APPENDIX I INSPECTION PHOTOS

March 30, 2016

Project No.: 0255-026

LIST OF APPENDIX I INSPECTION PHOTOS

March 30, 2016

Project No.: 0255-026

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FINAL 2015 Nanisivik Geotech Inspection Report



Photo 1. East Adit Treatment Facility—Looking east at breach in East Adit Treatment dyke.



Photo 2. East Adit Treatment Facility—Retention pond as seen from East Pit road.

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Photo 3. Port Area—As seen from Mt. Fuji.



Photo 4. Port Area—As seen from communication tower area.

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Photo 5. West Twin Dyke Spillway—Looking downslope along left edge of ramp on right bank of spillway. Note water flowing along channel.



Photo 7. West Twin Dyke Spillway—Spillway as seen from top of right bank. View looking downstream.



Photo 6. West Twin Dyke Spillway—Looking upstream along left bank of spillway. Note erosion scar approximately 1-2 m above base of spillway.



Photo 8. West Twin Dyke Spillway—Spillway outlet as seen from crest of right bank.

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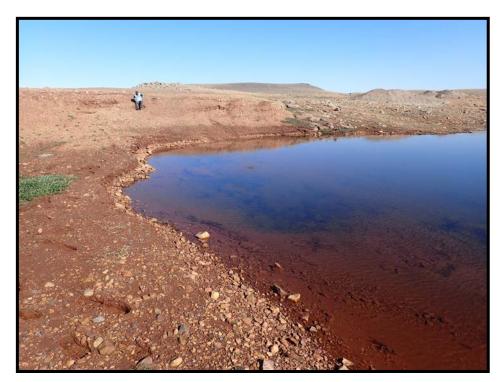


Photo 9. West Twin Outlet Channel—Thermokarst feature in bottom of polishing pond.



Photo 11. West Twin Outlet Channel—Looking north along wall.



Photo 10. West Twin Outlet Channel—Looking upstream at wall.



Photo 12. West Twin Outlet Channel—Settlement induced cracking along north edge of polishing pond.

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Photo 13. East Twin Creek Diversion Channel—View looking up gradient. Upstream of left bank erosion.

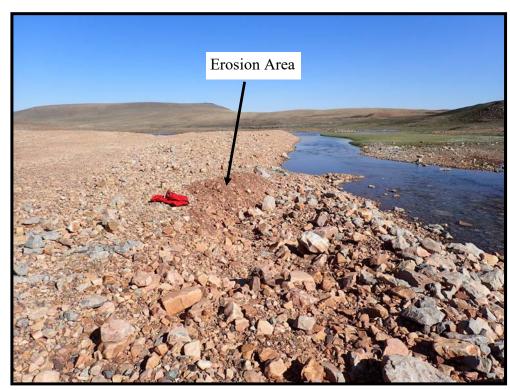


Photo 15. East Twin Creek Diversion Channel– Erosion area noted above seepage discharge point. Erosion is similar to 2013.



Photo 14. East Twin Creek Diversion Channel—View of area down-stream of armoured area. Note bedrock outcrop along face of dyke and in bottom of channel.



Photo 16. East Twin Creek Diversion Channel– View of area downstream of armoured area. Note bedrock outcrop along face of dyke and in bottom of channel.

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Photo 17. Surface Cell—Thermokarst settlement near E/W drainage channel.



Photo 19. Surface Cell—Cracking in secondary N/S drainage swale. View looking north.



Photo 18. Surface Cell—Settlement area along east edge of main N/S drainage swale. View looking north.



Photo 20. Surface Cell—E/W drainage channel on Surface Cell cover. View looking west.

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Photo 21. West Twin Dyke—Crest of dyke, view looking north.



Photo 22. West Twin Dyke—Face of dyke, view looking south.

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Photo 23. Test Cell—Settlement trough along edge of East/West Test Cell dyke.



Photo 25. Test Cell—View looking southwest along centre of Test Cell cover system.



