Appendix 3 List of the Deep Drilling Equipment

Article	Model	Specification
Drilling machine	ZIF-650M	Capacity: diameter 76mm. 800m(diamond crown bit)
		and 500m(hard alloy)
		Rotation speed: 87;118;188;254;340;
		460;576;800rpm
Drill pipes	TBDS	Length: 4,000mm
		Core diameter 76mm
Power unit	A2-72-4	Electric motor
		Revolution: 1,450rpm
Tlaint		Related power:30kwt
Hoist		Capacity: 4.4T
Mud pump	NB4-320/63	
Transportation	Automobile ZIL-131	
Water tank		Capacity:9km <sup>3</sup>

Appendix 4 Amount of Consumed Materials of the Driling Survey

Article		unit	Quantity
Diamond Bit(Longyear)	75.4mn	Pcs	37
Cemented carbide bit	93mn	Pcs	9
Cemented carbide bit	112m	Pcs	6
Core box		Pcs	380
Bentonite		kg	720
Diesel		Ĺ	249,200
Gasoline	İ	L	5,180

Appendix 5 List of Thin Section

								1 1 2 Western	3 0 0 m	ling sile man		Minorals	role			10 July 200	A CONTRACTOR OF THE PARTY OF TH	No. of the Control of		· · · · · · · · · · · · · · · · · · ·	
Serial	Sample	Rock Name/Description				Pri	Primary				_		2	S	Secondary	ary a	A pu	and Alteration	2		
No.	No.	•	ΟZ	¥	PI	Bt A	Am P	Px Sph	h Ap	Σ	Ö	<u>8</u>	Se	Tou	В	ธ	Ac	Ca	_	<u>\</u>	others
-	MJTA-3-32.5	diorite porphyry	0	0	, ()	abla			_	◁	◁	<u> </u>	0		⊲	0			$\vdash$	1	
7	MJTA-3-42	Bt granite	0	0	0	0				0	∇		0		◁	0					cristobalite
က	MJTA-3-72.9	Ho Bt granite	0	0	0	, ()	V	•		0			Δ		◁	0	◁				
4	MJTA-3-158.9	Bt adamellite	0	0	0	0				0			0		◁	0		◁			
5	MJTA-3-163.9	MJTA-3-163.9 silicified adamelite	0	0	0	0				∇	0		0			0		◁		ပ	cristobalite
9	MJTA-3-201.2	Ho Bt granite	0	0	0	0	0			∇			0		◁	0		◁		-	
7	MJTA-3-233.1	MJTA-3-233.1 altered Bt adamellite	0	0	O	ر.			•	٧	0		0		4	0		◁			
8	MJTA-4-40.9	hornfels	0	٧	0			_		◁	0		0			◁		-			
6	MJTA-4-42.0	hornfels	0		0					◁	0	<u> </u>	0		-	0	$\vdash$				
10	MJTA-4-63.5	hornfels	0				_	<u> </u>	_	0	0	Ŀ	0		0			0	Ĭ	0	
Ξ	MJTA-4-133.2 silicified rock	silicified rock	•		) ()	<u>с</u> .		_		0	0	<u> </u>	0		0	0		-		0	
12	MJTA-4-156.0	MJTA-4-156.0 fine grained diorite	•		7 0	∇	0			0	◁		0		0	0	ļ			_	
13	MJTA-4-187.5	MJTA-4-187.5 fine grained diorite	•		0		0			0	0		0		•	0					
14	MJTA-4-205.0 altered diorite	altered diorite	•	•	0					0	0		0		•	0		0		Ö	cristobalite
15	MJTA-5-34.7	Bt Ho granite	0	0	0	0	0	•	•	0			0		0	0					
16	MJTA-5-36.5	Bt Ho granite	0	0	) (	) C	0	•		0			0			0		◁	$\vdash$	_	
17	MJTA-5-64.5	Ho Bt granite	0	0	) (	)   0	0	•		0			0			◁					
18	MJTA-5-65.4	altered Ho Bt granite	0	0	0	0	0			•			0		0	0	4	-		_	
19	MJTA-5-104.2	MJTA-5-104.2 altered Bt granite	0	0	7 0	۷				∇			·		0	0		0			
20	MJTA-5-122.0	MJTA-5-122.0 altered Bt Ho granite	0	0	0	0	0			•					0	0		◁			
21	MJTA-5-140.5	MJTA-5-140.5 aftered Bt Ho granite	0	0	0	0	0	•		-			0		4	0	<u> </u>	◁			
22	MJTA-6-49.2	Bt granite	0	0	) (	0				٧	∇		0			0			_		
છ	MJTA-6-96.7	Bt adamellite	0	0	0	0				٧	0		0		4	◁	$\vdash$	4		-	
$\neg \neg$	MJTA-6-151.0 Bt adamellite	Bt adamellite	0	0	) (	0				0	0		0		•	0				_	
25	MJTA-6-153.0 Bt adamellite	Bt adamellite	0	0	7   @	<b>∇</b>				<b>∇</b>	0		0		0	0	_			$\vdash$	
Ahina	lance of mineral	Abundana of minorals: @. abundant: O. gamman. A. ga	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \						State of the state of	diam'r.							ļ		l	ł	

