

# Operation and Maintenance Report No. 24 (November 2013- May 2014)

Wisconsin Chrome  
Kaukauna, Wisconsin

August 27, 2014

Terracon Project No. 58127047

WDNR BRRTS No. 02-45-000225



**Prepared for:**

Wisconsin Department of Natural Resources  
Oshkosh, Wisconsin

**Prepared by:**

Terracon Consultants, Inc.  
Franklin, Wisconsin

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# Terracon

Geotechnical ■ Environmental ■ Construction Materials ■ Facilities

August 27, 2014

Wisconsin Department of Natural Resources  
Remediation and Redevelopment Program  
625 East County Road Y, Suite 700  
Oshkosh, Wisconsin 54901-9731

Attention: Ms. Jennifer Borski

Re: Semiannual Operation and Maintenance Report No. 24  
Wisconsin Chrome  
Kaukauna, Wisconsin  
WDNR BRRTS No. 02-45-000225  
Terracon Project No. 58127047

Dear Ms. Borski:

Terracon Consultants, Inc. (Terracon) has prepared this Semiannual Operation and Maintenance Report to summarize the activities that took place at the above-referenced site from November 1, 2013 through May 31, 2014. The report documents and includes a summary of groundwater sampling results, treatment system performance, and operations & maintenance activities.

Sincerely,

**Terracon**

Christopher W. Ingram  
Staff Geologist

Scott A. Hodgson, P.G.  
Senior Project Manager

CWI/SAH/BRS/DGW:cwi\N:\Projects\2012\58127047\Working Files\DRAFTS (Proposal-Reports-Communications)\Semi-Annual O\_M Reports\Spring 2014\Final O & M Report No. 24.docx

Copies to: Jerry Wittmann, Outagamie County Facilities Manager  
File



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**1.0 INTRODUCTION ..... 1**  
 1.1 Background Information..... 1  
**2.0 GROUNDWATER SAMPLING..... 2**  
 2.1 Groundwater Sampling Procedures ..... 2  
**3.0 GROUNDWATER SAMPLING RESULTS ..... 3**  
 3.1 Groundwater Sampling Results History..... 3  
 3.2 May 2014 Groundwater Sampling Results ..... 3  
     3.2.1 Total Chromium ..... 3  
     3.2.2 Volatile Organic Compounds..... 3  
 3.3 Cross-Section..... 4  
**4.0 TREATMENT SYSTEM PERFORMANCE AND OPERATION & MAINTENANCE ACTIVITIES.. 4**  
 4.1 Treatment System Performance ..... 4  
 4.2 Operation & Maintenance Activities..... 4  
**5.0 CONCLUSIONS AND RECOMMENDATIONS..... 5**  
**6.0 GENERAL COMMENTS..... 6**  
**7.0 REFERENCES ..... 7**  
**8.0 CERTIFICATIONS..... 8**

**APPENDICES**

**APPENDIX A – FIGURES**

- Figure 1 – Site Plan
- Figure 2 – Groundwater Contour Map (May 2014)
- Figure 3 – MW-7R Total Chromium
- Figure 4 – P-7B Total Chromium
- Figure 5 – Total Chromium Plume (May 2014)
- Figure 6 – Total VOC Plume (May 2014)
- Figure 7 – Cross Section A – A’
- Figure 8 – Influent Chromium Concentrations

**APPENDIX B – TABLES**

- Table 1 – Groundwater Elevations
- Table 2 – Groundwater Analytical Results
- Table 3 – Flow Meter Summary (Gallons)
- Table 4 – November 1, 2013 to May 31, 2014 Chromium and VOC Mass Removal Summary

**APPENDIX C – LABORATORY ANALYTIC TEST REPORTS AND FIELD SAMPLING SHEETS**

**APPENDIX D – FORM 4400-194**

## 1.0 INTRODUCTION

This Semiannual Operation and Maintenance Report was prepared by Terracon Consultants, Inc. (Terracon) for the Wisconsin Chrome Site for the reporting period November 1, 2013 through May 31, 2014 and includes the following information:

- Background information.
- Summary of May 2014 groundwater sampling results.
- Cross-sectional view of the contaminant plume.
- Time versus concentration graphs for selected wells and parameters.
- Graphs of influent and effluent flow and chromium concentrations.

### 1.1 Background Information

The Wisconsin Chrome Site (Figure 1, Appendix A) is a former chromium electroplating facility that was operated by the Wisconsin Chromium Corporation (WCC). Site investigation activities identified chromium and volatile organic compound (VOC) contamination at the facility. A groundwater extraction and treatment system, including collection trenches (A and B), angle injection wells, and an aboveground treatment facility, was constructed in 2001. VOCs from Trench A are treated by carbon, and chromium from Trenches A and B is treated by ion exchange. GeoTrans, Inc. installed the treatment system in accordance with the Remediation Plan approved by the Wisconsin Department of Natural Resources (WDNR).