Photo 24. Test Cell—Looking toward outlet of Test Cell cover system.



Photo 26. Test Cell—Test Cell area as seen from crest of West Twin Dyke.

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Photo 27. Test Cell—Looking towards toe of West Twin dyke from centre of Test Cell.



Photo 28. Test Cell—View looking east toward outlet of Test Cell cover system.

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Photo 29. Toe of Test Cell Dyke—Armour along shoreline of cover at toe of Test Cell Dyke. East/West arm, view looking east.



Photo 31. Toe of Test Cell Dyke—North/South arm, view looking south.



Photo 30. Toe of Test Cell Dyke—Armour along shoreline of cover at toe of Test Cell Dyke. East/West arm, view looking west.



Photo 32. Toe of Test Cell Dyke—Outlet of Test Cell Cover

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Photo 33. Toe of West Twin Dyke. As seen from crest of West Twin Dyke $\,$



Photo 34. Toe of West Twin Dyke—Settlement Area.

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Photo 35. Landfill—Surface of landfill cover looking north.



Photo 37. Landfill— As seen from the communication tower area.



Photo 36. Landfill—North sloping face of cover.



Photo 38. Landfill—West facing slope of landfill cover.

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Photo 39. West Open Pit—Crack in crown pillar. Note that there has been no visual change in the 10 years since closure.



Photo 41. West Open Pit—Surface of cover system looking downslope.



Photo 40. West Open Pit—Crack in crown pillar. Note that there has been very little change in the 10 years since closure.



Photo 42. West Open Pit—Centre of surface cover system looking west.

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Photo 43. East Open Pit— At transition from flat to sloping upper surface of cover system. Note minor settlement and cracking.



Photo 45. East Open Pit—Looking upslope along lower sloping face of cover. Note rill erosion.



Photo 44. East Open Pit—Face of remnant highwall where cracking of crown pillar has been observed.



Photo 46. East Open Pit—Cracking in crown pillar. Similar condition to 2014.

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Photo 47. East Trench—Trench cover as seen from upslope edge. Not small flow of water on surface of cover causing minor rill erosion.



Photo 48. East Trench—Spring water running along surface of cover causing minor rill erosion

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Photo 49. Oceanview Open Pit—Toe of cover system. Note seepage emerging at the bottom of toe.



Photo 51. Oceanview Open Pit—Main pit area as seen from backslope.



Photo 50. Oceanview Open Pit—Rill erosion along backslope. Note self armouring that is occurring.



Photo 52. Oceanview Open Pit—Small sinkhole in middle of cover system. Note little visible change since 2014.

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Photo 53. Area 14—Upper flat surface of waste rock cover.



Photo 54. Area 14—Slope face of waste rock cover.

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AREA 14 WASTE ROCK COVER

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Photo 55. Upper Dump Pond—General view of cover system, as seen from road above 09S portal.



Photo 56. Upper Dump Pond—View of surface of cover.

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Photo 57. Industrial Complex Cover—View across sloping face of cover.



Photo 59. Industrial Complex Cover—Surface of cover system.



Photo 58. Industrial Complex Cover—Cover system as seen from the communication tower area.

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Photo 60. 17N Portal—Surface water running along east edge of portal cover.



Photo 61. 17N Portal—Looking upslope along surface of cover.

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Photo 62. Oceanview Portal—Looking downslope along surface of portal cover.



Photo 63. Oceanview Portal—Settlement area along west edge of cover. Note very little to no change in 10 years.

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PROJECT:	NIAN	IICIVIIZ MINIT	

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

NANISIVIK MINE 2015 ANNUAL GEOTECHNICAL INSPECTION

TITLE: OCEANVIEW PORTAL COVER

I-21

nyrstar

APPENDIX No.:

PROJ No.: REV: 0255-026-03



Photo 64. K-Baseline Portal—Surface of cover as seen from East Trench.



Photo 65. K-Baseline Portal—Sloping face of cover system looking upslope.

