 26~27

-226

4.4-31

4-29

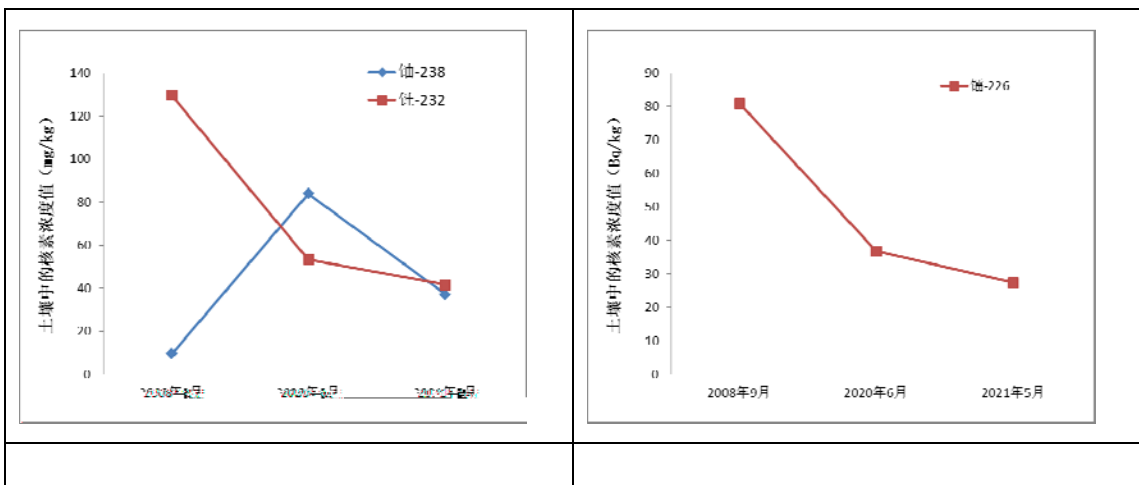
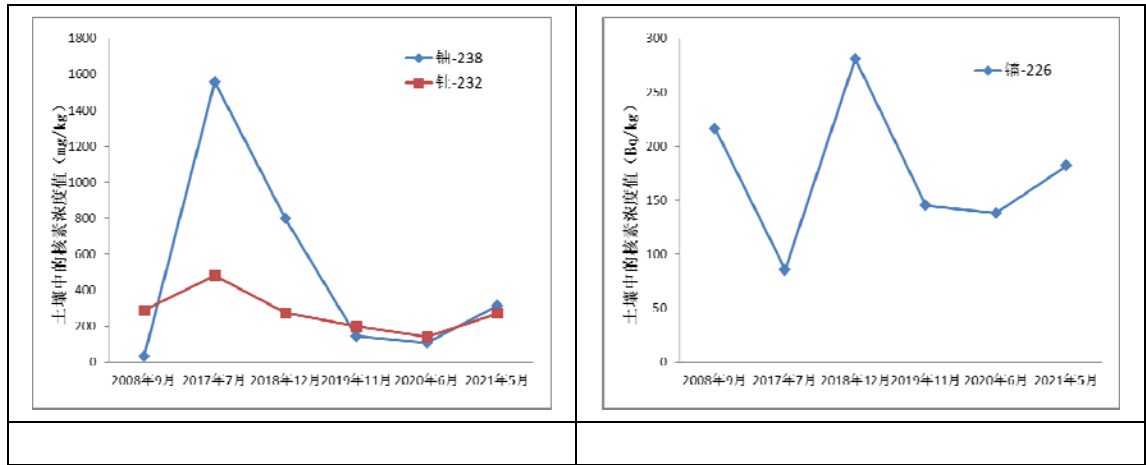
	2021 05 25 —2021 05 27		
	-226		
	82.6	9.88	16.8
	143	17.4	58.2
	182	22.9	121
	38.4	7.04	10.3
	19.0	2.26	7.82
	87.0	14.8	20.1
	163	25.4	67.1
	25.0	2.63	15.8
	57.1	6.91	19.5
	154	23.9	50.4
	35.7	3.09	11.6
	113	13.1	45.7
	30.6	2.71	7.68
	60.9	8.63	16.0
	24.7	2.51	4.74
	26.3	1.99	9.02
	56.7	5.89	21.3
	13.3	1.28	4.68
	18.5	1.42	6.69
	34.5	2.80	11.7
	26.3	2.22	6.32
50m	96.4	9.10	30.5
100m	142	14.7	44.5
150m	153	15.8	59.0

200m	108	12.0	46.8
250m	69.2	12.6	29.4
300m	26.5	2.89	12.4
350m	33.6	3.29	10.9
400m	30.6	3.20	9.86
450m	44.6	5.12	16.8
500m	37.4	3.37	12.6
	27.4	2.18	8.87
	24.3	3.01	10.3
2.7km	21.1	2.36	5.15
	mg/kg	Bq/kg	

