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 -

25 t/a 2015 10

9 [2015]7

2016 4 20

5 3

“ 2016 10 ”

“ — — ”

26 /

2017 10

[2018]65

[2019]6

2019 9 6

“ 2019

495 ”

2021 2

5

2

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

	γ	γ
		^{222}Rn
		α β
		U Th ^{226}Ra α β
		U Th ^{226}Ra
		U Th ^{226}Ra α β
		U Th ^{226}Ra
		U Th ^{226}Ra
		U Th ^{226}Ra α β
		U Th ^{226}Ra α β
		^{238}U ^{232}Th ^{226}Ra

GB3096-2012

2018 29

GB/T 14848-2017

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

≤10μm		70	μg/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	≤10	450	≤250	≤0.001	≤0.1	≤0.1	≤0.01

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

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

GB26451-2011

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

(GB12348 2008)2	60	50

4

I

GB 18599-2020 I

GB18597-2001

1

α β GB/T14848-2017 III

α≤0.5 Bq/L β≤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

103m

128m 423m

1-2

[2019]23 3-1

2115m

2.58 / 30m

0.0041 300m

0.3611

3-2

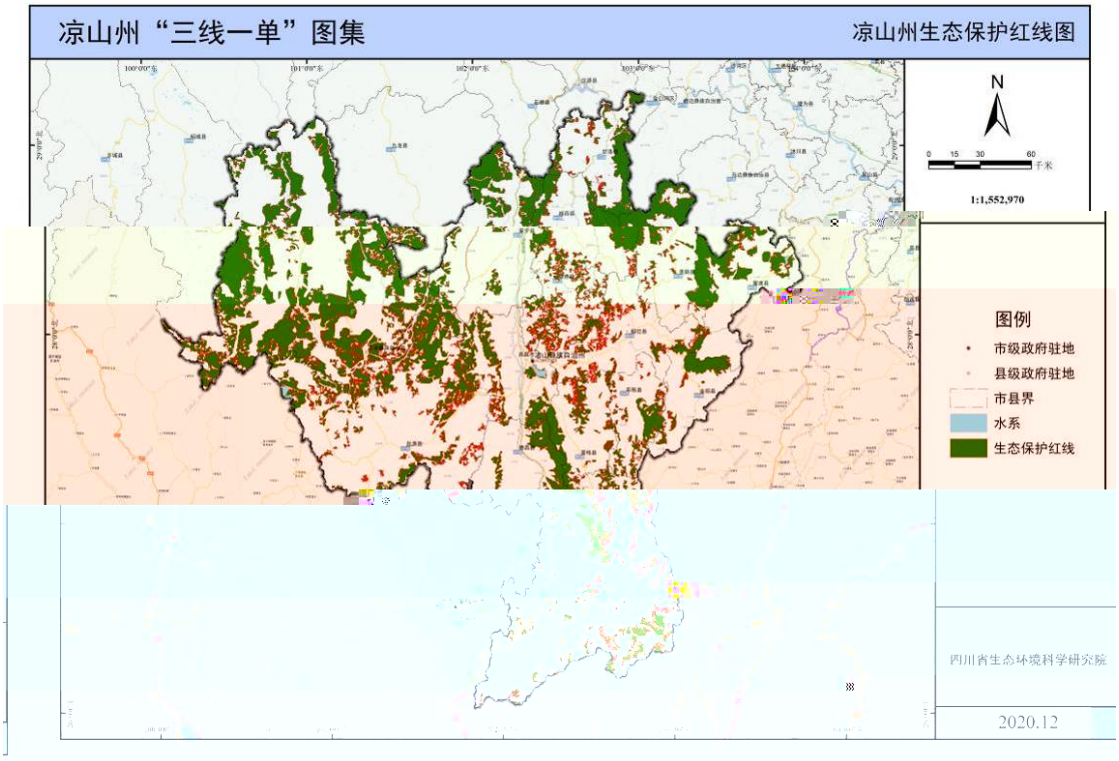
950m

1.8-3 1-1 1-3

		15m			GB3838-2002	
		50m				
		100m				

“ ”

< >



70 17

46.03% 36 4.9%

17 17 2 17

49.07%

“ ”

3

			1 2 3 4 5 5 1 2 1 2 3		

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

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

			:		
				/	/
				/	/
-YS5134243210002- -				/	/
			:		

			/	/	/
			/	/	/
-YS5134 24331000 1-					
			: GB3095-2012 / :	1 2	
			/	/	
			/	/	

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 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

26 / 16 /

10 / 26 8232

1

2

“ ”

3

4

5

6

2011

2011 7 25 [2011]30

5

1

2

“ ”

2013

[2013]199

1

“ ”

“ ”

2

26 t/a

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 1# 87.0 m^3 1# 32.0 m^3 119 m^3	1 75.21 m^3 2020 6 50cm	
		1	1 20t	
		1 50m^3	1 70m^3	F
	":m/ ²Đ 7±'ÿ¶•%+e E7 Đ„£ /8W »EÄ1Ñ ÒB•ðë1·3+5 @Đ œ ÷ •ÐE¡¶p ‡7' ë¿ ÉAHÔð6B•ðë1·ðèï 3$4	Ò 2m^3		
		2	2 1	
		10 6	10 70m	ڊ

161 m^3

			1.2m 2	
			1 150m^3	

		pH COD SS NH_3-N Pb 7	1
		SO_2	
	1m		
		α β ^{232}Th	
		γ	
		^{232}Th	

1

2015

2.4-2

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

				-238 -232 -226 -40 α β	

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

0.1496km^2

- -

26 t/a

1994

2009

2013 2016

1

3.1-1

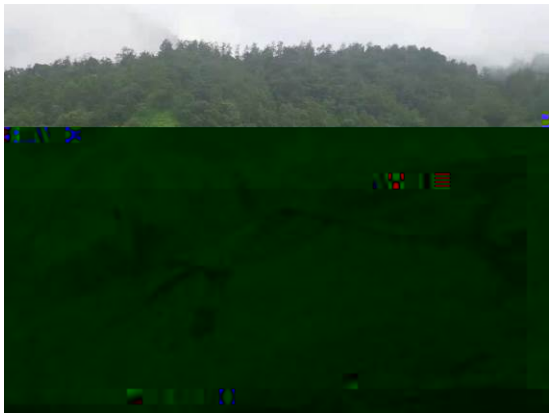
			0.1503km^2 2140m 2140m 26 t/a	0.1496km^2 26 t/a		
			1	1		
			- -		1 2	
			—	- -	3	
			2 3.52 hm^2 87.0 m^3 3.20 hm^2 32.0 m^3 119 m^3	1 75.21 m^3 2020 6 50cm		

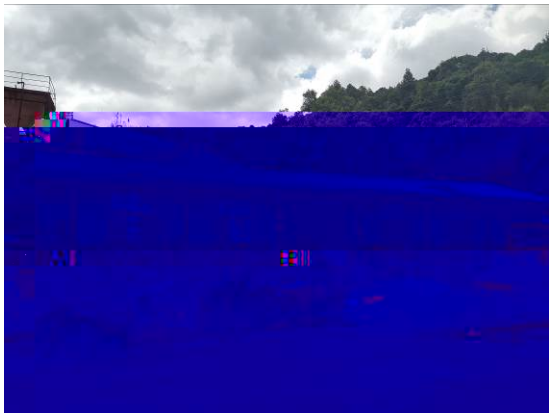
				2021 6		
			1 32.5m^2			
			2 16m^3	2 16m^3		
			1 6666.7m^2	1 6400m^2		
			1 270m^2	1 270m^2		
			PE 200mm 0.5km	PE 325mm 0.9 km 4 14m^3		
			PE 200mm 0.5km	150mm 2.8km 2 155 m^3/h		

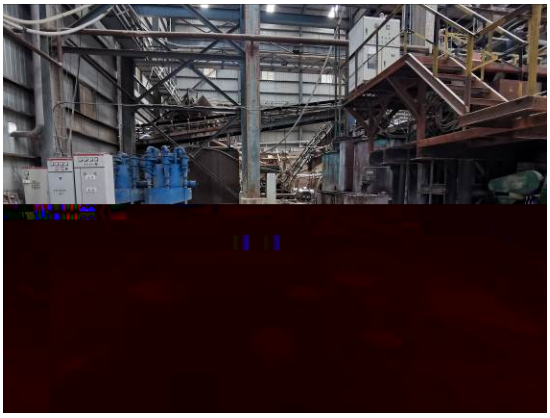
			161 m^3 1	1 2018 6 2018 10 11 20 11 27		
			2	2		
			800m 4m	800m 4m		
			2 800m^3	1 1000m^3		
			1	1		
			255.14m^2 5666.7			

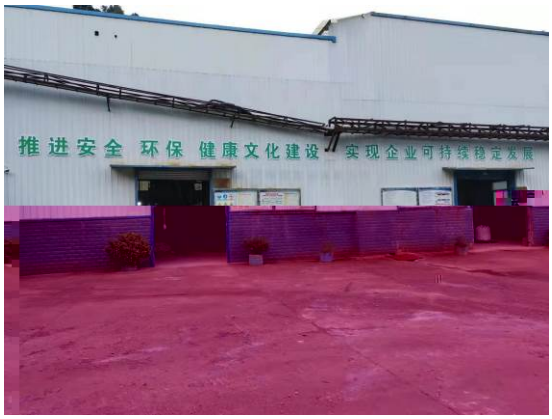
			m^2			
			1	1 20t 1	1	
			1 +1	2 2 15m	2	
			1			
			1 +1 5			
				1.2m 2		
				1 $150m^3$		
			1 $10m^3$	1 $30m^3$ 2	2 $30m^3$	

