D&B Engineers and Architects, P.C.

CIRCUITRON CORPORATION SITE PILOT SOURCE AREA TREATMENT SYSTEM

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REPORT TITLE

Site Management Report No.10

REPORTING PERIOD

February 2016 - July 2016

CLIENT

New York State Department of Environmental Conservation

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation
625 Broadway, 12th Floor, Albany, New York 12233

Site

NYSDEC Site No. 152082, Circuitron Corporation Site, Pilot Source Area Treatment System. East Farmingdale, Town of Babylon, Suffolk County, New York. Refer to *Figure 1* for a site location map.

Project Background and Site Description

The Circuitron Corporation Site (Site) Pilot Source Area Treatment System (PSTS) consists of a single integrated groundwater circulation well with an in-well vapor stripping and soil vapor extraction (GCW/IVS/SVE) system. The system was placed into operation by the United States Environmental Protection Agency (USEPA) in March 2008 to address moderate levels of residual contamination (chlorinated solvents) within soil and groundwater in the southwest corner of the Site. The GCW/IVS/SVE system was operated and maintained by the USEPA through June 2011 when site management responsibilities were transferred to the New York State Department of Environmental Conservation (NYSDEC) consistent with Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) requirements. Site management activities are now performed by the NYSDEC with funds allocated under the New York State Superfund Program. A copy of the Site Transfer Agreement is provided in *Appendix A*. Under D&B's State Superfund Contract with the NYSDEC, D&B has been authorized to perform site management activities at the Site.

During this reporting period the activities occurring at the Site were routine site inspections, system monitoring and maintenance, semiannual on-site groundwater sampling and annual off-site groundwater sampling. In response to equipment failures when the sparge compressor went off-line in January 2013, it was decided by the NYSDEC that portions of the PSTS system including the air sparge system and associated groundwater circulation well should remain off-line to evaluate the possibility of contaminant "rebound" in groundwater. A Remedial System Optimization (RSO) letter report was prepared in April 2014 by D&B on behalf of the NYSDEC to develop and evaluate alternative remedial technologies that may be applicable to the Site. In response to the RSO, a system evaluation pilot study was performed between June 2015 and October 2015. A final report summarizing the results of the system evaluation and recommendations for modifications to the existing system was submitted to and approved by the NYSDEC in January 2016. A scope of work to implement the proposed system modifications was submitted to and approved by the NYSDEC in May 2016. Following the approval of the scope of work, a solicitation package for the system modifications was submitted and approved by the NYSDEC Contract Manager in July 2016. Once the system modification activities are completed, a RSO completion report will be submitted to the NYSDEC. Similar to

previous reporting periods, the SVE blower was the only component of the PSTS system that was in operation. As such, monitoring and reporting activities were limited during this reporting period.

Pilot Source Area Treatment System Overview

The PSTS consists of a single integrated groundwater circulation well with an in-well vapor stripping and soil vapor extraction system. The overall process, which is an extension of air sparging technology, involves the creation of groundwater circulation cells around a well through which contaminated groundwater is cycled. As can be seen on *Figure 2*, the groundwater circulation well installed at the Site consists of a single well with separate upper and lower screened intervals. Nitrogen or ambient air is injected at the base of the well, decreasing the density of the groundwater, driving it upward and out of the upper screened zone into the vadose and/or saturated zones while simultaneously drawing groundwater in through the lower screened zone. In the process, groundwater contaminants are transferred from the dissolved phase to the vapor phase by the rising air bubbles via air stripping. Once discharged, the air-stripped groundwater flows downward, eventually reaching the lower portion of the saturated zone where it is cycled back through the well, replacing the water that rose resulting from the density gradient. This process creates a circulation pattern or cell that allows continuous cycling of groundwater through the well and air stripping process.

The portion of the well screen above the saturated zone is utilized by the SVE system to extract contaminants stripped from the groundwater. Extracted vapor is directed through a moisture "knockout" drum to remove any entrained water/moisture. Extracted soil vapor is subsequently processed through a series of vapor phase carbon adsorption vessels to remove targeted contaminants prior to being discharged to the atmosphere. It should be noted, however, that the process piping was reconfigured in August 2011 to bypass the vapor phase carbon adsorption vessels per the direction of the NYSDEC based on historically low contaminant concentrations detected in extracted soil vapor.

All treatment system components are located on-site within a mobile trailer. The treatment system is equipped with instrumentation and controls to allow for automated start-up and operation, as well as an autodial remote notification system. Refer to *Figure 3* for a schematic of the PSTS. Refer to *Figure 4* or a Process and Instrumentation Diagram of the PSTS.

