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Appendix A. Field sheet used for documenting rock stockpiles.

Cliffs Erie (LTV Stockpiles) Field Sheet

H:\\stk_pile_wksheet.doc

Date _____ By: (AK, MO, GM) _____

Stockpile # (DNR)_____ (LTV Sign: # & mat'l)_____

Material type--on-site observation: (circle one) Lean tac, waste rock, slaty waste rock, lean slaty tac, lean cherty: *add color, etc*_____

# of Lifts (1 is lowest) _____
Same material in each lift (Y or N)? _____, if not, describe for each on separate page.

Max particle size (longest dimension) _____ ft, in, cm
Minimum particle size _____ ft, in, cm
Predominant size (if any) midway up the slope _____ ft, in, cm

Sorting (well, moderately well, moderate, moderately poor, poor) _____

Access: ___mine road/ramp, if blocked, pick one: ditch, berm, _____
(need photos of ramps, roads, rail, berms, etc for perspective)
___none currently
___only certain lifts, which?_____
___other, describe_____

Which portions are reclaimed? (e.g.: top and every bench)_____
(reclaimed is defined as having ~6-24 inches of soil/ov burden applied over the rock stockpile and vegetated)

Stockpile outline OK? _____, if not, is it corrected on field map?___, or GPS'd?_____

Potential for (Y or N):
___ Crushed aggregate (material is competent & no deleterious)
___ Landscape materials
____ Boulders (natural or taconite—pick one)
__quantities visible/100 linear ft along the slope
__1-3 ft bldrs (<100, 100-1000, >1000 --pick one)
__> 3ft bldrs-pianos (<100, 100-1000, >1000 --pick one)
____ Flagstone (1/2-2" thick by 1-3 sq. ft. optimum)
____ Mulch/decorative (explain)_____
____ Other (list) _____
___ Rip rap (must be competent)
___ Natural sand and gravel, describe_____

Potential

Samples? (Y/N) ____

** **Photos** (usually have 3: far away perspective, close up of dominant size/color, and a close up of the matrix—*use scale*) Disk #_____
Photo 1 waypoint #_____ UTM/purpose: _____

____ Photo 2 waypoint #_____ UTM/purpose: _____
____ Photo 3 waypoint #_____ UTM/purpose: _____
____ Photo 4 waypoint #_____ UTM/purpose: _____
____ Photo 5 waypoint #_____ UTM/purpose: _____
____ Photo 6 waypoint #_____ UTM/purpose: _____
____ Photo 7 waypoint #_____ UTM/purpose: _____

Note: Photos and material confirmation and potential are most important.

Appendix B. Geologic descriptions of rock samples collected from stockpiles in the evaluation area.

Samples collected by: G. Melchert, M. Oberhelman, R. Riihilouma.

General comments:
Samples were contained in plastic 5 gallon buckets; some comprised one bucket, others multiple up to 5 buckets. All were weather-stained, some with iron gossans.

Samples consisting of multiple buckets were fairly uniform in nature; I attempted to quickly describe each type found per sample. Most were done with a 10x lens and an Olympus binocular scope up to 40x was employed for several samples as noted by **(40x)**.

All samples were fine to extremely fine grained, generally dark gray – black in color, with iron silicate-rich beds/laminae having a greenish-gray hue.

An emphasis was placed on identifying amphibole-bearing strata.

Sample 048: ***(40x)*** *(Stockpile 9601)* Bedded, light green, granular, quartz and iron silicate (greenalite?) with minor amphibole and with gray – black, discontinuous, wavy magnetite bands. Primary sedimentary texture. Minor small knots of siderite.

Some beds of relatively magnetite-poor, jasperoid chert up to several cm. thick. The quartz-iron silicate beds have disseminated pyrite as fine streaks and rare cubes to 1 –2 mm.

Sample 143: *(Stockpile 111)* Red-orange to orange-brown, pitted (weathered siderite?) with a blocky to hackly fracture; chaotic to poor, discontinuous bedding. A chert magnetite rock, with about 5% disseminated magnetite. No amphiboles discerned.

Sample 134: *(Stockpile 7007)* Rubbly, no pieces > 3 inches. Angular to flat, slaty. Fine to medium grained, minor fine amphibole. (minus 1.5 inch? crushed pile).

Sample 054: *(Stockpile 7003)* Well bedded, with thick red-purple, granular textured, chert rich magnetite poor beds and thin bedded dark gray magnetite rich beds. Blocky jointing; some of the chert rich beds have cross cutting, thin (1mm) veinlets of siderite.

Sample 007: *(Stockpile 2021)* Dark gray to black, amphibole rich with quartz-magnetite; amphibole may be cummingtonite (grunerite); rock has a general "felty" appearance. Rock is very flaggy; blocky jointing.

40x: Amphibole (cummingtonite?) appears prismatic to acicular, often in radiating masses. A modal estimate = 50% amphibole, 35% quartz, 15% magnetite. Some octahedral magnetite crystals were observed.

Sample 020: *(Stockpile 2062)* Thin bedded (1/2cm), very fine grained, magnetite-rich with magnetite-poor cherty "pods"; these cherty portions have vertical siderite filled fractures. Amphiboles?

Sample 144: *(Stockpile 1020)* Dark colored, irregular "hackly" fracture, "salt and pepper" appearance. Minor pebble conglomerate, granular texture occasional thin, fine grained magnetite-rich bands.

Sample 146: *(Stockpile 5021)* Dark, slaty rock, breaks into 3 cm thick slabs; very magnetic.

40x: Mode = quartz, magnetite, hornblende + other amphiboles (cummingtonite?). Some very fine pyrrhotite in more quartz-rich beds. Hornblende appears as individual, dark green prismatic crystals while the other amphiboles have an acicular, radiating habit.

Sample 063: *(Stockpile 1041)* Slaty rubble. Fine grained, dark gray.

Sample 050: *(Stockpile 2040)* Over all, massive, blocky, very fine grained, with gray magnetite-rich bands and undulose beds and pods of dark gray magnetite-poor, chert rich material. Some patches, beds of reddish purple chert-jasper with fine magnetite.

40x: Chert has recrystallized, "sugary" hornfelsic texture with knots, layers, lenses of amphibole rich material with a radiating, acicular habit. Also, very fine light green, glassy mineral – fayalite? diopside?

One small sample was brecciated with quartz, calcite and hornblende crystals (to 1 cm.) filling the fractures.

Sample 053: *(Stockpile 2062)* Very similar to 050 except more finely laminated, less chert as pods, lenses. Gossan on some pieces.

Sample 055: *(Stockpile 7008)* Two rock types:
1) A brown, red-brown, banded rock with beds ranging from 10 mm to 2 – 3 mm thick. Altered, granular, hematite-bearing siliceous bands and dense hematite bands. Occasional thicker (6 cm) granular, magnetite-bearing bands, slightly magnetic. Minor pebble conglomerate and patches of siderite.

2) Light green to green-gray, fine-grained, blocky, granular appearing rock; primary sedimentary texture.

40x: Mode = quartz + iron silicates (greenalite?) = 90 – 95%; + amphibole (10%), with brown, slightly magnetic siderite patches. Non-magnetic overall. Amphibole as tiny dark blades and small, radiating acicular masses.

Appendix C. Gradation sieve data for natural aggregate samples. The values in this table represent the percentage of the sample, by weight, that passed through a given sieve size opening. These were 30-pound grab samples from test pits. Sample #'s correspond to the waypoint sample sites in the database and Plate 2.