Abundance of minerals: @: abundant; O: common; ∆: scarce; ·: rare

Abbreviations: Qz: quartz; Kf: K-feldspar; Pl: plagioclase; Bt: biotite; Am: amphibole; Px: pyroxene; Sph: sphene; Ap: apatite;

M: opaque minerals; Se: sericite; Tour: tourmaline; Ep: epidote; Ch: chlorite; Ac: actinolite; Ca: carbonate minerals; Py: pyrite

Appendix 5 List of Thin Section (Cont.)

												Min	Minerals								
Serial	Sample	Rock Name/Description				Pri	Primary				L				Seco	econdary and	and /	Alteration	tion		
No.	No.		ΖÖ	₹	<u>P</u>	Bi /	Am	Px S	Sph A	Ap M	_	Qz Bt	se 1	Tou	Ep	ပ်	Ac	Ca	Ϋ́	P	others
26	MJTA-6-202.3 Bt monzonite	Bt monzonite	a	0	0	Ç.				0	_		0		٥	0		0			
27	MJTA-6-229	altered Bt granite	0	0	0	0				∇			0		◁	0		0			
28	MJTA-6-249	altered Bt adamellite	0	0	0	0				٥	_		0			0		•			muscovite
29	MJTA-7-94	Bt Ho granite	0	0	0	0	0			-			0		◁	0					
30	MJTA-7-124	altered Bt adamellite	0	0	0	٥٠				٥	_		0			0					muscovite
31	MJTA-7-188.2	MJTA-7-188.2 Bt Ho adamellite	0	0	0	ر.	ç.			0	_		0		0	0					
32	MJTA-7-216	altered andesite		Ç.	6٠					0	) (		0								
33	MJTA-8-37.5	Bt Qz porphyry	0	ಶ	0	0	0			4	$\nabla \mid 1$	<u>.</u>	0		•	0					
34	MJTA-8-55.6	Bt Qz porphyry	0	◁	0	0	0			∇	0		0			0					
35	MJTA-8-70.8	Bt Qz porphyry	0	4	0	0	٥.			٥	<b>∇</b> 1	_	0			0					
36	MJTA-8-84	Bt Qz porphyry	0	◁	0	0	٥			٥	0		0		•	0					
37	MJTA-8-104	Bt Qz porphyry	0	◁	0	0	0			٥	0		0		٠	0					
38	MJTA-8-151	strongly silicified rock	◁	ر.	ر.	ر.	٥.			◁	0		0			0					
39	MJTA-8-157	strongly silicified rock	ℴ	ر. د	ر.	ر.				0	0		0		•	0				0	
40	MJTA-8-231	Bt Qz porphyry	0	Ç.	0	0	٥.			0	0		0		0	0					
41	MJTA-8-249.4	MJTA-8-249.4 Bt Qz porphyry	0	ر.	0	0	С·			0	0		0		0	0				•	
42	MJTA-9-45.7	Qz porphyry	0	Ç.	4	٥.	<b>6</b> -				0		0		0	0	·				
43	MJTA-9-109.3 Qz porphyry	Qz porphyry	0	Ç.	4	Ç.	٥.			0	0		0		0	0					
44	MJTA-9-170	Qz porphyry	0	Ç.	0	Ç.	6٠			0	7 (		0		•	0		0			
45	MJTA-9-185.5	adamellite (silicified breccia)	0	0	0	Ç.	۲.			4	0		0		0	0		0			
46	MJTA-9-190	Bt adamellite	0	0	0	0	٥.			0	Δ (		0		◁	0		٥			
47	MJTA-9-195	Bt adamellite	0	0	0	ر.	<i>ر</i> ٠.			◁	0		0		◁	0		0			
48	MJTA-9-224	adamellite	◁	0	0	۵.	٥.			◁	◁		0		◁	0		0			
49	MJTA-9-250	adamellite	0	0	0	0	٥.		$\dashv$		◁		0	_		0		0			
50	MJTA-9-273	adamellite	0	0	0	0			$\dashv$		$\nabla$		0		0	0		◁			