In August 2001, GeoTrans injected 330 gallons of 10 percent ferric chloride into the four angle wells that extend below the former WCC building. The injection was completed in order to stabilize the hexavalent chromium contamination in the underlying groundwater. An evaluation of the injection was summarized in the June 14, 2004 GeoTrans report, *Supplemental Site Investigation Evaluation of Ferric Chloride Injection at the Former Wisconsin Chromium Corporation Site at 2101 Hyland Avenue, Kaukauna, Outagamie County, Wisconsin*.

In October 2006, Foth injected 300 gallons of 11.8 percent sodium bisulfite solution into the angle wells under a separate approval from the WDNR. Injection activities were reported to the WDNR in the June 2007 Foth report, *Groundwater Injection Documentation and Monitoring*. The report concluded that due to the poor hydraulic connection between the injection points and the groundwater monitoring wells, there was no measurable response in groundwater quality from the groundwater injection, but that continued monitoring may show impacts in the future.

In December 2007, Foth was authorized by the WDNR to complete a bench scale treatability test and a pilot scale reductant injection test near monitoring well MW7R. The pilot injection work was completed by Foth in April 2009. Foth prepared an update of the additional work in their May 14, 2009 First Quarter 2009 Operations & Maintenance Report No. 14.

In February 2009, Foth installed one injection well adjacent to monitoring well nest MW7. A full-scale injection of a reductant was planned for 2011 via an injection network directly beneath the building and throughout the site. However, injection was put on hold until funding became available. In 2013, Foth was contracted by WDNR to complete the full-scale injection. The full-scale injection is scheduled for summer 2014. Prior to injection additional monitoring wells and injection wells were constructed as part of the injection program to provide the necessary distribution and monitoring network.

On May 1, 2012, Terracon was contracted by the WDNR to perform the operations and maintenance (O&M) activities at the site.

## **2.0 GROUNDWATER SAMPLING**

### **2.1 Groundwater Sampling Procedures**

Site features for the Wisconsin Chrome site are shown on Figure 1, Appendix A. Groundwater monitoring at the facility is performed in accordance with the current monitoring schedule (Table 4 of the WDNR's Request for Bid/Scope of Work dated April 13, 2012). The monitoring is completed semiannually typically in March (weather dependent) and September.

Groundwater sampling procedures are as follows:

- Open all monitoring wells to be measured per the monitoring schedule, allow to equilibrate, and measure depth to water from the top of the well casing.
- Purge via low-flow techniques with a dedicated QED bladder pump, if present, pump controller, and water quality meter with flow-through cell until parameters are stable to within 10% for three consecutive readings taken at least two minutes apart.
- Document purge volume and field testing data. Groundwater sampling field sheets are included in Appendix C.
- Containerize purge water and discharge to treatment system.
- Collect groundwater and quality control samples per the monitoring schedule by use of a dedicated QED bladder pump, if present, or via disposable bailer.
- Transport groundwater samples to laboratory for analysis.

Field parameter measurements include temperature, pH, specific conductance, dissolved oxygen (DO), and oxidation-reduction potential (ORP). Field measurements are made prior to sample collection, and laboratory samples for VOCs are collected prior to filtered metals samples. Laboratory samples are properly containerized, preserved, and transported to Pace Analytical Laboratory under chain-of-custody.

A summary of groundwater levels is provided in Table 1, Appendix B. A groundwater table contour map for the most recent sampling event is included as Figure 2, Appendix A.

## 3.0 GROUNDWATER SAMPLING RESULTS

### 3.1 Groundwater Sampling Results History

Historical groundwater monitoring results are included in Table 2, Appendix B. Please see the notes in Table 2 regarding sampling methods and parameters that have changed over time.

### 3.2 May 2014 Groundwater Sampling Results

Groundwater sampling was initially postponed in March due to remaining thick snow cover. After the snow melted, Terracon attempted to sample the groundwater in April; however, Terracon discovered that several of the monitoring wells to be sampled had ice plugs in them and therefore could not be sampled. As such, the April groundwater sampling round was aborted. After confirming that the ice plugs in the monitoring wells had melted, Terracon collected groundwater samples from site monitoring wells on May 14-15, 2014 in conformance with the current monitoring plan. Groundwater sampling results are summarized in Table 2, and laboratory analytical reports and groundwater sampling information sheets are included in Appendix C. Following is a discussion of May 2014 groundwater results by parameter.

