

Victor, Elizabeth A - DNR

From: Shields, Shaun P - DNR
Sent: Tuesday, October 23, 2018 11:18 AM
To: Victor, Elizabeth A - DNR
Subject: Kewaunee Marsh Arsenic Spill Surface Water Criteria
Attachments: Kewaunee Arsenic Criteria Final Memo.docx

Sorry, sent this off to you yesterday with a less descriptive heading. Here it is again in case you missed it.

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Shaun Shields

Phone: (920) 662-5103

Shaun.Shields@wisconsin.gov

From: Shields, Shaun P - DNR
Sent: Monday, October 22, 2018 3:16 PM
To: Victor, Elizabeth A - DNR <Elizabeth.Victor@wisconsin.gov>
Cc: Figiel, Diane - DNR <Diane.Figiel@wisconsin.gov>
Subject: Surface Water Criteria

Hi Liz,

Sorry for the delay regarding this. Let me know if you have any questions regarding any of this.

Thanks

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Shaun Shields

Water Resource Engineer Limits Calculator – Water Quality Bureau

Wisconsin Department of Natural Resources

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dnr.wi.gov



DATE: October 22, 2018

TO: Elizabeth Victor – Green Bay

FROM: Shaun Shields

SUBJECT: Applicable Water Quality Criteria for the Kewaunee Marsh Arsenic Spill Site

This is in response to your request for water quality based effluent limits for the diffuse surface water discharge of Arsenic from contaminated sediment and soil from the Kewaunee Marsh Arsenic Spill Site to the Kewaunee River. The following evaluates applicable criteria for the surface waters affected by the Kewaunee Marsh Arsenic Spill Site.

The Kewaunee Marsh Arsenic Spill Site is located in a wetland adjacent to the Kewaunee River, and as a water of the state, water quality criteria are applicable to this wetland as well as the Kewaunee River and Lake Michigan to protect for downstream impact. Application of water quality criteria to wetlands is outlined in chs. NR 103, 104, and 106, Wis. Adm Code. In accordance to s. NR 104.02(3)(b)1, wetlands are classified as limited aquatic life or marginal surface waters and Arsenic toxicity criteria for limited aquatic life waters outlined in ch. NR 105 are applicable to this wetland.

When considering discharges to the Kewaunee River downstreams impacts for Lake Michigan must also be considered. Background ambient data are used to evaluate if discharges will exceed the water quality criteria. Monitoring at upstream sites indicated a background level ranging from 0-5.25 µg/L with an average of 1.63 µg/L. Additionally, downstream monitoring indicated an arsenic levels of 1.2 µg/L. Monitoring indicates background concentrations of arsenic in the Kewaunee River are likely greater than 0.2 µg/L which is the criteria for Lake Michigan. Its known that arsenic levels in Lake Michigan are about 0.9 ug/L, which exceeds the human cancer criteria for this waterbody. Because both the Kewaunee River and Lake Michigan currently exceed 0.2 ug/L, any arsenic transport from the Kewaunee Marsh Site at concentrations over 0.2 ug/L would contribute to an exceedance of water quality criteria for protection of the public water supply uses of Lake Michigan.

Due to the background concentrations and the resulting lack of available dilution from the stream flow in the Kewaunee River, the most stringent applicable criteria in this situation is the criteria applicable to Lake Michigan. **If the arsenic concentration in the overlying water of the wetland or groundwater discharging to the Kewaunee River meets the human cancer criteria for public water supply of 0.2 µg/L, it is likely to be sufficiently protective of human health and water quality in the wetland, the Kewaunee River, and Lake Michigan.**

Applicable Water Quality Criteria for Arsenic			
Criteria (µg/L)	Kewaunee Marsh Limited Aquatic Life	Kewaunee River Warm Water Sport Fishery	Lake Michigan Cold Water Public Water Supply
Acute Toxicity	340	340	340
Chronic Toxicity	152.2	152.2	148
Human Cancer	40	13.3	0.2

If additional sampling of the Kewaunee River shows levels of Arsenic below 0.2 µg/L, this site may be re-evaluated to determine a level of arsenic that will not exceed the human cancer criteria for a public water supply.

Previous work aimed at applying methodology to derive 'effluent limits' using groundwater discharge to the Kewaunee River towards deriving benchmarks for remediation efforts. It is believed that it may not be appropriate to apply the limit calculating methodology for wastewater dischargers to the diffuse nature of the arsenic transport to the Kewaunee River from the Kewaunee Marsh Arsenic Spill Site. Total arsenic transport includes various pathways including erosion, groundwater, and surface water which are not adequately accounted for using methods applicable for wastewater dischargers in chs. NR 102, 104, 105, and 106. Furthermore, certain water quality criteria are applicable in the marsh itself for protection of the designated uses of a wetland, since this is a water of the state.

