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Suncor Energy Products Partnership

Annual Summary Report - 2021
Former Sears Retail Site and Adjacent Hounsfield Heights Area
1620 – 14th Avenue NW
Calgary, Alberta

Clifton

Clifton

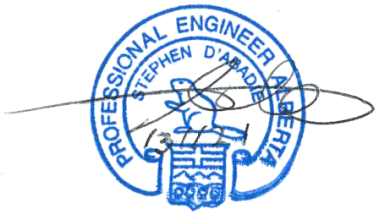
31 March 2022 **File CG3418 019**

Suncor Energy Inc.

Annual Summary Report – 2021

Former Sears Retail Site and Adjacent Hounsfield Heights Area

1620 – 14th Avenue NW Calgary, Alberta, 9445



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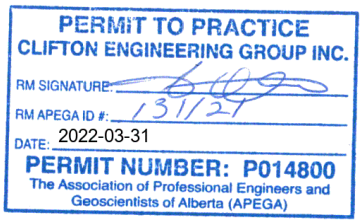
Prepared by:
Stephen d'Abadie, P.Eng., P.Biol.
Project Manager

2022-03-31

Reviewed by:
David G. Pritchard, P.Geol.
Director, Environmental Services



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1.0 Introduction

Clifton Engineering Group Inc. (Clifton) has been retained by Suncor Energy Products Partnership ("Suncor") to manage the on-going remediation and monitoring and sampling program at the Site, which includes the Mall Area north of 14th Avenue NW, and the Hounsfield Heights Area to the south (collectively known as the "Site"). As part of the on-going Site management and remediation, Suncor is required, as per Ministerial Order 09/2020, to provide an Annual Report to Alberta Environment and Parks on 31 March of each calendar year. This requirement has been in place since the 2018 Environmental Protection Order where the previous responsible party, Sears Canada Inc. (Sears), was required to submit an Annual Report. This report documents the fourth Annual Report for the Site and the third Annual Report since the release of Ministerial Order 09/2020.

This Annual Report follows the outline presented in the previous 2020 Annual Report which captures the requirements set forth in Ministerial Order 09/2020. The current report documents activities associated with the Site between the dates of 01 January 2021 and 31 December 2021.

2.0 Communication

Communication to the pertinent stakeholders has been completed using a variety of avenues. All communication is tailored to the specific audience and has been conducted in accordance with the communications plan proposed as part of the Revised Remediation Plan. The original Remediation Plan was submitted in December 2018, a revised version in August 2019, a further revision in June 2020 and the final version was submitted for acceptance by AEP in March 2021. Acceptance of the Revised Remediation Plan (Version 3.0) was provided by AEP in a letter dated 4 May 2021.

The communications plan component of the Revised Remediation Plan (Version 3.0) has been updated in each version of the plan which has been prepared. The communication plan is presented in Section 2.1 and a summary of the communications which occurred in 2021 are summarized in Section 2.2.

2.1 Two-Way Communication Strategy

The plan to establish an effective two-way communication strategy was undertaken in 2020. As part of this strategy a virtual open house meeting was held in 2021 and an additional in-person meeting has been proposed for 2022. The intent behind having the in-person and open house meetings is to further develop and implement alternate information sharing pathways and opportunities for stakeholders to bring their concerns to Suncor. The information presented below forms the current basis of the communication strategy.

2.1.1 Website

Suncor has established and has been using a website (www.suncor.com/hounsfield-heights) to house all the historical reports from the Sears website, as well as new reports, and the regular community bulletins and notifications.

2.1.2 Key Communication Contact

Suncor has also established and continues to use a Site-specific email address (hounsfieldheights@suncor.com) for use by the residents of Hounsfield Heights. This email address is directly linked to the responsible Suncor team to ensure that a timely response is provided to the residents according to the Ministerial Order. Having one point of contact will ensure that someone from the Suncor team will always be available to respond. This email address is intended to be the primary form of communication, but Suncor understands that on occasion communication by phone with an individual team member may be the preferred and most effective way to communicate.

2.1.3 Community Bulletins

In 2021, Suncor posted two community bulletins on its website, and distributed it via mail and/or email to all residents within the Site. The bulletin provides information on how the residents can contact Suncor should they have any questions. In addition to this, the bulletin has asked residents to notify Suncor on their communication preference (mail vs e-mail) for future bulletins.