	Sieve Size (U. S. Standard)																			
Sample #	4"	3"	2.5"	2"	1.5"	1.25"	1"	3/4"	5/8"	1/2"	3/8"	#4	#8	#10	#16	#30	#40	#50	#100	#200
70	100	100	95	94	88	84	78	70	66	61	54	40	34	33	29	24	21	18	14	10.0
276	100	100	88	86	80	77	73	69	66	64	60	46	36	34	23	10	6	4	2	0.8
278	100	100	93	78	71	68	65	62	60	58	55	46	38	36	30	23	20	17	11	5.5
81	100	100	100	97	94	93	91	88	86	85	82	75	69	67	62	54	50	45	33	25.7
82	100	100	100	100	100	99	99	98	98	98	98	97	97	97	96	91	84	70	39	27.0
83	100	100	91	91	89	88	85	82	81	79	76	67	59	57	49	32	23	16	8	4.3
100	100	100	95	88	84	81	77	71	67	63	58	48	42	40	35	27	23	18	12	6.9
104	100	100	100	87	81	75	69	63	60	56	51	40	31	29	22	15	12	9	6	4.1
125	100	94	86	81	74	70	67	63	61	59	55	49	43	42	35	24	17	11	8	4.7
128	100	94	90	86	82	81	77	75	72	69	66	60	54	53	47	37	32	26	16	10.1
135	100	100	100	100	100	99	97	92	89	85	79	68	62	60	53	35	19	10	5	3.1
Class 5 upper limits							100	100			90	80		65			35			10
Class 5 lower limits							100	90			50	35		20			10			3

Appendix D. Stockpile information.

Stockpile ID	Stockpile Name	Photo?	Sampled?	In Pit?	Acres	Stockpile Volume	
101	Overburden	TRUE	FALSE	FALSE	10		
102	Overburden	TRUE	FALSE	FALSE	13		
103	Overburden	TRUE	FALSE	FALSE	20		
104	Overburden	TRUE	FALSE	FALSE	9		
105	Overburden	FALSE	FALSE	FALSE	57		
106	Overburden	FALSE	FALSE	FALSE	53		
107	Overburden	FALSE	FALSE	FALSE	23		
108	Overburden	TRUE	FALSE	FALSE	196		
109	Overburden	FALSE	FALSE	FALSE	9		
110	Lean Ore #3	TRUE	TRUE	FALSE	2	242327	tons
111	Taconite #4	TRUE	TRUE	FALSE	2	302353	tons
112	Lean Ore #3A	TRUE	FALSE	FALSE	2	81986	tons
113	Taconite #6	TRUE	FALSE	FALSE	1	12825	tons
114	Taconite #4A	TRUE	FALSE	FALSE	2	50713	tons
1016	1016	TRUE	FALSE	FALSE	18	628416	loose cubic yards
1019	1019	TRUE	TRUE	FALSE	52	3167759	loose cubic yards
1020	1020	TRUE	TRUE	FALSE	26	820225	loose cubic yards
1041	1041	TRUE	TRUE	FALSE	48	1686051	loose cubic yards
1044	1044	TRUE	FALSE	FALSE	21	707001	loose cubic yards
2004	2004	FALSE	FALSE	FALSE	81		
2005	2005	FALSE	FALSE	FALSE	16		
2012	2012	TRUE	FALSE	FALSE	130	5919997	loose cubic yards
2013	2013	TRUE	FALSE	FALSE	15	27436	loose cubic yards
2014	2014	FALSE	FALSE	TRUE	3	63543	loose cubic yards
2021	2021	TRUE	TRUE	FALSE	16	515548	loose cubic yards
2022	2022	TRUE	FALSE	FALSE	9	1708421	loose cubic yards
2023	2023	FALSE	FALSE	FALSE	13	804583	loose cubic yards
2025	2025	TRUE	FALSE	FALSE	22	897010	loose cubic yards
2029	2029	TRUE	FALSE	FALSE	17	56496	loose cubic yards
2031	2031	TRUE	TRUE	FALSE	52	1412127	loose cubic yards
2040	2040	TRUE	TRUE	FALSE	163	8810149	loose cubic yards
2050	2050	TRUE	TRUE	TRUE	12	158963	loose cubic yards
2052	2052	FALSE	FALSE	TRUE	13	140610	loose cubic yards
2061	2061	FALSE	FALSE	FALSE	14	635146	loose cubic yards
2062	2062	TRUE	TRUE	TRUE	93	4353401	loose cubic yards
2064	2064	TRUE	FALSE	FALSE	18	1076056	loose cubic yards
2065	2065	TRUE	FALSE	FALSE	25	1646070	loose cubic yards
5021	5021	TRUE	TRUE	FALSE	72	3789472	loose cubic yards
7003	7003	TRUE	TRUE	FALSE	79	4701629	loose cubic yards
7006	7006	FALSE	FALSE	FALSE	17	1590119	loose cubic yards
7007	7007	TRUE	TRUE	FALSE	14	156651	loose cubic yards
7008	7008	TRUE	TRUE	FALSE	244	9383911	loose cubic yards
7010	7010	TRUE	FALSE	FALSE	23	986791	loose cubic yards
7022	7022	TRUE	FALSE	FALSE	25	558723	loose cubic yards
7095	7095	FALSE	FALSE	FALSE	17	1207633	loose cubic yards
7096	7096	FALSE	FALSE	FALSE	1	16287	loose cubic yards
7097	7097	FALSE	FALSE	FALSE	23	777476	loose cubic yards
7099	7099	FALSE	FALSE	TRUE	11	26484	loose cubic yards
7494	7494	TRUE	FALSE	FALSE	20	59352	loose cubic yards

Stockpile ID	Stockpile Name	Photo?	Sampled?	In Pit?	Acres	Stockpile Volume	
7694	7694	TRUE	FALSE	FALSE	17	230012	loose cubic yards
9006	9006	FALSE	FALSE	FALSE	15		
9051	9051	TRUE	TRUE	FALSE	144	4155447	loose cubic yards
9054	9054	FALSE	FALSE	TRUE	7	442452	loose cubic yards
9601	9601	TRUE	TRUE	FALSE	89	3758840	loose cubic yards
1	Nap	TRUE	FALSE	FALSE	0		
2	Nap	FALSE	FALSE	FALSE	0		
3	Nap	FALSE	FALSE	FALSE	0		
99	Exploration Sites	Nap	Nap	Nap	Nap		

Appendix E. Stockpile descriptions. Codes for "material" are 1) glacial overburden, 6) natural ore mixed size rock, 11) taconite mixed size rock (natural ore mines), 12) lean taconite, and 13) waste rock (Iron Formation).

Stockpile ID	Material	Color	Comments
101	1	brown	No easy access. Scattered occurrences of gravel in this stockpile.
102	1	brown	Poor access currently, gravel in places. Boulders are mostly granite.
103	1	brown	Good access. Occurrence of gravel on south side.
104	1	brown	Good access, no boulders.
105	1	brown	Mostly glacial till, possible gravel in south part.
106	1	brown	Good access, sand-rich stockpile, some gravel occurrences.
107	1	brown	By county solid waste transfer site, all reclaimed.
108	1	brown	Good access
109	1	brown	mixed till and natural ore rocks
110	6	brown	upper lift has potential for granular fill. Lower lift is red ore.
111	11	brown banded	Good access
112	6	red	
113	11	brown banded	fair access, interesting colors, mosses growing on rocks
114	11	brownish gray	natural ore fines are spread over much of the stockpile and planted with red pine.
1016	13	gray banded	
1019	13	brownish gray	two lifts, used as crushed rock for railroad ballast by LTV, good access, contains some thin black fissile slate.
1020	13	brownish gray	rock size varies by location, good access
1041	13	brownish gray	good access, portions of top are covered with several feet of thin black brittle slate, predominant size of slate is 3 inches and very thin/brittle
1044	13	gray banded	some areas of brown banded boulders, lots of large boulders, a few boulders are splitting along bedding plane.
2004	1	brown	abundant boulders
2005	1	brown	mostly reclaimed and vegetated
2012	13	brownish gray	localized concentrations of flagstone
2013	13	brownish gray	stockpile also has concentrations of colorful red, green, maroon and brown banded rocks. good access, very rare flagstone
2014	13		Under water.
2021	12	brownish gray	North part of stockpile is older "taconite". good access
2022	12	brownish gray	good access
2023	12		
2025	12	brownish gray	lowest lift and bench are reclaimed, spotty flagstone
2029	12	brownish gray	Stockpile also contains concentrations of pale green rocks. good access