1 226 13.3~182 Bq/kg
226 24.3~27.4 Bq/kg 2019
-226 6 217Bq/kg 1983 1990
-226 2.4~425.8 Bq/kg
2 1.28~25.4 mg/kg ²³⁸U
12350Bq/g U -238 15.81 313.69 Bq/kg
“ 2019 -238 10
245Bq/kg ” “ 1983 1990 -238
1.8~520 Bq/kg ” -238 26.92 37.17
Bq/kg
3 4.68~121 mg/kg ²³²Th
4046Bq/g Th -232 18.94 489.57 Bq/kg
“ 2019 -232 12
395Bq/kg ” “ 1983 1990 -232
1.0~437.8Bq/kg ” 8.87~10.3 mg/kg -232
35.89 41.67 Bq/kg
-226 -238
-232

2	-238	33.8	797 Bq/kg	“ 2019
	-238		10	245Bq/kg ”
“ 1983 1990		-238		1.8~520
Bq/kg ”				
3	-232	32.4	273 Bq/kg	“ 2019
	-232		12	395Bq/kg ”
“ 1983 1990		-232		
1.0~437.8Bq/kg ”				
2019				4.4-35

	2019 11 19			
	-238	-226	-232	-40
	1.41×10^2	3.48×10^1	5.76×10^1	9.50×10^2
	8.84×10^1	3.47×10^1	3.56×10^1	6.44×10^2
	1.44×10^2	1.45×10^2	1.99×10^2	9.12×10^2
	1.04×10^2	5.55×10^1	2.94×10^1	5.28×10^2
Bq/kg				



1 -226

-226

2 -238

2017 2018

1983 1990

-238 1.8~520 Bq/kg

-238

3 -232

-232

2021 05 25~27 -226
4.4-37 4-3

	2021 05 25		
	-226		
	23.2	2.69	6.22
99.0	10.9	22.3	
18.3	2.13	5.60	
103	8.57	24.5	
500m	72.7	10.1	22.3
500m	144	15.3	28.9
500m	104	11.6	22.2
mg/kg	Bq/kg		

1 226 18.3~144 Bq/kg 2019
-226 6 217Bq/kg
1983 1990 -226 2.4~425.8
Bq/kg
2 2.13~15.3 mg/kg ²³⁸U
12350Bq/g U -238 26.30 188.96 Bq/kg
“ 2019 -238 10
245Bq/kg ” “ 1983 1990 -238
1.8~520 Bq/kg ”
3 5.6~28.9 mg/kg ²³²Th
4046Bq/g Th -232 22.66 116.93 Bq/kg
“ 2019 -232 12
395Bq/kg ” “ 1983 1990 -232
1.0~437.8Bq/kg ”
-226 -238 -232

2	-238	103	110 Bq/kg	“ 2019
	-238		10	245Bq/kg ”
“ 1983 1990		-238		1.8~520
Bq/kg ”				
3	-232	57.9	87.1 Bq/kg	“ 2019
	-232		12	395Bq/kg ”
“ 1983 1990		-232		
1.0~437.8Bq/kg ”				