Abbreviations: Qz: quartz; Kf: K-feldspar; Pl: plagioclase; Bt: biotite; Am: amphibole; Px: pyroxene; Sph: sphene; Ap: apatite; Abundance of minerals: ⊚: abundant; O: common; ∆: scarce; ·: rare

M: opaque minerals; Se: sericite; Tour: tourmaline; Ep: epidote; Ch: chlorite; Ac: actinolite; Ca: carbonate minerals; Py: pyrite

Appendix 6 List of Polished Section

I
1 1
- 1
- 1
- 4

Abbreviation: Ak: alkinite(?); Bn: bornite; Bs: bismuthinite(?); Cb: cubanite; Cp: chalcopyrite; Cv: covellite; Gn: galena; Go: goethite; Ht: hematite; II: ilmenite; Mo: molybdenite; Mt: magnetite; Po: pyrhotite; Py: pyrite; Sp: sphalerite;  $\emptyset$ :  $\geq$ 30%; O: 10~30%;  $\Delta$ : 5–10%; +: <5%

Appendix 6 List of Polished Section (Cont.)

le Host rock		╽┟	╽┟					2	Mineralogy	\ \}						
No.		=		₹	Po 0	S S S	D Wo	۳	ડે	Bs	Ak	Gn	Sp	Py	Ŧ	G
MJTA-6-249.0 altered Bt granite			$\dashv$			Δ	_			∇				0		0
28 MJTA-7-124.0 altered Bt granite	ered Bt granite		$\dashv$		7									0		0
29 MJTA-7-188.2 Bt Ho adamellite	Ho adamellite		$\dashv$			∇						٥		0		0
1	porphyry		$\dashv$		◁									0		0
	porphyry	ĺ	$\dashv$		◁	Δ								0		٥
32 MJTA-8-86.0   Qt porphyry	porphyry		_					7	Δ		7			0		0
33 MJTA-8-102.0 Qt porphyry	porphyry		-	٥	0									0		
34 MJTA-8-104.0 Qt porphyry	porphyry		$\dashv$		٥	Δ								0	٥	0
35 MJTA-8-121.0 Qt porphyry	porphyry		$\dashv$				Δ					7		0	Ø	0
36 MJTA-8-150.4 strongly silicified rock	ongly silicified rock	İ	$\dashv$		4	Δ								0		0
37 MJTA-8-157.0 strongly silicified rock	ongly silicified rock				0							0		0		0
38 MJTA-8-240.2 Qt porphyry	porphyry		-		0	0								0		0
MJTA-8-249.4   Qt porphyry	porphyry		Н			Δ						$\nabla$		0		0
40 MJTA-9-45.7 Qt porphyry	porphyry		$\dashv$			◁						٥		0		0
41 MJTA-9-109.3 Qt porphyry	porphyry		-		◁	◁								0		
MJTA-9-136.0   Qt porphyry	porphyry		-			0	_			+				0		0
43 MJTA-9-161.0 silicified breccia	ified breccia	1		$\exists$		Δ						٥		0		0
44 MJTA-9-163.0 silicified breccia	sified breccia		$\dashv$			◁		٥	Δ					0		٥
ccia		7	⊿			◁								0		0
MJTA-9-195.0 Bt adamellite	adamellite		-		◁	0								0		0
47 MJTA-9-209.0 Bt adamellite	adamellite					<b>∇</b>								0		◁
48 MJTA-9-212.5 Bt adamellite	adamellite		$\dashv$		∇	0	_							0		0
224.5 intense altered rock	inse altered rock		-			◁	0							0		0
50 MJTA-9-239.0 intense altered rock	inse altered rock					_	0							0		0
51 MJTA-9-277.0 Bt adamellite	adamellite		$\dashv$	7	◁	0								0		0
52 MJTA-9-281.7 Bt adamellite	adamellite					0						0	0	0		

Abbreviation: Ak aikinite(?); Bn: bornite; Bs: bismuthinite(?); Cb: cubanite; Cp: chalcopyrite; Cv: covellite; Gn: galena; Go: goethite; Ht: hematite; II: ilmenite; Mo: molybdenite; Mt: magnetite; Po: pyrhotite; Py: pyrite; Sp: sphalerite; ◎: ≥30%; ○: 10-30%; △: 5-10%, +: <5%