During the January 2013 system inspection, it was noted that the compressor for the air sparge system was not operating. NYSDEC was notified and determined that the compressor pump should not be repaired and the air sparge system should remain off-line to evaluate the potential for contaminant rebound.

It should be noted that the current system configuration as discussed above, will undergo system modifications during the upcoming monitoring period. The new configuration of the modified system will be discussed in the following Site Management Report.

Regulatory Requirements/Cleanup Goals

In line with the objectives and requirements of the Operable Unit 1 (OU-1) Record of Decision (ROD) and Operable Unit 2 (OU-2) ROD included in *Appendix B*, the PSTS was constructed and put into routine operation focusing on the following goals:

OU-1 ROD

- Reduce the concentrations of contaminants in Site soil and sediment to levels which are protective of human health and the environment; and,
- Prevent further deterioration of the area groundwater.

OU-2 ROD

- Prevent potential future ingestion of site-related contaminated groundwater;
- Restore the quality of the groundwater contaminated from the site-related activities to levels consistent with the Federal and State drinking water and groundwater quality standards; and,
- Mitigate the off-site migration of the site-related contaminated groundwater.

System Performance Summary

Several components of the PSTS system (e.g. sparge system) were off-line during this reporting period, as such a system performance evaluation of the system as constructed was not undertaken. Review and evaluation of system performance will resume in future reports, as needed, based on the operational status of the PSTS system and the results of the groundwater sampling.

System Runtime/Downtime Summary

The total elapsed time for this reporting period was 4,368 hours (February 1, 2016 through July 31, 2016). Of this total time frame, the SVE component of the PSTS operated for 4,080 hours or approximately 93 hours percent of the total elapsed time. As previously discussed and per the direction of NYSDEC, the air sparge component did not operate this reporting period as a result of equipment failure and NYSDEC's decision to evaluate the possibility of contaminant rebounding in groundwater. System runtime/downtime for the SVE component is summarized below. Refer to *Table 1* for treatment system operation and maintenance logs, which identify specific information regarding alarm conditions, downtime and repairs.

In-Well Air Stripping System, SVE Component Runtime/Downtime Summary

	(Hours)	(Percentage)
SVE System Runtime - Current Reporting Period [1]	4,080	93.00%
SVE System Downtime - Current Reporting Period [1]	288	7.00%
Total SVE System Runtime To Date [2]	46,571	--

Notes:
1. Reported value based on the following: System start-up date of 8/24/2011; and total elapsed time 4,368 hours for the current reporting period
2. Reported value reflects system runtime since inception in July 2008, as recorded by the USEPA.

In-Well Air Stripping System, Nitrogen Sparging Component Runtime/Downtime Summary

	(Hours)	(Percentage)
System Runtime - Current Reporting Period [1]	0	0.00%
System Downtime - Current Reporting Period [1]	4,368	100.00%
Total System Runtime To Date [2]	26,635	--

Notes:
1. Reported value based on the following: System start-up date of 8/24/2011; and total elapsed time 4,368 hours for the current reporting period
2. Reported value reflects system runtime since inception in July 2008, as recorded by the USEPA.

A tentative schedule for the performance of routine system maintenance for the current and subsequent reporting periods is presented below.

Major System Component	Manufacturer	Model Number	Maintenance Frequency	Current Reporting Period [1]					
				Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16
Air Sparge Compressor	Quincy Compressor	QR-25® Series, Model F325	Bi-Monthly						
High Temperature Refrigerated Dryer	Parker	ZDHHT15-100 (60Hz)	Every Four Months						
Nitrogen Generator	O2N2 SITE Gas Systems	NM Model	Quarterly						
Vacuum Blower	Ametek	EN909BG72WL	Bi-Monthly		♦		♦		♦
Vapor Phase Carbon Adsorption Vessels	Carbtrol Corporation	G-3	As Needed						

Major System Component	Manufacturer	Model Number	Maintenance Frequency	Subsequent Reporting Periods [2]					
				Aug-16	Sept-16	Oct-16	Nov-16	Dec-16	Jan-17
Air Sparge Compressor	Quincy Compressor	QR-25® Series, Model F325	Bi-Monthly						
High Temperature Refrigerated Dryer	Parker	ZDHHT15-100 (60Hz)	Every Four Months						
Nitrogen Generator	O2N2 SITE Gas Systems	NM Model	Quarterly						
Vacuum Blower	Ametek	EN909BG72WL	Bi-Monthly						
Vapor Phase Carbon Adsorption Vessels	Carbtrol Corporation	G-3	As Needed						

Notes:
1. Limited preventive maintenance activities (i.e., lubrication, filter replacements) were completed for major system components as noted. During this reporting period the air sparge compressor was not in operation (off-line since 1/3/2013), as a result no maintenance was performed for this component.
2. The following represents tentative schedules for performance of routine maintenance of major system components, it should be noted that this schedule has been intentionally left blank due to the system modifications that are scheduled to be performed during the subsequent reporting period.