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NANISIVIK MINE 2015 ANNUAL GEOTECHNICAL INSPECTION

TITLE: K-BASELINE PORTAL COVER

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APPENDIX No.:

PROJ No.: 0255-026-03

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Photo 66. Area 14 Portal—Surface of portal cover system.

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Photo 67. 09S Portal—Eroding road between 09S and 17N portals.



Photo 68. 09S Portal—Looking upslope along surface of cover. Note shale deposited on top of armour from upslope.

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AN APPLIED EARTH SCIENCES COMPANY

09S PORTAL COVER

APPENDIX No.: PROJ No.:

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I-24 0255-026-03



Photo 69. Lower Adit—As seen from Industrial Complex cover.

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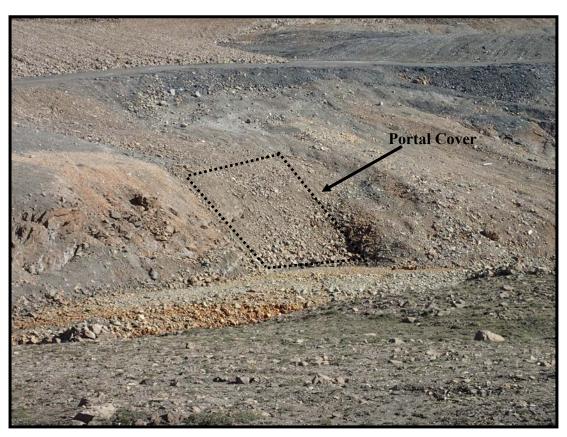


Photo 70. Mill Portal—Portal plug as seen from right bank of Twin Lakes Creek.

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BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY	TITLE:	MILL	PORTAL	

PROJ No.:

0255-026-03

I-26

REV:

client: **nýrstar**



Photo 71. Shale Hill Raise—Mound over backfilled raise. No settlement has been observed.



Photo 73. Oceanview West Raise— Mound over backfilled raise. No settlement has been observed.



Photo 72. Oceanview East Raise. — Mound over backfilled raise. No settlement has been observed.



Photo 74. Area 14 Raise—Graded area above backfilled raise. Note stake with flagging denoting approximate location of raise.

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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY CLIENT:

nyrstar

NANISIVIK MINE 2015 ANNUAL GEOTECHNICAL INSPECTION PROJECT: TITLE: MINE RAISE COVERS APPENDIX No.: PROJ No.: I-27



Photo 75. Area 14 Shale Quarry.



Photo 77. Mt. Fuji Shale Quarry.

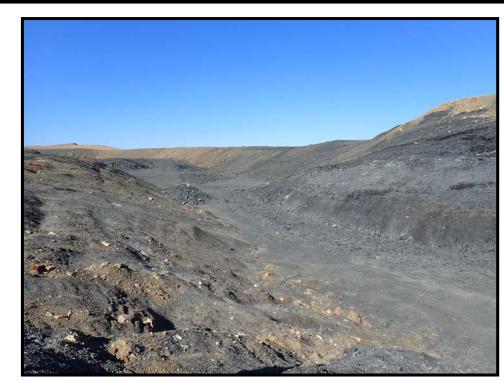


Photo 76. Shale Hill Quarry.



Photo 78. Mt. Fuji Shale Quarry—Midslope benches.

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PROJECT:		NANISIVIK MINE GEOTECHNICAL INSPE	CTION
TITLE:	SHALI	E BORROW AREAS	
APPENDIX No.:		PROJ No.:	REV:

0255-026-03

I-28



Photo 79. Kuhulu Lake Road Armour Quarry—Thermokarsting in floor of quarry. Note minor ponding near northwest corner.



Photo 80. Chris Creek Armour Quarry—Surface of quarry floor.