2.2 Summary of 2021 Communication

In 2021, communication was as follows:

- Clifton, on behalf of Suncor, circulated two communication bulletins, one in April and one in September 2021. The April and September 2021 bulletins provided a summary of the documents posted to the communications website, a summary of the activities completed since the previous bulletin was released and an update on the activities to be conducted in the next quarter. All communication bulletins also include a closure requesting residents notify Suncor if they wish to receive future bulletins via email.
- A virtual public meeting was held in March 2021 to provide all stakeholders, particularly the residents of Hounsfield Heights, with a summary of the approved Revised Remediation Plan (Version 3.0), the then current activities being conducted as well as a summary of the upcoming activities to be completed as part of the Revised Remediation Plan (Version 3.0). The public meeting concluded with a question-and-answer session which was documented and also posted on the communications website.
- Clifton, on behalf of Suncor, was in contact with select residents regarding accessing their property for the on-going soil vapour sampling program as well as the LPH assessment conducted in April 2021.
- Additional communication with residents in the Hounsfield Heights – Briar Hill Community as well as the private property owners of the Mall Area was through email, phone, or in-person communication. This was completed on an as needed basis. If specified, Clifton contacted residents using their communication method of choice; and
- Additional communication with stakeholders such as AEP and the City of Calgary was through email, phone, or in-person communication.

All communication in 2021, including that with individual property owners, was related to the discussion of results of historical work completed, work being currently completed and future proposed work or as a means of requesting access to specific portions of the Site which required additional consent, either verbally or through an access agreement. Specific concerns were primarily related to the technical information presented within reports which were responded to individually through email.

3.0 Environmental Work

In 2021, Clifton, on behalf of Suncor completed the following activities associated with the Site:

- Groundwater Monitoring and Sampling: June and September 2021 and November 2021.
- Soil Vapour Sampling: July 2021.
- Soil Vapour Contingency Plan Sampling: March 2021, July 2021 and November 2021.
- Dual Phase Vapour Extraction (DPVE) system: Continued operation and additional pneumatic and drawdown testing.
- Liquid Petroleum Hydrocarbon (LPH) Assessment: Field activities and reporting.
- Remedial Options Analysis.
- Permeable Reactive Barrier Performance Monitoring.

Figure 1 of Appendix A depicts the current groundwater monitoring well network while Figure 2 depicts the soil vapour probe network. A summary of each of the above activities is presented in the following sections. At the end of each section a reference to the full report housed on the Suncor communications website is provided.

3.1 Groundwater Monitoring and Sampling

In 2021, Clifton completed two groundwater monitoring and sampling events. The majority of the first event was completed in June while the Mall Area was sampled in September, and the second event was conducted in November. Due to the short time difference between the Mall Area being sampled in September 2021, it was not sampled again during the November 2021 event. Both the Hounsfield Heights and Mall Areas will be sampled during both events in 2022. A report was released to the stakeholders documenting the June and September event in February 2022. It is anticipated that the report for the November 2021 event will be made available in April 2022. However, the results from the November 2021 event are summarized within this report.

The purpose of the on-going groundwater monitoring and sampling program is to assess/confirm whether the petroleum hydrocarbon (PHC) and 1,2-dichloroethane (DCA) plume is expanding, declining or remaining stable, and confirm whether the concentrations of the contaminants of potential concern (CoPC)

are below the appropriate guidelines at the lateral extents of the plume. A further objective of the groundwater monitoring and sampling program is to obtain additional data to determine if there is evidence to support the processes of natural attenuation in certain areas of the plume and to determine whether LPH is present within the monitoring well network.

3.1.1 June and September 2021 Groundwater Monitoring and Sampling Event

Between June and September 2021, Clifton completed a groundwater monitoring and sampling event which consisted of collecting samples from 107 monitoring wells throughout the Hounsfield Heights and North Hill Mall areas. Prior to the sampling, all wells were monitored for depth to the groundwater and the total depth of the well in addition to measuring the organic vapour concentration of the well and determining if LPH was present. Sampling of the wells was completed using either a dedicated disposable bailer or a HYDRASleeve.

Samples were submitted for analysis of BTEX, PHC fractions F1 to F2, VOCs and routine chemistry (select wells).

Upon receiving the groundwater results, they were compared to the AEP 2019 Tier 1 and 2 Guidelines as well as the Site-specific guidelines generated for the protection of human health through the vapour inhalation pathway.

A summary of the results is presented below.

3.1.1.1 Results Summary

The monitoring results from this event show the following inferred groundwater flow directions for each Unit:

- Unit 1: Southwest/southeast
- Unit 2: South
- Unit 3: South/southeast
- Unit 4: South/southeast
- Unit 5: Southeast

The inferred groundwater flow directions were generally consistent with previous investigations.