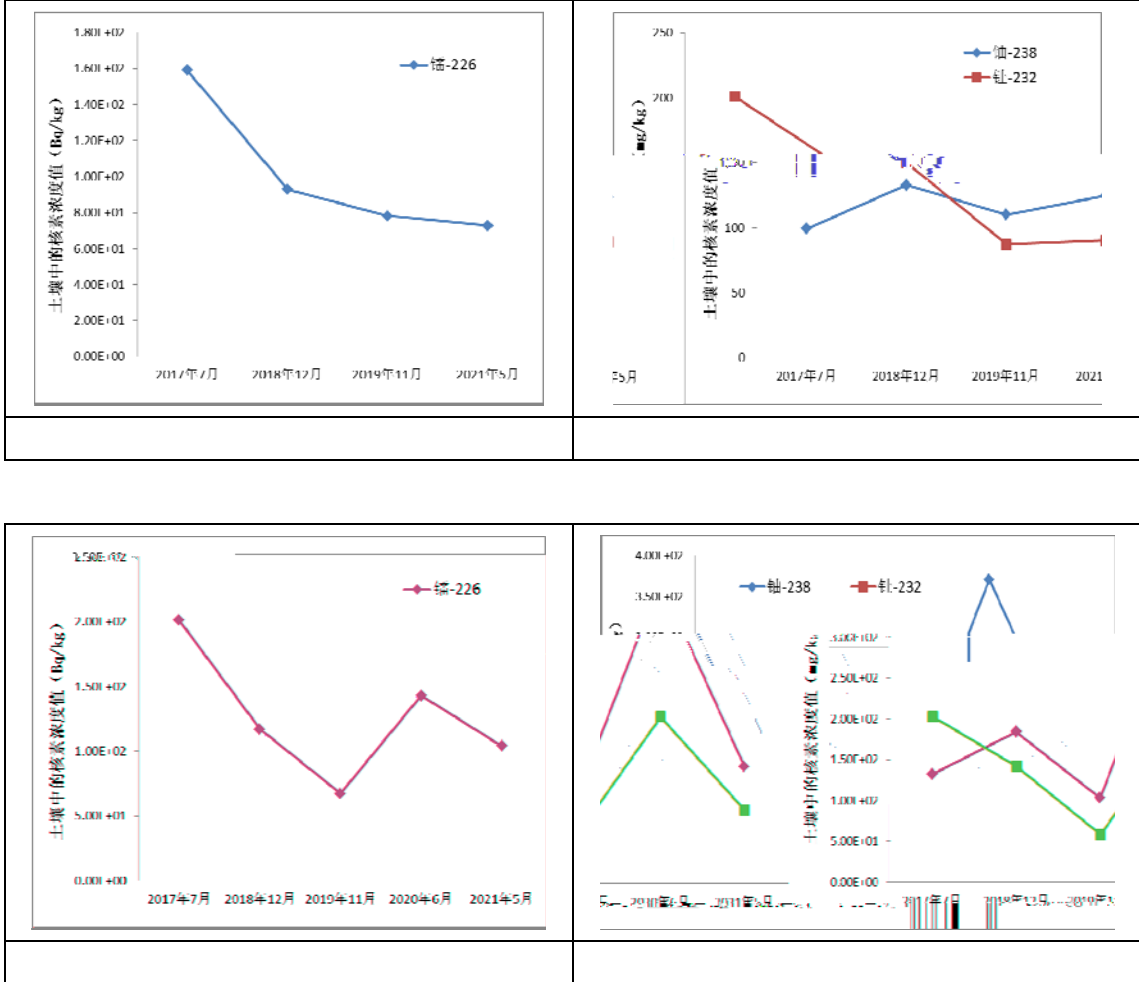
2020

4.4-41

	2020 06 17				
			-238	-226	-232
	15.8	34.1	1.49×10^2	1.99×10^2	1.58×10^2
	11.6	31.3	3.71×10^2	1.43×10^2	2.04×10^2
	mg/kg		Bq/kg		

1	226	143~199	Bq/kg	2019
	-226		6	217Bq/kg 1983
1990	-226			2.4~425.8 Bq/kg
2	-238	149	371 Bq/kg	“ 2019
	-238		10	245Bq/kg ”
“ 1983 1990		-238		1.8~520
Bq/kg ”				
3	-232	158	204 Bq/kg	“ 2019
	-232		12	395Bq/kg ”
“ 1983 1990		-232		
1.0~437.8Bq/kg ”				

4-33



1		-238	-232	-226
2			-232	-226
3	-238			
6	2020		-232	-226

5.1-1

		1	
		1.2m 2	
	1 +1		
		2 15m	
	1 +1 5		
	1		

1

2

2#

1#

2

2

5.1 2

5 1

	1#	1			2	3
		2	10m	TSP	1h	1
		3	10m		4	

1

2021

5

26

27

1#

5.1 3

			(m/s)	(m ³ /h)				(kg/h)
					(%)	(mg/m ³)	(mg/m ³)	
2021 26	05	1-1	10.2	2400	/	20	20	/
		1-2	10.3	2430	/	20		/
		1-3	10.0	2370	/	20		/
2021 27	05	1-1	8.6	2110	/	20	20	/
		1-2	8.7	2120	/	20		/
		1-3	9.2	2220	/	20		/

1#

20mg/m³

GB26451-2011

5

50 mg/m³

2
 2021 5 27 28
 5.1 4

	2021 05 27			2021 05 28		
	34	84	67	34	67	67
	50	84	34	67	67	50
g/m^3						

2
 GB26451-2011 6
 1.0mg/m³

1#

GB26451-2011

5.2-1

	1 2m ³	1		1 2m ³ 1 20m ³ /d

		1 4m ³		
	1 2m ³			

1

2021 06 03 04 2021 12 23 24

	2021	06	03	12	23	2021	06	04	12	24
pH	8.59	8.62	8.65	8.60	8.70	8.68	8.72	8.71		
	15	55	34	24	13	10	20	16		
F	6.79	6.58	6.41	5.96	5.82	5.78	6.51	6.44		
	54	55	52	53	52	53	50	53		
	1.30	1.21	1.18	0.54	1.29	0.75	0.59	0.55		
	0.00232	0.00202	0.00226	0.00219	0.00193	0.00173	0.00240	0.00288		
	0.0183	0.0171	0.0185	0.0199	0.0109	0.0103	0.0159	0.0185		
	0.0004	0.0006	0.0004		0.0008	0.0004		0.0006		
	0.00050	0.00045	0.00053	0.00049	0.00066	0.00064	0.00070	0.00071		

	0.0903	0.116	0.118	0.113	0.0863	0.0715	0.0771	0.0974
	ND	ND	ND	ND	ND	ND	ND	ND
	4.21×10^{-3}	1.81×10^{-3}	3.78×10^{-3}	4.17×10^{-3}	2.00×10^{-3}	2.81×10^{-3}	2.40×10^{-3}	2.72×10^{-3}
	pH				mg/L			