			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			

5 3.1-3

		2021	05	25	—2021	05	26			
					-238		-226		8232	

-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

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

	/	/			3	

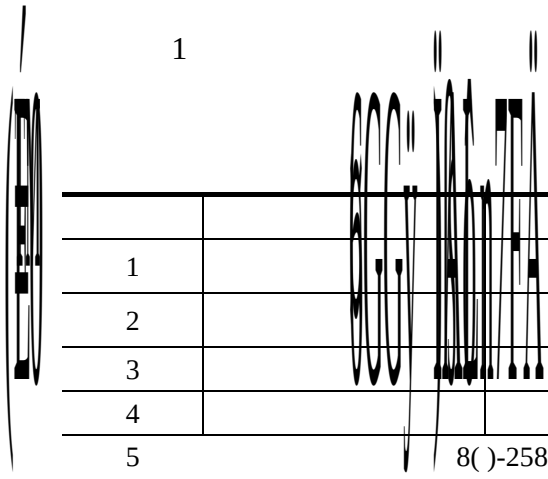
1

2 2 2

2

3 3

1



3.1-6

1		kg	4000
2			20000
3		t	145
4		t	10
5			

8( )-2588.5(10)5.5( )]TJET8ref 470.48 52.74 .72 ref13ref 470.42 .72 .78 8 0 R

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

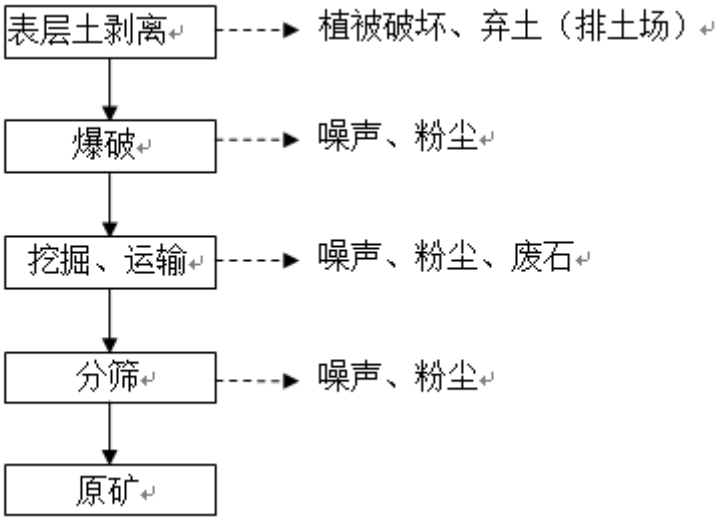
3

4

2260m 2000m 2140m

2140m

3-5



3-5

- -

- -

- 50-70

- -

20%

20 %

40 %

60.11%

— — —

(

, ,

0.2 0.3mm

pH

Na_2SiO_3

3-6

- -

1

2

2

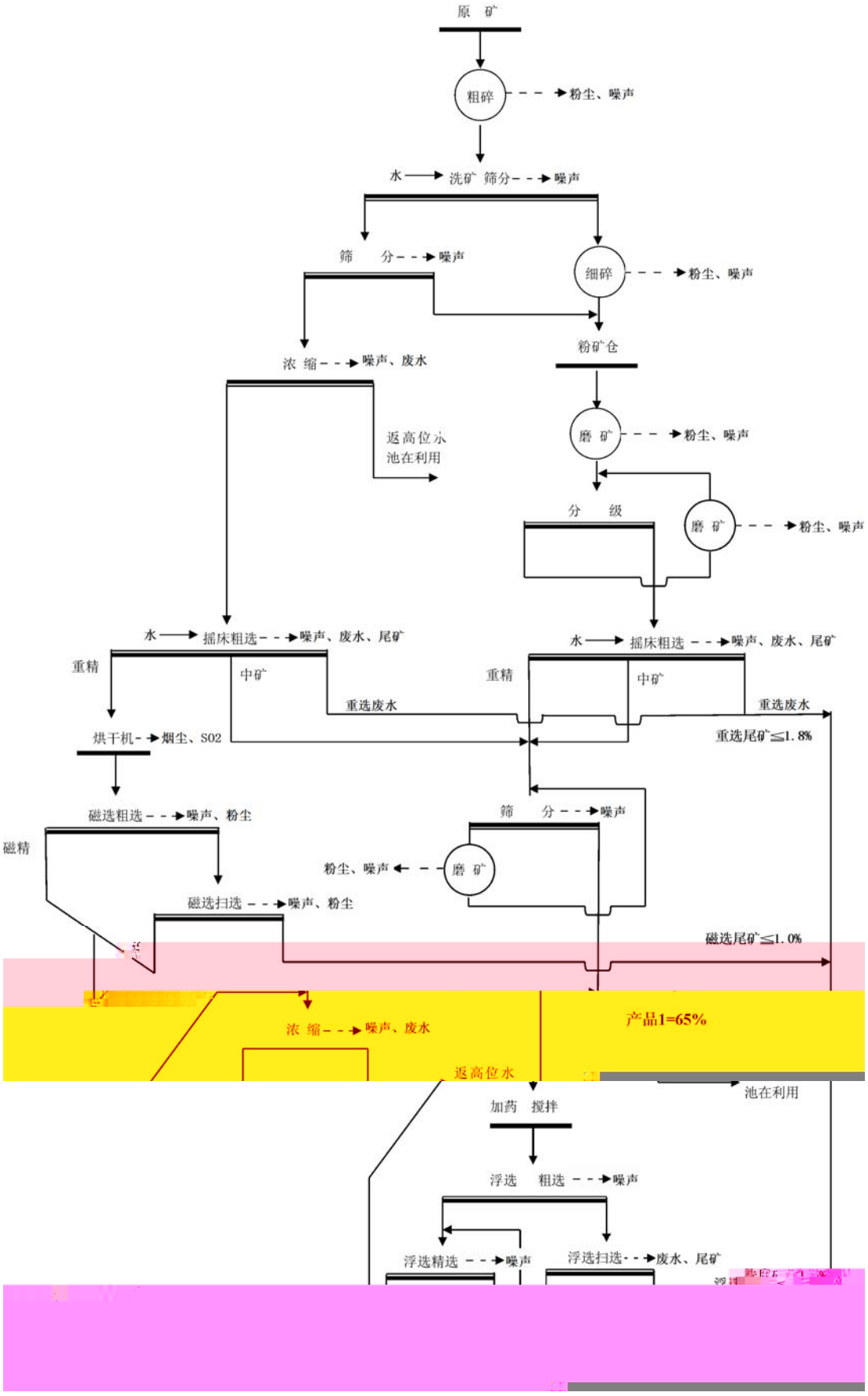
3 —

- -

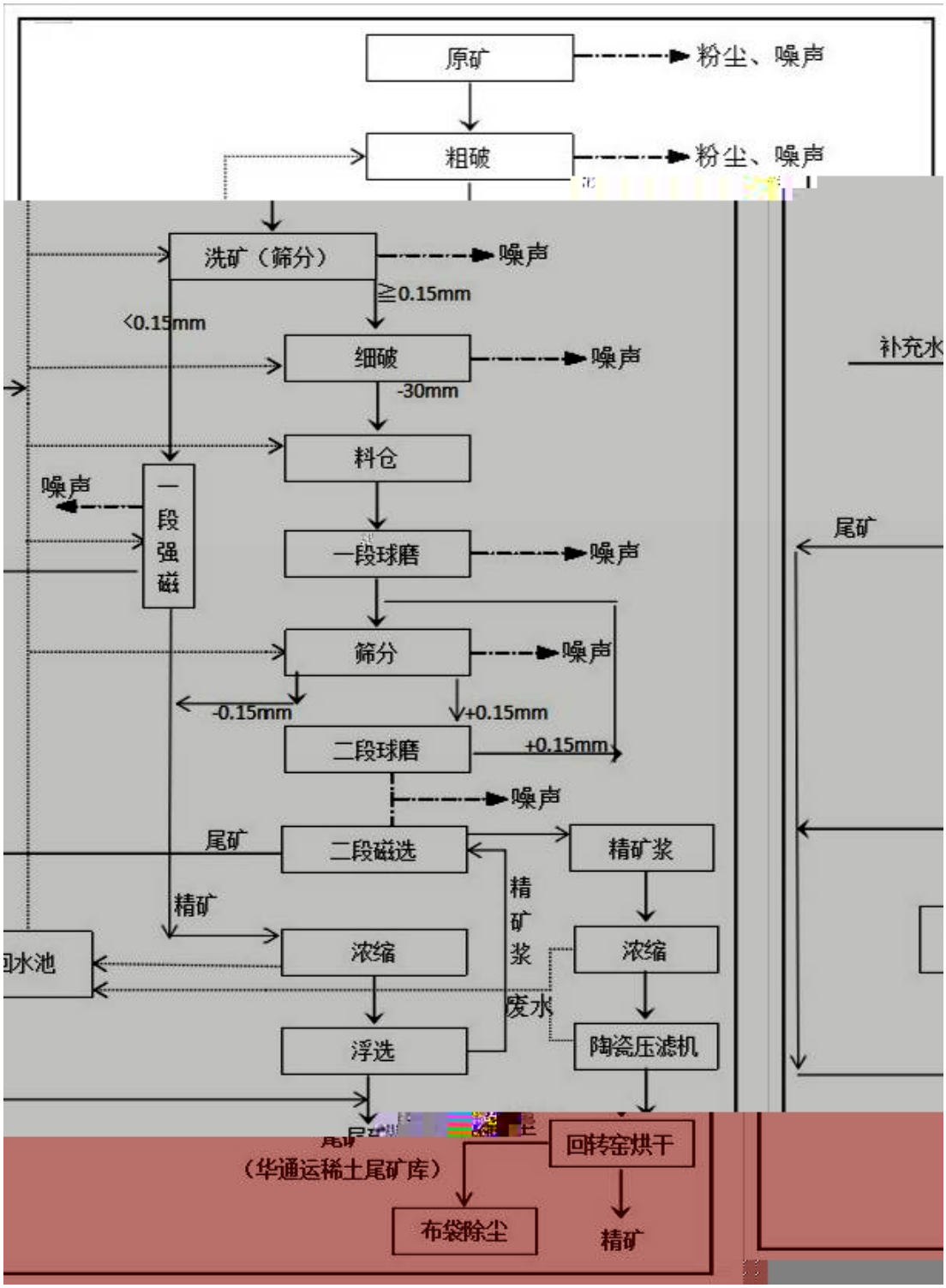
4

1.75km

3-7


原 矿
粗碎
粉尘、噪声
水
洗矿 筛分
噪声
筛 分
噪声
细碎
粉尘、噪声
浓 缩
噪声、废水
粉矿仓
返高位水池在利用
磨 矿
粉尘、噪声
分 级
磨 矿
粉尘、噪声
水
摇床粗选
噪声、废水、尾矿
重精
中矿
重选废水
烘干机
烟尘、SO2
水
摇床粗选
噪声、废水、尾矿
重精
中矿
重选废水
重选尾矿≦1.8%
磁选粗选
噪声、粉尘
磁精
磁选扫选
噪声、粉尘
筛 分
噪声
粉尘、噪声
磨 矿
磁选尾矿≦1.0%
浓 缩
噪声、废水
产品1=65%
返高位水
池在利用
加药 搅拌
浮选 粗选
噪声
浮选精选
噪声
浮选扫选
废水、尾矿

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

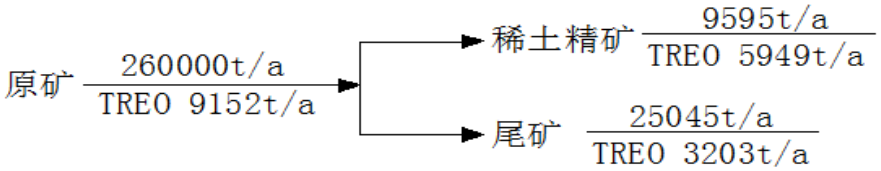
2 TREO

3.2-2

3-8

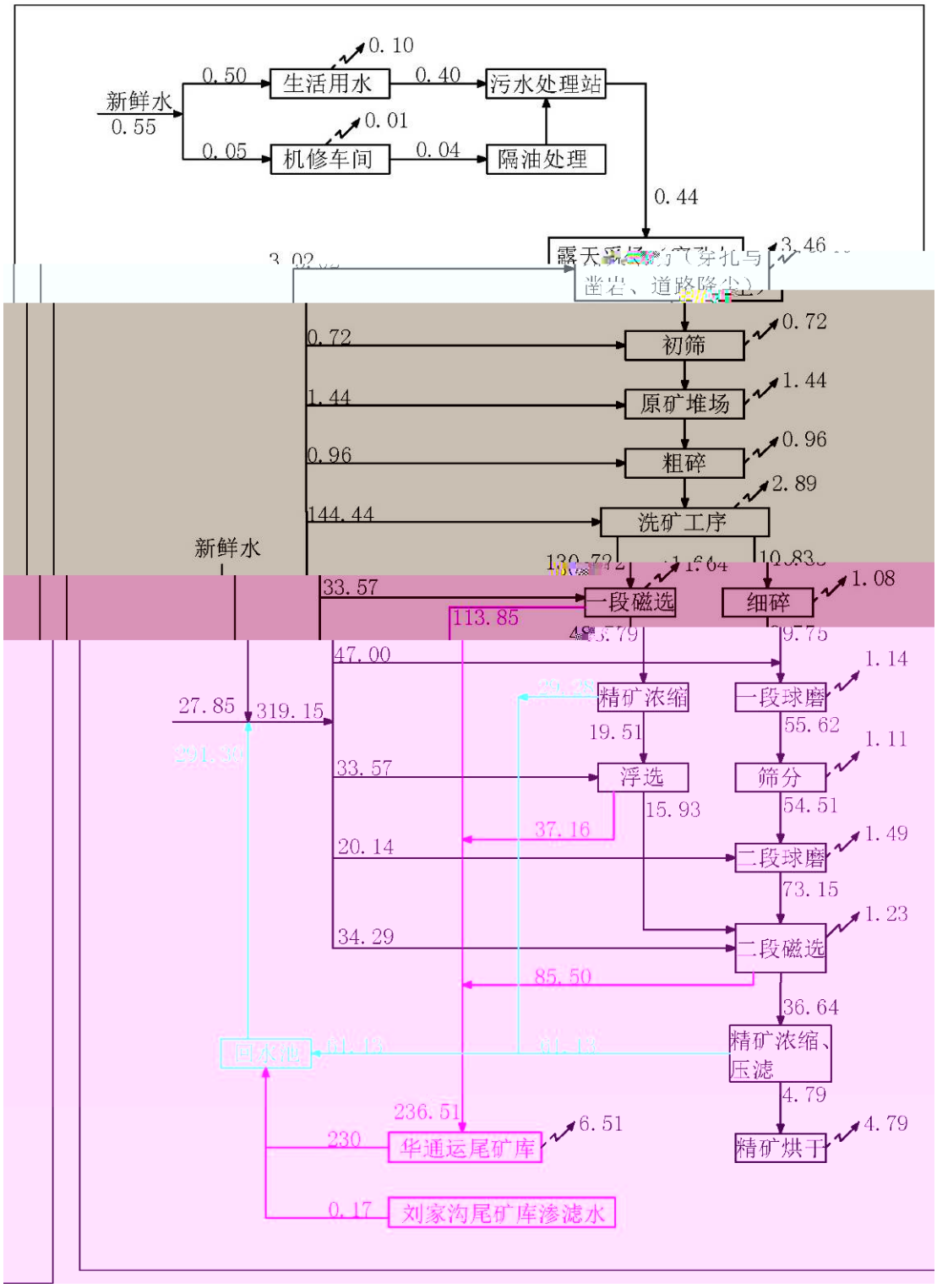
	t/a		t/a
	260000		9595
			250405
	260000		**260000**

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



1

120 12m^3/d 9.6m^3/d 0.40 m^3/h 1 20m^3/d


新鲜水
0.55
0.50
生活用水
0.10
0.40
污水处理站
0.05
机修车间
0.01
0.04
隔油处理
0.44
3.46
3.02
0.72
初筛
0.72
1.44
原矿堆场
1.44
0.96
粗碎
0.96
2.89
144.44
洗矿工序
新鲜水
33.57
一段磁选
细碎
1.08
113.85
47.00
1.14
精矿浓缩
一段球磨
27.85
319.15
19.51
55.62
1.11
33.57
浮选
筛分
15.93
54.51
37.16
20.14
1.49
二段球磨
73.15
1.23
34.29
二段磁选
85.50
36.64
回水池
51.13
51.13
精矿浓缩、压滤
4.79
236.51
6.51
230
华通运尾矿库
精矿烘干
4.79
0.17
刘家沟尾矿库渗滤水

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

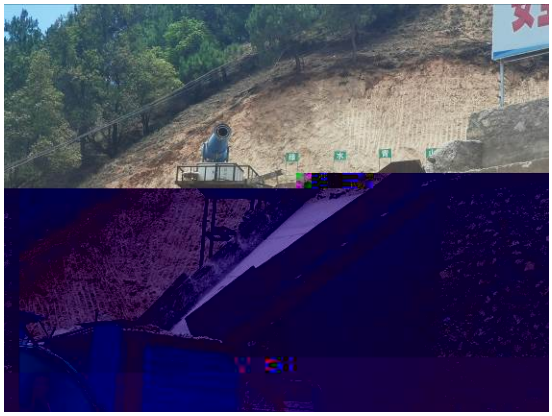
1 1

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 9.6m^3/d

2

291.13 m^3/h

61.13m^3/h

236.51 m^3/h

230 m^3/h +

3

2018 11

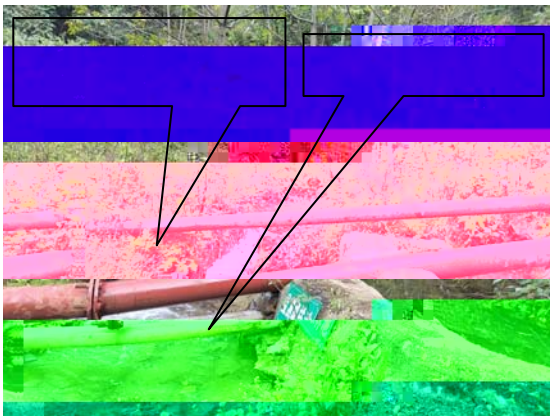
1 4m^3

4

3.3-2

	1 2m^3	1	
		+	
		1 4m^3	
	1 2m^3		

TD .0057 T0.8971 .6714 TD ( )Tj ET 76.56 302.36 .72074 72 re f 127.8 300.9



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

“ ” 6.0 hm^2

354.48 m^3 31.5 m 69m 4m

1 2.0 1 4.0

28m 59.5 m 13.94 m^3

17.17

[2014]113

2017 <

“ ” > [2017]5

< “ ”

> [2017]16

“ ”

2016 43.65

4017.92 21.25

“ ”

“ ” “ ”

“ ”

[2021]1 “ ……

2 …… ”

“ ”

3976.06 m^3 198.37m

116.15 m^3/a 0.75

25.7

“ ”

