

Technical Memorandum

To: Bill Johnson, DNR
From: Barr Engineering Co.
Subject: Results of County Well Index Review
Date: February 2, 2015
Project: 23690862.00
c: Jennifer Saran, Poly Met Mining Inc.

We accessed the Minnesota Department of Health County Well Index (CWI) on January 28, 2015 to identify and locate any groundwater wells surrounding the NorthMet Site that were not previously identified in the Supplemental Draft Environmental Impact Statement (SDEIS) or in the January 9, 2015 Water Modeling Data Package Volume 2 – Plant Site.

Previous References

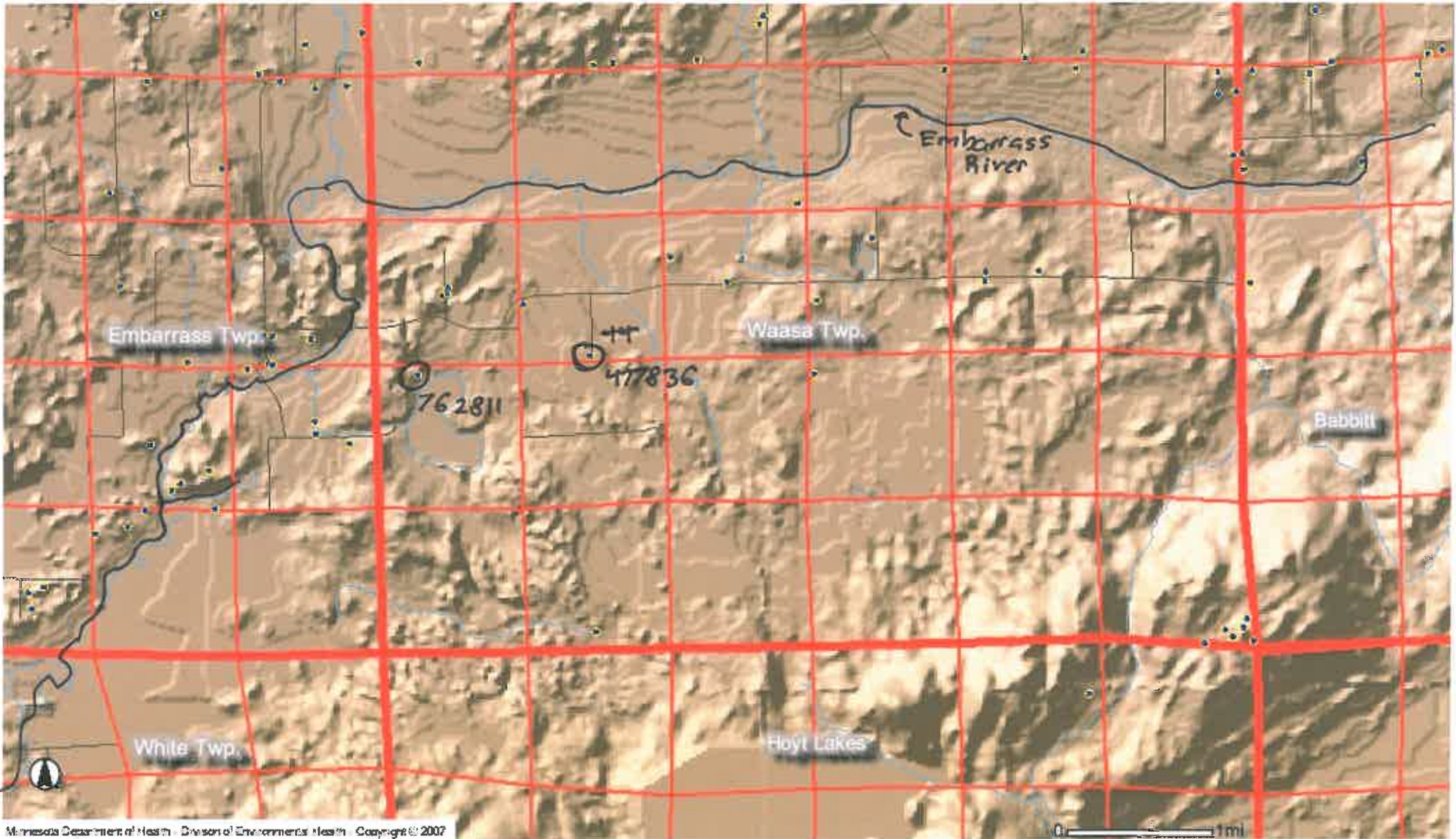
Twenty-seven groundwater wells are referenced in the SDEIS in Chapter 4, Section 4.2.2.3 (*Embarrass River Watershed*). These wells are shown in Figure 4.2.2-14 and listed in Table 4.2.2-24. Fifteen individual residential wells were part of a PolyMet baseline sampling program, and are referenced in a January 27, 2009 Technical Memo, which presented the results of that sampling effort. These wells are all present between the Tailings Basin and the Embarrass River. No groundwater wells (excepting PolyMet monitoring wells) existed between the Mine Site and the Partridge River at the time.