Stockpile ID	Material	Color	Comments
2031	12	gray	
2040	12	gray	good access
2050	12	gray	good access
2052			Stockpile is under water
2061			Not sampled, minimal quantities, part is under stockpile 2050
2062	12	brown banded	good access, predominant rock size varies from 2.5 ft to .5 ft depending on location. The coloration is a dull brown and gray banding rather than bright brown.
2064	12	gray banded	good access lift 3, lifts 1 and 2 are reclaimed.
2065	12	brownish gray	good access, numerous decorative boulders near waypoints 29 and 17. Some green rocks at waypoint 24.
5021	13	brownish gray	good access, best stockpile for flagstone.
7003	12	brownish gray	good access, some areas of brown banded rocks. Set aside area (wpt 244) and other areas have purple rocks. Most of top is reclaimed.
7006	13	pale green, gray, thin brown	good access from top
7007	12	pale green, gray, thin brown	2 West X Super pocket and regular pocket located here. Good access. Rock size varies across area. Some red banded boulders.
7008	13	pale green, gray, thin brown	part of stockpile reserved from reclamation because of decorative aspects (thinnly laminated brown or mix of brown, gray and green).
7010	12	brown banded	
7022	12	gray	good access, some rocks have oxidized brown surfaces. Contains small loading pocket. Predominant rock size is 2.5 ft in places. Some red banding.
7095	13		
7096	13		small quantity used for pad for structure.
7097	13		mostly consumed by crushed aggregate operation.
7099	13		small new stockpile
7494	13	pale green, gray, thin brown	mostly thinnly bedded brown rock. Park of major haul road.
7694	13	brown banded	good access from top. Part of large haul road.
9006	1	brown	reclaimed. Contains some iron formation boulders to 4 ft long.
9051	12	gray banded	Good access. Some interesting brown banding in places. Some gray rocks. Some surfaces have iron staining.
9054	13		Under water.
9601	13	pale green	Good access. Abundant red jasper rocks. Stockpile undergoing reclamation currently. Predominant size in places is 0.8 ft. Interesting red and green contrasting rocks.

Appendix F. Aggregate potential of the stockpiles. Stockpiles 101 through 109 are overburden stockpiles. The others are rock stockpiles. Aggregate Pot1 refers to the qualitative estimate that portions of the stockpile have potential for crushed rock aggregate (rock stockpiles) or sand and gravel aggregate (overburden stockpiles). Aggregate Pot2, 3, and 4 refer to other potential uses.

Stockpile ID	Maximum Rock Size	Predominant Rock Size	Aggregate Pot1	Aggregate Pot2	Aggregate Pot3	Aggregate Pot4
101			moderately desirable			
102	3 feet		moderately desirable			
103	2.5 feet	2 inches	moderately desirable			
104	4 inches	2 inches	moderately desirable			
105			less desirable			
106						
107			less desirable			
108						
109						
110			moderately desirable			
111	6 feet	1 feet	highly desirable	decorative	small riprap	
112	2.5 feet	0.5 inches	less desirable			
113	4 feet	0.5 feet	less desirable	decorative		
114	6 feet	6 inches	less desirable	decorative		
1016	6 feet	4 feet	less desirable	decorative	large riprap	
1019	5 feet	2 feet	less desirable			
1020	8 feet	2 feet	moderately desirable	large riprap		
1041	6 feet	2 feet	highly desirable	small riprap		
1044	12 feet	2 feet	moderately desirable	decorative	large riprap	
2004						
2005						
2012	8 feet	1 feet	moderately desirable	small riprap	large riprap	flagstone
2013	8 feet	1 feet	moderately desirable	small riprap		
2014						
2021	10 feet	1 feet	moderately desirable	small riprap		
2022	7 feet	2 feet	highly desirable	small riprap	flagstone	
2023						
2025	6 feet	0.75 feet	less desirable			
2029	6 feet	1.5 feet	moderately desirable	small riprap		
2031	4 feet	1.5 feet	highly desirable	small riprap		
2040	12 feet		highly desirable	large riprap	small riprap	decorative
2050	8 feet	2 feet	highly desirable	small riprap		

Stockpile ID	Maximum Rock Size	Predominant Rock Size	Aggregate Pot1	Aggregate Pot2	Aggregate Pot3	Aggregate Pot4
2052						
2061						
2062	8 feet	1 feet	moderately desirable	decorative	small riprap	large riprap
2064	12 feet	1 feet	highly desirable	decorative	small riprap	large riprap
2065	14 feet	2 feet	highly desirable	large riprap	small riprap	decorative
5021	7 feet	1 feet	less desirable	flagstone		
7003	2.5 feet	1.5 feet	moderately desirable	decorative	small riprap	
7006	2 feet	0.7 feet	highly desirable	decorative	small riprap	
7007	6 feet		highly desirable	small riprap	large riprap	decorative
7008	4 feet	0.5 feet	highly desirable	decorative	small riprap	large riprap
7010	8 feet	1.5 feet	highly desirable	decorative	small riprap	large riprap
7022	4 feet	1 feet	highly desirable	small riprap		
7095						
7096						
7097						
7099						
7494	6 feet	1 feet	moderately desirable	decorative	small riprap	
7694	3 feet	0.5 feet	moderately desirable	decorative	small riprap	
9006						
9051	6 feet	3.5 feet	moderately desirable	decorative	large riprap	small riprap
9054						
9601	5 feet	2.5 feet	highly desirable	decorative	small riprap	

Appendix G. Photographs. Photo number refers to the number portions of the file name. For example, file Mvc-061f.jpg refers to the photo number 61. Photo waypoint is the same as sample sites on Plate 2.

Photo Number	Photo Waypoint	Stockpile ID	Comments
61	209	1019	slope
62	209	1019	close up
63	210	1019	cut
64	210	1019	close up
65	210	1019	close up
66	211	1019	crushed rock pile
67	211	1019	crushed rock pile
68	211	1019	face
69	211	1019	close up
70	212	1041	slope
71	212	1041	closeup of slatey material
72	212	1041	close up, brown rocks with some fissile shale
73	213	1041	slope
74	213	1041	close up
75	214	2040	lift 2 perspective
76	214	2040	lift 2 close up
77	50	2040	lift 2 perspective
78	50	2040	lift 2 close up
79	215	2040	lift 3 close up
80	215	2040	lift 3 perspective
81	333	9601	close up of green and red algal rocks
82	333	9601	piles
83	216	9601	piles, green and red algal rocks
84	216	9601	close up, red algal and green boulders (nice)
85	216	9601	close up
86	217	9601	perspective, side of stockpile
87	144	1020	side view purplish tinted rocks
88	144	1020	close up of purplish tinted rocks
89	218	9601	end dumps, brown banded & iron staining
90	218	9601	close up, nice gray, brown and green chert banding
91	219	9601	recently bulldozed
92	219	9601	recently bulldozed
93	219	9601	recently bulldozed end dumps
94	219	9601	perspective of access
95	220	2012	flagstone
96	220	2012	general
97	221	2012	larger flagstone
98	221	2012	brown staining
99	221	2012	cut smaller
100	221	2012	cut smaller
101	222	2012	poor photo
102	223	2022	sign
103	223	2022	sizes on slope
104	223	2022	sizes on slope
105	224	2012	sign, second lift
106	225	2012	boulders
107	226	2012	back side of second lift
108	226	2012	backside of second lift
109	227	5021	flagstone
110	227	5021	close up, flagstone (nice)
111	227	5021	flagstone, medium distance (nice)
112	227	5021	flagstone
113	227	5021	small blocky rocks