2020

2021 8

5

[2021]80 8

9 10

224 t

195 t

8140 t 2.1t/m^3

3876.19 m^3 4017.92 m^3

21.25 3876.19

m^3

A

3976.06 m^3

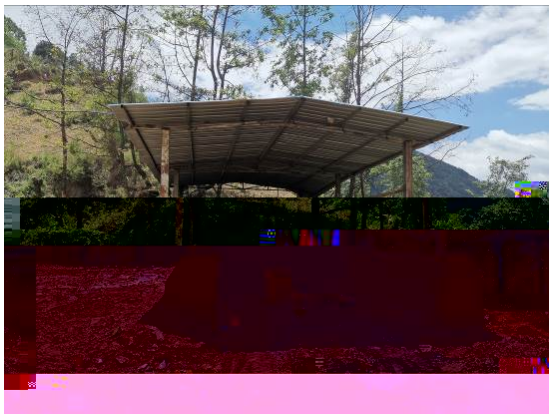
26 t/a 25.04 t/a 19.26

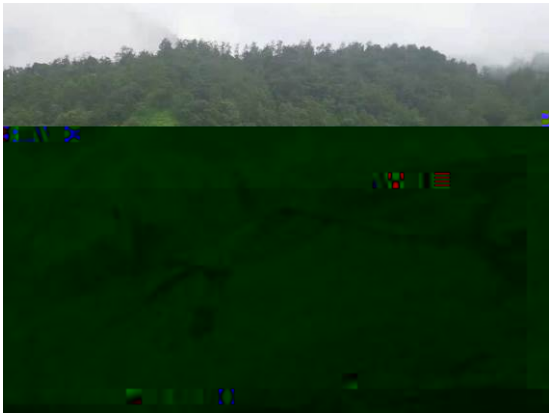
m^3/a 20 t/a 25.04 t/a 18.98

m^3/a 38.24 m^3/a

150 t/a 116.15 m^3/a 0.75

25.7





		-238 -226 -232			
				1	
				1.2m 2	

			——	2	

		-238 -226 -232		1 4m^3	

3.1-3

1Bq/g

2.8km

1.75km

29

29

2020 688

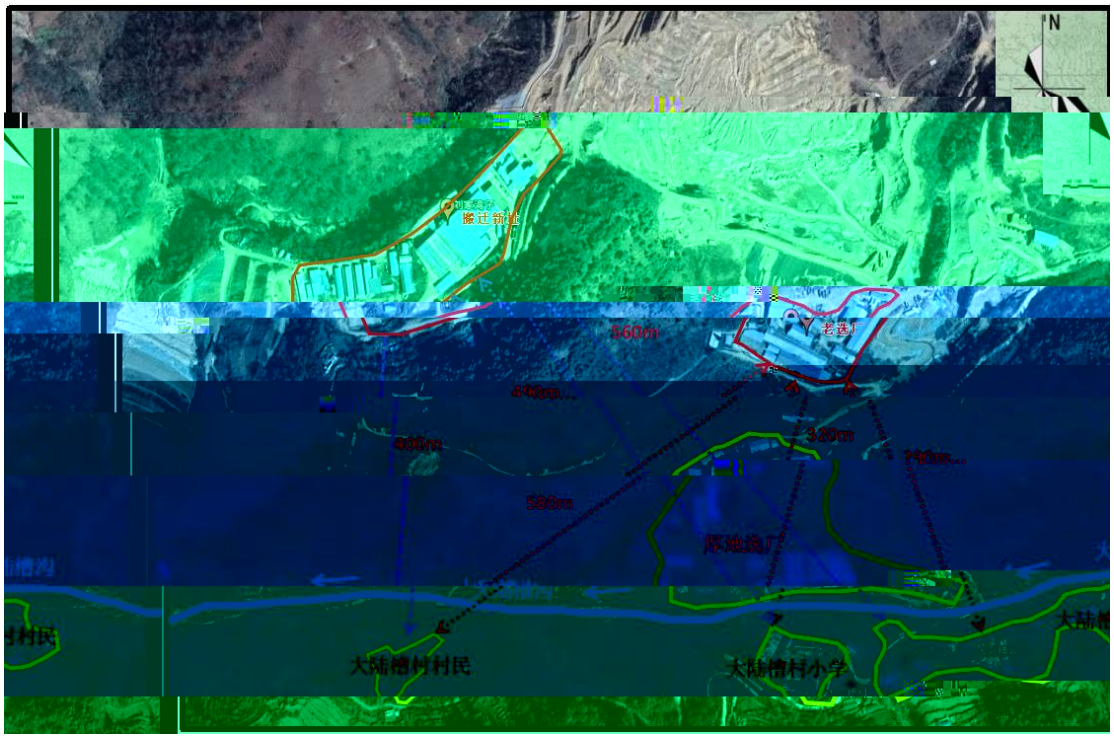
26 /a

2016 “ 2016 10 ”

“ ” “

”

200m



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

1 2096m 2082m

2 2020

“ 3.2.2 ”

1

2

3

NO_X SO_2

4 —

- -

2

1

NO_X SO_2

2 2

1

2

3

2.8km

1.75km

1 $10m^3$

1 $30m^3$ 4 $14m^3$

2016 34

5 3

2016 10

1

2 26 /a

3

4

NO_X SO_2

5

6

7

8

2020 688

2016 31

2016 2016

3.5-1

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

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

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

3.5-1 2016 “

”

27°05′-27°36′

101°54′-102°29′ 2288.35km^2

58km

4-1

-

2400 1900

(F1)

310° 340°

45° 75°

I

60°

( )

I

1

($Q4^{el+dl}$) ($Q4^{al+pl}$) (T3 J_1bg)

(δO_2) ($\xi\pi$)

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-J_1bg)

2

I (SO_4)

(58 60)

(18 25) (10 20) (0 5) 1 4mm

$SiO_2$54.81 CaO7.29 K_2O+Na_2O >3 $K_2O>Na_2O$

SiO_2

II (§)

SiO_2 60.28 TiO_2 0.34 $A1_2O_3$ 17.64 Fe_2O_3 2.59

FeO 1.77 CaO 2.88 BaO 0.59 SrO 1.15 K_2O 5.99 Na_2O 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

2

480m 4.3-1 4-3

1		TSP PM_{10}	7	
2		TSP PM_{10}	7	

PM_{10}

2021 5 27 -6 3 7 TSP PM_{10}

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 PM_{10} 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

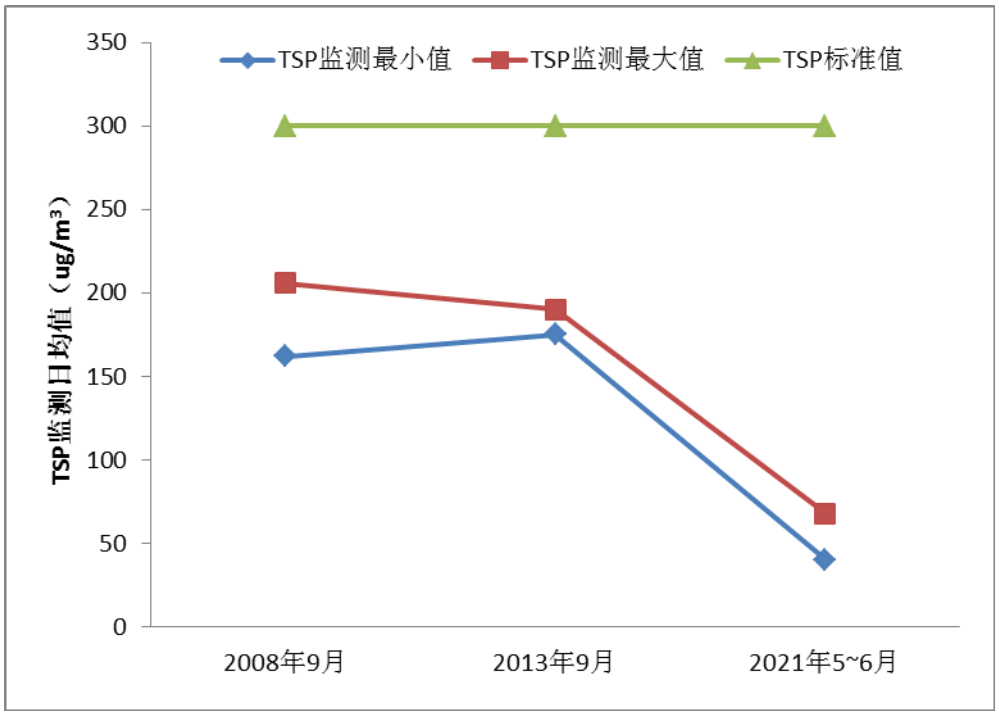
		TSP	%
		175~190	63.33
		208~231	77.00

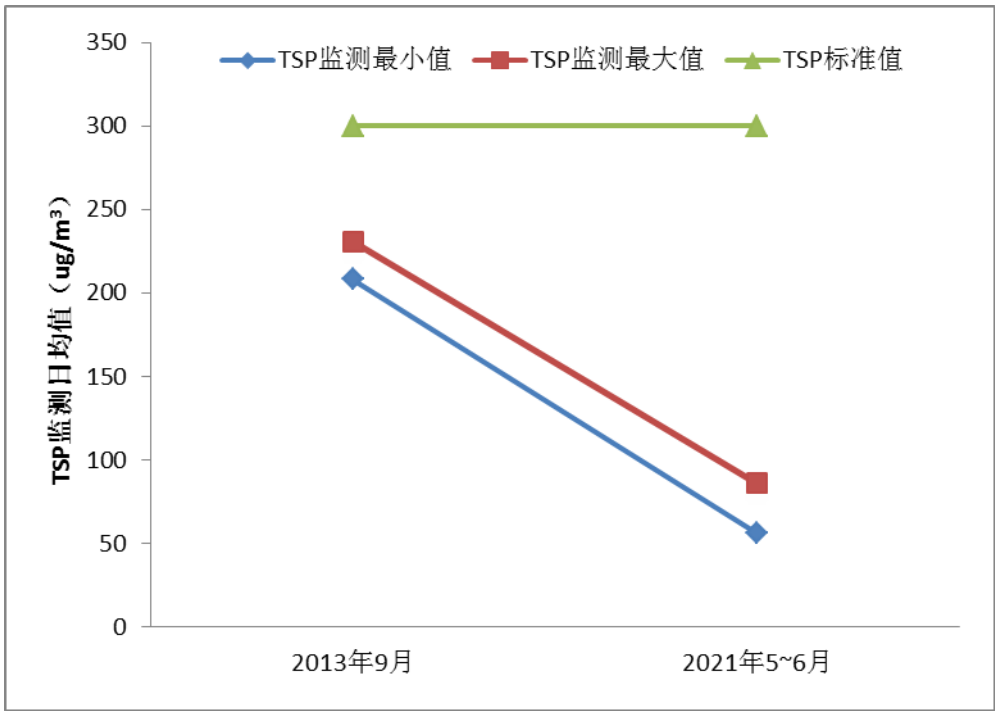
TSP 24

GB3096-2012

TSP 4-4 TSP

4-5





1 TSP

GB3096-2012

2 TSP

3 TSP PM_{10}

7

7

4.3-6 4-3

W1		pH		
W2				
W3				
W4				
W5	500m		3 1	
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	0.00030-0.0068	0.00017-0.00069	0.00054-0.0095	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

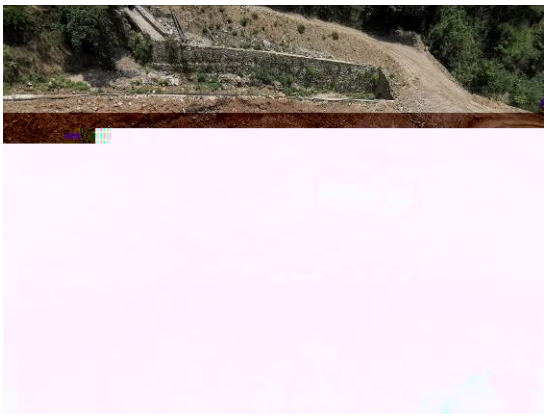
1 W4

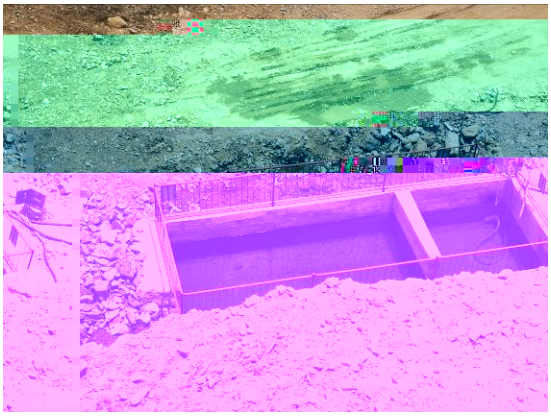
W4

W4

1

× × 15m × 5m × 3.5m 262m^3





2 W7

W7

2021 6

2#

7 W4

2021 6 W4

4.3-6 4-3

2021 12 23 25 3

4.3-10

	W1	W2	W3	W4	W5	W6	W7	
	8.2-8.4	8.0-8.5	7.8-8.0	8.1-8.2	8.3-8.5	8.3-8.5	8.4-8.6	/
	0.095-0.109	0.230-0.257	0.073-0.119	0.656-0.726	0.084-0.108	0.334-0.378	0.355-0.406	1.0

III

2 (GB3838 2002)

3

5 2008 9 18

19 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
		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