No LPH was observed in any monitoring wells.

Samples were obtained from 107 monitoring wells and were submitted for laboratory analysis of BTEX, PHC fractions F1 and F2, and VOCs. Of the BTEX and PHC fractions F1 and F2, benzene was the most frequently detected and was the parameter which most commonly exceeded the AEP 2019 Tier 1 Guidelines. With respect to VOCs, 1,2-DCA was the most frequently detected VOC and most commonly exceeded the AEP Tier 1 Guidelines.

Benzene has been detected in concentrations in excess of the AEP 2019 Tier 1 Guidelines in thirty-three monitoring wells across Units 1, 2 and 3. Concentrations of benzene ranged from below detection (<0.00040 mg/L) to a maximum of 4.33 mg/L in EX-5 (Unit 3). No exceedances of the Site-Specific Tier 2 Guidelines generated for the protection of human health through the vapor inhalation pathway for benzene, xylene(s) and PHC fraction F1 were observed.

1,2-DCA has been detected at concentrations greater than the AEP 2019 Tier 1 Guidelines in thirty monitoring wells across Units 1 through 4. Concentrations of 1,2-DCA on-Site ranged from below detection (<0.001 mg/L) to 0.208 mg/L in BH4003A (Unit 3). No samples exceeded the Site-Specific Tier 2 Guidelines generated for the protection of human health through the vapor inhalation pathway.

3.1.2 November 2021 Groundwater Monitoring and Sampling Event

In November 2021, Clifton completed a groundwater monitoring and sampling event which consisted of collecting samples from 97 monitoring wells throughout the Hounsfield Heights and North Hill Mall areas. Prior to the sampling, all wells were monitored for depth to the groundwater and the total depth of the well in addition to measuring the organic vapour concentration of the well and determining if LPH was present. Sampling of the wells was completed using either a dedicated disposable bailer or a HYDRASleeve.

Samples were submitted for analysis of BTEX, PHC fractions F1 to F2, 1,2-DCA and routine chemistry (select wells).

Upon receiving the groundwater results, they were compared to the AEP 2019 Tier 1 and 2 Guidelines as well as the Site-specific guidelines generated for the protection of human health through the vapour inhalation pathway.

A summary of the results is presented below.

3.1.2.1 Results Summary

The monitoring results from this event show the following inferred groundwater flow directions for each Unit:

- Unit 1: Southeast
- Unit 2: South
- Unit 3: South/southeast
- Unit 4: South/southeast
- Unit 5: Southeast

The inferred groundwater flow directions were generally consistent with previous investigations.

LPH was detected in one monitoring well, BH1704, during this investigation. The LPH thickness observed in monitoring well BH1704 was 0.003 m. This is the first time LPH has been observed on-Site since June 2019 when it was observed in monitoring well BH1704 at a thickness of 0.035 m.

Samples were obtained from 97 monitoring wells and were submitted for laboratory analysis of BTEX, PHC fractions F1 and F2, and 1,2-DCA. Of the BTEX and PHC fractions F1 and F2, benzene was the most frequently detected and was the parameter which most commonly exceeded the AEP 2019 Tier 1 Guidelines.

Benzene has been detected in concentrations in excess of the AEP 2019 Tier 1 Guidelines in thirty monitoring wells across Units 2, 3, 4 and 5. Concentrations of benzene ranged from below detection (<0.00040 mg/L) to a maximum of 5.82 mg/L in EX-5 (Unit 3). Monitoring well EX-5 also exceeded the Site-Specific Tier 2 Guidelines generated for the protection of human health through the vapor inhalation pathway for benzene. This monitoring well is an active extraction well for the DPVE system and so is expected to contain higher concentrations as it actively draws vapour and groundwater towards it for extraction purposes.

1,2-DCA has been detected at concentrations greater than the AEP 2019 Tier 1 Guidelines in thirty-two monitoring wells across Units 1 through 5. Concentrations of 1,2-DCA on-Site ranged from below detection (<0.001 mg/L) to 0.143 mg/L in EX-5 (Unit 3). No samples exceeded the Site-Specific Tier 2 Guidelines for 1,2-DCA generated for the protection of human health through the vapor inhalation pathway.