Photo Number	Photo Waypoint	Stockpile ID	Comments
114	228	5021	large flagstone
115	228	5021	4 ft flagstone
116	229	5021	blocky rocks
122	230	7007	2-6 ft boulders
123	230	7007	close up of decorative banding
124	230	7007	smaller rocks
125	231	7007	pile
126	232	7007	crushed rock aggregate piles
127	232	7007	crushed aggregate piles
128	233	7022	mostly < 1 ft
129	234	7022	mostly < 3 ft
130	234	7022	close up, 1 ft rocks, some red algal
131	234	7022	contrast between two rock sizes
132	235	7022	medium view
133	235	7007	overview, crushed piles from stkpile 7022
134	236	7008	large boulders (reserved rocks)
135	236	7008	close up
136	237	7008	reserved rocks
137	237	7008	reserved rocks
138	238	7008	different part of stockpile
139	238	7008	different part of stockpile
140	239	7010	perspective
141	239	7010	perspective
142	239	7010	close up
143	240	7010	boulder area
144	241	7010	overview
145	241	7010	close up of boulders, 1-3 ft
146	242	7003	lift 1 slope
148	242	7003	close up of photo 146, some purple
149	243	7003	lift 2 end dump piles
150	243	7003	view of end dump
151	243	7003	close up, some purple rocks
152	244	7003	brown staining and brown banded
153	244	7003	close up
154	244	7003	pile
155	244	7003	close up purple rocks (reserved)
156	244	7003	perspective
157	244	7003	overview
158	245	7008	reserved rocks
159	245	7008	reserved rocks
160	36	113	perspective
161	36	113	close up
162	36	113	close up
163	36	113	close up fines among 12 inch rocks
164	37	113	top of lift, no overburden
166	38	113	decorative boulder
167	39	112	red fines
168	39	112	close up
169	40	112	slope
170	41	112	south slope
171	41	112	close up south slope
172	41	112	landscape rocks
173	42	112	top of stockpile
174	42	112	perspective
175	43	114	rock pad with main pile in background
176	44	114	south side showing red ore over tac rocks
177	44	114	red ore over rocks
178	44	114	red ore over rocks
179	44	114	close up red ore
180	44	114	rock pad edge of pile

Photo Number	Photo Waypoint	Stockpile ID	Comments
181	44	114	close up of 180
182	45	114	perspective, NE side
183	46	114	close up of surface material
192	48	9601	perspective recently bulldozed
193	48	9601	far berm marking edge of lift
194	49	9601	access from base of lift
198	55	7008	general end dumps
199	55	7008	medium view
200	55	7008	close up
201	55	7008	close up
202	55	7008	perspective of end dumps looking N.
203	55	7008	perspective of end dumps looking N.
204	57	7003	perspective of brown banded rocks
205	57	7003	medium view of photo 204
206	59	7008	reclaimed vs unreclaimed slope
207	59	7008	reclaimed vs unreclaimed slope
208	60	7494	perspective
209	60	7494	close up
210	61	7694	perspective
211	61	7694	medium view
212	61	7694	close up
213	63	1041	photo of fissile slate sample point
214	63	1041	photo of fissile slate sample site
215	63	1041	sample site of thin brittle slate
219	70	110	test pit in foreground
220	70	110	close up of aggregate sample
221	72	110	close up, red material
222	72	110	perspective view, red material
223	74	111	from across bike trail
224	74	111	close up, boulders
226	102	101	close up, cobbly gravel 12 feet from top of lift, some slate contamination
227	103	102	view from stockpile #101
228	104	102	close up of gravel
229	104	102	gravel at a distance
230	105	102	sand layers under sandy till close up
231	105	102	close up, slate contamination
233	109	102	end dumps of slate over gravel
235	110	99	borrow pit, coarse gravel
236	113	1	shows layering in red ore
237	346	99	glacial boulders in logged area
238	285	99	exposed small boulders in logging road cut
239	285	99	boulder pavement
240	285	99	boulder pavement
248	120	99	gravelly esker
249	120	99	panorama, right half
250	120	99	panorama, left half
252	122	99	close up
253	122	99	from a distance
255	122	99	from a distance (best)
256	100	103	perspective
257	100	103	perspective (better photo)
258	128	104	perspective of slope with gravel
259	168	99	decorative boulders, Colby Lake addition
260	168	99	decorative boulders, close up
261	168	99	decorative boulders, looking E.
262	168	99	decorative boulders
263	142	99	1 block E. of waypoint, boulders in woods (poor)
264	142	99	1 block E. of waypoint, boulders as barrier
268	135	99	perspective of bank

Photo Number	Photo Waypoint	Stockpile ID	Comments
269	135	99	close up of gravel
270	135	99	panorama of pit, looking SE
271	135	99	panorama
272	135	99	panorama
273	278	99	small pit, looking N
274	276	99	pit face, looking NW
275	136	99	panorama
276	136	99	panorama
277	125	99	perspective
278	125	99	mid distance
279	125	99	close up
282	147	99	wind eroded sand and gravel face
283	147	99	sand and gravel face, wind eroded, ripples
284	147	99	close up of ripples
285	147	99	close up of different ripples
286	147	99	close up of ripples and cobbles
287	147	99	medium distance, good photo
288	147	99	close up to right side (west) of photo 287
289	147	99	close up left side of photo 287
290	148	99	perspective
292	148	99	close up sand and gravel layers
293	149	99	perspective of ripples
294	149	99	close up of ripples and gravel layer
295	150	99	close up of gravel
296	150	99	perspective, gravel on right half, sand on left half
309	156	108	slate
310	156	108	slate
325	2	99	side-dump rail cars
326	2	99	side-dump rail cars, top view
327	329	2050	medium distance, end dumps
328	329	2050	close up, boulders
329	329	2050	perspective
330	331	9051	close up of boulders
331	331	9051	medium view
332	332	2031	close up, boulders
333	332	2031	medium view
334	1	7022	small pocket at 2WX
335	1	7022	small pocket at 2WX, close up
338	0	99	buckets of samples in Hibbing DNR office
433	201	1044	sign
434	201	1044	boulders near road
435	201	1044	boulders near road
436	201	1044	close up
437	203	1044	sign
438	204	1044	slope
439	204	1044	close up
440	334	1020	top lift
441	334	1020	close up
442	205	1020	side of lift
443	205	1020	close up
444	206	1020	side of lift showing size variability
445	207	1016	medium view, boulders
446	207	1016	close up
447	208	1016	perspective
448	208	1016	close up decorative
468	4	2021	perspective
469	5	2021	perspective
470	3	2021	close up
471	3	2021	close up
472	6	2021	perspective

Photo Number	Photo Waypoint	Stockpile ID	Comments
473	7	2021	close up
474	8	2064	perspective of excavated area
475	9	2064	close up excavated area
476	10	2064	banded boulders
477	10	2064	boulders close up
478	10	2064	perspective of banded rocks
479	11	2064	perspective
480	11	2064	close up
481	12	2062	lift 3 perspective
482	12	2062	lift 3 close up, brown & gray banded
483	12	2062	lift 3 colors and banding (good)
484	13	2013	perspective with van
485	13	2013	recent dumpings
486	13	2013	recent dumpings, close up
487	14	2013	decorative brown banded
488	14	2013	decorative rocks, banded
489	16	2029	perspective, wide road
490	15	2029	brown banded boulders
491	15	2029	close up
492	15	2029	close up 75 ft W of photo 491
493	17	2065	2 West super pocket and rail car
494	17	2065	boulders with van for scale
495	17	2065	close up of set aside boulders
496	18	2062	lift 2 general, 1 ft boulders
497	19	2062	lift 2 perspective of bench ~100 ft wide
498	19	2062	lift 2 perspective
499	20	2062	lift 2 general, 1 ft boulders
500	20	2062	lift 2 close up
501	20	2062	lift 2 close up 40 ft E of photo 500
502	21	2062	lift 2 perspective
503	21	2062	lift 2 medium view
504	21	2062	lift 2 close up
505	22	2062	lift 1 perspective
506	22	2062	lift 1 boulders
507	22	2062	lift 1 close up
508	22	2062	lift 1 close up
509	23	2062	lift 1 perspective
510	23	2062	lift 1, 6-9 inch rock
511	23	2062	lift 1 close up, 1-4 inch rock, some fissile material here
512	24	2065	green rocks along ramp
514	24	2065	green rocks along ramp, 1-2 ft rocks
515	24	2065	green rocks along ramp, 2-6 inch rocks
516	25	2029	perspective, part of slope is reclaimed
517	25	2029	medium
518	25	2029	close up
519	25	2029	close up
520	26	2013	perspective
521	27	2013	medium view
522	27	2013	close up
523	27	2013	close up
524	28	2065	perspective, west side, and rail line
525	30	2065	average pile, 2-4 ft boulders
526	30	2065	average pile, 1-2 ft boulders
527	30	2065	average pile, 2-12 inch rocks
528	29	2065	big rocks
529	29	2065	big rocks
530	32	2025	perspective, excavation area
531	32	2025	close up
532	32	2025	closer close up
533	31	2025	reclaimed bench and rocks

Photo Number	Photo Waypoint	Stockpile ID	Comments
534	31	2025	size of rocks on slope, at a distance
535	31	2025	slope
536	31	2025	close up of slope
537	34	2013	natural revegetation
538	34	2064	perspective reclaimed lifts 1&2 vs lift 3
539	35	2025	natural reclamation on lift 1

Appendix H. Observation sites. Waypoint is synonymous with sample site in Plate 2. The sample sites where only photos were taken are not listed here.