Hg	ND	ND	ND	ND	ND	0.0001

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

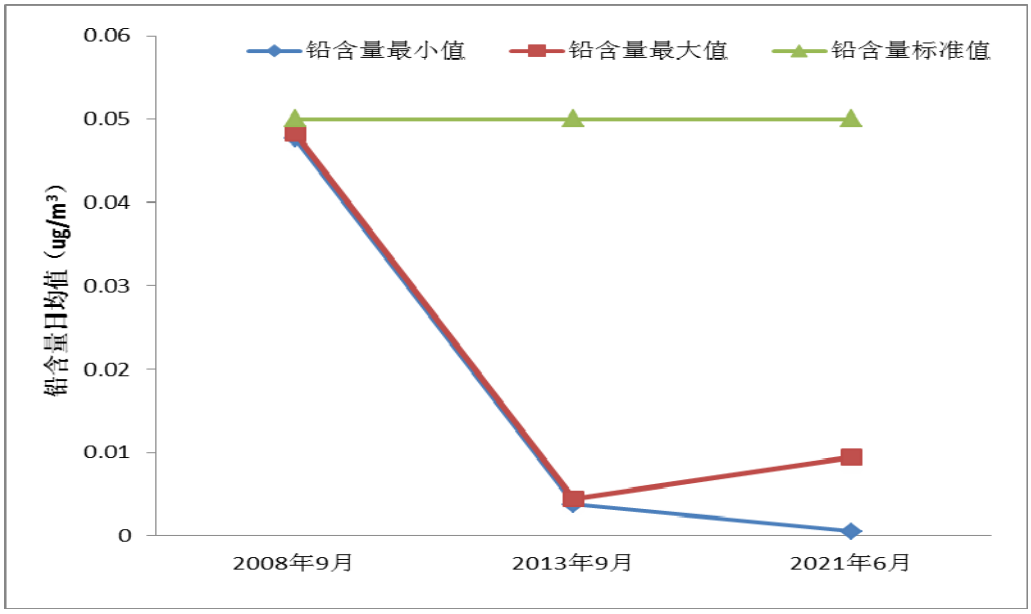
1 Pb

W3 W4 W5 3 Pb

Pb 3

W6

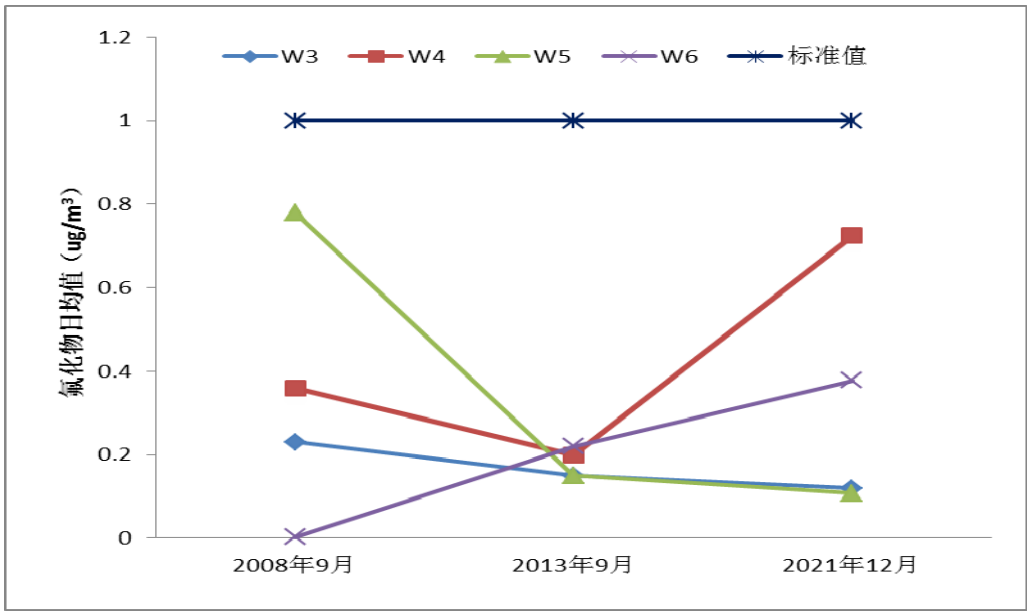
4-6



2 4 W3 W5

W4 W6

4-7



4

4.3-16 4-3

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

K^+ Na^+ Ca^{2+} Mg^{2+} CO_3^{2-} HCO_3^- Cl^- SO_4^{2-}

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 1 5

4.3-20 4-3

1		1 K^+ Na^+ Ca^{2+} Mg^{2+} CO_3^{2-} HCO_3^- Cl^- SO_4^{2-} 2 pH	1 1	
2				
3				
4				
5				

K^+ Na^+ Ca^{2+} Mg^{2+} CO_3^{2-} HCO_3^- Cl^- SO_4^{2-}

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 Ä

	/	/	/	/	/	
	/	/	/	/	/	
	/	/	/	/	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 Ã./ º `CX

Ä1 Å./ ƒ(© ± ú./.#2« »

N©- ./ j./ ƒ+a Ê W,´./79 ƒ ú ¦ T ×,´4ö5•794ô @ Ä W79] pG +a4ö5•79 ₫"K¯ Ù »00 O./.#4ô @ Å Ä W./79 j.ãG¨- F **[MCE¹:T.#KfGý ¦.# »00 O./.#** È ¦ @ j./ ƒ h ó × T ×,´4ö79 V j4ö5•79 ₫"K¯ Ù »00 O./.# F AGÿ4ö5•79 ₫$' 8 .#9!L K¯ Ù »00 O./ È4ÿ.d.¾ úNþ F#û% ÈJñ E³ j&ø Ä

N©- 00 O./.#2« »+a **:T.#Gý ¦.# »00 O./.#** r**4ö5•79 »00 O./.#** È00 O./(™ "O.ãJø./ j k È REOñ }+aQ F@$@L} ~ Ä

Ä2 Å Ï./ d+O:T.#

\N©- 00 O./(™ "O.ãJø./ j k È d+O 9:T.#./ È ./.#] F [GÿEî ` 19.00%Ä

>˜ 4.3-25 DL01ÃDL02 'B g Ï./ F – @ 6

./ g 5F '	6 À 5 Ì Ä Wt% Å											
	REO	BaO	SrO	F	Pb	Zn	SiO_2	TiO_2	AL_2O_3	Fe_2O_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 À 5 Ì Ä Wt% Å											
	CaO	MgO	Na_2O	K_2O	P_2O_5	S	CO_2	ThO_2	U	H_2O^+	H_2O^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 Å./.#,´Nþ F0; Ö

\N©- 00 O./ º,´Nþ F Œ+X j&ø ÈNþ F$! Ö X 200m ; Ä `>˜ 0 ü 30m W G 6 _2¹ [(æ./.# Ä =1Ñ _./.#./(™ F79.#./(™ wF• = <0; Ö,´Nþ F#û% Œ+X ¼ s3P,´Eñ0+ üLö Œ+X È(© [_MCE¹.# ÃU Á!ý Ã!QL .#1yJñKq Ç8¢./(™ J>ÛNþ F xU 8¢+¿ ® O(æ(™ Ä

"O.ãJø./ (™*6Nþ F j k È X"W F V µ x.¾2Â Ã2é2¹(æ Ä:T.# J>ÛNþ F.d.¾ x W ? =1y,´.¾2Â(æ ÈMCE¹.# X `>˜ j&øNþ F ' @+¿ ®,´?@U 8¢JñK` O ÄTôJñ ./"W F @?@Jñ./ Ä+a ¾./.#Nþ F j&ø È8$ ¯./.## F)·Eî 20% : Ä

2 Ã./ j"d · `CX

i ž É -1 ç < ï WLv ‘00 O./ j ž `CX Õ z Ê Ä ` p 0 O •

`CXLO Å È./ j 6 3 ` r k?± 9$' 8.#9!L K¯ Ù ¥ O_2 Ã.á W!"K¯ Ù ¯ È.ãG¨- F

Q^{edl}

1

1

Q^{edl}

2 5 2

10 20 0.5

3 20

Q^{edl} 2 40

1.4 1 40

14 40% 60%

0.5

2

Xc

5 10% 30% 2 5%

316

2 5 5 7

3

δ O_2 ξ

0.1

1 5

0.5 2.0% 80 150

1 2.5L/s.km^2

2

1 3

7.25

4 8 80%

1902.12

3

40 50m 80 90m

3

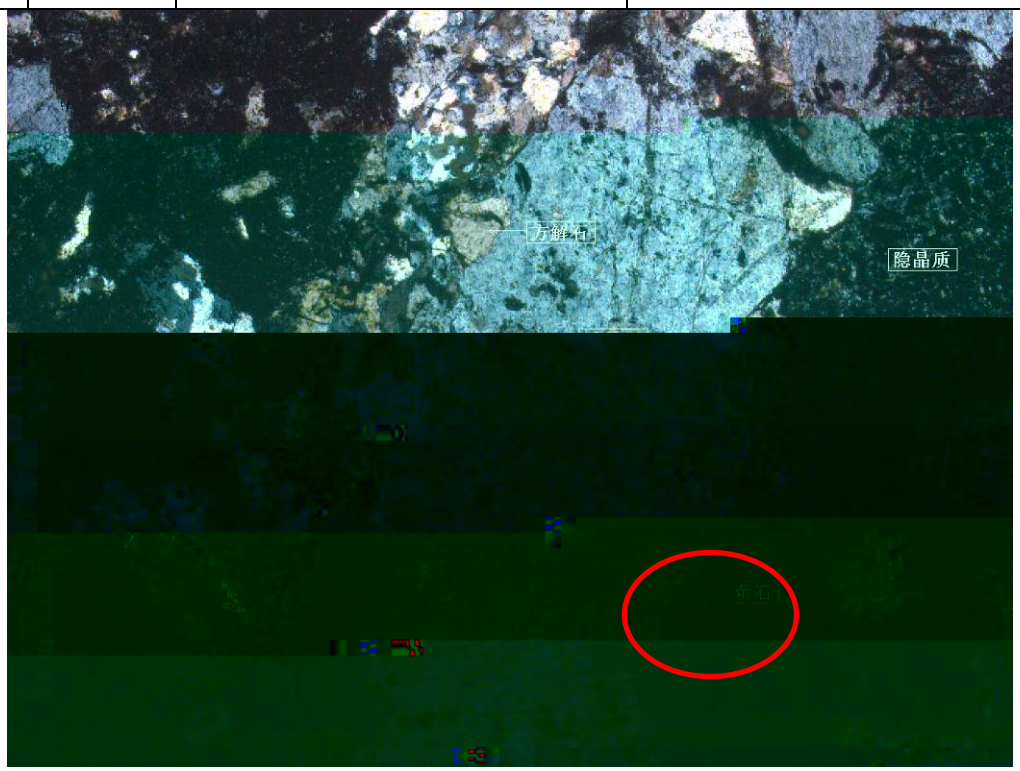
2022 5 6

3

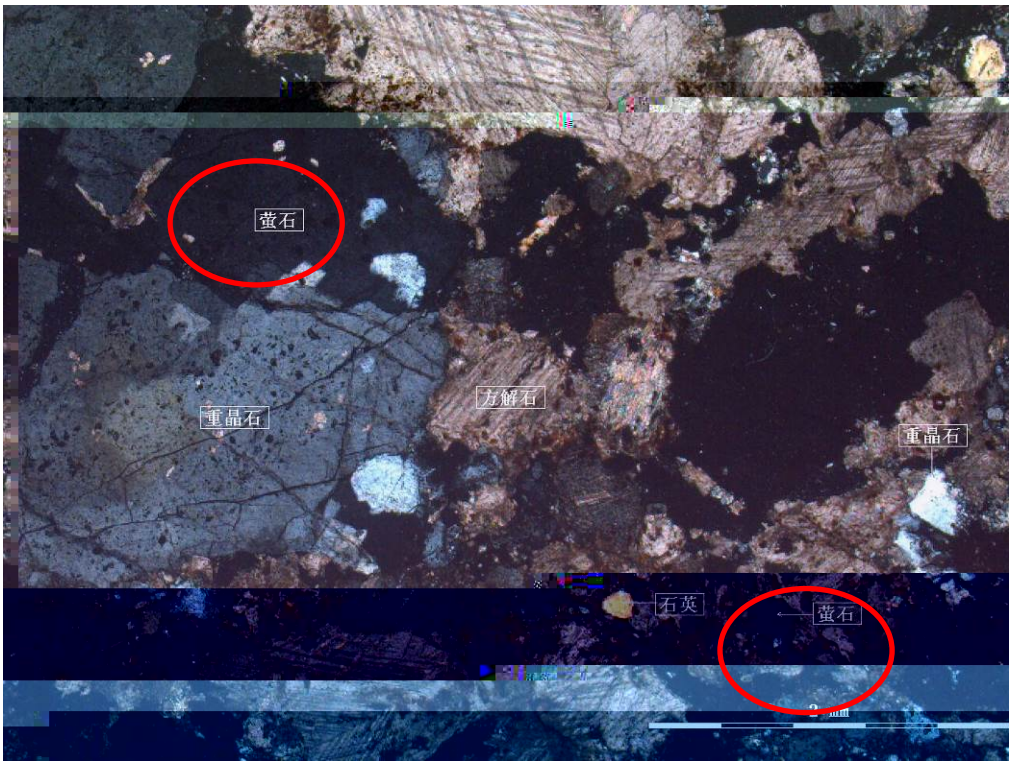
17

		2022 5	2022 6
1		5mm 60	
2			
3			

			60 6mm



4-8 2022 5



4-9 2022 6

4

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	A 2 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)

		GB 12348-2008	AWA6228+ 00304011 00304010	/

4.3-31

	2021 05 25		2021 05 26			
1#	52.2	47.0	47.1	46.7	60	50
2#	59.8	35.9	59.9	42.9		
3#	41.4	40.1	43.2	35.3		
4#	48.9	47.3	51.6	47.3		
5#	59.3	58.8	59.8	59.4		
6#	56.0	55.8	56.5	55.5		
7#	62.9	61.9	62.3	62.0		

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

2008 9 19 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		
2#	1m	51.6	40.9	52.2	41.6		
3#	1m	52.4	42.3	53.0	40.8	60	50
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

11

11 5 6

4.3-34 4-3

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

2

GB36600-2018 1 45

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

4.3-36

	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

	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	**200**	
5		0.32	0.96	0.5	0.52	**100**	
6		0.37	0.56	0.56	0.41	**250**	
7		0.30	0.50	0.93	0.72	**120**	
8		0.006	0.003	0.006	0.02	**2.4**	
9		0.11	0.1	0.10	0.22	**100**	