Vapor Phase Discharge Summary

Vapor-phase discharge samples were not collected this reporting period due to the system being partially shut-down. Review and evaluation of sample results will resume in future reports, as needed, based on the operational status of the PSTS system and the results of the groundwater sampling. All historic samples exhibited VOCs well below the site-specific effluent limit of 0.5 lbs/hr, which was developed in consultation with the NYSDEC as a means to monitor the vapor-phase VOCs associated with the operation of the GCW/IVS/SVE. Refer to *Table 2* for historical analytical results.

Operational Cost Summary

Operational costs this reporting period include monthly utility, maintenance, and engineering charges. Capital construction costs and NYSDEC project management effort are not included in the evaluation.

The total operational cost incurred during the period from February 1, 2016 through July 31, 2016 was approximately $40,326. Of this amount, approximately $32,039 was related to engineering charges and approximately $8,287 was related to utilities, laboratory and subcontractor charges. Operational costs were not evaluated relative to the pounds of VOCs removed since several components of the PSTS system (e.g sparge system) were off-line this reporting period. Operational costs will be evaluated during future reporting periods to evaluate efficiency and effectiveness of the treatment system.

Groundwater Monitoring Summary

Sixteen "on-site" groundwater monitoring wells were sampled during this reporting period on June 16 and 17, 2016 to determine groundwater quality at the Site. Groundwater samples were collected from six monitoring wells (GW-N15S, GW-N15M, GW-N15D, GW-N45S, GW-N45M, and GW-N45D) located upgradient of the GCW/IVS/SVE system, seven monitoring wells (MW-4S, MW-4D, GW-SW45S, GW-SW45M, GCW-SPY-D, GW-SE07S, and GW-SE15S) in the vicinity of the GCW/IVS/SVE system, and three monitoring wells (GW-SE30S, GW-SE30M, and GW-SE30D) downgradient of the GCW/IVS/SVE system. It should be noted that monitoring well GCW-SPY-S was not sampled this reporting period due to the well being dry. Groundwater samples were collected from shallow, intermediate, and deep zones. All samples were analyzed in accordance with USEPA Method 8260 for VOCs. The location of the groundwater monitoring wells and GCW/IVS/SVE system are depicted on *Figure 5*.

VOCs were detected in excess of SCGs in nine of the sixteen "on-site" groundwater samples. VOCs were detected in samples collected from the shallow, intermediate and deep groundwater zones. 1,1,1-Trichloroethane was detected in excess of its SCG (5 µg/L) in two shallow wells (MW-4S and GW-SE07S) in the vicinity of the GCW/IVS/SVE system at concentrations of 10 µg/L and 35 µg/L, respectively. Chlorobenzene was detected in excess of its SCG (5 µg/L) in one shallow well (GW-SE30S), two intermediate wells (GW-N15M and GW-SE30M) and three deep wells (GCW-SPY-D, GW-N15D and GW-SE30D) downgradient and upgradient of the GCW/IVS/SVE system at concentrations ranging from 8.3 µg/L to 91 µg/L. *Table 3* presents tabulated analytical results relative to SCGs. *Figure 5* summarizes exceedances of SCGs in groundwater by well location.

Seventeen "off-site" groundwater monitoring wells were sampled during this reporting period on June 17, 2016 to determine groundwater quality in the vicinity of the Site. Groundwater samples were collected from two monitoring wells (MW-1S and MW-1D) located up gradient of the site, two monitoring wells (MW-3S and MW-3D) side gradient to the site and thirteen monitoring wells (MW-15, MW-13, MW-5D, MW-6D, MW-6S, MW-16, MW-17, MW-7S, MW-7D, MW-18, MW-14, MW-19S and MW-19D) located downgradient of the Site. Groundwater samples were collected from shallow and deep zones. All samples were analyzed in accordance with USEPA Method 8260 for VOCs. The groundwater monitoring well locations are depicted on *Figure 6* and *Figure 7*.