Stockpile ID	Waypoint	StudyArea	Feature	Exposure Type	Comments
2021	3	LTV Mine	geologic	surface	brown rubbly rock, naturally revegetated, max 3 ft, predominant 0.5 ft.
2021	7	LTV Mine	other	natural exposure	sampled 1 bucket, stake #8
2013	13	LTV Mine	geologic	surface	colorful red and green rocks
2013	14	LTV Mine	geologic	surface	decorative brown banded rocks
2029	15	LTV Mine	geologic	surface	pale green rocks
2065	17	LTV Mine	geologic	natural exposure	accumulations of oversize boulders
2062	20	LTV Mine	other	natural exposure	sampled 1 bucket of gray platy rock, stake #9
2065	24	LTV Mine	geologic	natural exposure	concentration of green rocks here
2029	25	LTV Mine	geologic	surface	dull brownish gray rocks
2013	26	LTV Mine	geologic	surface	older dark brownish gray rocks
2013	27	LTV Mine	geologic	surface	older dark brownish gray rocks
99	47	LTV vicinity	geologic	dig	silty cobbly gravel
9601	48	LTV Mine	other	natural exposure	collected 5 buckets, red and green rocks
9601	49	LTV Mine	other	natural exposure	two hand samples
2040	50	LTV Mine	other	natural exposure	sampled--4 buckets, stake #1
2062	53	LTV Mine	other	natural exposure	sampled 4 buckets, stake #2
7003	54	LTV Mine	geologic	surface	dark gray and reddish purple rocks
7008	55	LTV Mine	other	natural exposure	sampled 4 buckets, stake #5
7008	55	LTV Mine	geologic	surface	predominately thinnly bedded brown rocks with some pale green
7003	57	LTV Mine	geologic	surface	brown banded rocks
7008	58	LTV Mine	geologic	surface	mixed rocks of thin bedded brown, pale green, and steel gray (reserved area)
1041	62	LTV Mine	other	natural exposure	sampled 1 hand specimen, primary rock type
1041	63	LTV Mine	other	natural exposure	sampled 1 bucket of thin brittle slate
1041	64	LTV Mine	other	natural exposure	sampled 1 hand specimen
99	68	LTV vicinity	geologic	cut exposure	v. silty gravel with abundant argillite
99	69	LTV Mine	physical		area 6 loading pocket
110	70	LTV vicinity	geologic	dig	silty granular material, sampled aggregate
110	70	LTV vicinity	other		aggregate sample
110	72	LTV vicinity	geologic	dig	muddy red ore
106	75	LTV vicinity	geologic	dig	silty sandy, gravelly loam
106	76	LTV vicinity	geologic	dig	medium sand
106	77	LTV vicinity	geologic	dig	medium sand
106	78	LTV vicinity	geologic	dig	mostly fissile brittle slate

Stockpile ID	Waypoint	StudyArea	Feature	Exposure Type	Comments
106	79	LTV vicinity	geologic	dig	silty gravelly sand
106	80	LTV vicinity	geologic	dig	silty gravel west of road
106	81	LTV vicinity	geologic	dig	gravel sample
106	81	LTV vicinity	other		aggregate sample
106	82	LTV vicinity	geologic	dig	sample medium sand 6 ft up the slope
106	82	LTV vicinity	other		aggregate sample
106	83	LTV vicinity	geologic	dig	sample coarse gravel 3 ft above ditch E side of road.
106	83	LTV vicinity	other		aggregate sample
105	84	LTV vicinity	geologic	cut exposure	mixed slate and loamy till
105	85	LTV vicinity	geologic	dig	mixed red ore
99	86	LTV vicinity	geologic	dig	dk brown silty fine gravel
99	87	LTV vicinity	geologic	dig	loamy sand and gravel, marginal
99	88	LTV vicinity	geologic	dig	reddish brown coarse gravel
105	89	LTV vicinity	geologic	surface	gravel delta at base of slope
105	90	LTV vicinity	geologic	natural exposure	sandy loam till
105	91	LTV vicinity	geologic	natural exposure	sticky loamy till
105	92	LTV vicinity	geologic	dig	coarse gravel mixed with till
105	93	LTV vicinity	geologic	dig	brown till
105	94	LTV vicinity	geologic	dig	silty coarse gravel, dark red brown
105	95	LTV vicinity	geologic	natural exposure	gravel mixed with abundant slate
99	96	LTV vicinity	geologic	dig	dark red brown coarse gravel, cobbly
103	97	LTV vicinity	geologic	dig	veneer of red lean ore
103	98	LTV vicinity	geologic	cut exposure	excavation with glacial till exposed
103	99	LTV vicinity	geologic	dig	till, slate and natural ore mixed
103	100	LTV vicinity	geologic	dig	silty coarse gravel, looks good, some glacial boulders, rare argillite, sampled ~8 ft up the slope.
103	100	LTV vicinity	other		aggregate sample
101	101	LTV vicinity	geologic	dig	sticky cobbly till
101	102	LTV vicinity	geologic	dig	silty cobbly gravel with some slate contamination
102	104	LTV vicinity	geologic	dig	slightly silty cobbly gravel
102	104	LTV vicinity	other		aggregate sample
102	105	LTV vicinity	geologic	dig	mixed cobbly gravel, sand, sandy till and slate contamination in places
102	106	LTV vicinity	geologic	dig	mixed gravel, slate, and red sediments
102	107	LTV vicinity	geologic	dig	mixed gravel, slate, and red sediments
99	108	LTV vicinity	geologic	cut exposure	cobbly gravel
102	109	LTV vicinity	geologic	natural exposure	small slate end dumps overly natural cobbly gravel
99	110	LTV vicinity	geologic	cut exposure	cobbly gravel

Stockpile ID	Waypoint	StudyArea	Feature	Exposure Type	Comments
99	111	LTV vicinity	geologic	cut exposure	gravel pit, gravelly sand, sandy gravel
99	112	LTV vicinity	geologic	cut exposure	gravel pit, cobbly gravel, about 40 ft deep.
1	113	LTV vicinity	geologic	cut exposure	borrow site shows red natural ore
1	114	LTV vicinity	geologic	natural exposure	till covers side of lower lift
1	115	LTV vicinity	geologic	cut exposure	mixed overburden, sand, slate, limonite
99	116	LTV vicinity	geologic	dig	glacial till, light gray brown sandy clay loam
99	117	LTV vicinity	geologic	cut exposure	former esker ~10 ft high, now depleted gravel pit, 1-4 ft bldrs piled
99	118	LTV vicinity	geologic	cut exposure	dk red brown till
99	119	LTV vicinity	geologic	cut exposure	gray brown till,clay loam
99	120	LTV vicinity	geologic	cut exposure	mixed till and gravel, very silty
99	121	LTV vicinity	geologic	cut exposure	brown glacial till
99	122	LTV vicinity	geologic	cut exposure	c. sand and cobbly gravel, 2-4" dominant.
99	123	LTV vicinity	geologic	dig	c sand and gravel, 1-2 ft boulders occur.
99	124	LTV vicinity	geologic	cut exposure	silty fine gravel, mostly < 1 inch.
99	125	LTV vicinity	geologic	cut exposure	slightly silty c. sand and gravel, sampled.
99	125	LTV vicinity	other		natural aggregate sample
103	126	LTV vicinity	geologic	dig	silty gravel with some argillite
103	127	LTV vicinity	geologic	dig	mixed till and gravel
104	128	LTV vicinity	geologic	dig	coarse gravel, some sand layers, sampled 7 ft from base of slope.
104	128	LTV vicinity	other		aggregate sample
104	129	LTV vicinity	geologic	dig	coarse gravel with some argillite
2	130	LTV vicinity	geologic	dig	yucky red natural ore and fines
99	131	LTV vicinity	geologic	dig	cobbly silty gravel
99	132	LTV vicinity	geologic	cut exposure	slty c. sand and gravel with argillite
1019	133	LTV Mine	other	natural exposure	sampled 2 buckets of crushed rock aggregate (~minus 1.5 inch).
7007	134	LTV Mine	other	natural exposure	sampled 2 buckets of crushed rock aggregate (~minus 1 inch)
99	135	LTV vicinity	geologic	cut exposure	fine gravel, sampled
99	135	LTV vicinity	other		natural aggregate sample
99	136	LTV vicinity	geologic	cut exposure	coarse gravel, lots of 6-18 inch rocks
99	137	LTV vicinity	geologic	dig	glacial till, brownish gray silty till
99	138	LTV vicinity	geologic	dig	brownish gray cobbly silty till
99	139	LTV vicinity	geologic	dig	lt red brown sandy cobbly loam till with slate
99	140	LTV vicinity	geologic	natural exposure	sandy loam till, part of private overburden stockpile
107	141	LTV vicinity	geologic	dig	glacial till with cobbles
99	142	LTV vicinity	geologic	cut exposure	silty coarse gravel with argillite
111	143	LTV vicinity	other	natural exposure	sampled 4 buckets, stake #6
1020	144	LTV Mine	other	natural exposure	sampled 1 bucket