Current Review and Results

The current search of the CWI included the area extending from the Plant Site north to the Embarrass River and from the Mine Site south to the Partridge River. Two wells not previously referenced were identified. Both wells are located approximately two miles north of the Tailings Basin. Their locations are shown in Figure 1 (attached) and are in the area of other previously identified residential wells. Well and boring records are also attached. No groundwater wells located between the Mine Site and the Partridge River (excepting PolyMet monitoring wells) are currently listed in the CWI.

Attachments:

Figure 1: Well Locations
Attachment A: Well Records



○ = Domestic well not previously discussed

Minnesota Unique Well No.

477836

County St. Louis
 Quad Embarrass
 Quad ID 318B

MINNESOTA DEPARTMENT OF
 HEALTH
**WELL AND
 BORING RECORD**
 Minnesota Statutes Chapter 103I

Entry Date 12/13/1991
 Update Date 02/14/2014
 Received Date

Well Name GRAIG, CHARLIE		Well Depth	Depth Completed	Date Well Completed
Township Range Dir Section Subsections Elevation		81 ft.	81 ft.	08/28/1991
60 14 W 30 BABCAB Elevation Method		7.5 minute topographic map (+/- 5 feet)		
Well Address		Drilling Method Non-specified Rotary		
4634 EMBARRASS RD		Drilling Fluid	Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No	
EMBARRASS MN 55732		Water	From Ft. to Ft.	
Geological Material		Use Domestic		
GRAVEL	Color BROWN	Casing Type Steel (black or low carbon)	Joint No Information Drive Shoe? <input checked="" type="checkbox"/>	
SAND	BROWN	Yes <input type="checkbox"/> No	Above/Below 1 ft.	
GRAVEL & SAND	GRAY	Casing Diameter	Weight	Hole Diameter
GRAVEL	GRAY	6 in. to	80.5 ft. 19.45 lbs./ft.	6 in. to 80.5 ft.
		Open Hole from 81 ft. to 81 ft.		
		Screen NO Make Type		
		Diameter	Slot/Gauze	Length Set Between
		Static Water Level		
		17 ft. from Land surface Date Measured 08/28/1991		
		PUMPING LEVEL (below land surface)		
		22 ft. after 4 hrs. pumping 15 g.p.m.		
		Well Head Completion		
		Pitless adapter manufacturer MONITOR Model SNAPPY		
		<input type="checkbox"/> Casing Protection <input checked="" type="checkbox"/> 12 in. above grade		
		<input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)		
REMARKS		Grouting Information Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Not Specified		
CASING: THREADED AND WELDED.		Nearest Known Source of Contamination		
Located by: Minnesota Geological Survey Method: Digitization (Screen) - Map (1:24,000)		100 feet South West direction Septic tank/drain field type		
Unique Number Verification: Address verification Input Date: 09/16/2003		Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
System: UTM - Nad83, Zone 15, Meters X: 561898 Y: 5278531		Pump <input type="checkbox"/> Not Installed Date Installed 08/30/1991		
		Manufacturer's name AERMOTOR Model number A 12 B-50 HP 0.5 Volts 230		
		Length of drop Pipe 40 ft. Capacity 12 g.p.m. Type Submersible Material Other		
		Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/>		
		Yes <input checked="" type="checkbox"/> No		
		Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input type="checkbox"/> No		
First Bedrock		Well Contractor Certification		
Last Strat gravel (+larger)-gray		Aquifer Quat. Water Table Aquifer		
Depth to Bedrock ft.		Peteresen Well Co. 69183 CARLSON, M.		
		License Business Name Lic. Or Reg. No. Name of Driller		
County Well Index Online Report		477836		Printed 1/27/2015
				HE-01205-07

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Minnesota Statutes Chapter 1031

Well Name	Township	Range	Dir	Section	Subsections	Use	Depth Drilled	Depth Completed	Date Completed	Lic/Reg. No.
GRAIG, CHARLIE	60	14	W	30	BABCAB	Domestic	81 ft.	81 ft.	08/28/1991	69183

Elevation	Method	Aquifer	Quat.	Water Table	Depth to Bedrock	Open Hole	Static Water Level
1450 ft.	7.5 minute topographic map (+/- 5 feet)	Aquifer			ft.	81 - 81 ft.	17 ft.