VOCs were detected in excess of SCGs in three of the seventeen "off-site" groundwater samples. VOCs were detected in samples collected from the shallow and deep groundwater zones. Toluene was detected in excess of its SCG (5 µg/L) in the side gradient deep well MW-3D at a concentration of 10 µg/L. 1,1,1-Trichloroethane was detected in excess of its SCG (5 µg/L) in the downgradient shallow well MW-13 at the concentration of 29 µg/L. 1,1-Dichloroethene was detected in excess of its SCG (5 µg/L) in MW-19 at concentrations of 5.6 µg/L. *Table 4* presents tabulated analytical results relative to SCGs. *Figure 6* and *Figure 7* summarize exceedances of SCGs in groundwater by well location.

Data Validation Summary

Sixteen on-site and seventeen off-site groundwater samples were collected this reporting period. All groundwater samples were analyzed by ConTest Laboratories, Inc. in accordance with USEPA Method 8260 for VOCs.

The data package (16F0995 & 16F0994) were reviewed for contract and method compliance to determine the usability of the sample results. The findings of the review process are summarized below:

Groundwater Samples

June 16 and 17, 2016

Laboratory performance was acceptable, with the following exceptions:

Methylene chloride was detected in the method blank. It was not detected in any of the samples therefore qualification of the data was not necessary.

The percent recovery (%R) was below the quality control (QC) limit in the MS and MSD for dichlorodifluoromethane associated with all samples. Dichlorodifluoromethane was qualified as an estimated detection limit (UJ) in all samples.

The %Rs were above the QC limits in the MS and/or MSD for bromochloromethane, 2-butanone, chloroethane, cyclohexane, 1,1-dichloroethane, 1,2-dichloropropane, 2-hexanone, methyl acetate, 4-methyl-2-pentanone and methylene chloride associated with all samples. These compounds were not detected in any of the samples therefore, qualification of the data was not necessary.

The %Rs were above the QC limits in the LCS for bromochloromethane, carbon disulfide, cyclohexane, methyl acetate and methylene chloride associated with samples GW-SE07S, MW-6D, MW-1S and MW-1D, MW-7S, MW-7D, MW-17, MW-14, MW-5D, MW-15, MW-16, MW-18, MW-19S, MW-19D, MW-3S and MW-3D. The %Rs were above the QC limits in the laboratory control sample for carbon disulfide, cyclohexane, methyl acetate and methylene chloride associated with all samples except GW-SE07S, MW-6D, MW-1S, MW-1D, MW-13 and Trip Blank. These compounds were not detected in any of the samples therefore, qualification of the data was not necessary.

Sample MW-19D was field duplicated as sample BLIND DUPLICATE. Based on field duplicate results the following compounds were qualified as estimated (UJ/J) in samples MW-19D and BLIND DUPLICATES: 1,1-dichloroethene, tetrachloroethene and 1,1,1-trichloroethane.

No other problems were found with the sample results and all results are deemed usable for environmental assessment purposes as qualified above.

All analytical data associated with the Site has been submitted to the NYSDEC in the required EQuIS format and within 30 days of receipt of the data from the laboratory.

Non-routine Maintenance Summary

No non-routine maintenance was performed during this reporting period.

Findings, Conclusions and Recommendations

Findings:

- The site management activities performed this reporting period include routine site inspections, system monitoring and maintenance, semiannual on-site groundwater sampling and annual off-site groundwater sampling. In response

to equipment failures when the sparge compressor went off-line in January 2013, it was decided by the NYSDEC that portions of the PSTS system including the air sparge system and associated groundwater circulation well should remain off-line to evaluate the possibility of contaminant "rebound" in groundwater. A Remedial System Optimization (RSO) letter report was prepared in April 2014 by D&B on behalf of the NYSDEC to develop and evaluate alternative remedial technologies that may be applicable to the Site. In response to the RSO, a system evaluation pilot study was performed between June 2015 and October 2015. A final report summarizing the results of the system evaluation and recommendations for modifications to the existing system was submitted to and approved by the NYSDEC in January 2016. A scope of work to implement the proposed system modifications was submitted and approved by the NYSDEC in May 2016. Following the approval of the scope of work, a solicitation package for the system modifications was submitted and approved by the NYSDEC Contract Manager in July 2016. Once the system modification activities are completed, a RSO completion report will be submitted to the NYSDEC. Similar to previous reporting periods, the SVE blower was the only component of the PSTS system that was in operation. As such, monitoring and reporting activities are limited this reporting period.

