

Legend

- Monitoring Well Location
- 03U093** Monitoring Well ID
- 130/55** Trichloroethene/1,1,1-Trichloroethane Concentration (µg/L)
- 1.6** 1,4-Dioxane Concentration (µg/L)
- Extraction Well Location
- Cross-Section Line
- Site Boundary
- 2018 1,4 Dioxane Concentration Contour (µg/L)

2018 Trichloroethene Concentrations (µg/L)

Upper and Lower Unit 3

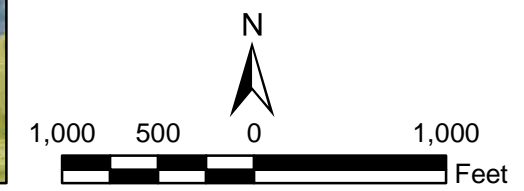
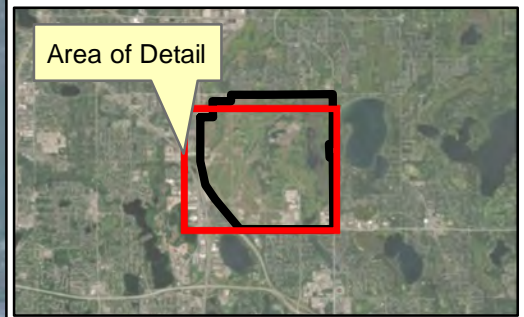
- 5-100
- 100-1,000
- > 1,000
- Operable Unit 2

Bedrock Geology

- St. Peter Sandstone
- Prairie du Chien Group
- Jordan Sandstone
- St. Lawrence Formation
- Tunnel City Group

Notes:

1. 03F and 03U extraction wells are shown with data in parentheses, but concentrations were not used for contouring (except for SC-3 and SC-4, which were used for contouring since they are being sampled as monitoring wells and since they are screened only within Upper Unit 3).
2. Results are from groundwater samples collected in Summer 2018.
3. 2016 Aerial Photograph (Source: DigitalGlobe, Vivid - USA)
4. Mossler, John H.. (2013). M-194 Bedrock Geology of the Twin Cities Ten-County Metropolitan Area, Minnesota. Retrieved from the University of Minnesota Digital Conservancy, <http://hdl.handle.net/11299/154925>
5. µg/L = micrograms per liter



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ANNUAL PERFORMANCE REPORT

OU2, Upper and Lower Unit 3 Combined, Trichloroethene and 1,4-Dioxane Isoconcentration Map, Summer 2018



FY 2018

Figure 12-7

**1,4-Dioxane Concentrations in TGRS and Extraction Wells
Fiscal Year 2018
TGRS, OU2
Arden Hills, Minnesota**

			1,4-Dioxane
Screening Criteria (HRL)			1.0
Location	Date	Dup	µg/L
03L002	6/14/2018		13
03L007	6/26/2018		0.043 JP
03L014	6/19/2018		107
03L017	6/19/2018		12
03L017	6/19/2018	D	12.2
03L018	6/21/2018		11.3
03L020	6/18/2018		10
03L021	6/14/2018		9.6
03L077	6/7/2018		13.8
03L078	6/13/2018		3
03L079	6/14/2018		0.73
03L802	6/25/2018		0.26
03L806	6/22/2018		14.2
03L809	6/26/2018		15.7
03L833	6/25/2018		13.2
03L833	6/25/2018	D	12.9
03M002	6/14/2018		14
03M020	6/18/2018		10.8
03M802	6/25/2018		0.13
03M806	6/22/2018		15.4
03U002	6/19/2018		7
03U003	6/13/2018		0.25
03U003	6/13/2018	D	0.22
03U005	6/26/2018		0.055 JP
03U007	6/26/2018		0.042 JP
03U009	6/19/2018		< 0.07
03U014	6/19/2018		10.7
03U017	6/19/2018		11.3
03U018	6/21/2018		0.53
03U018	6/21/2018	D	0.51
03U020	6/18/2018		2.7
03U021	6/14/2018		96

**1,4-Dioxane Concentrations in TGRS and Extraction Wells
Fiscal Year 2018
TGRS, OU2
Arden Hills, Minnesota**

			1,4-Dioxane
Screening Criteria (HRL)			1.0
Location	Date	Dup	µg/L
03U027	6/19/2018		0.091
03U028	6/13/2018		0.12
03U029	6/13/2018		0.76
03U030	6/13/2018		0.11
03U032	6/22/2018		6.2
03U077	6/7/2018		5.8
03U078	6/13/2018		0.16
03U079	6/14/2018		0.24
03U092	6/21/2018		4.4
03U093	6/21/2018		2.3
03U094	6/21/2018		157
03U096	6/21/2018		6.9
03U099	6/21/2018		< 0.07
03U114	6/21/2018		< 0.07
03U659	6/13/2018		35.9
03U671	6/13/2018		1.4
03U677	6/26/2018		0.32
03U701	6/11/2018		8.7
03U702	6/11/2018		8.8
03U703	6/13/2018		0.067 JP
03U708	6/12/2018		0.29
03U709	6/12/2018		4.3
03U710	6/19/2018		0.18 JMS157
03U711	6/25/2018		3.4
03U715	6/20/2018		8.3
03U801	6/25/2018		0.1
03U801	6/25/2018	D	0.14
03U803	6/26/2018		< 0.070 UB 0.02
03U804	6/25/2018		< 0.07
03U805	6/26/2018		3
03U805	6/26/2018	D	2.8
03U806	6/22/2018		7.7