Apppendix 7 List of the results for X-ray Diffraction analysis

o N	•		_											
2	Area	Samo	doitoiroseO					Dete	Detected minerals	nineral	s			
	200	Campie 160.	Description	Qz	Ы	Hor	Chl	III / Mc	Kao S	Smec	Prp	Lau (	Cc G	Gyp Py
1 Zaltu	Zalturbulck	MJTA-3-32.5	Py-dism diorite porphyry (1∼2%)	0	0		0	•	-					
2 Zaltu	Zalturbuick	MJTA-3-122.7	stgly silicified zone with chlorite network with patches of Kfd	0	С		<	b						
3 Zaltı	Zalturbulck		stgly chloritized zone with some sulfides	0	0		△	-						
4 Zalturbulck	ırbulck	MJTA-3-172.5	gypsum veinlets (w=3m-4mm) in white∼pink argillic zone ∠50°	0	0		△			4				0
5 Zaltu	Zalturbuick	MJTA-3-204.6	MJTA-3-204.6 white mineral veinlet											0
6 Zaltu	Zalturbulck	MJTA-4-42.0	MJTA-4-42.0 weakly silicified green colored andesite with Py-dism	0	0		◁	0						
7 Zaltu	Zalturbulck	MJTA-4-63.5	strongly silicified~argiled zone with Py-dism veinlets	0			۷	•						
8 Zaltu	Zalturbulck	MJTA-4-180.3 white clay	white clay					•		•			0	
9 Zaltu	Zalturbulck	MJTA-4-187.5	MJTA-4-187.5 dark gray, c.grnd andeestic rock chlorite, Kf?, Ep, Qz?	0	0	0	∇	•						
10 Zalturbulck	ırbulck	strongly chlori   Strongly chlori   MJTA-4-205.0   vein (calcite?)	strongly chloritized rock with strong py dism with white vein (calcite?)	0	0		0				•			4
11 Zalturbulck	ırbulck	MJTA-4-217.1	MJTA-4-217.1 pink+Chl+Qz+etc	Δ	•		0				∇	0	0	
12 Zaiturbulck	ırbulck	MJTA-5-34.7	Ho-Bi or Bi-Ho granodiorite?	0	0	Δ	V	a						
13 Zalturbulck	ırbulck	MJTA-5-36.5	pink colored alteration band	0	0		◁	•						
14 Zalturbulck	ırbulck	MJTA-5-64.5	flesh (little bit argillized) granite	0	0	٥	•	0			•			
15 Zaltu	Zalturbulck	MJTA-5-65.4	pink colored altered granite (with Ep)	0	0		٥				•			
16 Zalturbulck	irbulck	strongly MJTA-5-122.0 veinlets	strongly ep, chloritized rock, pink granite, with minor calcite veinlets	0	0		◁							
17 Zalturbulck	ırbulck	MJTA-5-140.5	MJTA-5-140.5 weakly argilled rock with Ep-Chl network	0	0		◁							
18 Akmola	ola	MJTA-6-20.8	argillic alteration zone with slight silicification	0				٥						
19 Akmola	ola	MJTA-6-49.2	stgly silicified zone with py-dism Chloritization, Epidotization	0				٥						•
20 Akmola	ola	MJTA-6-96.7	stgly silicified rock with pyrite dism (3%)	0	0	$\neg$	◁	┛	$\dashv$	$\dashv$	$\dashv$		$\dashv$	4

abundant, ③ : common, 〇 : a little, △ : rare, •
Abbreviations: Qz: quartz; Pl: plagioclase; Hor. hornblende; Chl: chlorite; Ill/Mc: Illite/Micas mixed layer; Kao: kaolinite
Smec: smectite; Prp: pyrophyllite: Lau: laumontite; Cc: calcite; Gyp: gypsum; Py: pyrite

Apppendix 7 List of the results for X-ray Diffraction analysis (Cont.)