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APPENDIX II 2015 GEOTECHNICAL MONITORING SCHEDULE

March 30, 2016

Project No.: 0255-026

2015 Geothechnical and Geothermal Instrument Readings Completed

		01-Jan	01-Feb	01-Mar	07-Apr	05-May	19-May	26-May	02-Jun	unr-60	16-Jun	23-Jun	30-Jun	lut-70	14-Jul	21-Jul	28-Jul	04-Aug	11-Aug	18-Aug	25-Aug	01-Sep	08-Sep	15-Sep	22-Sep	29-Sep	06-Oct	03-Nov	01-Dec	08-Dec	15-Dec	22-Dec	29-Dec	
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TC13A	Thermocouple	Not	t func	ctionir	ng																													
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BGC05-09	Thermistor																																	
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BGC03-10	Thermistor																																	Monthly Reading
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BGC03-35	VW Piezo.																																	
BGC03-36	Thermocouple																																	
BGC03-37	Thermistor	Not	t func	ctionir	ng																													
BGC05-05	Thermistor																																	
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BGC05-07	VW Piezo.																																	
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Bi-Weekly Reading

2015 Geothechnical and Geothermal Instrument Readings Completed

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APPENDIX III 2016 - 2019 GEOTECHNICAL MONITORING PROGRAM SCHEDULE

March 30, 2016

Project No.: 0255-026

2016-2019 Geothechnical and Geothermal Instrument Reading Schedule

		01-Jan	01-Feb	01-Mar	01-Apr	15-Apr 01-May	11-May	21-May	01-Jun	07-Jun	14-Jun	21-Jun	01-Jul	07-Jul	14-Jul	21-Jul	01-Aug	07-Aug	14-Aug	21-Aug	01-Sep	07-Sep	14-5ep 21-Sen	01-Oct	11-0ct	21-Oct	01-Nov	01-Dec	08-Dec	15-Dec	22-Dec	29-Dec	
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Weekly Reading