This evaluation does not consider the Public Health Groundwater Quality Standards in ch. NR 140.

If there are any questions or comments, please contact Shaun Shields at (920) 662-5103 or Shaun.Shields@wisconsin.gov or Diane Figiel at (608) 264-6274 or Diane.Figiel@wisconsin.gov.

ATTACHMENTS (2): Background Monitoring Data, Maps of Monitoring Data and Treatment Area

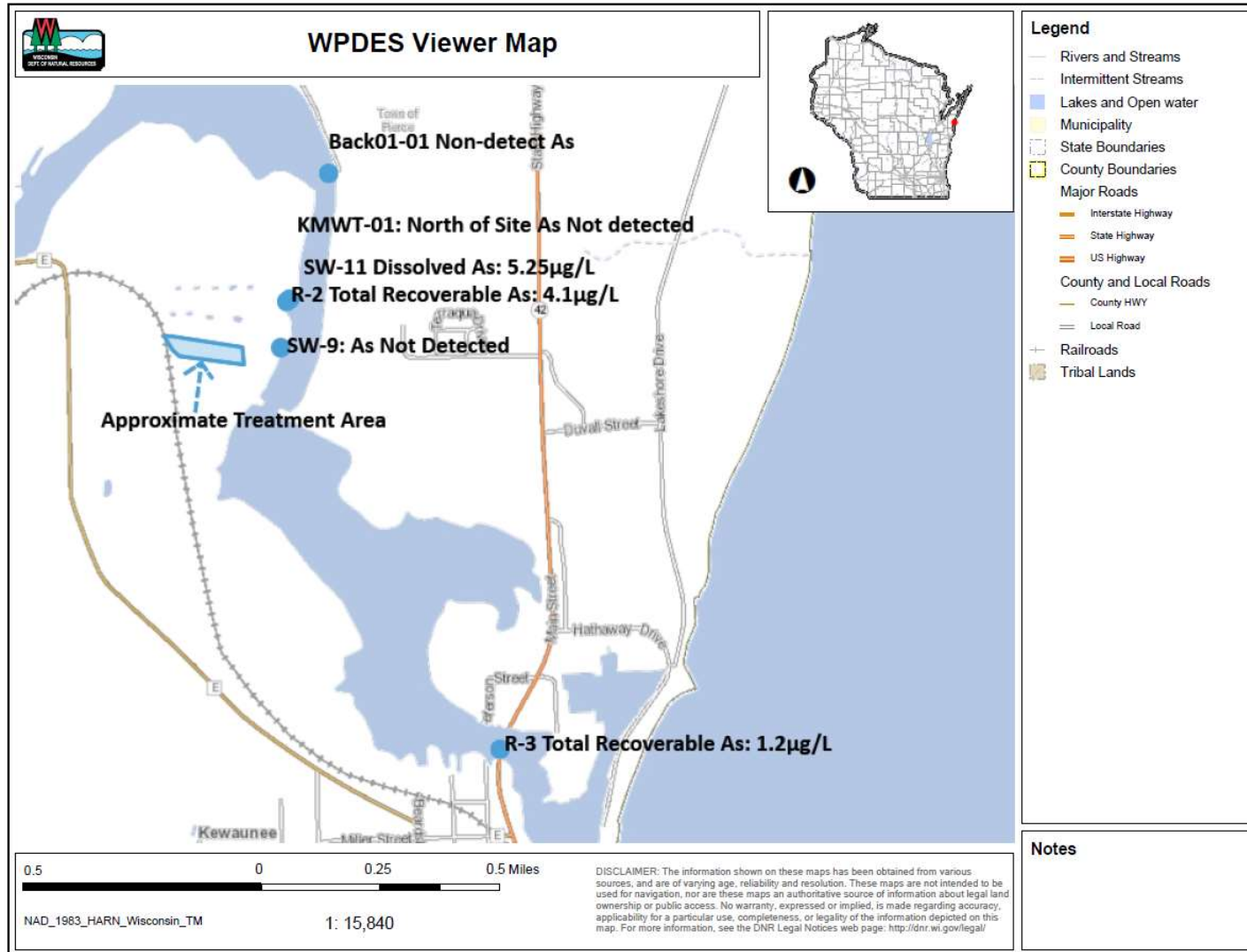
E-cc: Rachel Fritz, Water Resources Engineer – Madison
Diane Figiel, Water Resources Engineer – WY/3

Attachment #1: Background Monitoring Data

Upstream			
Sample ID	Date	Arsenic (µg/L)	Description
SW-3	4/18/2003*	2.06	Near slough north of fence
SW-3	11/2/2005	N.D	Near slough north of fence
KMWT-01	6/1/1997	ND	North of Site
Back01-01	7/26/2001	ND	First upstream bend in Kewaunee River
R-2	1/30/1995	4.1	North East of Site Near Slough Mouth
SW-11	4/23/2013	5.25	Near slough mouth NE of site, near R-2 sampling location
SW-9	10/26/2012	ND	Just upstream of treatment area
Average		1.63	
Downstream			
Sample ID	Date	Arsenic (µg/L)	Description
R-3	1/30/1995	1.2	At HWY 42 Bridge Near Confluence with Lake Michigan

*Total dissolved Arsenic (total recoverable arsenic N.D.)