Stockpile ID	Waypoint	StudyArea	Feature	Exposure Type	Comments
5021	146	LTV Mine	other	natural exposure	sampled 4 buckets, stake #10
99	147	LTV Mine	geologic	cut exposure	sand with occasional gravel, ripple photos
99	148	LTV Mine	geologic	cut exposure	gravel layer over sand layer
99	149	LTV Mine	geologic	cut exposure	thinly bedded sand layers
99	150	LTV Mine	geologic	cut exposure	sand and gravel
108	151	LTV vicinity	geologic	dig	silty fine sand
108	152	LTV vicinity	geologic	cut exposure	mixed glacial till and fissile slate, borrow site.
108	153	LTV vicinity	geologic	cut exposure	sandy till, borrow site
108	154	LTV vicinity	geologic	cut exposure	mixed fissile slate and lean natural ore
108	155	LTV vicinity	geologic	cut exposure	brownish red to dk gray thin fissile slate
108	156	LTV vicinity	geologic	natural exposure	100% fissile slate
108	157	LTV vicinity	geologic	natural exposure	mixed dk red natural ore and gray slate
108	158	LTV vicinity	geologic	cut exposure	mostly till with some slate and natural ore
99	159	LTV vicinity	geologic	dig	reddish brown silty till
2064	160	LTV Mine	physical	natural exposure	berm (tailings) blocking access to top of lift 3
112	164	LTV vicinity	physical		edge of stockpile
2012	220	LTV Mine	other	natural exposure	collected single flagstone sample
7008	236	LTV Mine	geologic	surface	reddish green and reddish silver banded rocks
7003	242	LTV Mine	geologic	surface	dark gray brown rocks, some banding
7003	244	LTV Mine	geologic	surface	dark gray and reddish purple rocks
3	246	LTV Mine	geologic	dig	rock stockpile with overburden over it
3	247	LTV Mine	geologic	natural exposure	bouldery gravelly till
3	248	LTV Mine	geologic	natural exposure	localized boulders on surface
3	249	LTV Mine	geologic	natural exposure	old waste rock stockpile covered with till, tree covered, 1-8" dbh
99	254	LTV vicinity	geologic	dig	silty fine gravel
99	255	LTV vicinity	geologic	cut exposure	pebbly gravel
99	256	LTV vicinity	geologic	cut exposure	coarse gravel with cobbles
99	257	LTV vicinity	geologic	surface	coarse pebbly gravel
99	258	LTV vicinity	geologic	cut exposure	coarse cobbly gravel
99	259	LTV vicinity	geologic	cut exposure	coarse cobbly gravel
99	260	LTV vicinity	geologic	cut exposure	pebbly gravel
99	261	LTV vicinity	geologic	cut exposure	pebbly gravel
99	262	LTV vicinity	geologic	cut exposure	cobbly gravel
99	263	LTV vicinity	geologic	cut exposure	cobbly gravel with boulders
99	264	LTV vicinity	geologic	cut exposure	cobbly gravel
99	265	LTV vicinity	geologic	cut exposure	pebbly gravel
99	266	LTV vicinity	geologic	dig	cobbly gravel

Stockpile ID	Waypoint	StudyArea	Feature	Exposure Type	Comments
99	267	LTV vicinity	geologic	dig	pebbly gravel
99	268	LTV vicinity	geologic	dig	cobbly gravel
99	269	LTV vicinity	geologic	dig	c. cobbly gravel
99	270	LTV vicinity	geologic	dig	c. cobbly gravel
99	271	LTV vicinity	geologic	cut exposure	coarse cobbly gravel
99	272	LTV vicinity	geologic	cut exposure	pebbly gravel with some cobbles
99	273	LTV vicinity	geologic	dig	silt 0-2 ft
99	274	LTV vicinity	geologic	natural exposure	bouldery till, 1-2 ft boulders
99	275	LTV vicinity	geologic	dig	silty cobbly gravel
99	276	LTV vicinity	geologic	cut exposure	coarse gravel
99	276	LTV vicinity	other		natural aggregate sample
99	277	LTV vicinity	geologic	dig	cobbly gravel with 1-2 ft boulders
99	278	LTV vicinity	geologic	cut exposure	coarse gravel with common 1-2 ft boulders
99	278	LTV vicinity	other		natural aggregate sample
109	279	LTV Mine	geologic	cut exposure	mixed layers of till and natural ore
99	280	LTV vicinity	geologic	tree tip over	coarse gravel
99	281	LTV vicinity	geologic	dig	coarse gravel with boulders
99	282	LTV vicinity	geologic	cut exposure	cobbly gravel with boulders to 5 ft
99	283	LTV vicinity	geologic	dig	silty pebbly gravel, numerous 1-4 ft boulders at surface
99	284	LTV vicinity	geologic	cut exposure	coarse pebbly gravel, low silt
99	285	LTV vicinity	geologic	surface	till with abundant 1-4 ft boulders at surface
99	286	LTV vicinity	geologic	surface	bouldery till, numerous boulders at surface
99	287	LTV vicinity	geologic	surface	granite outcrop
99	288	LTV vicinity	geologic	surface	boulder rich till
99	289	LTV vicinity	geologic	cut exposure	gravel
99	290	LTV vicinity	geologic	dig	glacial till
99	291	LTV vicinity	geologic	surface	boulder rich till
99	292	LTV vicinity	geologic	dig	silty fine sand with scattered pebbles
99	293	LTV vicinity	geologic	dig	silty fine sand with scattered pebbles
99	294	LTV vicinity	geologic	cut exposure	glacial till
99	295	LTV vicinity	geologic	surface	Exposed Duluth Complex and glacial till
99	296	LTV vicinity	geologic	surface	Exposed Duluth Complex (hills) and till
99	297	LTV vicinity	geologic	surface	Bouldery till
99	298	LTV vicinity	geologic	dig	glacial till
99	299	LTV vicinity	geologic	cut exposure	coarse gravel, few boulders
99	300	LTV vicinity	geologic	cut exposure	coarse gravel with cobbles, rare boulders
99	301	LTV vicinity	geologic	cut exposure	cobbly gravel, scattered boulders <2 ft