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

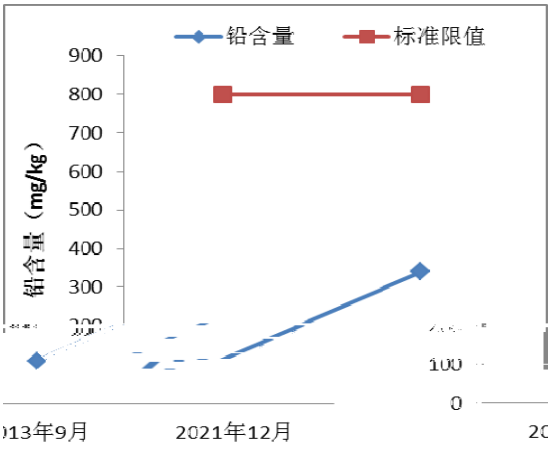
1

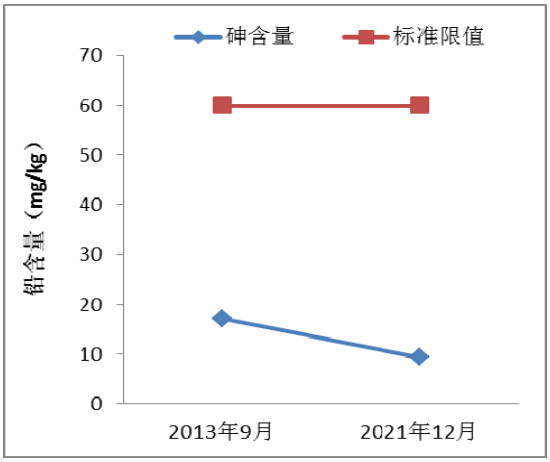
GB36600-2018

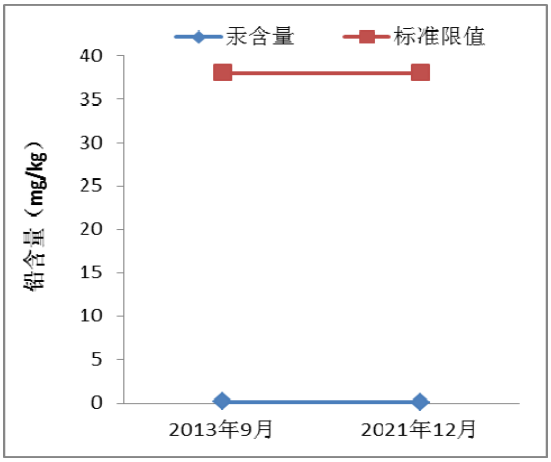
2 2013

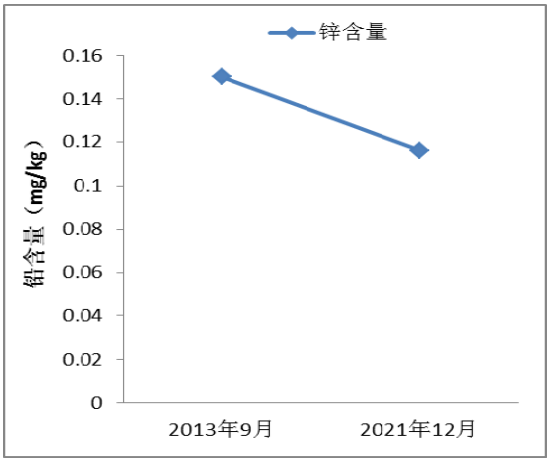
2013

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

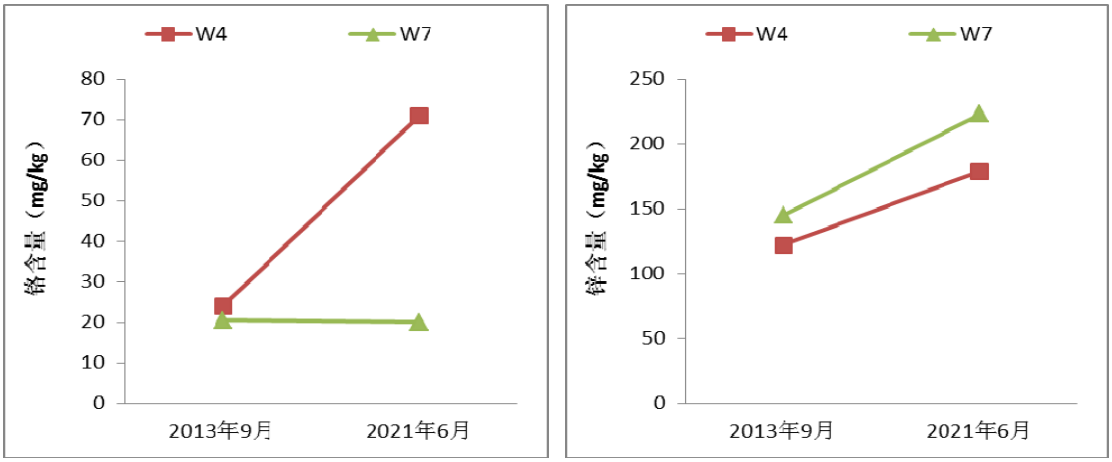
2013 9

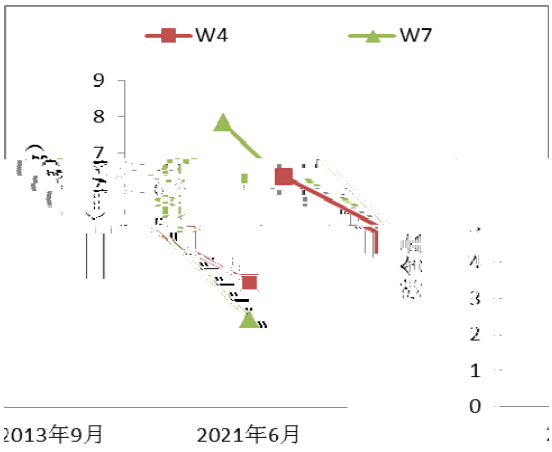
30m	8.02	616	122	0.392	6.35	23.8
500m	8.41	2785	145	0.465	7.85	20.5

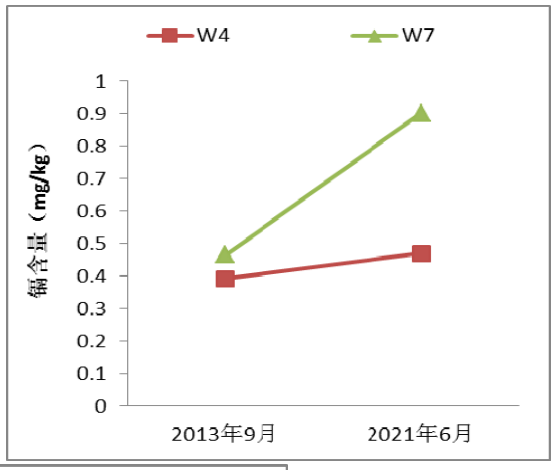
2013 9 W4 W7

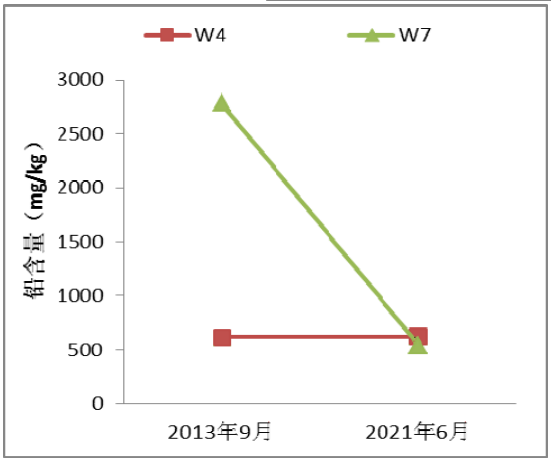
1

2




W4
W7
9
8
2013年9月
2021年6月


W4
W7
镉含量（mg/kg）
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2013年9月
2021年6月


W4
W7
铅含量（mg/kg）
3000
2500
2000
1500
1000
500
0
2013年9月
2021年6月

“ ”

1

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

hm^2 32.89% 107.82 hm^2 32.42%

3.55% 8.62%

2

“ ” 284.71 hm^2 85.62 % 109.37hm^2 32.89 % 78.45hm^2 23.59 % 46.43hm^2 13.96%

4-13

70%

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

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

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

Scutellaria amoena

	Galium aparine		
	Paederia yunnanensis		

Lonicera sp

4-15

	( )	(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

hm^2 32.89% 107.82 hm^2 32.42%

46.43 hm^2 13.96%

4

32 7 22

147 11 30

20 6 14

		Amphibia
I		*Salientia*

i		*Bufonidae*
1		*Bufo andrewsi*
ii		*Ranidae*
2		*Rha1ophorus hui*
		Reptilia
I		*Squamata*
i		*Scincidae*
1		*Scincella potanini*
ii		*Colubridae*
2		*Dinodon*
		Aves
I		*Columbiformes*
i		*Columbidae*
1		*Streptopelia orientalis*
ii		*Cuculidae*
2		*Cuculus poliocephalus*
		Alcedinidae
3		*Alcedo atthis*
		Upupidae
4		*Upupa epops*
		Alaudidae
5		*Alauda gulgula*
		Hirundinidae
6		*Hirundo rustica*
7		*Hirundo daurica*
		Oriolidea
8		*Oriolus chinensis*
		Corvidae
9		*Pica pica*

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

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 hm^2 32.89% 78.45 hm^2

23.59 %

44.04 hm^2 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

116.24hm^2 34.96% 98.56 hm^2

29.64% 2.13% 8.32%

2

291.40 hm^2

87.63 % 116.24hm^2

34.96 % 79.61 hm^2 23.94 %

40.42hm^2 12.16 %

4-18

	( )	(hm^2)	(%)

>70%	37	98.56	29.64
	211	332.53	100.00

116.24 hm^2 34.96 % 98.56 hm^2

29.64 %

41.12 hm^2 12.37 %

3

7

4-20

	( )	(hm^2)	(%)
	37	98.56	29.64
	63	55.21	16.60
	54	116.24	34.96
	12	21.39	6.43
	3	0.70	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

116.24hm^2 34.96% 79.61 hm^2

23.94%

38.03 hm^2 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 hm^2

1.80 % 9.26 hm^2 2.78 %

0.69 hm^2 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

hm^2 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 hm^2 2.01 %

9.26 hm^2 2.78 %

15.94

hm^2 4.79 %

2008 2021

6.87 hm^2 2.07%

6.70 hm^2 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		

9.26hm^2 2.78%

6.01hm^2 1.8%

15.94hm^2

4.79%

2008 2021

6.87 hm^2

2.07%

6.01 hm^2 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		

10.42hm^2 3.13%

6.01hm^2 1.8%

17.10 hm^2 5.14 %

2008 2021

6.87 hm^2

2.07%

6.01 hm^2 1.8%

5

2008 2021

6.87 hm^2

2.07% 6.01 hm^2

1.80 %

2008 2021 6.70 hm^2 2.01%

6.87 hm^2 2.07%

6.01 hm^2 1.80 %

2008 2021

6.87 hm^2

2.07%

6.70 hm^2 2.01 %

2008 2021

6.87 hm^2 2.07%

6.01 hm^2

1.8%

2.78%

2008 2021

6.87

hm^2 2.07%

6.01 hm^2 1.8%

γ

γ

X-γ 2021 07 25

X-γ 4.4-1

4-22

γ

		2021 07 25 X-γ
1	1m	0.261
2	1m	0.211
3	1m	0.218
4	1m	0.222
5	1m	0.098
6	1m	0.101
7	1m	0.097
8	1m	0.223
9	1m	0.273
10	1m	0.261

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 μGy/h 2 3 X-γ

2021 072301101

4.4-1

1 X-γ 0.097~0.273 μGy/h 0.119~0.127μGy/h 2.7km 0.105 μGy/h X-γ

2 1995 γ 17.1~127.4 nGy/h 2019 4 64.9~179.1 nGy/h X-γ X-γ

γ

			X-γ (×10^{-8}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 γ 0.1817~0.4705 μGy/h γ

2 γ 0.1587~0.2211 μGy/h γ

2017 γ

γ

		X-γ	
	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 γ 0.14~0.33μSv/h γ

2 γ 0.12μSv/h γ

γ

		X-γ	
	2018 12 13	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
μSv /h			

γ

0.12~2.21μSv/h γ

γ 0.07μSv/h γ

γ

	2019 11 18	
	X-γ	
	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
μSv /h		

γ

0.18~2.45μSv/h γ

γ 0.10μSv/h γ

γ

	2020 06 17	
	X-γ	
	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
μSv /h		

γ

0.05~0.29μSv/h γ

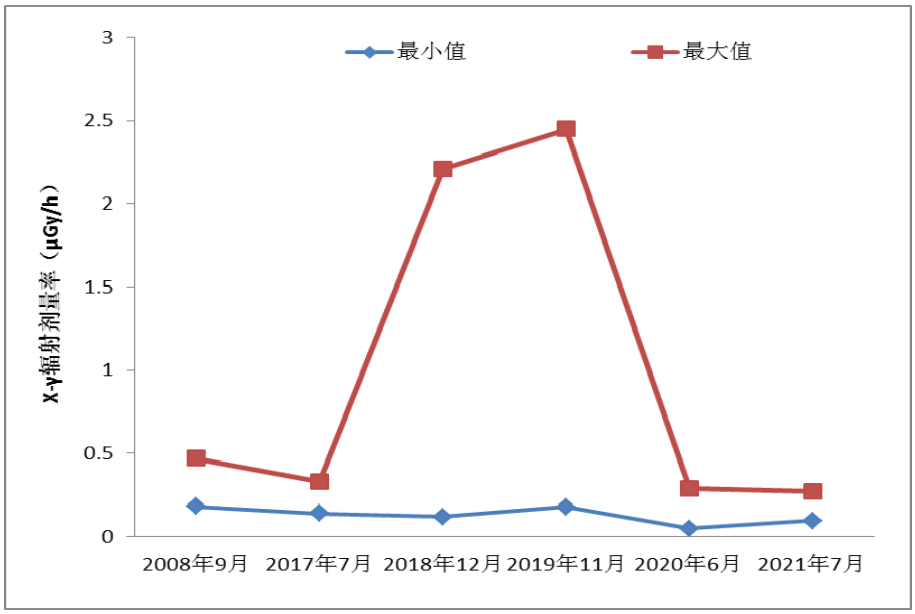
0.28μSv/h γ γ

0.06μSv/h γ

γ

X- γ

4-23



γ

γ

1 2021 6 X-γ

0.097~0.273 μGy/h 2008 9 X-γ

0.1817~0.4705 μGy/h X-γ

γ

2 2021 6 X-γ

0.119~0.127μGy/h 2.7km 0.105 μGy/h

2008 9 0.1587~0.2211μGy/h

γ

γ

3 γ

2021 05 25~28 α

β 4-21 4.4-7

α β

				α	β
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 30 Bq/m^3

1995 20

3.3~40.6 Bq/m^3

2 α $1.05\sim1.11\times10^{-6}$ Bq/m^3 β

6.00×10^{-5} 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/m^3 ”

2 2017 7

2017

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

Bq/m^3

4.4-9 3

GB 18871-2002 “

500Bq/m^3 ”

α	2017 07 18	<LLD: 1×10^{-5}	3.0×10^{-4}
β	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 /m^3

238U 12350 Bq/g U 232 Th

4046 Bq/g Th

0.00007mg/m^3 0.00008mg/m^3

GB26451-2011 0.0025 mg/m^3

2 2018 12

2018

	2018 12 13	32.4

	2018 12 13	52.8
Bq/m^3		

4.4-11

GB 18871-2002 “

500Bq/m^3 ”

	2019 11 18	2019 11 19
-238	9.12×10^{-4}	6.35×10^{-4}
-226	3.32×10^{-4}	3.22×10^{-4}
-232	4.26×10^{-4}	4.80×10^{-4}
-40	4.75×10^{-3}	4.21×10^{-3}
Bq/m^3		