Area	Samuel No	Constitution					Dete	Detected minerals	nerals				
5			Qz	Ē	Hor	_ Ghl	III / Mc K	Kao Sr	Smec P	Prp L	Lau (	Cc G	Gyp Py
Akmora	MJTA-6-228.2	silicified rock (green colored) with Py dism	0				۷						
Akmora	MJTA-6-229.0	epidotitized & chloritized rock with slightly silicified	0	۵		◁							
		epidotitized & chloritized rock with slightly silicified (with							-	_	_	-	
23 Akmora	MJTA-6-249.0	MJTA-6-249.0 [Qz+Py network)	0	0		۷	٥						•
24 Akmora	MJTA-7-104.5	MJTA-7-104.5 strongly silicified rock (with a little Py)	0				0						
25 Akmora	MJTA-7-124.0	MJTA-7-124.0 stgly argilled rock with py dism (porphyry?)	0	0		٥	Δ						-
26 Akmora	MJTA-7-176.4 clay vein	clay vein	0	0		◁						_	•
27 Akmora	MJTA-7-188.2	MJTA-7-188.2  argillic zone with py dism	0	0		◁							-
28 Akmora	MJTA-7-216.0	MJTA-7-216.0 silicified & argillized rock in fructured & sheared zone	0				4						٥
29 Akmora	MJTA-7-237.0	MJTA-7-237.0 white clay alteration, granitoid,	0	0		4							•
		argilled & chloritized (dacite) porphyry with network of Qz,											
30 Akmora	MJTA-8-37.5	clay	0	◁		0	0	0					
31 Akmora	MJTA-8-84.0	MJTA-8-84.0 argilled & silicified rock with network	0	0	- 545	٥	0	0	-				
32 Akmora	MJTA-8-104.0	MJTA-8-104.0 argillized & slightly silicified rock with network	0	Δ		Δ	\ \						•
33 Akmora	MJTA-8-150.4	MJTA-8-150.4 stgly silicified & argilled rock with Py dism	0	Δ		Δ	Δ					-	•
34 Akmora	MJTA-8-231.0	MJTA-8-231.0 silicified rock, Kfd alteration?	0	0		Δ							
35 Akmora	MJTA-8-249.4	MJTA-8-249.4 silicified zone with clay, Qz network with Py dism	0	0		٥	٥						•
36 Akmora	MJTA-9-74.0	MJTA-9-74.0 white, argilled rk with Py & black sulfide	0				۷	0					
37 Akmora	MJTA-9-87.5	argilled & silicified rock with Py dism & black colored minera	0				7	•					
38 Akmora	MUTA-9-206.0 Py dism	pale greenish light gray colored granite,weakly altered with Py dism	0	0		0	◁						4
Akmora	MJTA-9-224.0	MJTA-9-224.0 light gray silicified granite with Py dism with Qz-veinlets	0	0			٥						
40 Akmora	MJTA-9-250	dark green silicified granite	0			<	4				_	F	

abundant, Θ : common, Ο : a little, Δ : rare, •
Abbreviations: Qz: quartz; Pl: plagioclase; Hor. hornblende; Chl: chlorite; III/Mc: Illite/Micas mixed layer; Kao: kaolinite
Smec: smectite; Prp: pyrophyllite; Lau: laumontite; Cc: calcite; Gyp: gypsum; Py: pyrite

Appendix 8 Chemical Composition of Granitic Rocks

	Total	<u>&amp;</u>	99.34	1 43 100 92	1.28 101.65	0.86 100.17	1.12 101.64	1.58 101.11	1 12 101 54	100.38	105.04
	<u></u>	3	441	1 43	1 28	98.0	1		1 12	2.85	2 43 105 04
	10 <sub>2</sub>	8	0.56	0.50	0.54		0.51	0.53	0.46	0.58	0 79
	SiO <sub>2</sub>					i .	65.56	64.47	64.87	63.12	53 84
	P <sub>2</sub> O <sub>5</sub>	%	0.15	0.14	0.14	L	0.12	0.13	0 11	0.18	0.20
	Na <sub>2</sub> O	%	3.61	3.12	3.57	3.47	3.32	3.18	3.11	2.72	2.52
	Mno			0.09	l	3	0.09	0.09	0.09	0.11	0.10
	Og W	8	2.31	1.79	l	18.0	1.97	2.00	2.28	2.83	5.42
	ν Σ	<u>%</u>	2.52	4.13	2.22	3.98	3.17	3.55	3.15	3.42	1.64
1		(%)	0.75	2.20	2.42	1.25	2.25	2.48	2.44	1.46	5.98
(	ပ <sub>ဒ</sub> ြ	(%)	3.21	4.09	4.96	2.67	4.39	4.59	4.49	4.76	8.03
,	CaO C <sub>2</sub> O <sub>3</sub>	(%)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
(	CaC	(%)	17.1	3.16	4.76	2.11	3.85	3.58	4.28	3.55	7.68
(		(%)	14.72	14.63	16.79	14.02	15.29	14.93	15.14	14.80	16.41
	Area		Akmola	Akmola	Aktau west	Western Zalturbulak	Western Zalturbulak	Western Zalturbulak	Akmola	Akmola	Zalturbulak
	Rock Name		MJTA-9-156S Intense altered granitoid	MJTA-7-94S Hb Bt adamerite	Ho diorite porphyry	Ho Bt granite	Bt Hb granodiorite	Bt Hb granodiorite	Bt Hb granodiorite	Porphyritic granodiorite– Hb. Bt granite	Hb Px diorite-gabbro
_	Sample		MJTA-9-156S	MJTA-7-94S	A2115D	A3001	A3006	A3007	A3008	C2053	M143D