#### 3.2.1 Total Chromium

Total chromium concentrations exceed its Wisconsin Administrative Code, Chapter NR 140 enforcement standard (ES) (100 micrograms per liter [ $\mu\text{g/L}$ ]) at the following wells:

- MW-2 (128  $\mu\text{g/L}$ ).
- MW-7R (3,810  $\mu\text{g/L}$ ).

Time versus total chromium concentrations for wells MW-7R and P-7B, which are in the vicinity of the pilot injection test, are provided as Figures 3 and 4, Appendix A.

A plan view of total chromium concentrations and the extent of ES exceedances for May 2014 is provided as Figure 5, Appendix A.

#### 3.2.2 Volatile Organic Compounds

Selected wells were sampled for VOCs in conformance with the monitoring schedule. Individual VOC concentrations exceeded ESs at the following monitoring wells:

- MW-7R (562  $\mu\text{g/L}$  1,1-dichloroethene; 6,280  $\mu\text{g/L}$  1,1,1-trichloroethane; and 19.9  $\mu\text{g/L}$  trichloroethene).
- P-7A (3,680  $\mu\text{g/L}$  1,1-dichloroethane; 21.8  $\mu\text{g/L}$  1,2-Dichloroethane; 741  $\mu\text{g/L}$  1,1-dichloroethene; and 8.1  $\mu\text{g/L}$  1,1,2-trichloroethane).

- P-7B (9,540 µg/L 1,1-dichloroethane; 42.3 µg/L 1,2-Dichloroethane; 503 µg/L 1,1-dichloroethene; 19,800 µg/L 1,1,1-trichloroethane; and 66.7 µg/L 1,1,2-Trichloroethane).

A plan view showing total VOC concentrations and the estimated extent of total VOC concentrations exceeding 100 µg/L for May 2014 is provided as Figure 6, Appendix A.

### **3.3 Cross-Section**

Figure 7, Appendix A shows the vertical distribution of total chromium and total VOCs in groundwater. The estimated extent of total chromium and total VOCs above 100 µg/L is also shown on the cross-section.

## **4.0 TREATMENT SYSTEM PERFORMANCE AND OPERATION & MAINTENANCE ACTIVITIES**

### **4.1 Treatment System Performance**

A total of approximately 108,104 gallons of groundwater was treated and discharged to the sanitary sewer system from November 1, 2013 through May 31, 2014. The system was not operational from December 31, 2013 through February 13, 2014, and again from March 13, 2014 through April 12, 2014. Approximately 74,407 gallons of groundwater influent were generated from Sump A, and 28,024 gallons were generated from Sump B during the same time period. Flow meter readings are provided in Table 3, Appendix B. Sump A and B influent sample and effluent sample results are summarized in Table 2. An updated O&M form 4400-194 is included in Appendix D, which provides a summary of the system performance during the reporting period.

From the period of November 1, 2013 through May 31, 2014, a total of 0.26 pounds of chromium and 0.39 pounds of VOCs were removed from groundwater. The mass removal summary is shown in Table 4, Appendix B.

### **4.2 Operation & Maintenance Activities**

Site visits to perform routine O&M activities and collect monthly/quarterly system monitoring samples typically occurred on the first Thursday of the month throughout the reporting period when the system was operational. The system did not operate from November 14 through 18, 2013 (acid shortage), March 13 through April 8, 2014 (effluent pH sensor), and May 16 through May 31, 2014 (caustic chemical pump). The system did not discharge any groundwater during the period December 31, 2013 through March 13, 2014 (combination of lack of groundwater infiltration and frozen lateral lines on Sump B). The Sump B lateral line remained frozen until April 22, 2014.



Additional non-routine system maintenance visits/activities are explained below.

- The system was down from November 14-18, 2013 when the system ran out of sulfuric acid while awaiting shipment of the correct sulfuric acid drums. Initially, incorrect product was shipped and had to be returned. Terracon made several non-routine site visits to receive the incorrect drums, and again to receive the correct drums and restart the system.
- Terracon met John Johnson from Heart of the Valley Metropolitan Sewerage District (HOTV) at the site on November 19, 2014, for HOTV to collect fourth quarter effluent compliance samples per the wastewater permit.
- The ion exchange canisters were replaced on November 22, 2013.
- On January 15, 2014, it was noted that the electrical breakers inside the remediation shed had tripped and the temperature of the building had dropped to 38 degrees Fahrenheit. The breakers were reset and did not trip again.
- Quarterly compliance samples were collected on March 13, 2014.
- On April 8, 2014, Terracon met Faith Technologies onsite to install a new effluent pH sensor.
- Terracon mobilized to the site on April 23, 2014 to perform the spring groundwater sampling round. However, the sampling was aborted due to ice blockage in several monitoring wells that were to be sampled.
- On May 15, 2014 the ion exchange canisters were replaced.
- After a system alarm was noted, Terracon discovered that the sodium hydroxide chemical pump was not operating properly on May 16, 2014. Consequently, the system did not operate from May 16, 2014 through the end of the reporting period on May 31, 2014.