^{238}U 12350Bq/g U ^{232}Th

4046Bq/g Th

0.00016mg/m^3 0.00013mg/m^3

GB26451-2011 0.0025mg/m^3

4 2020 06

2020

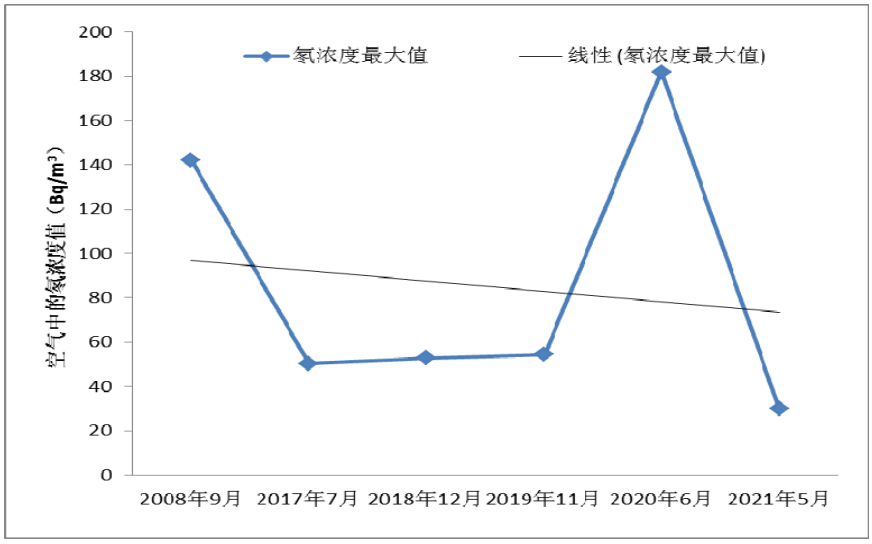
	2020 06 17
	130
	30
	182

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

0.0000027mg/m^3 0.000061mg/m^3

GB26451-2011 0.0025mg/m^3

4-24



4-24

1995 20

3.3~40.6 Bq/m^3

2021 05 25 -226

7 4.4-17 4-3

	2021 05 25				
	-226			α	β
	3.56×10^{-2}	0.00027		0.0384	0.0121
	3.52×10^{-2}	0.00053		0.0414	0.0162
	4.53×10^{-2}	0.00012		0.0421	0.0108
	5.20×10^{-2}	0.00238	0.00008	0.0536	0.0464
500m	5.72×10^{-2}	0.00066		0.0789	0.0515
500m	2.62×10^{-2}	0.00114	0.00024	0.0344	0.0194
500m	3.44×10^{-2}	0.00491	0.00194	0.244	0.167
		mg/L		Bq/L	

4.4-17

1 -226 26.2 57.2 mBq/L “ 2019

-226 0.72 26 mBq/L

2.2 14mBq/L ” “

1995 -226 0.50~58mBq/L”

2 0.12 4.91μg/L “ 2019

0.03 7.6μg/L

0.21 4.1μg/L ” “

1995 0.030~6.3μg/L”

3 0.08 1.94μg/L “ 2019

0.03 0.83μg/L

0.05 0.49μg/L ” “ 1995

0.029~5.7μg/L”

4 α 0.0344 0.244Bq/L β

0.0108 0.167 Bq/L “ 2019

α 0.01 0.34 Bq/L β 0.02 0.57 Bq/L ”

α β

-226

5

	U (μg/L)	Th (μg/L)	α (Bq/L)	β (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 0.155~25.115μg/L “ 2019

” “

1995 ”

2 5 0.16~11.255μg/L “ 2019

” “

1995 ”

3 5 -226 46.5~134.5 mBq/L “ 2019

” “

1995 ”

4 5 α 0.0303~0.780 Bq/L “ 2019

”

5 2 β 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}
α	0.43	0.28
β	0.36	0.26
μg/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 α 0.28~0.43 Bq/L “ 2019 ”

5 2 β 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}

α	0.148	0.158
β	0.128	8.81×10^{-2}

μg/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 α 0.148~0.158 Bq/L β 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
α	1.34×10^{-1}	1.40×10^{-1}
β	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 α 0.134~0.140 Bq/L β

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}
α	9.92×10^{-2}	2.07×10^{-1}
β	8.26×10^{-2}	1.30×10^{-1}
	μg/L	Bq/L

1 2 2.10~4.26μg/L “ 2019

” “ 1995

”

2 2 1.72~1.72μg/L “ 2019

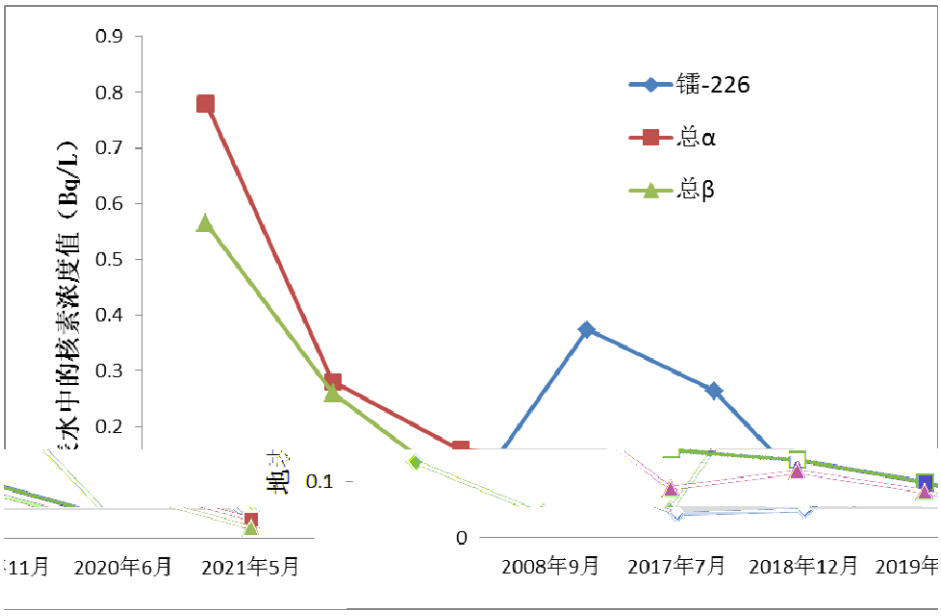
” “

1995 ”

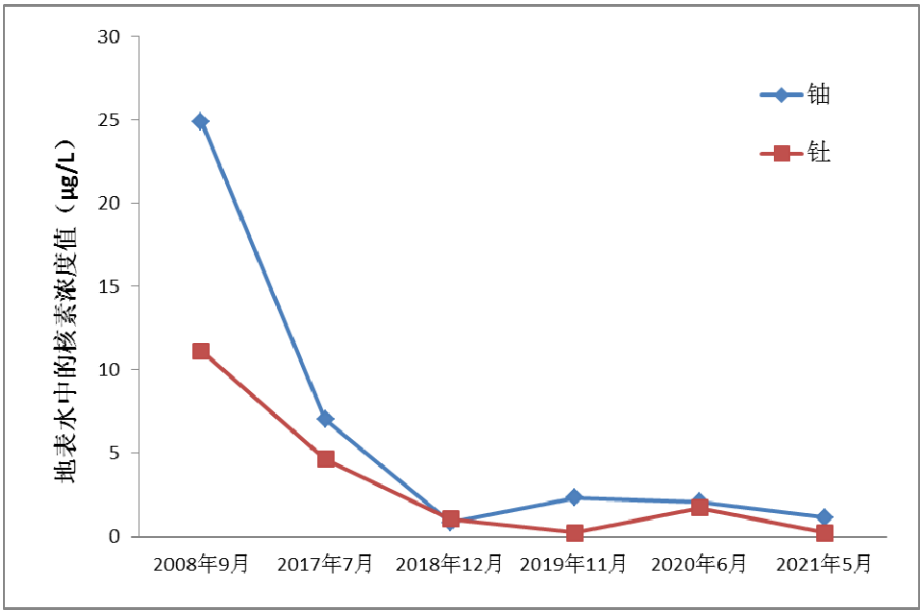
3 2 α 0.0992~0.207 Bq/L β 0.0826~0.130 Bq/L “ 2019 ”

4.4-23 -226 α β 4-25 4-26

	-226 Bq/L	μg/L	μg/L	α Bq/L	β 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



α β



1 2017 2021

2 2018

“ 1995 ”

2021 05 26 -226 α

β 4.4-24 4-3

	2021 05 26				
	-226			α	β
	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 α β ○

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 14.4μg/L “ 2019

0.03 16μg/L ”

“ 1995

0.060~9.7μg/L ”

3 0.11 0.13μg/L “ 2019

0.02 1.3μg/L ” “

1995

0.071~2.3μg/L ”

4 α 0.0498 0.411Bq/L β

0.0425 0.255 Bq/L GB/T14848-2017

III α≤0.5 Bq/L β≤1.0Bq/L α “ 2019

α 0.01 0.20 Bq/L ″

α β

GB/T14848-2017 III -226

	2017 07 18
	0.16
	0.14
-226	0.053

α	0.0453
β	0.1357
	μg/L Bq/L

4.4-25

1 -226 53mBq/L “ 2019 ” “ 1995 ”

2 0.16 μg/L “ 2019 ” “ 1995 ”

3 0.14 μg/L “ 2019 ” “ 1995 ”

4 α 0.0453 Bq/L β 0.1357 Bq/L GB/T14848-2017 III α≤0.5 Bq/L β≤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}
α	0.06
β	0.05
	μg/L Bq/L

4.4-26

1 -226 36 mBq/L “ 2019

” “

1995 ”

2 0.10 μg/L “ 2019

” “

1995 ”

3 0.05μg/L “ 2019

” “

1995 ”

4 α 0.06 Bq/L β

0.05 Bq/L GB/T14848-2017 III

α≤0.5 Bq/L β≤1.0Bq/L “ 2019

”

2018 4.4-27

	2018 12 13
	0.28
	0.05
-226	0.11
-40	3.47×10^{-2}
α	2.10×10^{-2}
β	4.91×10^{-2}

μg/L Bq/L

1 -226 110mBq/L “ 2019

” “

1995 ”

2 0.28 μg/L “ 2019

” “

1995 ”

3 0.05μg/L “ 2019

” “

1995 ”

4 α 0.021 Bq/L β

0.0491 Bq/L GB/T14848-2017 III

α≤0.5 Bq/L β≤1.0Bq/L “ 2019

”

2019 4.4-28

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

1 0.08 μg/L “ 2019

” “

1995 ”

2 α 0.0337 Bq/L β

0.0342 Bq/L GB/T14848-2017 III

α≤0.5 Bq/L β≤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}
α	1.13×10^{-2}
β	1.47×10^{-2}
	μg/L Bq/L

1 0.08 μg/L “ 2019
” “
1995 ”

2 0.08μg/L “ 2019
” “
1995 ”

3 α 0.0113 Bq/L β
0.0147 Bq/L GB/T14848-2017 III
α≤0.5 Bq/L β≤1.0Bq/L “ 2019
”

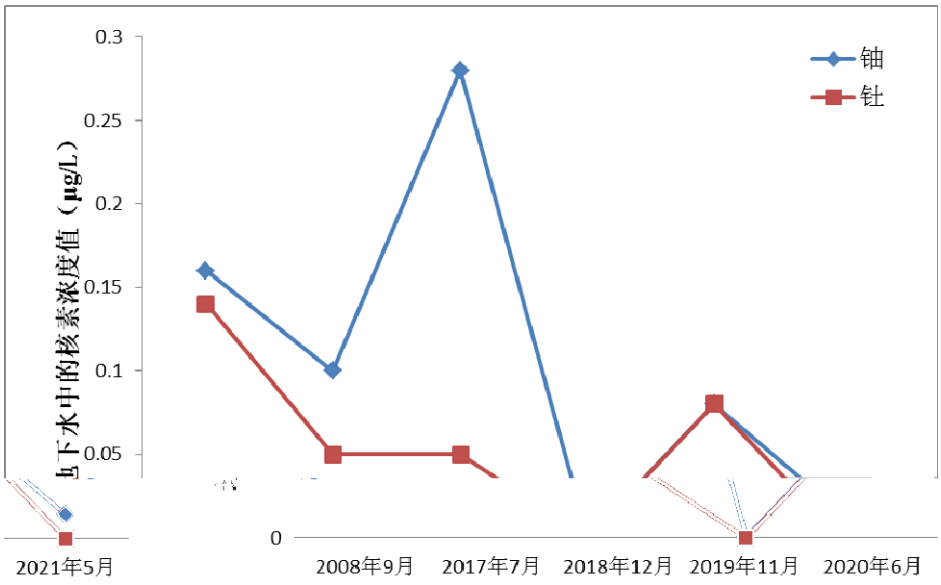
4.4-30 -226 α
β 4-27 4-28

	μg/L	μg/L	-226 Bq/L	α Bq/L	β 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

[redacted]

α β



1 2017 2020

α β “ 2019 ”

“ 1995 ”

-226 “ 2019

” “ 1995

”

2

α β

α β 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 ^{238}U

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 ^{232}Th

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

Bq/kg

		-232	-238	-226
1		135.33	21.6	88.38
2		287.40	30.7	216.18
3		106.66	14.2	121.93
4		129.69	9.5	80.91

1 226 80.91~216.18 Bq/kg “ 2019 -226 6 217Bq/kg ”“ 1983 1990 -226 2.4~425.8 Bq/kg ”

2 -238 9.5 30.7 Bq/kg ″ 2019 -238 10 245Bq/kg ″ ″ 1983 1990 -238 1.8~520 Bq/kg ″

3 -232 106.66~287.40 Bq/kg ″ 2019 -232 12 395Bq/kg ″ ″ 1983 1990 -232 1.0~437.8Bq/kg ″

2017 4.4-33

	2017 07 18			
	<LLD:27.6	1.26×10^{2}	<LLD:49.0	44.5
	20.6	1.19×10^{2}	75.5	35.8
-226	23.0	85.7	49.3	26.2
-40	3.16×10^{2}	7.02×10^{2}	6.52×10^{2}	7.32×10^{2}

Bq/kg

1 226 23.0~85.7 Bq/kg “ 2019 -226 6 217Bq/kg ” “ 1983 1990 -226 2.4~425.8 Bq/kg ”

2 44.5~126 mg/kg ^{238}U 12350Bq/g U -238 555.75 1556.1 Bq/kg “ 2019 -238 10 245Bq/kg ” “ 1983 1990 -238 1.8~520 Bq/kg ”

3 20.6~119 mg/kg ^{232}Th 4046Bq/g Th -232 83.35 481.47 Bq/kg “ 2019 -232 12 395Bq/kg ” “ 1983 1990 -232 1.0~437.8Bq/kg ”

2018 4.4-34

	2018 12 13			
-238	33.8	7.97×10^2	89.4	39.5
-232	35.7	2.73×10^2	1.07×10^2	32.4
-226	43.0	2.81×10^2	43.8	40.7
-40	5.11×10^2	7.24×10^2	9.53×10^2	5.63×10^2

Bq/kg

1 226 40.7~281Bq/kg “ 2019 -226 6 217Bq/kg ” “ 1983 1990 -226 2.4~425.8 Bq/kg ”