	2021 06 03 12 23				2021 06 04 12 24			
pH	8.08	8.15	8.18	8.12	8.17	8.15	8.16	8.13
	37	32	26	22	22	19	24	19
F ⁻	5.77	5.46	5.57	5.44	5.72	5.14	5.57	5.16
	58	58	55	59	57	57	55	56
	0.09	0.11	0.14	0.23	0.64	1.02	0.56	0.72
	0.00254	0.00272	0.00276	0.00292	0.00206	0.00224	0.00223	0.00228
	0.0218	0.0255	0.0227	0.0252	0.0176	0.0182	0.0177	0.0187
	0.0006		0.0007	0.0005	0.0014	0.0006	0.0008	0.0011
	0.00054	0.00043	0.00048	0.00055	0.00044	0.00060	0.00056	0.00054
	0.133	0.0970	0.138	0.148	0.0791	0.129	0.130	0.118
	ND	ND	ND	ND	ND	ND	ND	ND





									GB26451 -2011 2		
	2021	06	03	12	23	2021	06	04		12	24
pH	7.36	7.34	7.31	7.38	7.33	7.34	7.40	7.39		6~9	
									50		

	2.42	2.42	2.43	2.45	2.41	2.46	2.43	2.46	8
COD				5	5				70
		0.08				0.07			4
	0.00148	0.00144	0.00152	0.00156	0.00155	0.00159	0.00157	0.00132	0.8
	0.00125	0.00198	0.00090	0.00088	0.00114	0.00120		0.00107	1.0
									0.1
									0.1
		0.00006	0.00007	0.00006	0.00006	0.00007	0.00006	0.00005	0.05
	0.00167	0.00393	0.00210	0.00168	0.00169	0.00193	0.00166	0.00180	0.2
	ND	ND	ND	ND	ND	ND	ND	ND	
	ND	ND	ND	ND	ND	ND	ND	ND	
	pH				mg/L				

5.2-4

GB26451-2011

2

500m

GB3838-2002

	2021 06 03				2021 06 04			
pH	8.07	8.02	8.11	8.09	8.15	8.10	8.14	8.12
	0.220	0.429	0.552	0.590	0.088	0.082	0.249	0.238
	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.03
N	1.13	1.12	1.06	0.84	0.45	0.47	0.49	0.51
		5	5	6	5	6	5	6
				0.06				

	pH	mg/L
--	----	------

5.2-5

2

1 2m³

1

20m³/d

GB26451-2011

2

6

COD 8.76t/a

0.05t/a

1

20m³/d

GB26451-2011

2

85-95dB(A)

100m

120dB A

85-95dB(A)

70-95dB(A)

1
dB(A)

41.4~59.8 dB(A)

35.3~47.3

GB 12348-2008 2

2

47.3~62.0dB(A)

56.0~62.9 dB(A)

12348-2008 2

GB

15 dB(A)

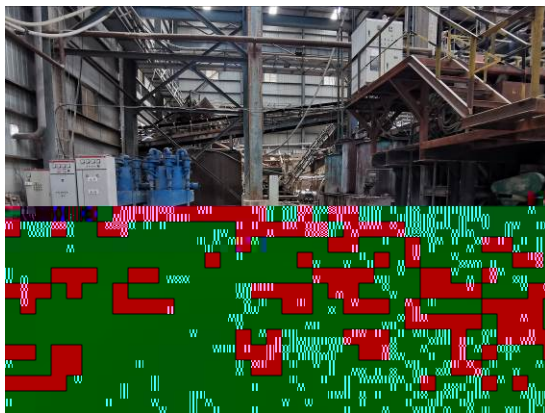
	224 t/a	2	1 2.8km	
	25.04 t/a			

			1.75km	
	18t/a			
	4 t/a	200L		

		Mb 6.0m K 1×10^{-7} cm/s
	C30 250mm	Mb 6.0m K 1×10^{-7} cm/s

2

2	8m ³ 6×9×1.7m C30 240mm	Mb 6.0m K 1×10^{-7} cm/s
	1 30m ³ C30 240mm	Mb 6.0m K 1×10^{-7} cm/s
	1 150m ³ P6 240mm	Mb 6.0m K 1×10^{-7} cm/s
4	14m ³ C30 240mm	Mb 6.0m K 1×10^{-7} cm/s