Field Located Minnesota Geological Survey	Location Method Digitization (Screen) - Map (1:24,000)	Universal Transverse Mercator (UTM) - NAD83 - Zone 15 - Meters
Unique No. Verified Address verification	Input Source Minnesota Geological Survey	UTM Easting (X) 561898
	Input Date 09/16/2003	UTM Northing (Y) 5278531
Geologic Interpretation Bruce Bloomgren	Agency (interpretation) Minnesota Geological Survey	Interpretation Method Geologic study 1:24k to 1:100k

Geological Material	Color	Hardness	DEPTH (ft.)		ELEVATION		Stratigraphy	Primary Lithology	Secondary Lithology	Minor Lithology
			From	To	Thickness	From				
GRAVEL	BROWN	HARD	0	33	33	1450	1417	gravel (+larger)-brown	Gravel	
SAND	BROWN	SOFT	33	66	33	1417	1384	sand-brown	Sand	
GRAVEL & SAND	GRAY	HARD	66	70	4	1384	1380	sand +larger-gray	Gravel	Sand
GRAVEL	GRAY	HARD	70	80	10	1380	1370	gravel (+larger)-gray	Gravel	

County Well Index Online Well Stratigraphy Report	477836	Printed 1/27/2015
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Minnesota Unique Well No.

762811

County St Louis
 Quad Embarrass
 Quad ID 318B

MINNESOTA DEPARTMENT OF
 HEALTH
**WELL AND
 BORING RECORD**

Entry Date 05/04/2009
 Update Date 07/14/2009
 Received Date 01/12/2009

Minnesota Statutes Chapter 103I

Well Name ESALA, EVELYN		Well Depth	Depth Completed	Date Well Completed	
Township Range Dir Section Subsections Elevation 1451 ft.		85 ft.	85 ft.	07/25/2008	
60 14 W 20 CDDDAC Elevation Method topographic map (+/- 5 feet)		Drilling Method Multiple methods used			
Well Address 7513 KOSKELA RD EMBARRASS MN 55732		Drilling Fluid Water	Well Hydrofractured? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No From Ft. to Ft.		
Geological Material		Use Domestic			
Color	Hardness	Casing Type Steel (black or low carbon) Joint Threaded Drive Shoe? <input checked="" type="checkbox"/> Yes			
SAND & ROCKS BROWN MEDIUM 0 18		<input type="checkbox"/> No Above/Below ft.			
FINE SAND BROWN M.SOFT 18 43		Casing Diameter	Weight	Hole Diameter	
FINE SAND & GRAVEL GRAY MEDIUM 43 72		6 in. to 72 ft.	19.45 lbs./ft.	6 in. to 72 ft.	
BROKEN GRANITE RED/BLK SFT-HRD 72 85		Open Hole from 72 ft. to 85 ft.			
		Screen NO	Make	Type	
		Diameter	Slot/Gauze	Length	Set Between
		Static Water Level 19 ft. from Land surface Date Measured 07/17/2008			
		PUMPING LEVEL (below land surface) 22 ft. after 4 hrs. pumping 15 g.p.m.			
		Well Head Completion Pitless adapter manufacturer MONITOR Model SNAPPY <input type="checkbox"/> Casing Protection <input type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)			
NO REMARKS		Grouting Information Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Specified			
Located by: Minnesota Geological Survey Method: Digitization (Screen) - Map (1:24,000)		Grout Material: from to 72 ft. 4 bags			
Unique Number Verification: Info/GPS from data source Input Date: 05/11/2009		Nearest Known Source of Contamination 50 feet W direction Sewer type			
System: UTM - Nad83, Zone 15, Meters X: 563802 Y: 5278738		Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
		Pump <input type="checkbox"/> Not Installed Date Installed 07/25/2008 Manufacturer's name GOULDS Model number 7SB05422 HP 0.5 Volts 230 Length of drop Pipe 30 ft. Capacity 7 g.p.m Type Submersible Material			
		Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
First Bedrock Archean rocks undivided Aquifer Archean Rocks Undivided		Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Last Strat Archean rocks undivided Depth to Bedrock 72 ft.		Well Contractor Certification Petersen Well Drilling, Inc. 2139 PETERSEN, D. License Business Name Lic. Or Reg. No. Name of Driller			
County Well Index Online Report		762811		Printed 1/27/2015 HE-01205-07	

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**WELL AND BORING
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Entry Date 05/04/2009
 Update Date 07/14/2009
 Received Date 01/12/2009

Minnesota Statutes Chapter 1031

Well Name ESALA, EVELYN	Township 60	Range 14	Dir W	Section 20	Subsections CDDDAC	Use Domestic	Depth Drilled 85 ft.	Depth Completed 85 ft.	Date Completed 07/25/2008	Lic/Reg. No. 2139																																																											
Elevation 1451 ft.	Method 7.5 minute topographic map (+/- 5 feet)		Aquifer Archean Rocks Undivided		Depth to Bedrock 72 ft.	Open Hole 72 - 85 ft.	Static Water Level 19 ft.																																																														
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