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

q Ж 9 ﻫ Ъ

1.0~437.8Bq/kg ″

2020 4.4-36

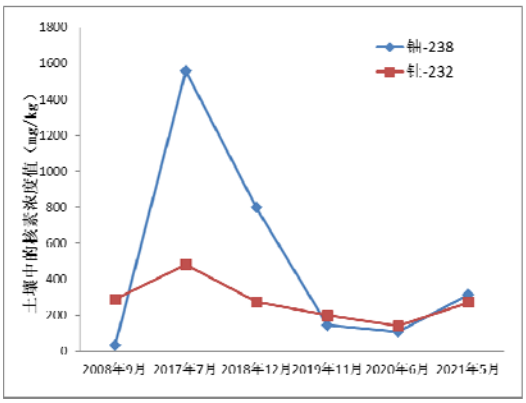
	2020 06 17				
			-238	-226	-232
	9.32	18.1	1.07×10^{2}	1.38×10^{2}	1.04×10^{2}
	4.85	14.7	7.96×10^{1}	7.61×10^{1}	8.02×10^{1}
	5.45	7.68	5.95×10^{1}	4.76×10^{1}	4.17×10^{1}
	8.64	33.4	7.05×10^{1}	1.25×10^{2}	1.40×10^{2}
	2.90	15.7	7.00×10^{1}	4.15×10^{1}	8.11×10^{1}
	4.21	11.2	8.39×10^{1}	3.68×10^{1}	5.35×10^{1}
mg/kg Bq/kg					

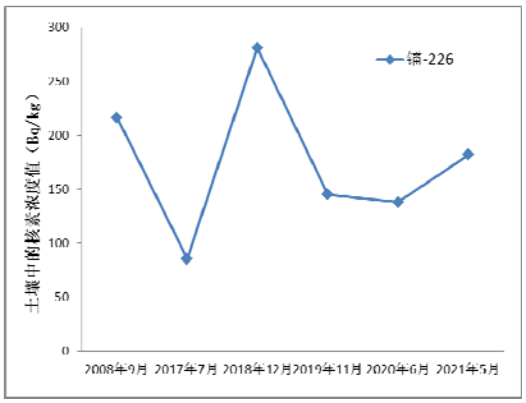
1 226 36.8~138Bq/kg “ 2019 -226 6 217Bq/kg ” “ 1983 1990 -226 2.4~425.8 Bq/kg ”

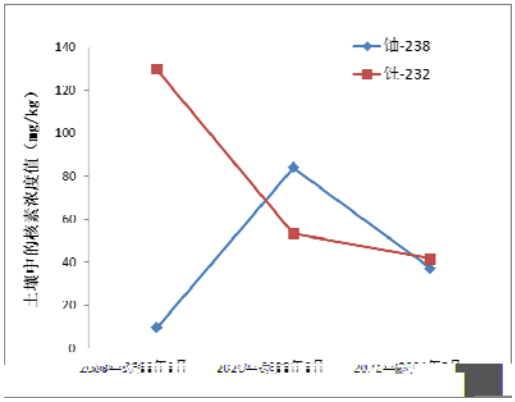
2 -238 59.5~107 Bq/kg ″ 2019 -238 10 245Bq/kg ″ ″ 1983 1990 -238 1.8~520 Bq/kg ″

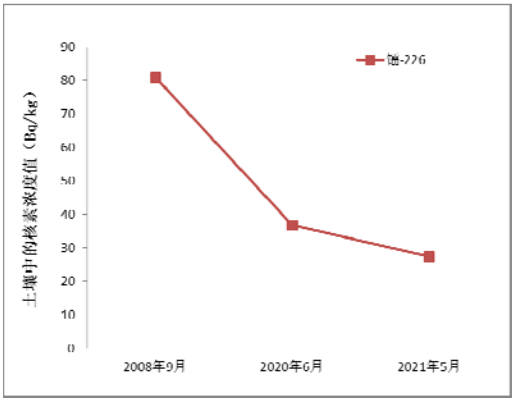
3 -232 41.7 140 Bq/kg ″ 2019 -232 12 395Bq/kg ″ ″ 1983 1990 -232 1.0~437.8Bq/kg ″

4-30 4-31









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 ^{238}U 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 ^{232}Th 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

2017 4.4-38

	2017 07 18	
-238	99.4	1.32×10^2
-232	2.01×10^2	2.03×10^2
-226	1.59×10^2	2.01×10^2
-40	5.62×10^2	5.78×10^2

Bq/kg

1 226 159~201 Bq/kg “ 2019 -226 6 217Bq/kg ”“ 1983 1990 -226 2.4~425.8 Bq/kg ”

2 -238 99.4 132 Bq/kg ″ 2019 -238 10 245Bq/kg ″ ″ 1983 1990 -238 1.8~520 Bq/kg ″

3 -232 201 203 Bq/kg ″ 2019 -232 12 395Bq/kg ″ ″ 1983 1990 -232 1.0~437.8Bq/kg ″

2018 4.4-39

	2018 12 13	
-238	1.33×10^2	1.84×10^2

-232	1.50×10^{2}	1.42×10^{2}
-226	92.8	1.17×10^{2}
-40	6.47×10^{2}	6.74×10^{2}

Bq/kg

1 226 92.8~117 Bq/kg “ 2019 -226 6 217Bq/kg ”“ 1983 1990 -226 2.4~425.8 Bq/kg ”

2 -238 133 184 Bq/kg ″ 2019 -238 10 245Bq/kg ″ ″ 1983 1990 -238 1.8~520 Bq/kg ″

3 -232 142 150 Bq/kg ″ 2019 -232 12 395Bq/kg ″ ″ 1983 1990 -232 1.0~437.8Bq/kg ″

2019 4.4-40

	2019 11 19			
	-238	-226	-232	-40
	1.10×10^{2}	7.81×10^{1}	8.71×10^{1}	6.87×10^{2}
	1.03×10^{2}	6.72×10^{1}	5.79×10^{1}	7.36×10^{2}

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

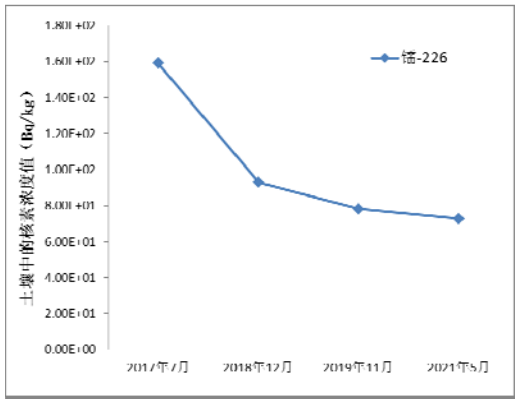
	2020 06 17				
			-238	-226	-232
	15.8	34.1	1.49×10^2	1.99×10^2	1.58×10^2
	11.6	31.3	3.71×10^2	1.43×10^2	2.04×10^2
mg/kg Bq/kg					

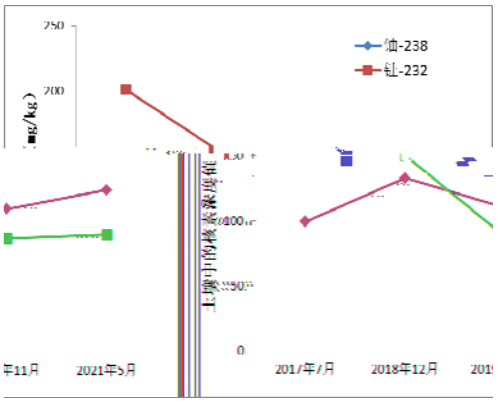
1 226 143~199 Bq/kg “ 2019
-226 6 217Bq/kg ”“ 1983
1990 -226 2.4~425.8 Bq/kg ”

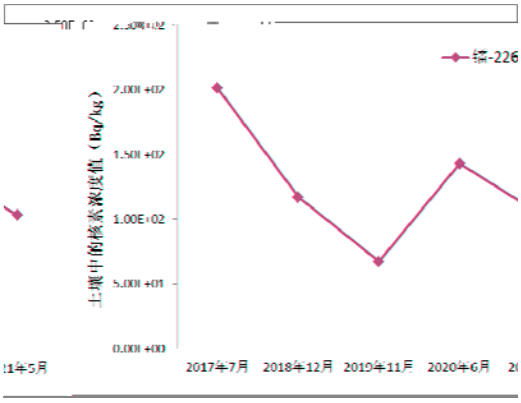
2 -238 149 371 Bq/kg 〃 2019
-238 10 245Bq/kg 〃
〃1983 1990 -238 1.8~520
Bq/kg 〃
3 -232 158 204 Bq/kg 〃 2019
-232 12 395Bq/kg 〃
〃 1983 1990 -232
1.0~437.8Bq/kg 〃

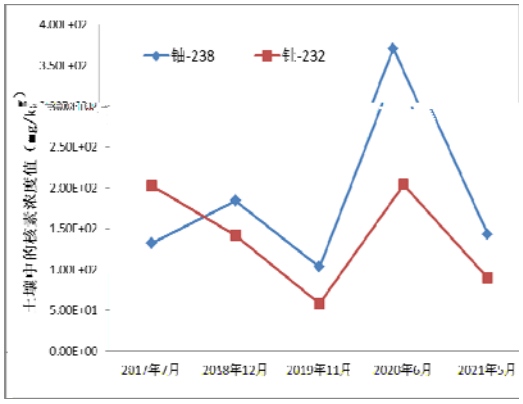
4-32

4-33









1 -238 -232 -226

2 -232 -226

-238

3 -232 -226

-238 2020 6

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 1h 1	
		2	10m	TSP	4	
		3	10m			

1

2021 5 26 27 1#

5.1 3

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

1# 20mg/m^3

GB26451-2011 5 50 mg/m^3

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

μg/m^3

2

GB26451-2011 6

1.0mg/m^3

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 2m^3 1 20m^3/d

GB26451-2011 2

6

COD 8.76t/a 0.05t/a

1 20m^3/d

GB26451-2011 2

85-95dB(A)

100m

120dB A

85-95dB(A)

70-95dB(A)

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)