Attachment #2: Map of Background Monitoring Sites



Attachment #2: Map of Treatment Area

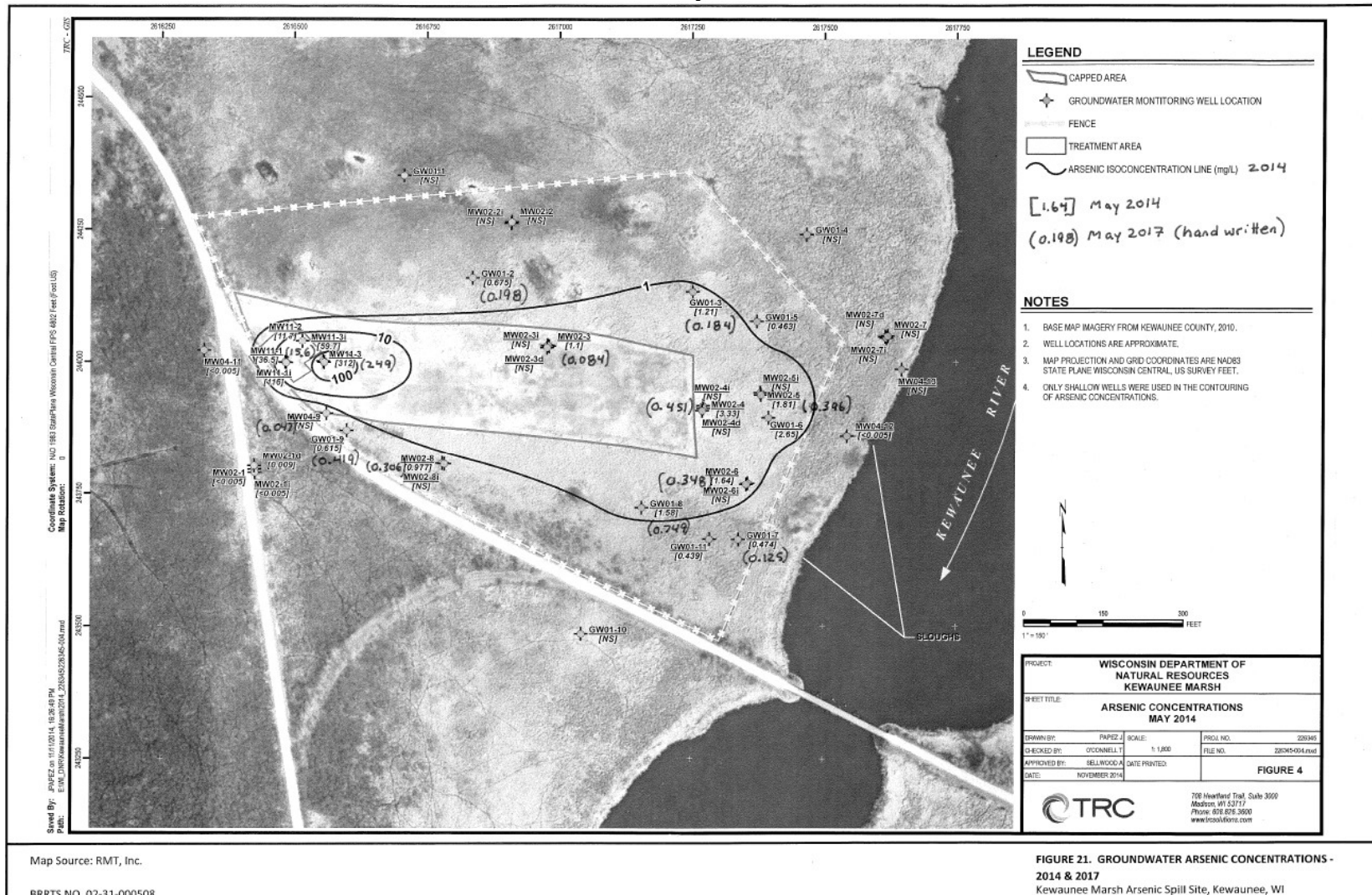


FIGURE 21. GROUNDWATER ARSENIC CONCENTRATIONS - 2014 & 2017
 Kewaunee Marsh Arsenic Spill Site, Kewaunee, WI