**1,4-Dioxane Concentrations in TGRS and Extraction Wells
Fiscal Year 2018
TGRS, OU2
Arden Hills, Minnesota**

			1,4-Dioxane
Screening Criteria (HRL)			1.0
Location	Date	Dup	µg/L
04J077	6/7/2018		13
04J077	6/7/2018	D	12.5
04J702	6/11/2018		12.7
04J708	6/12/2018		7
04J713	6/18/2018		6
04U002	6/14/2018		12.1
04U020	6/18/2018		9.5
04U077	6/7/2018		12.3
04U510	6/19/2018		< 0.07
04U701	6/11/2018		12
04U702	6/11/2018		12
04U702	6/11/2018	D	11.4
04U708	6/12/2018		7.3
04U709	6/12/2018		12.4
04U711	6/25/2018		7.3
04U713	6/12/2018		11.3
04U802	6/25/2018		0.4
04U806	6/22/2018		13.5
04U833	6/25/2018		13.2
PJ#806	6/22/2018		13.5

Notes:

- HRL - Health Risk Limit (Minnesota Department of Health). Shading indicates exceedence of the HRL
- D - Field Duplicate
- JP - Result is qualified as estimated since the detection is below the laboratory reporting limit
- UB# - Result is qualified as non-detect. The following numerical value is the associated blank concentration
- JMS# - Result is qualified as estimated due to outlying MS recovery
The following numerical value is the associated % MS recovery

Table 12.8

**Groundwater Quality Data
Fiscal Year 2018
TGRS, OU2
Arden Hills, Minnesota**

			1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichloroethane	cis-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene
TGRS Cleanup Level ⁽¹⁾			200	70	6.0	4.0	70	5.0	5.0
Location	Date	Dup	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
03L002	6/14/2018		0.38 JP	0.36 JP	0.59 JP	< 1.0	< 1.0	< 1.0	13
03L007	6/26/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03L014	6/19/2018		100	3.6	3.5	< 1.0	2.5	< 1.0	150
03L017	6/19/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03L017	6/19/2018	D	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03L018	6/21/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03L020	6/18/2018		0.30 JP	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	6.2
03L021	6/14/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.2
03L077	6/7/2018		1.3	< 1.0	0.86 JP	< 1.0	< 1.0	< 1.0	24
03L078	6/13/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03L079	6/14/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.74 JP
03L802	6/25/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 JMS 71.6	1.5
03L806	6/22/2018		0.97 JP	< 1.0	0.53 JP	< 1.0	< 1.0	< 1.0	38
03L809	6/26/2018		2.4	1.8	2.2	< 1.0	1.1	< 1.0	120
03L833	6/25/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.8
03L833	6/25/2018	D	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.7
03M002	6/14/2018		0.65 JP	1.4	1.4	< 1.0	0.44 JP	< 1.0	20
03M020	6/18/2018		1.5	0.36 JP	0.30 JP	< 1.0	< 1.0	< 1.0	19
03M802	6/25/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	6.9
03M806	6/22/2018		0.51 JP	46	25	0.53 JP	7.7	< 1.0	330
03U002	6/19/2018		1.6	0.38 JP	0.57 JP	< 1.0	0.45 JP	< 1.0	16
03U003	6/13/2018		3.8	0.80 JP	1.1	< 1.0	2.1	< 1.0	61
03U003	6/13/2018	D	3.7	0.84 JP	1.0	< 1.0	2.1	< 1.0	61
03U005	6/26/2018		< 1.0	< 1.0	< 1.0	< 1.0	0.36 JP	< 1.0	< 1.0