- The SVE system was shut-down this reporting period in June 2016 prior to groundwater sampling.
- An evaluation of system performance was not performed this reporting period since several components of the PSTS system were shut-down. Instead, the sample results were evaluated to determine if any rebounding was occurring based on the sparge system being shut down.
- Vapor-phase discharge samples were not collected this reporting period.
- Total operational cost during the period from February 1, 2016 through July 31, 2016 was approximately $40,326 including engineering, utility and subcontractor costs. However, not all components of the PSTS operated this reporting period.
- Sixteen groundwater samples were collected and analyzed for VOCs in June 2016 from "on-site" wells. VOCs were detected in samples collected from the shallow and intermediate groundwater zones. 1,1,1-Trichloroethane was detected in excess of its SCG (5 µg/L) in two shallow wells (MW-4S and GW-SE07S) in the vicinity of the GCW/IVS/SVE system at concentrations of 10 µg/L and 35 µg/L, respectively. Chlorobenzene was detected in excess of its SCG (5 µg/L) in one shallow well (GW-SE30S), two intermediate wells (GW-N15M and GW-SE30M) and three deep wells (GCW-SPY-D, GW-N15D and GW-SE30D) downgradient and upgradient of the GCW/IVS/SVE system at concentrations ranging from 8.3 µg/L to 91 µg/L.
- Seventeen groundwater samples were collected and analyzed for VOCs in June 2016 from "off-site" wells. VOCs were detected in samples collected from the shallow and deep groundwater zones. Toluene was detected in excess of its SCG (5 µg/L) in the side gradient deep well MW-3D at a concentration of 10 µg/L. 1,1,1-Trichloroethane was detected in excess of its SCG (5 µg/L) in the downgradient shallow well MW-13 at the concentration of 29 µg/L. 1,1-Dichloroethene was detected in excess of its SCG (5 µg/L) in MW-19 at concentrations of 5.6 µg/L.

Conclusions:

- 1,1,1–Trichloroethane levels in on-site monitoring well (MW-4S) were lower this reporting period than the previous reporting period. 1,1,1–Trichloroethane levels in on-site monitoring well (GW-SE07S) were higher this reporting period than the previous reporting period. In addition, chlorobenzene levels in on-site monitoring wells (GCW-SPY-D, GW-N15S, GW-N15M, GW-N15D, GW-SE30S, GW-SE30M, and GW-SE30D) were higher this reporting period than the previous reporting period.
- 1,1,1–Trichloroethane, 1,1-dichloroethane and chlorobenzene levels in off-site monitoring well (MW-13) were lower this reporting period than the previous reporting period. However, it should be noted that 1,1-dichloroethene levels in off-site monitoring well (MW-19D) were higher this reporting period than the previous reporting period.
- The current PSTS system has been effective at reducing contaminant levels in groundwater on-site. However, contaminant levels remain elevated above site cleanup goals in on-site and off-site groundwater. As the NYSDEC is currently aware, D&B is in the process of performing system modifications to the current system configuration which will be summarized in the following Site Management Report.

Recommendations:

- Based on the data from recent sampling events, additional groundwater sampling is needed to determine if rebounding of chlorinated VOC concentrations within both on-site and off-site wells is occurring. At this time, D&B recommends that the following actions be taken in support/consideration of the GCW/IVS/SVE system currently installed at the site:
  - ◊ Continue to sample the on-site and off-site wells on a semiannual and annual frequency, respectively.
  - ◊ Perform system monitoring and maintenance of the modified system once modifications are complete.

Reclassification/Delisting Evaluation

USEPA finalized the NPL Listing for the Site on March 31, 1989. Since that time, completion of the following project phases has occurred, as summarized below:

Project Phase	Completion Dates
Operable Unit 01A	
IRM Waste Removal	**04/1989**
Operable Unit 01	
Remedial Investigation	**03/1991**
Remedial Design	**09/1994**
Remedial Action	**01/1997**
Operable Unit 02	
Remedial Investigation	**09/1994**
Remedial Design	**09/1996**
Remedial Action	**06/2000**

Given the above, NYSDEC reclassified the Site pursuant to the requirements identified in 6 NYCRR §375-2.7 as a Class 4 Site on July 21, 2011 since the residual contamination does not appear to constitute a significant threat to public health or the environment based on remedial efforts performed to date. Site delisting is not feasible at this time as all remediation and post-remediation activities have not been completed.

Report Certification:

I have personally examined and am familiar with the information submitted in the referenced Report. To the best of my knowledge and belief, and based upon my inquiry of those individuals immediately responsible for obtaining the information reported therein, I certify that the submitted information is true, accurate, and complete.

Project Director: Richard M. Walka — Senior Vice President — 11.10.16 — **Date**

Project Manager: James Van Horn — Project Manager — 11-17-16 — **Date**