2021 6 2021 12

GB/T14848-2017

1

19.00%

200m

2

1

2

3

2

2021 12

11

1 1# 2# 3# 4# 5# 6# 9#

GB36600-2018

2 7# 8# 10# 11#

GB15618-2018

7

2013 9

W4 W7

1

30m

2

1

2

500.0m

25m

1.3m

1.1m

1.0m

6m

20m

22m

3

220.0m

1.60m

1.80m

1

2017

3

1

1

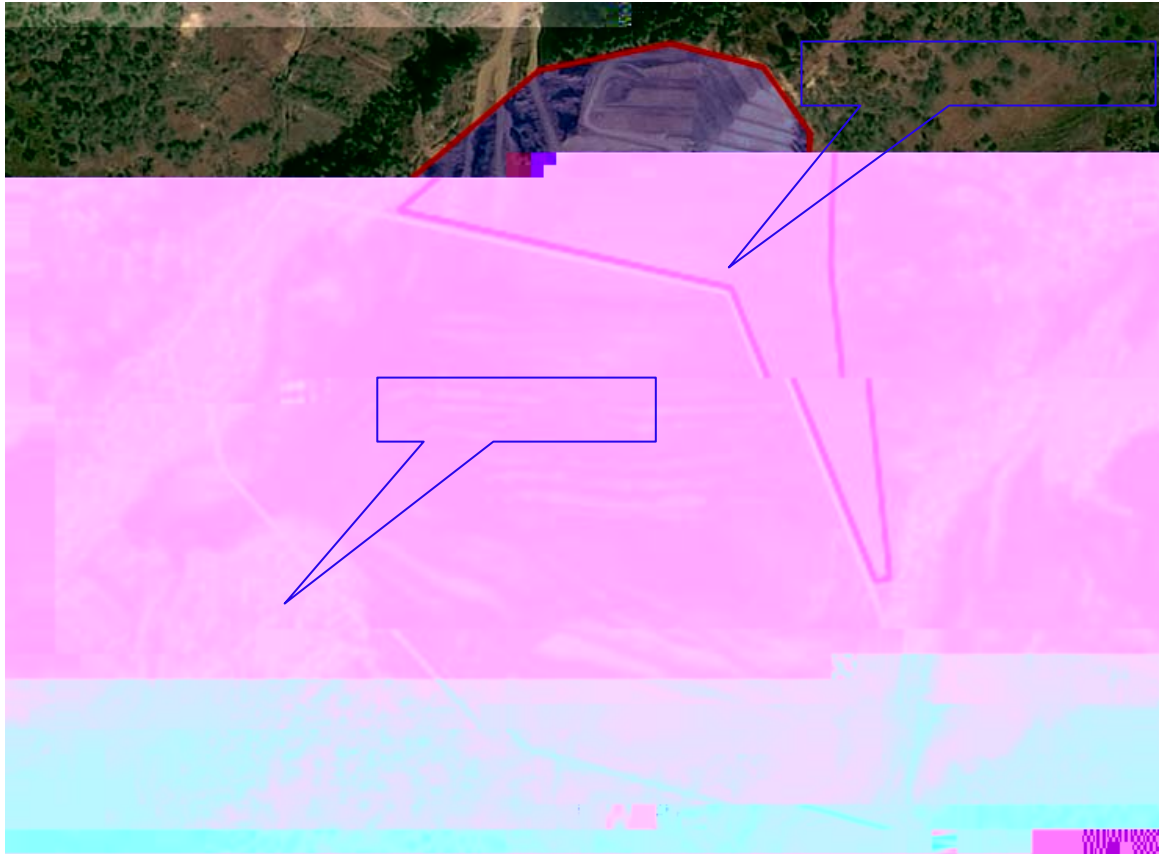
+2163m +2299m

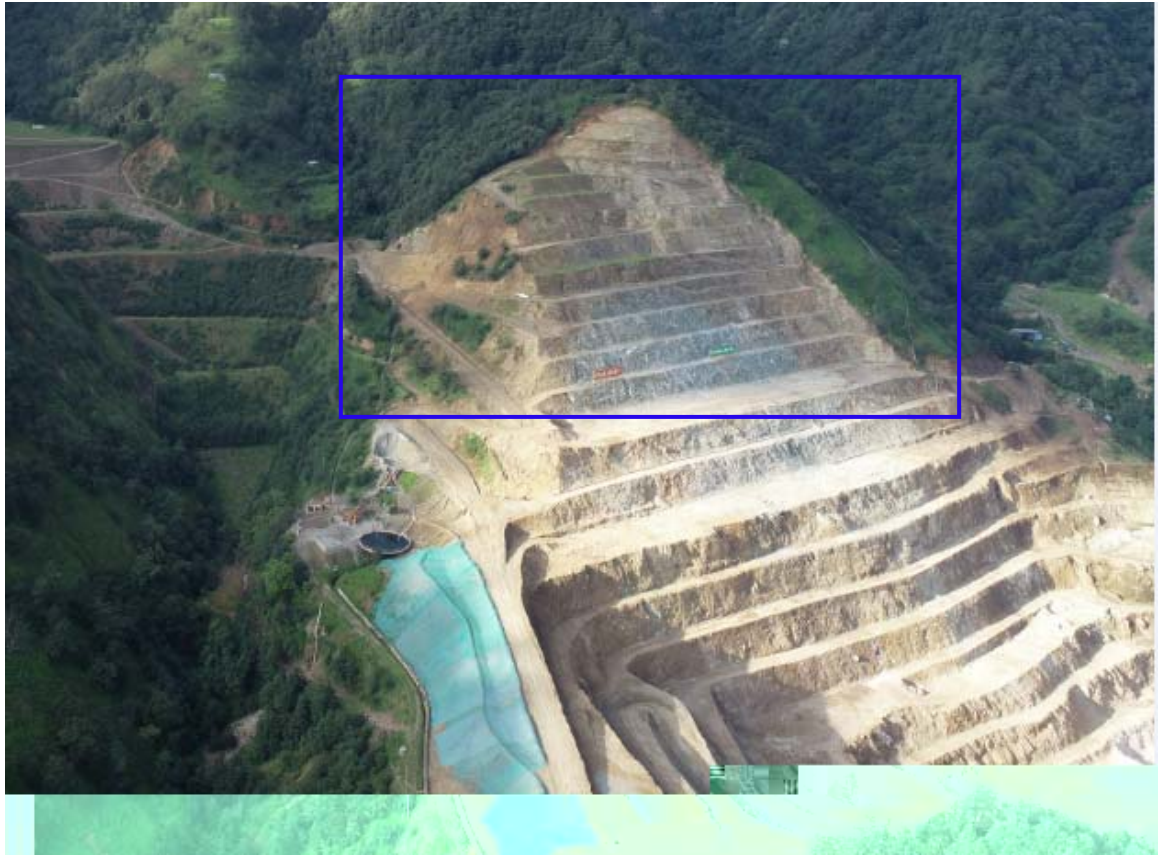
2018 7

14

4.58hm²

5-2





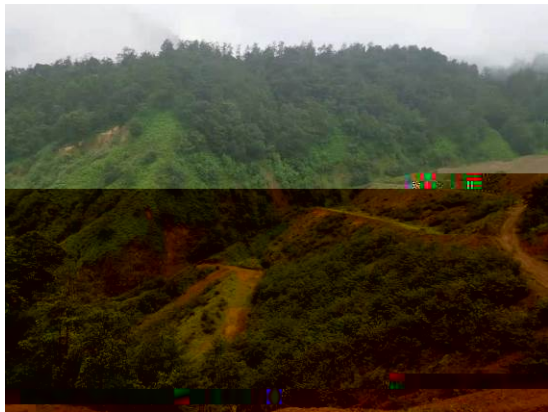
2

30cm



41.7%

			1	75.21	m ³	
	1.3m	1.1m	1.0m			6m
20m	22m	2020	6			
50cm						



2018 11

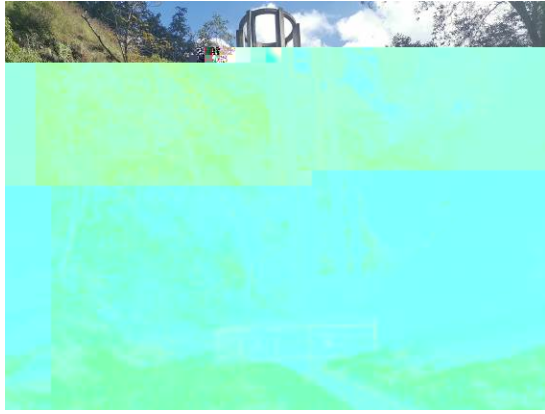
15

2021 3 24

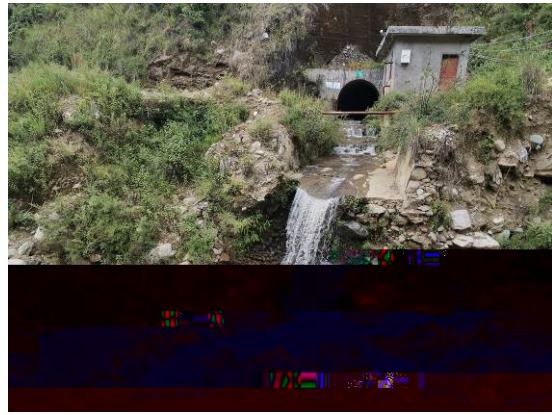
16

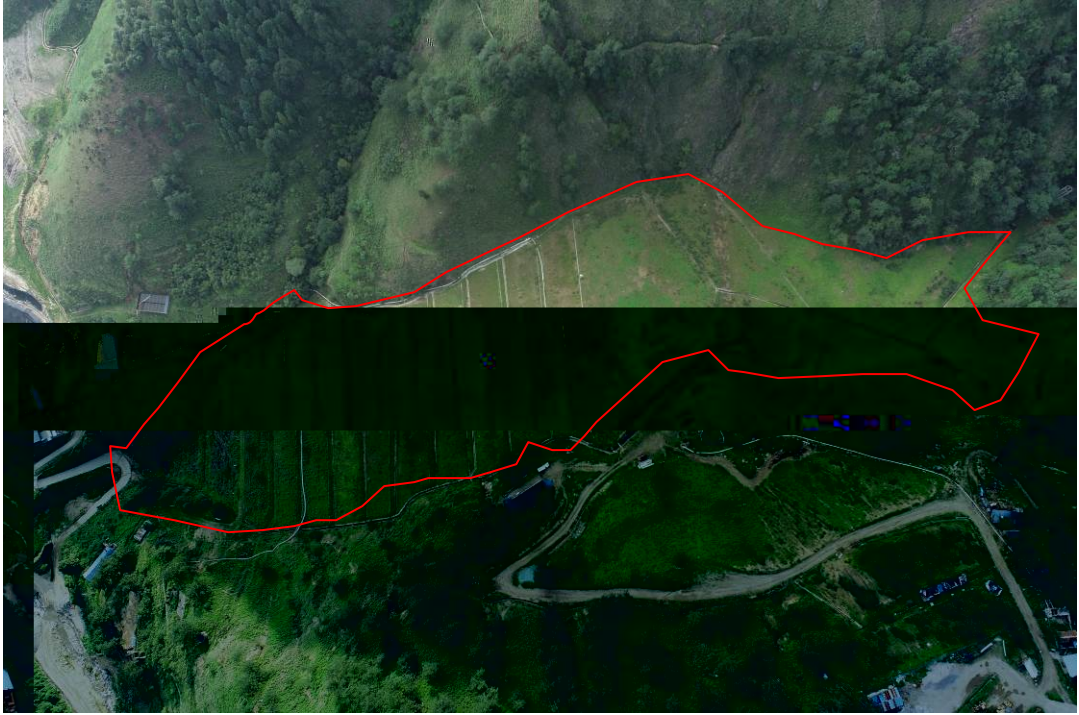
+ 1.5 2.2m +
0.8 0.8m

3.0 3.0m



+





10m³