Table 12.8

**Groundwater Quality Data
Fiscal Year 2018
TGRS, OU2
Arden Hills, Minnesota**

			1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichloroethane	cis-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene
TGRS Cleanup Level ⁽¹⁾			200	70	6.0	4.0	70	5.0	5.0
Location	Date	Dup	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
03U007	6/26/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03U009	6/19/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03U014	6/19/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03U017	6/19/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.96 JP
03U018	6/21/2018		21	1.7	2.3	< 1.0	7.3	< 1.0	49
03U018	6/21/2018	D	21	1.7	2.3	< 1.0	7.6	< 1.0	50
03U020	6/18/2018		13	1.2	2.2	< 1.0	0.93 JP	< 1.0	50
03U021	6/14/2018		14	12	9.3	< 1.0	9.2	< 1.0	230
03U027	6/19/2018		0.38 JP	< 1.0	< 1.0	< 1.0	0.46 JP	< 1.0	7.1
03U028	6/13/2018		0.38 JP	< 1.0	< 1.0	< 1.0	1.1	< 1.0	21
03U029	6/13/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.1
03U030	6/13/2018		3.8	0.85 JP	1.1	< 1.0	2.1	< 1.0	61
03U032	6/22/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03U077	6/7/2018		1.2	< 1.0	< 1.0	< 1.0	< 1.0	0.78 JP	27
03U078	6/13/2018		1.4	< 1.0	0.71 JP	< 1.0	1.1	11	46
03U079	6/14/2018		5.6	0.39 JP	1.1	< 1.0	2.0	< 1.0	64
03U092	6/21/2018		0.40 JP	< 1.0	< 1.0	< 1.0	0.90 JP	< 1.0	8.5
03U093	6/21/2018		50	0.31 JP	3.6	< 1.0	1.7	< 1.0	130
03U094	6/21/2018		200 JMS 74.5	8.6	4.3	< 1.0	13	< 1.0	200
03U096	6/21/2018		5.3	0.58 JP	0.92 JP	< 1.0	< 1.0	< 1.0	19
03U099	6/21/2018		0.56 JP	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.5
03U114	6/21/2018		0.68 JP	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.0
03U659	6/13/2018		93	10	11	< 1.0	140	< 1.0	730
03U671	6/13/2018		1.6	< 1.0	0.62 JP	< 1.0	< 1.0	16	45

Table 12.8

**Groundwater Quality Data
Fiscal Year 2018
TGRS, OU2
Arden Hills, Minnesota**

			1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichloroethane	cis-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene
TGRS Cleanup Level ⁽¹⁾			200	70	6.0	4.0	70	5.0	5.0
Location	Date	Dup	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
03U677	6/26/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03U701	6/11/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 JL 74.6	0.69 JP
03U702	6/11/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 JL 74.6	0.44 JP
03U703	6/13/2018		0.63 JP	< 1.0	< 1.0	< 1.0	< 1.0	2.8	6.6
03U708	6/12/2018		1.3	< 1.0	0.31 JP	< 1.0	< 1.0	2.7	20
03U709	6/12/2018		2.4	0.41 JP	0.74 JP	< 1.0	0.69 JP	< 1.0	20
03U710	6/19/2018		3.7	< 1.0	0.71 JP	< 1.0	0.98 JP	< 1.0	43
03U711	6/25/2018		3.2	0.80 JP	1.3	< 1.0	0.52 JP	0.56 JP	31
03U715	6/20/2018		6.7	< 1.0	0.79 JP	< 1.0	< 1.0	< 1.0	21
03U801	6/25/2018		< 1.0	< 1.0	< 1.0	< 1.0	0.35 JP	< 1.0	16
03U801	6/25/2018	D	< 1.0	< 1.0	< 1.0	< 1.0	0.40 JP	< 1.0	17
03U803	6/26/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03U804	6/25/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03U805	6/26/2018		< 1.0	10	8.4	< 1.0	3.7	1.3	47
03U805	6/26/2018	D	< 1.0	10	8.6	< 1.0	3.7	1.3	49
03U806	6/22/2018		< 1.0	0.56 JP	0.38 JP	< 1.0	< 1.0	0.54 JP	35
04J077	6/7/2018		0.91 JP	2.0	2.0	< 1.0	0.79 JP	< 1.0	60
04J077	6/7/2018	D	0.88 JP	2.0	2.0	< 1.0	0.76 JP	< 1.0	59
04J702	6/11/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 JL 74.6	1.1
04J708	6/12/2018		0.78 JP	1.1	0.78 JP	< 1.0	< 1.0	< 1.0	9.7
04J713	6/12/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 JL 74.6	< 1.0
04U002	6/14/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.1
04U007	6/26/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
04U020	6/18/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.4

Table 12.8

**Groundwater Quality Data
Fiscal Year 2018
TGRS, OU2
Arden Hills, Minnesota**

			1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichloroethane	cis-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene
TGRS Cleanup Level ⁽¹⁾			200	70	6.0	4.0	70	5.0	5.0
Location	Date	Dup	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
04U077	6/7/2018		1.2	0.55 JP	1.2	< 1.0	0.35 JP	< 1.0	33
04U510	6/19/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
04U701	6/11/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 JL 74.6	2.5
04U702	6/11/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 JL 74.6	1.2
04U702	6/11/2018	D	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 JL 74.6	1.1
04U708	6/12/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 JMS 73.8	< 1.0
04U709	6/12/2018		0.67 JP	0.40 JP	0.93 JP	< 1.0	< 1.0	< 1.0	16
04U711	6/25/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
04U713	6/12/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 JL 74.6	< 1.0
04U802	6/25/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.30 JP
04U806	6/22/2018		0.86 JP	2.0	1.8	< 1.0	0.59 JP	< 1.0	49
04U833	6/25/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.39 JP
PJ#806	6/22/2018		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	12

Notes:

⁽¹⁾ Cleanup levels for TGRS are from the OU2 ROD. Shading indicates exceedence of the cleanup level.

D - Field Duplicate

JP - Result is qualified as estimated since the detection is below the laboratory reporting limit

JL# - Result is qualified as estimated due to outlying LCS recovery. The following numerical value is the associated %LCS recovery.

JMS# - Result is qualified as estimated due to outlying MS recovery. The following numerical value is the associated % MS recovery.