3.1.3 Trend and Decay Rate Analysis: Benzene and 1,2-DCA

A Mann-Kendall (Mann, 1945; Kendall, 1975; Gilbert, 1987) Plume Stability Analysis (M-K PSA) has been applied to select monitoring wells to assess concentration trends for benzene and 1,2 – DCA. The *GSI Mann-Kendall Toolkit* (2012) was used to calculate the M-K PSA. The Toolkit applies the “S” statistic, confidence factor (CF) and coefficient of variation (COV) to determine if the concentrations are increasing (CF>95%), probably increasing (95%>CF>90%), have no trend (CF<90% or CF <90% and COV>1), are stable (CF <90% and COV<1), are probably decreasing (95%>CF>90%) or are decreasing (CF>95%). Clifton performed a MK-PSA to incorporate all monitoring wells across the entire Site that had been sampled at least four times, and the most recent time they were sampled indicated an exceedance of the applicable guideline for either benzene or 1,2-DCA.

In addition to the use of the M-K PSA, Clifton has also conducted an assessment of decay rates for benzene and 1,2-DCA at select wells which were showing a decreasing or probably decreasing trend in the MK-PSA analysis and had a most recent (November 2021) concentration that exceeded the applicable guidelines. This analysis excluded extraction wells currently in operation as they do not represent steady-state conditions (EX-4 to EX-7). Decay rates and predicted time to reach applicable guidelines were calculated from the concentration data using the SourceDK spreadsheet application (GSI 2011). The Tier 1 empirical approach was used. This approach extrapolates the estimated timeframe for a monitoring well to reach a specific guidance value based on a log concentration vs. time graph. The concentrations used in

the decay rate estimates are those on the decay portion of the concentration curve (i.e. decreasing concentrations). The calculations were applied with a 95% upper/lower confidence level (UCL and LCL) in order to provide an estimated timeframe range to reach the guidance value. The guidance value applied to the analysis was 0.005 mg/L for both benzene and 1,2-DCA which corresponds with the AEP 2019 Tier 1 Guidelines.

It is important to note that SourceDK is a screening level tool to estimate remedial timeframes and uncertainties associated with those timeframes. The intended purpose of using this tool for the Site is to provide a snapshot of potential remedial timeframes based on current data sets and existing conditions primarily under a natural attenuation approach.

Based on the results obtained during the most recent sampling events (2021), approximately 69% (76 of 110 wells) of the samples met the AEP 2019 Tier 1 Guidelines for benzene. Of the 34 wells which exceeded the guidelines for benzene, an MK-PSA was performed on 26. Four of the wells which exceeded are active extraction wells and the other four did not contain a minimum of four data points within the last five years to complete the assessment. The results of the MK-PSA indicated that of the 26 monitoring wells which have an exceedance, five indicated an increasing trend while 21 indicated no trend, stable trend or a decreasing/probably decreasing trend. A summary of the results of this analysis are provided in the table below. The MK-PSA analysis output table is provided in Appendix B.

M-K PSA for Benzene	
Increasing	BH1906, BH1944, BH1977, BH2005, BH1974 and BH4003A
Probably Increasing	None
No Trend	BH1907, BH1910, BH4006, BH4007,
Stable	BH1904
Probably Decreasing	None
Decreasing	BH1905, BH1912, BH1915, BH1921, BH1924, BH1925, BH1967, BH1971, BH1982, BH510A, BH1704, EX-1 and EX-2

Decay rate analysis was performed on 13 monitoring wells for benzene. Based on the results, eight of the wells are predicted to meet the guidelines within a 5-year timeframe, three wells within a 10-year timeframe and two wells are anticipated to take longer than 15 years to meet the applicable guidelines. There is a varying level of uncertainty associated with the estimated timeframes for each well which will potentially be further reduced by obtaining additional groundwater sampling data. The Decay Rate analysis spreadsheets are attached in Appendix C.

Predicted Time to Guideline Concentration for Benzene

Monitoring Well	Applicable Guideline (mg/L)	Predicted Year to Meet Applicable Guideline	Estimated Timeframe (95% LCL)	Estimated Timeframe (95% UCL)
BH1905	0.005	2028	2022	2062
BH1912	0.005	2023	2021	2026
BH1915	0.005	2022	2020	2025
BH1921	0.005	2022	2018	2035
BH1924	0.005	2060	2040	2164
BH1925	0.005	2022	2021	2024
BH1967	0.005	2030	2025	2040
BH1971	0.005	2021	2020	2024
BH1982	0.005	2027	2025	2030
BH510A	0.005	2033	2025	2067
BH1704	0.005	2050	2028	CNC
EX1	0.005	2025	2017	CNC