1 30m³





GB50863-2013

11.1.6

13.3.2

V

0.9km

4 14 m³



2020 11 6

513424-2020-24-L





1

2

2

1 4m^3



3.1-3

1Bq/g

2.8km

1.75km

1

2

2#

1#

2

3

5.9 1

5 1

1#	1			2	3
	2	10m		1h	1
	3	10m		4	

3

2021

5

26

27

1#

5.9 2

			(m/s)	(m ³ /h)	(g/m ³)	(g/m ³)	(g/m ³)

2021 26	1-1	1#	10.2	2400	2.79	0.518	3.308
	1-2		10.3	2430	1.18	0.195	1.375
	1-3		10.0	2370	1.86	0.352	2.212
2021 27	1-1	1#	8.6	2110	1.57	0.329	1.899
	1-2		8.7	2120	1.70	0.241	1.941
	1-3		9.2	2220	1.36	0.260	1.62

1#

1.375

3.308 g/m³

GB26451-2011 5

0.10 mg/m³

4

2021 5 27 28

5.9-3

			ng/m ³	ng/m ³	ng/m ³
2021 05 25			6.76	3.31	10.07
			1.81	0.61	2.42
			5.79	2.29	8.08
2021 05 26			7.96	1.84	9.8
			3.55	0.82	4.37
			6.10	2.33	8.43
2021 05 25			18.8	11.3	30.1
			3.35	1.38	4.73
			4.50	1.51	6.01
2021 05 26			5.80	1.31	7.11
			2.86	0.65	3.51
			5.08	1.69	6.77
2021 05 25			2.02	0.62	2.64
			6.09	2.09	8.18
			6.48	2.02	8.5
2021 05 26			4.94	1.46	6.4
			3.08	0.68	3.76
			5.14	1.45	6.59

3
30.1 ng/m³

GB26451-2011 6 0.0025mg/m³

5

1#

GB26451-2011

		-226					
	2021 05 25	2.37×10 ⁻²	0.432	0.380	0.00432	0.00284	0.00716
	2021 05 26	2.64×10 ⁻²	1.83	0.933	0.00437	0.00342	0.00779
	2021 05 25	3.25×10 ⁻²	0.590	0.414	0.00615	0.00306	0.00921
	2021 05 26	4.41×10 ⁻²	0.261	0.231	0.00446	0.00094	0.0054
	2021 05 25	2.59×10 ⁻²	0.125	0.098	0.00386	0.00012	0.00398
	2021 05 26	3.51×10 ⁻²	0.146	0.105	0.00428	0.00017	0.00445
mg/L		Bq/L					
2021N-122							