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

			1.75km	
	18t/a			

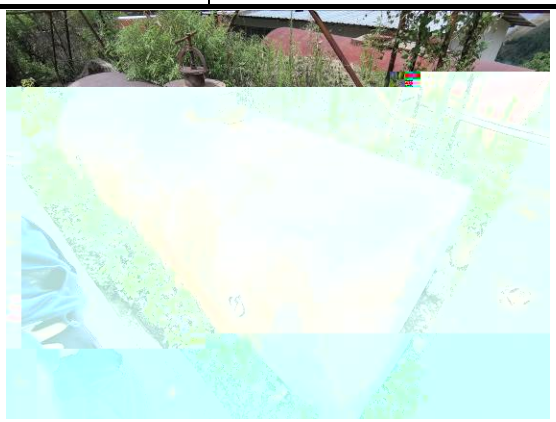
200L

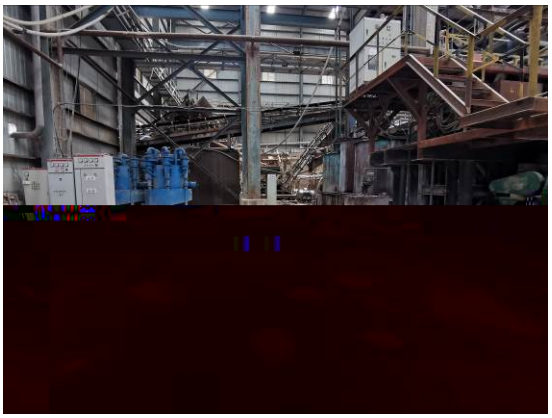
4 t/a

		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

1.3m 1.1m 1.0m

500.0m 25m 6m 20m 22m

3

220.0m 1.60m 1.80m

1

2017

3 1

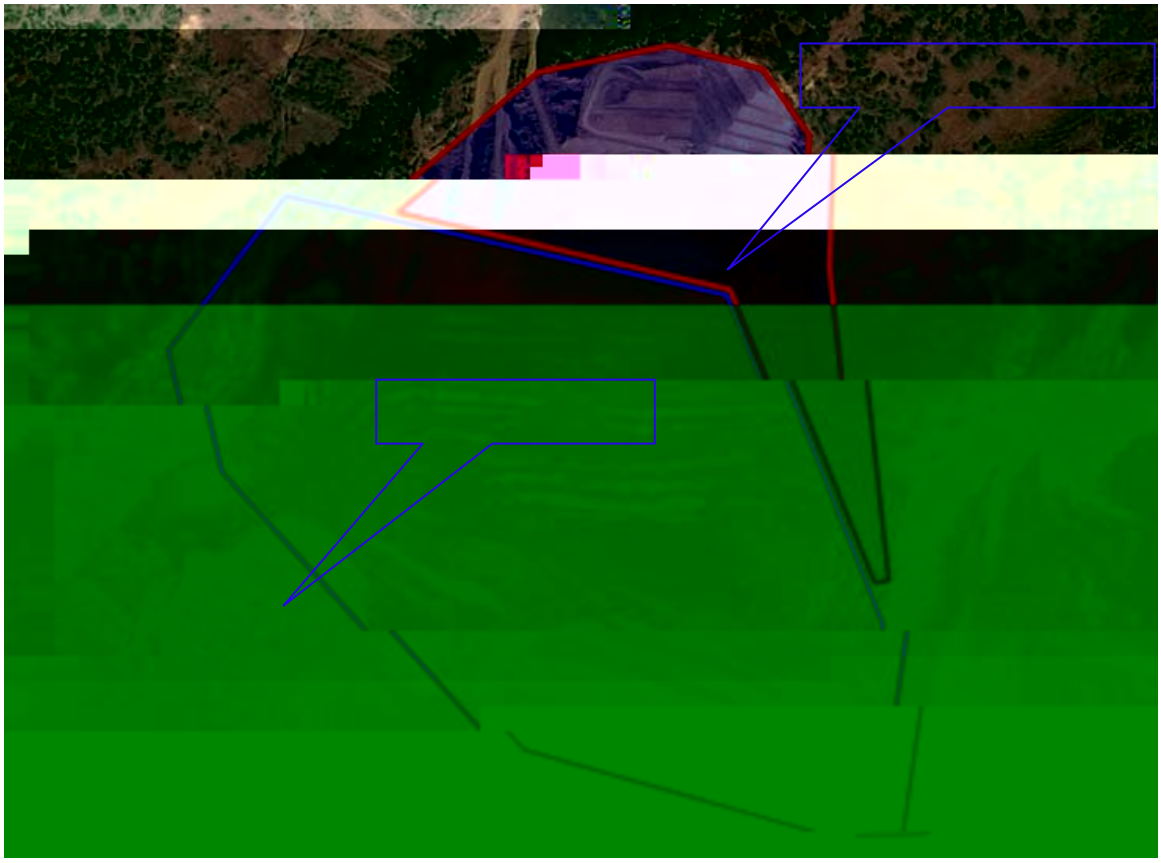
1

+2163m +2299m

2018 7 14

4.58hm^2

5-2



2

30cm

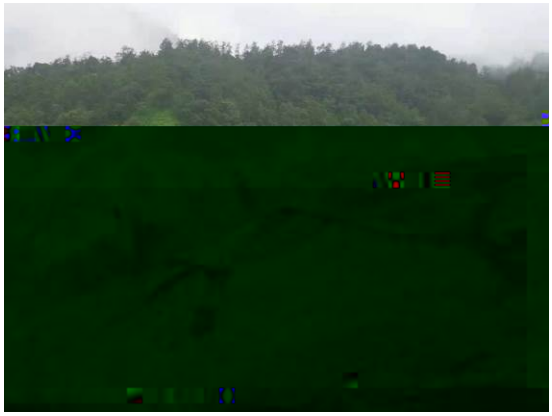
41.7%

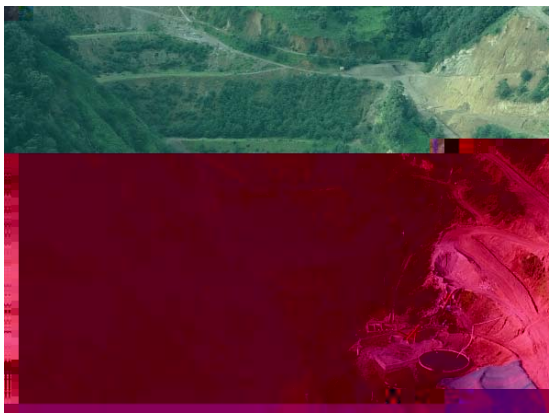
1 75.21 m^3

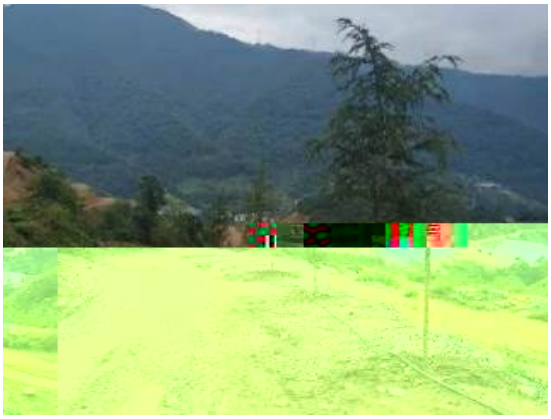
1.3m 1.1m 1.0m 6m

20m 22m 2020 6

50cm





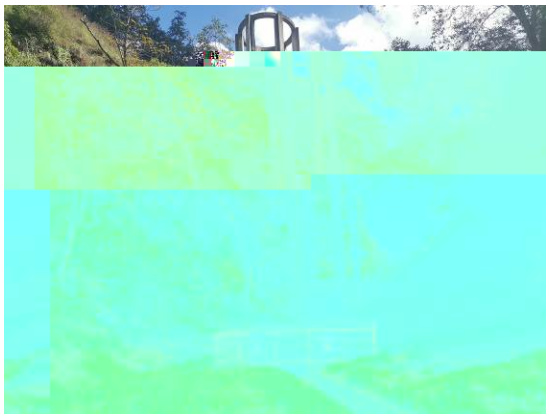


2018 11

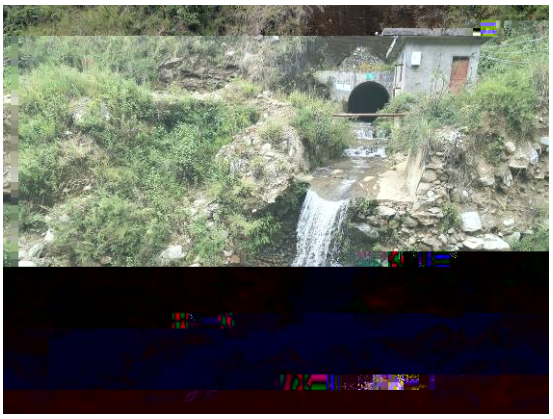
15 2021 3 24 16

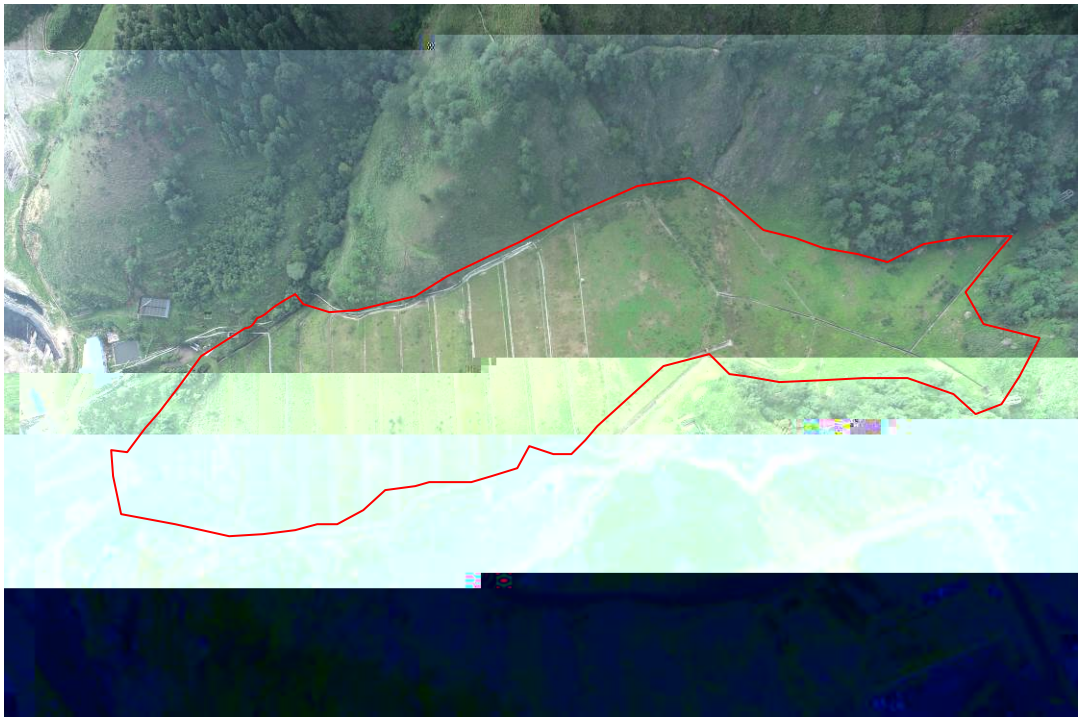
“ + 1.5 × 2.2m + 3.0 × 3.0m ”

0.8 × 0.8m



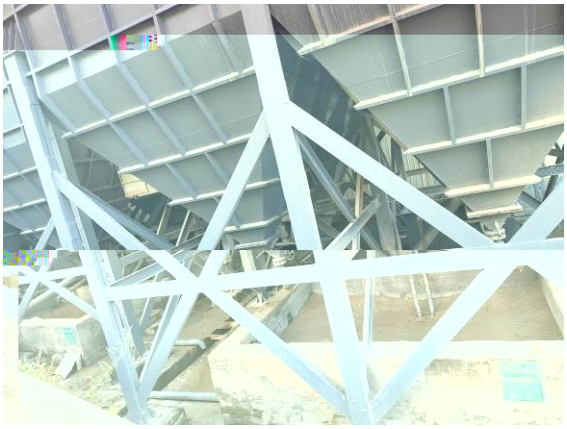
+





$10m^3$

1 $30m^3$



GB50863-2013 “ 11.1.6

” “ 13.3.2 V

”

0.9km

4 14 m^3

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 1h 1	
		2	10m		4	
		3	10m			

3

2021 5 26 27 1#

5.9 2

			(m/s)	(m^3/h)	(μg/m^3)	(μg/m^3)	(μg/m^3)

2021 05 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 05 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

3.308μg/m^3 GB26451-2011 5

0.10 mg/m^3

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/m^3

GB26451-2011 6 0.0025mg/m^3

5

1#

GB26451-2011

		-226	α	β			
	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 α β ○

2021N-122

1

0.00921mg/L GB26451-2011 2

2 0.00445mg/L

GB26451-2011 2

1

2

GB16297-1996 15m

SO_2 95

15m SO_2

GB9078-1996

95 15m SO_2

GB13271-2001

II 200mg/m^3 SO_2 900mg/m^3

GB18483-2001 75%

2

TSP PM_{10}

480m

2021 5 27 -6 3 7

TSP PM_{10} TSP PM_{10} 24

GB3096-2012

1

85

Pb

Pb 10.8mg/l GB3838-2002

216 0.04mg/l GB3838-2002

2

$17.12m^3$

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

18320m^3/a Pb Th 24

Pb Th 0.0965mg/L 0.0583mg/L 0.21Bq/L

GB8979 1996

7650m^3

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)

19.8 10 198 10 116.4 m^3 1

161 m^3

4

2.8km 1.75km

1

2

3

2

GB36600-2018

2013

2013

1

2

1

5km

2

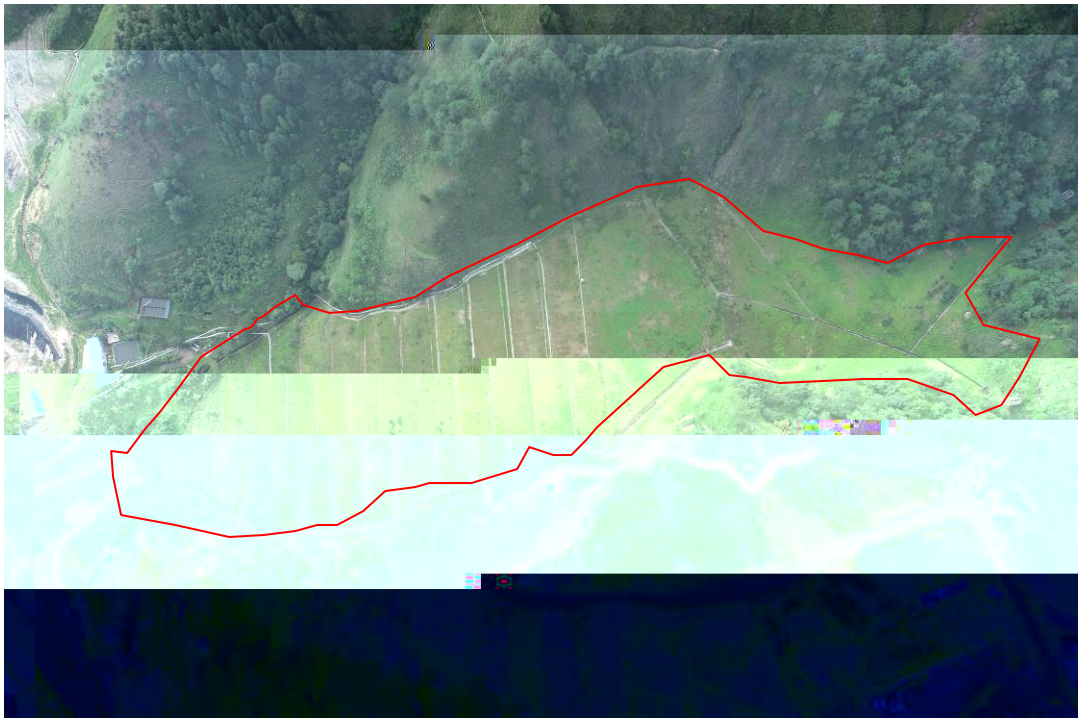
3

90

1

2018 11

“ + + ”

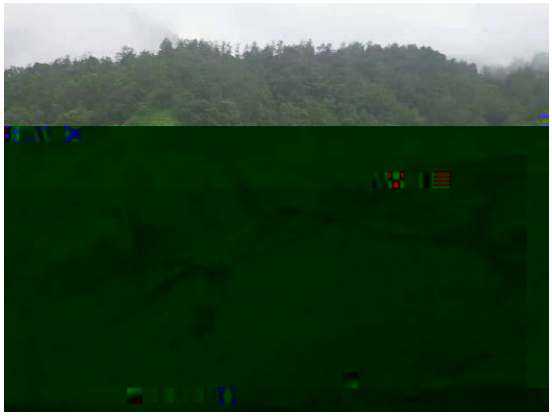


2

1 75.21 m^3

2020 6

50cm



3

2017 3 1

4.58hm^2

30cm

4

2008 2021

γ

β 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

γ

-232

2022 2022

37 2022

2022 2022

(HJ 819-2017)

HJ 1209-2021

[2018]1

HJ61-2021

7-2 7-3

	4	LegdB A	1 / 1	GB12348-2008 2
	4			
	1#		1 /	GB26451-2011 5 6
	2#			
	10m	TSP PM_{10}	1 /	
	10m			
		TSP PM_{10}	1 /	GB3095-2012
		pH	1 /	GB3838 2002 III

	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 500m 10 11	1 /
	α β U Th 226 Ra 210 Po 210 Pb	1 2 3 4 5 500m 6 500m	1 /
	226 Ra	1 2 3 4 5 500m 6 500m	1 /

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

$0.1496km^2$ - -

26 t/a

5km

1 TSP

GB3096-2012

2

3 TSP PM_{10}

1 pH

GB3838-2002

2 W3 W4 W5 3 Pb Pb

3 W6

3 W3 W5 W4

W6

GB/T14848-2017 5

1

GB36600-2018

2 2013

2013

3

2013 9 W4 W7

1 30m

2

γ

γ

1 2021 6 X-γ

0.097~0.273 μGy/h 2008 9 X-γ

0.1817~0.4705 μGy/h X-γ

γ

2 2021 6 X-γ

0.119~0.127μGy/h 2.7km 0.105 μGy/h

2008 9 0.1587~0.2211μGy/h

γ

γ

3 γ

1995 20

3.3~40.6 Bq/m^3

1 2017 2021

2 2018

“ 1995 ”

1 2017 2020

α β “ 2019 ” “

1995 ”

-226 “ 2019 ”

“ 1995

”

2

α β α

β GB/T14848-2017 III

-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 2m^3

1 20m^3/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 PM_{10}

480m

2021 5 27 -6 3 7

TSP PM_{10} TSP PM_{10} 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 56.0~62.9 dB(A)

47.3~62.0dB(A) GB

12348-2008 2

15 dB(A)

2.8km 1.75km

2

γ -232

8-1

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

		41.7%				
4			2	GB15562.1-1995	2022 12	0.1
			7-2 7-3		2022 12	——
						60.3

1

2

3

4

5