Stockpile ID	Waypoint	StudyArea	Feature	Exposure Type	Comments
99	302	LTV vicinity	geologic	surface	Duluth Complex bedrock with till covered in places.
99	303	LTV vicinity	geologic	road cut	bedrock and small amount of coarse gravel
99	304	LTV Mine	geologic	cut exposure	coarse gravel with abundant argillite
99	305	LTV Mine	geologic	cut exposure	coarse gravel with abundant argillite
99	306	LTV Mine	geologic	dig	till
99	308	LTV vicinity	geologic	dig	sandy till?
99	309	LTV Mine	geologic	dig	till
99	310	LTV Mine	geologic		glacial till, boulders at surface
99	311	LTV Mine	geologic	cut exposure	25 ft of glacial till
99	312	LTV Mine	geologic	cut exposure	cobbly gravel and sand layers, 5-15 ft exposed
99	313	LTV Mine	geologic	cut exposure	gravel over fine sand
99	314	LTV Mine	geologic		flow till?
99	315	LTV Mine	geologic	cut exposure	15 ft of till
99	316	LTV Mine	geologic	cut exposure	15 ft of cobbly gravel
9006	317	LTV Mine	geologic	dig	overburden
99	318	LTV Mine	geologic	dig	sandy till
99	319	LTV Mine	geologic	dig	till
99	320	LTV Mine	geologic	dig	till
99	321	LTV Mine	geologic	cut exposure	till
99	322	LTV Mine	geologic	dig	till
99	323	LTV Mine	geologic	dig	till
99	324	LTV Mine	geologic	cut exposure	common large boulders, some gravel and till
99	325	LTV vicinity	geologic	dig	till
99	326	LTV vicinity	geologic	surface	bedrock in ridges
99	327	LTV vicinity	geologic	dig	sandy till, boulders at surface
99	328	LTV Mine	geologic	dig	silt with rare pebbles, ocasional very large boulders at surface
2050	329	LTV Mine	other	natural exposure	sample collected, 1 bucket
9051	331	LTV Mine	other	natural exposure	single hand specimen collected
2031	332	LTV Mine	other	natural exposure	sample collected
2040			geologic	natural exposure	lift 3, 1 rock sample, coarser grained than other sites
2004		LTV Mine			

Appendix I. Coordinates for the field sample sites. All coordinates are UTM NAD83. Waypoint # is synonymous with sample sites on Plate 2.

Waypoint#	Feature	X_COORD	Y_COORD	Method
001	pocket	563800	5269116	Screen digitized
002	rail cars	569464	5274964	Screen digitized
003	rock stockpile	566937	5271806	GPS
004	rock stockpile	566952	5271811	GPS
005	rock stockpile	566957	5271894	GPS
006	rock stockpile	566916	5271658	GPS
007	rock stockpile	566899	5271680	GPS
008	rock stockpile	566405	5271331	GPS
009	rock stockpile	566389	5271337	GPS
010	rock stockpile	566430	5271334	GPS
011	rock stockpile	566351	5271212	GPS
012	rock stockpile	567260	5271524	GPS
013	rock stockpile	566415	5271174	GPS
014	rock stockpile	566335	5271022	GPS
015	rock stockpile	566535	5270807	GPS
016	rock stockpile	566362	5270715	GPS
017	rock stockpile	566681	5270978	GPS
018	rock stockpile	567108	5271379	GPS
019	rock stockpile	567712	5271418	GPS
020	rock stockpile	567756	5271418	GPS
021	rock stockpile	568071	5271406	GPS
022	rock stockpile	567161	5271299	GPS
023	rock stockpile	566975	5271402	GPS
024	rock stockpile	566744	5270958	GPS
025	rock stockpile	566046	5270730	GPS
026	rock stockpile	566312	5271140	GPS
027	rock stockpile	566307	5271126	GPS
028	rock stockpile	566487	5271224	GPS
029	rock stockpile	566440	5271116	GPS
030	rock stockpile	566496	5271166	GPS
031	rock stockpile	566709	5271924	GPS
032	rock stockpile	566726	5271904	GPS
033	rock stockpile	566136	5271067	GPS
034	rock stockpile	566154	5271206	GPS
035	rock stockpile	566412	5271641	GPS
036	rock stockpile	554236	5266255	GPS
037	rock stockpile	554224	5266270	GPS
038	rock stockpile	554288	5266272	GPS
039	rock stockpile	554289	5266171	GPS
040	rock stockpile	554287	5266145	GPS
041	rock stockpile	554248	5266117	GPS
042	rock stockpile	554231	5266124	GPS
043	rock stockpile	554296	5266233	GPS
044	rock stockpile	554329	5266128	GPS
045	rock stockpile	554394	5266220	GPS
046	rock stockpile	554349	5266243	GPS
047	gravel	565783	5265571	GPS
048	rock stockpile	567058	5268228	GPS
049	rock stockpile	566661	5268306	GPS
050	rock stockpile	567683	5269370	GPS
051	rock stockpile	567748	5269067	GPS

Waypoint#	Feature	X_COORD	Y_COORD	Method
053	rock stockpile	567246	5271531	GPS
054	rock stockpile	563924	5266411	GPS
055	rock stockpile	563754	5266279	GPS
056	rock stockpile	563909	5266276	GPS
057	rock stockpile	563840	5266785	GPS
058	rock stockpile	563407	5266056	GPS
059	rock stockpile	563380	5266149	GPS
060	rock stockpile	562885	5267009	GPS
061	rock stockpile	562985	5267282	GPS
062	rock stockpile	563253	5271312	GPS
063	rock stockpile	563224	5271353	GPS
064	rock stockpile	563908	5271900	GPS
068	gravel	562488	5263166	GPS
069	pocket	558350	5267901	Screen digitized
070	rock stockpile	554183	5265924	GPS
071	rock stockpile	554192	5265953	GPS
072	rock stockpile	554166	5265885	GPS
073	rock stockpile	554184	5265994	GPS
074	rock stockpile	554284	5265889	GPS
075	till	554720	5265782	GPS
076	sand	554659	5265808	GPS
077	sand	554629	5265766	GPS
078	slate	554645	5265679	GPS
079	sand	554564	5265640	GPS
080	gravel	554561	5265971	GPS
081	gravel	554587	5265926	GPS
082	sand	554391	5265672	GPS
083	gravel	554368	5265667	GPS
084	till	554451	5265950	GPS
085	overburden	554497	5266150	GPS
086	gravel	554483	5266245	GPS
087	gravel	554417	5266474	GPS
088	gravel	554473	5266382	GPS
089	gravel	554365	5265760	GPS
090	till	554146	5266332	GPS
091	till	554224	5266364	GPS
092	mixed gravel	554438	5266114	GPS
093	till	554263	5265712	GPS
094	gravel	554279	5265660	GPS
095	mixed gravel	553804	5266306	GPS
096	gravel	553923	5266172	GPS
097	overburden	553789	5265870	GPS
098	till	553861	5265808	GPS
099	overburden	554002	5265969	GPS
100	gravel	554010	5265824	GPS
101	till	553639	5264737	GPS
102	gravel	553594	5264629	GPS
103	photo point	553646	5264700	GPS
104	gravel	553694	5264689	GPS
105	mixed gravel	553681	5264648	GPS
106	mixed gravel	553739	5264577	GPS
107	mixed gravel	553724	5264851	GPS
108	gravel	553943	5264866	GPS
109	gravel	553926	5264814	GPS
110	gravel	553343	5265031	GPS

Waypoint#	Feature	X_COORD	Y_COORD	Method
111	gravel	553463	5264244	GPS
112	gravel	553492	5263878	GPS
113	rock stockpile	553564	5264281	GPS
114	rock stockpile	554068	5264619	GPS
115	rock stockpile	553787	5264421	GPS
116	till	556014	5263396	GPS
117	gravel	556555	5262748	GPS
118	till	556922	5263762	GPS
119	till	556693	5263686	GPS
120	gravel	556503	5263614	GPS
121	till	556388	5263566	GPS
122	gravel	553332	5267579	GPS
123	gravel	553481	5266622	GPS
124	gravel	553462	5266702	GPS
125	gravel	553510	5266729	GPS
126	gravel	554038	5265841	GPS
127	mixed gravel	553967	5265797	GPS
128	gravel	554011	5265793	GPS
129	gravel	554074	5265706	GPS
130	rock stockpile	553928	5265672	GPS
131	gravel	555586	5266426	GPS
132	gravel	558222	5264794	GPS
133	crushed aggregate	562794	5270716	GPS
134	crushed aggregate	563815	5268985	GPS
135	gravel	552753	5274939	GPS
136	gravel	556689	5272283	GPS
137	till	555517	5265637	GPS
138	till	555534	5265649	GPS
139	till	555432	5266207	GPS
140	till	555996	5266314	GPS
141	till	555583	5266354	GPS
142	gravel	562099	5263572	Screen digitized
143	rock stockpile	554260	5265853	GPS
144	rock stockpile	558737	5270643	GPS
146	rock stockpile	571091	5276059	GPS
147	sand	565453	5269019	GPS
148	gravel	565403	5268967	GPS
149	sand	565486	5268952	GPS
150	gravel	565392	5268857	GPS
151	sand	558659	5264157	GPS
152	overburden	558432	5264362	GPS
153	till	558772	5264313	GPS
154	overburden	559133	5264408	GPS
155	slate	559500	5264264	GPS
156	slate	559447	5264256	GPS
157	overburden	559334	5264425	GPS
158	overburden	558870	5264174	GPS
159	till	558712	5264088	GPS
160	berm	566327	5271210	GPS
161	berm	558277	5264750	GPS
162	berm	566605	5270848	GPS
163	rock stockpile	554369	5266104	GPS
164	rock stockpile	554216	5266223	GPS
166	gate	558160	5264583	GPS
167	rock stockpile	563249	5266951	Screen digitized