1
0.00921mg/L GB26451-2011 2

2 0.00445mg/L
GB26451-2011 2

1

2

GB16297-1996

15m

SO₂

95

15m

SO₂

GB9078-1996

95

15m

SO₂

GB13271-2001

II

200mg/m³

SO₂

900mg/m³

GB18483-2001

75%

2

TSP PM₁₀

480m

	2021	5	27	-6	3		7
TSP						TSP	
PM ₁₀						PM ₁₀	24
GB3096-2012							

1

85

Pb

	Pb	10.8mg/l		GB3838-2002
216			0.04mg/l	GB3838-2002

2

17.12m³

3

4t/a

4

Pb F⁻

7

W4 W7

GB3838-2002

GB3838 2002 III
Pb W3 W4 W5 3 Pb
Pb 3
W6

W3 W5
W4 W6

Pb Th

18320m³/a

Pb Th Pb Th 24
0.0965mg/L 0.0583mg/L 0.21Bq/L
GB8979 1996

7650m³

Pb 0.0980mg/L Th 0.0646mg/L

0.24Bq/L Hg 0.0147mg/L

GB8979-1996

5

GB/T14848-2017

5

1#

4

1

85-95dB(A)

100m

2

75-95dB(A)

200m

7
1 41.4~59.8 dB(A) 35.3~47.3
dB(A) GB 12348-2008 2
200m

2 56.0~62.9 dB(A)
47.3~62.0dB(A) GB
12348-2008 2

15 dB(A)

198 10 19.8 10
116.4 m³ 1
161 m³
4

2.8km

1.75km

1

2

3

2

GB36600-2018

2013

2013

1

2

1

5km

2

3

90

1

2018 11

+

+



2

1

75.21 m³

2020 6

50cm



3

2017 3

1

4.58hm²

30cm

4

2008

2021



GB/T14848-2017

III

-226

1

-226

2

-232

-232

3

-238

2017

2018

1983

1990

-238

1.8~520 Bq/kg

-238

-238

-232

-226

-232

-226

-238

-232

-226

-238

2020

6

-232

	500m			
	500m	16		
		pH	1 /	GB36600-2018
		pH	1 /	GB/T14848-2017

		1-4 5-8 9 10	1 /
	-226	1-4 5-8 9 10 11	500m 1 /
	U Th 226 Ra 210 Po 210 Pb	1 2 3 4 5 6	500m 500m 1 /
	226 Ra	1 2 3 4 5 6	500m 500m 1 /

		1 2 3 4	1 /
	^{210}Po ^{210}Pb		1 /
		1-4 5-8 9 10 11 12 13	500m 1 /

0.1496km²

26 t/a

- - -

5km

1
GB3096-2012

TSP

2

3

TSP PM₁₀

1

pH

GB3838-2002

2 W3 W4 W5 3

Pb

Pb

3

W6

3 W3 W5

W4

W6

GB/T14848-2017

5 • ^ ~'PDEøD 7²n•WD,€F9N 1y •L'

1						
	GB36600-2018					
2				2013		
2013						
3						
2013	9			W4	W7	
1				30m		
2						
1	2021	6				X-
	0.097~0.273	μGy/h	2008	9		X-
	0.1817~0.4705	μGy/h				X-
2	2021	6				X-
	0.119~0.127	μGy/h		2.7km		0.105 μGy/h

2008 9

0.1587~0.2211 μ Gy/h

3

1995 20
3.3~40.6 Bq/m³

1 2017 2021

2 2018

1995

1 2017 2020

“ 2019 ” “

1995 ”

-226 “ 2019 ”

“ 1995

”

2

-226

1

-226

-226

2

-238

2017 2018

1983 1990

-238

1.8~520 Bq/kg

-238

3

-232

-232

-238

-232

-226

-232

-226

-238

-232

-226

-238

2020 6

1#

GB26451-2011



2

1 2m³

1 20m³/d

7

1 41.4~59.8 dB(A) 35.3~47.3
dB(A) GB 12348-2008 2

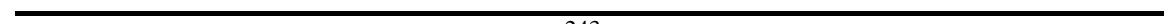
2 56.0~62.9 dB(A)
47.3~62.0dB(A) GB
12348-2008 2

15 dB(A)

2.8km

1.75km

200L



2021 12

11

1 1# 2# 3# 4# 5# 6# 9#

GB36600-2018

2 7# 8# 10# 11#

GB15618-2018

1 30m

2

1

1#

GB26451-2011

2

1

0.00921mg/L

GB26451-2011

2

2

0.00445mg/L

GB26451-2011

2

2

TSP PM₁₀

480m

2021 5 27 -6 3 7

TSP PM₁₀

TSP PM₁₀ 24

GB3096-2012

Pb

Pb

W3 W4 W5 3

Pb

Pb

3

W6

W3 W5
W4 W6

5

GB/T14848-2017

5

1#

4

200m

7

1

41.4~59.8 dB(A)

35.3~47.3

dB(A)

GB 12348-2008 2

200m

2
47.3~62.0dB(A)
12348-2008 2

56.0~62.9 dB(A)

GB

15 dB(A)

2.8km

1.75km

8-1

1			1	20m ³ /d		2022 12	10
			1	2m ³		2022 12	0.2

		41.7%				
4			2	GB15562.1-1 995	2022 12	0.1
			7-3	7-2	2022 12	
						60.3

1

2

3

4

5