## **5.0 CONCLUSIONS AND RECOMMENDATIONS**

The results of the laboratory analysis from the May 14-15, 2014 sampling event indicate that the groundwater continues to exceed the 1992 NR 140, WAC, ESs for total chromium and five different VOCs (1,1-dichloroethane; 1,2-dichloroethane, 1,1-dichloroethene; 1,1,1-trichloroethane, and trichloroethene). The areal extent of the total chromium plume appears to have decreased and has retracted from its September 2013 extent downgradient beyond observation well MW-6R, but has expanded to the northwest to envelope observation well MW-2. Concentrations have decreased in the heart of the plume at observation well MW-7R. The areal extent of the VOC plume has decreased compared to September 2013. Although total VOC concentrations in observation well MW-7R (acting as a piezometer) and piezometer P-7A in the heart of the plume have decreased since September 2013, total VOC concentrations in medium-depth piezometer P-7B have increased significantly. The treatment injection to take place in summer 2014 should help to mitigate or arrest the vertically downward migration of this slug of contamination in the heart of the plume.



The containment trenches appear to be functioning as designed when the pumps are operating. The groundwater laboratory analysis and the groundwater elevations indicate that the groundwater plume is being controlled horizontally by the groundwater containment trenches when the system is operating at design flow rates.

Approximately 108,104 gallons of groundwater were extracted from the containment trenches from November 1, 2013 through May 31, 2014.

Based on the laboratory analysis from the November 1, 2013 through May 21, 2014 sampling event and the laboratory analysis from the effluent sampling during the reporting period, Terracon recommends continued operation of the groundwater extraction system with direct discharge to the Heart of the Valley sanitary sewer system. In addition, Terracon informally made the following general recommendations to WDNR to increase system efficiency prior to publishing this report:

- Replace the malfunctioning sodium hydroxide chemical pump.
- Research and confirm the operating requirements for the ion-exchange treatment canisters. If the canisters can adequately treat the influent without first lowering the pH, significant long-term cost savings would result. If the pH does not have to be lowered for treatment, the system may have to be re-wired/re-programmed by an electrician to allow system operation without running the acid pump. Also, the existing full drum of acid and three drums of sodium hydroxide onsite would have to be returned or recycled at some additional cost. Six empty acid drums and one empty sodium hydroxide drum should be disposed.

These recommendations have been implemented and the system is running without pH adjustment. Details will be presented in the Fall 2014 O & M Report due in November 2014.

## **6.0 GENERAL COMMENTS**

The analysis and opinions expressed in this report are based upon data obtained from the system operation and maintenance activities and laboratory chemical analyses at the indicated locations or from other information discussed in this report. This report does not reflect variations in subsurface stratigraphy, hydrogeology, and contaminant distribution that may occur across the site. Actual subsurface conditions may vary and may not become evident without further assessment.

This report was prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted environmental engineering practices. No warranties, express or implied are intended or made. In the event any changes in the nature or location of suspected sources of contamination as outlined in this report are observed, the conclusions and recommendations contained in this report shall not be

valid unless these changes are reviewed and the opinions of this report are modified or verified in writing by Terracon.

## **7.0 REFERENCES**

Foth, 2007, Groundwater Injection Documentation and Monitoring, June 2007.

Foth, 2009, First Quarter 2009 Operations & Maintenance Report No. 14: Green Bay, WI, May 14, 2009.

GeoTrans, Inc., 2004, Supplemental Site Investigation Evaluation of Ferric Chloride Injection at the Former Wisconsin Chromium Corporation Site at 2101 Hyland Avenue, Kaukauna, Outagamie County, WI, June 14, 2004.

McMahon Associates, Inc., 2005, Quarterly Progress Report #4, October, November, December 2004, and Semi-Annual Operations & Maintenance Report, July 2004 – December 2004

## 8.0 CERTIFICATIONS

I, Blaine R. Schroyer, P.E., hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

E-31505

Signature and P.E. number

Project Engineer

Title

I, Scott A. Hodgson, P.G., hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03 (1), Wis. Adm. Code, am registered in accordance with the requirements of ch. GHSS 2, Wis. Adm. Code, or licensed in accordance with the requirements of ch. GHSS 3, Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Scott A. Hodgson PG-1229  
Signature and P.G. number

8/27/14  
Date

Project Geologist

Title