Waypoint#	Feature	X_COORD	Y_COORD	Method
168	till boulder-rich	564379	5263556	Screen digitized
201	rock stockpile	558558	5270411	GPS
202	rock stockpile	558550	5270417	GPS
203	rock stockpile	558279	5270601	GPS
204	rock stockpile	558243	5270553	GPS
205	rock stockpile	558765	5270682	GPS
206	rock stockpile	558647	5270686	GPS
207	rock stockpile	559941	5271149	GPS
208	rock stockpile	559701	5271031	GPS
209	rock stockpile	563136	5270733	GPS
210	rock stockpile	562980	5270513	GPS
211	rock stockpile	562816	5270711	GPS
212	rock stockpile	563908	5271892	GPS
213	rock stockpile	563114	5271268	GPS
214	rock stockpile	567337	5269321	GPS
215	rock stockpile	567445	5269126	GPS
216	rock stockpile	567157	5268102	GPS
217	rock stockpile	567206	5268044	GPS
218	rock stockpile	567552	5268438	GPS
219	rock stockpile	566883	5268274	GPS
220	rock stockpile	570472	5271230	GPS
221	rock stockpile	570795	5271216	GPS
222	rock stockpile	570697	5271293	GPS
223	rock stockpile	569770	5271222	GPS
224	rock stockpile	569745	5271252	GPS
225	rock stockpile	569929	5271254	GPS
226	rock stockpile	569641	5271289	GPS
227	rock stockpile	570699	5275850	GPS
228	rock stockpile	571084	5276078	GPS
229	rock stockpile	570854	5275825	GPS
230	rock stockpile	563588	5268924	GPS
231	rock stockpile	563681	5268838	GPS
232	rock stockpile	563768	5269015	GPS
233	rock stockpile	563760	5269334	GPS
234	rock stockpile	563746	5269258	GPS
235	rock stockpile	563858	5269219	GPS
236	rock stockpile	563392	5266084	GPS
237	rock stockpile	563526	5265753	GPS
238	rock stockpile	563303	5266335	GPS
239	rock stockpile	563528	5267021	GPS
240	rock stockpile	563230	5266901	GPS
241	rock stockpile	563216	5266813	GPS
242	rock stockpile	564261	5267067	GPS
243	rock stockpile	563969	5266818	GPS
244	rock stockpile	563925	5266340	GPS
245	rock stockpile	563906	5266300	GPS
246	rock stockpile	569703	5270619	GPS
247	rock stockpile	569718	5270777	GPS
248	rock stockpile	569813	5271082	GPS
249	rock stockpile	569923	5270874	GPS
250	till boulder-rich	569635	5271695	GPS
251	till boulder-rich	569864	5272102	GPS
252	overburden	567303	5268807	GPS
253	gravel	554019	5272723	GPS
254	gravel	554074	5272635	GPS

Waypoint#	Feature	X_COORD	Y_COORD	Method
256	gravel	554026	5272364	GPS
257	gravel	554289	5272419	GPS
258	gravel	554445	5272196	GPS
259	gravel	554331	5272334	GPS
260	gravel	552772	5274911	GPS
261	gravel	552679	5275436	GPS
262	gravel	557082	5273089	GPS
263	gravel	556690	5272276	GPS
264	gravel	556071	5272434	GPS
265	gravel	555789	5272692	GPS
266	gravel	555825	5272782	GPS
267	gravel	555662	5272924	GPS
268	gravel	555568	5272909	GPS
269	gravel	554491	5272304	GPS
270	gravel	554632	5272371	GPS
271	gravel	554636	5272214	GPS
272	gravel	557066	5276233	GPS
273	silt	556885	5272985	GPS
274	till boulder-rich	556143	5273059	GPS
275	gravel	556066	5273141	GPS
276	gravel	554324	5272321	GPS
277	gravel	555441	5271521	GPS
278	gravel	556866	5272310	GPS
279	overburden	564621	5269736	GPS
280	gravel	557207	5272405	GPS
281	gravel	557031	5272259	GPS
282	gravel	556851	5272304	GPS
283	gravel	556662	5271906	GPS
284	gravel	556446	5271815	GPS
285	till boulder-rich	556143	5271583	GPS
286	till boulder-rich	556571	5271145	GPS
287	outcrop	556784	5272229	GPS
288	till boulder-rich	558443	5272247	GPS
289	gravel	555004	5268072	GPS
290	till	554536	5268411	GPS
291	till boulder-rich	553671	5268868	GPS
292	sand	555213	5268569	GPS
293	sand	555096	5268454	GPS
294	till	565282	5263767	GPS
295	till/outcrop	568486	5266807	GPS
296	till/outcrop	568369	5266776	GPS
297	till boulder-rich	570223	5266415	GPS
298	till	570153	5267428	GPS
299	gravel	569429	5268712	GPS
300	gravel	569577	5268741	GPS
301	gravel	569730	5268892	GPS
302	till/outcrop	571363	5268430	GPS
303	gravel	570795	5268367	GPS
304	gravel	565739	5268055	GPS
305	gravel	566044	5268117	GPS
306	till	565090	5268750	GPS
308	till	555151	5267802	GPS
309	till	560301	5267652	GPS
310	till boulder-rich	560675	5266819	GPS
311	till	560566	5269099	GPS

Waypoint#	Feature	X_COORD	Y_COORD	Method
312	gravel	565085	5269234	GPS
313	sand	565476	5269039	GPS
314	till	568305	5268549	GPS
315	till	564458	5268876	GPS
316	gravel	564406	5268615	GPS
317	overburden	556463	5266898	GPS
318	till	556341	5267065	GPS
319	till	556119	5267193	GPS
320	till	562514	5268774	GPS
321	till	562189	5268360	GPS
322	till	562198	5267941	GPS
323	till	564104	5267337	GPS
324	gravel	563771	5267334	GPS
325	till	560937	5276610	GPS
326	outcrop	565057	5277258	GPS
327	till	564220	5277177	GPS
328	silt	570316	5277126	GPS
329	rock stockpile	569128	5271322	GPS
330	rock stockpile	568920	5271441	GPS
331	rock stockpile	566477	5268541	GPS
332	rock stockpile	568282	5269686	GPS
333	rock stockpile	566758	5268350	Screen digitized
334	rock stockpile	558601	5270827	Screen digitized
335	rock stockpile	562852	5270615	Screen digitized
336	till boulder-rich	552467	5273069	Screen digitized
337	till	553239	5272601	Screen digitized
338	sand	553651	5272765	Screen digitized
339	sand	553565	5272778	Screen digitized
340	till boulder-rich	552035	5271922	Screen digitized
341	gravel	552291	5270310	Screen digitized
342	gravel	564365	5269206	Screen digitized
343	gravel	554214	5273190	Screen digitized
344	sand	553893	5272759	Screen digitized
345	gravel	554401	5271466	Screen digitized
346	till boulder-rich	554490	5271584	Screen digitized
347	till boulder-rich	554348	5271435	Screen digitized
348	till	554263	5273262	Screen digitized