Monthly Reading

Bi-Weekly Reading

2016-2019 Geothechnical and Geothermal Instrument Reading Schedule

		01-Jan	01-Feb	01-Mar	01-Apr	15-Apr	01-May	11-May	21-May	01-Jun	07-Jun	14-Jun	21-Jun	01-Jul	07-Jul	14-Jul	21-Jul	01-Aug	07-Aug	14-Aug	21-Aug	01-Sep	07-Sep	14-Sep	21-Sep	01-Oct	11-0ct	21-0ct	01-Nov	01-Dec	08-Dec	15-Dec	22-Dec	29-Dec
Toe of West Twin Dyke	е	•							•										•															
BGC03-18	Thermocouple	Not	t fun	ctior	nıng																													
BGC03-19	Thermistor																																	
BGC05-26	Thermistor																																	
Test Cell																																		
BGC05-04	Thermistor																																	
BGC05-18	VW Piezo.																																	
BGC05-19	Thermistor																																	
BGC05-20	VW Piezo.																																	
BGC05-21	Monitoring Well	Not	t fun	ctior	ning																										f			
BGC05-22	VW Piezo.																																	
BGC05-23	Monitoring Well	Not	t fun	ctior	ning																													
BGC05-24	VW Piezo.																																	
BGC05-25	Contingency	l	1		T		1																			\neg	\neg		\Box		口	\neg		\neg
FG-7	Frost Gauge				t																					\neg					m	\neg		-
FG-8	Frost Gauge																																	
Test Cell Dyke		_	_		_																		_						_					
BGC02-09	Thermistor	Not	t fun	ctior	ning	Т	П	Г	Π									П		П	Т	Т	П	Т		\neg	_	$\overline{}$			П	\neg	\neg	-
BGC03-22	Thermistor	İ	I	I	ΤŤ																					\dashv	\neg	\vdash	_		H	-		_
BGC05-29	Thermistor	İ			t																					\dashv	\neg	\vdash	_		H	-		_
Toe of Test Cell Dyke	THOTTHIOLO			1			1	<u> </u>	1																	$\overline{}$		_	_		_			
BGC05-27	Thermistor	T	Т	T	T	П	T	ī	Ī		Π										_		П	T		\neg	_	一	$\overline{}$		П	\neg	$\overline{}$	-
BGC05-28	VW Piezo.				╁																					\dashv	-	\vdash	\vdash		H	\dashv	-	-
FG-9	Frost Gauge		1		╁	\vdash	1												-		-					\dashv	\vdash	一	╁		H	\dashv	\dashv	-
FG-10	Frost Gauge		1		╁	\vdash	1												-		-					\dashv	\vdash	一	╁		H	\dashv	\dashv	-
Oceanview Pit	1100t Gauge	_	_		_	_													_						_	_	_	_	_		_	\dashv	_	
BGC05-01	Thermistor	Τ	Т	П	Т	Т	Т	П	I	Г	Π								_		_		П	Т		\neg	$\overline{}$	$\overline{}$	$\overline{}$	Г	П	\neg	\neg	
FG-16	Frost Gauge				t																					\neg	\vdash	 	1			\neg		-
East Open Pit	1100t Gauge			_	_	_				_									_		_	_				_		_	_	_	_	_		
BGC05-02	Thermistor	T	Т	T	T	П	T	ī	Ī		Π										_		П	T		\neg	_	一	$\overline{}$		П	\neg	$\overline{}$	
BGC05-03	Thermistor		1		+	\vdash													_							\dashv	-	一			H	\dashv	\dashv	_
FG-13	Frost Gauge				╁														-							\dashv	-	\vdash	\vdash		H	\dashv	-	
FG-14	Frost Gauge		1		+	\vdash													_							\dashv	-	一			H	\dashv	\dashv	_
Landfill	1 10st Gauge	<u> </u>		_		_		<u> </u>	<u> </u>	_	<u> </u>				.				_							-	_	_		_	ш	_	_	
BGC05-30	Thermistor	T	T		T	Т	T		ı														1	T		\neg								
FG-11	Frost Gauge		1		t	1	1												\dashv							\dashv	-	\vdash	\vdash		\vdash	\dashv	\dashv	-
Area 14	1 100t Gauge		_	_	_	_	_			_					_						_			_		_		_		_			_	
TC7	Thermocouple	T	Т		T	Т	T	Π	T										T	Т			П	T		\neg	_				\Box	\neg		
FG-15	Frost Gauge		1		t	1	1												\dashv				-			\dashv	-	\vdash	\vdash		\vdash	\dashv	\dashv	-
Upper Dump Road	1 100t Gauge		_	_	_	_	_	_		_									_									_		_	-			
FG-17	Frost Gauge	T	T	Г	T	Т	T	Г	ı														1	T		\neg	_				\Box	$\overline{}$	$\overline{}$	
West Open Pit	1 103t Gauge		_	_	_	_	_	_		_									_		_							_	_	_	_			
BGC08-01	Thermistor	T	T	Г	T	Т	T	Г	ı														1	T		\neg	_				\Box	$\overline{}$	$\overline{}$	
Mill Cover	THEITHISTO		_	_	_	_	_	_		_									_		_							_	_	_	_			
BGC08-02	Thermistor	T	T		T		T	Г	I														-	Т		\neg						\neg		
Water Quality / Levels			_	_		_		_		-									_				_		_	_	_	_	_	-	-	_	_	
159-4	Water Level	T	П		П		П	ı	I															Т							\Box		$\overline{}$	
159-4	Water Quality	1	1		╁	1	1			_			\vdash										\dashv	-	-	\dashv		┢	\vdash	_	₩	\dashv	-	\dashv
Spillway Inlet	Water Quality Water Quality	1	1	1	╂	1	1		-	-							\vdash		\dashv		-					\dashv	لــــا	₩	₩	-	⊢	\dashv		_
Spinitaly mice	water quality	I	1		1	1																						Щ.			$oldsymbol{ol}}}}}}}}}}}}}}}}}}$			