Predicted Time to Guideline Concentration for Benzene				
Monitoring Well	**Applicable Guideline (mg/L)**	**Predicted Year to Meet Applicable Guideline**	**Estimated Timeframe (95% LCL)**	**Estimated Timeframe (95% UCL)**
EX2	0.005	2027	2024	2033

Based on the results obtained during the most recent sampling events (2021) approximately 68% (75 of 110 wells) of the samples met the AEP 2019 Tier 1 Guidelines for 1,2-DCA. Of the 35 wells which exceeded the guidelines for 1,2-DCA, a MK-PSA was performed on 25. Four of the wells which exceeded are active extraction wells and the other six did not contain a minimum of four data points within the last five years to complete the assessment. The results of the MK-PSA indicated that of the 25 monitoring wells which had an exceedance, three indicated an increasing trend while 22 indicated no trend, stable trend or a decreasing/probably decreasing trend. The results of this analysis are provided in the table below. The MK-PSA analysis output table is provided in Appendix B.

M-K PSA for 1,2 – DCA	
Increasing	BH1907, BH2006 and BH4003A
Probably Increasing	None
No Trend	BH1910, BH1928 and BH1981
Stable	BH4006, BH4007, BH4009A and BH510A
Probably Decreasing	BH1971 and EX-2
Decreasing	BH1905, BH1906, BH1912, BH1915, BH1921, BH1924, BH1925, BH1939, BH1967, BH1974, BH1982, BH1704 and EX-1

Decay rate analysis was performed on 16 monitoring wells for the compound 1,2-DCA. Based on the results of the 16 wells assessed, six are predicted to meet the guidelines within a 5-year timeframe, four wells within a 10-year timeframe, two wells within a 15-year timeframe and then remaining four wells are anticipated to take longer than 15 years to meet the applicable guidelines. There is a varying level of uncertainty associated with the estimated timeframes for each well which will potentially be further reduced by obtaining additional groundwater sampling data. The Decay Rate analysis spreadsheets are attached in Appendix C.

Predicted Time to Guideline Concentration for 1,2-DCA

Monitoring Well	Applicable Guideline(mg/L)	Predicted Year to Meet Applicable Guideline	Estimated Timeframe (95% LCL)	Estimated Timeframe (95% UCL)
BH1905	0.005	2023	2019	2031
BH1906	0.005	2051	2035	2128
BH1912	0.005	2028	2026	2029
BH1915	0.005	2025	2019	2044
BH1921	0.005	2042	2034	2060
BH1924	0.005	2044	2032	2088
BH1925	0.005	2025	2022	2032
BH1939	0.005	2028	2026	2030
BH1967	0.005	2027	2022	2039
BH1971	0.005	2030	2022	2083
BH1974	0.005	2035	2021	CNC
BH1982	0.005	2027	2024	2033

Predicted Time to Guideline Concentration for 1,2-DCA				
Monitoring Well	**Applicable Guideline(mg/L)**	**Predicted Year to Meet Applicable Guideline**	**Estimated Timeframe (95% LCL)**	**Estimated Timeframe (95% UCL)**
BH1704	0.005	2036	2027	2073
EX1	0.005	2021	2016	CNC
EX2	0.005	2032	2024	2064

3.1.4 Natural Attenuation Assessment

3.1.4.1 Background

Biodegradation is one aspect of the natural attenuation of contaminants within soil and groundwater. Natural attenuation can also occur through the processes of diffusion, dilution, dispersion, sorption, volatilization, and in the case of 1,2-DCA, through abiotic transformations. Biodegradation can occur under aerobic and anaerobic conditions, where the PHCs and VOCs are used as electron donors. Therefore, the availability of electron acceptors is the primary limiting factor in the success of biodegradation. Laboratory analysis of routine chemistry was completed to determine if there is evidence to suggest biodegradation of benzene and 1,2-DCA is occurring.

Biodegradation of petroleum hydrocarbons can be indirectly observed as changes in the concentration of certain dissolved ions, nutrients, and metals in groundwater resulting from reduction-oxidation (redox) reactions in the subsurface. Redox reactions occur in a predictable order in the subsurface based on electrical potential. Generally, the following redox reactions can be expected, in approximately the following order:

$$O_2^+ + 4H^+ + 5e^- \rightarrow H_2O$$ - Aerobic Respiration
$$2NO_3^- + 12H^+ + 10e^- \rightarrow N_2 + 6H_2O$$ - Nitrate Reduction (anaerobic)
$$MnO_2 + 4H^+ + 2e^- \rightarrow Mn^{2+} + 2H_2O$$ - Manganese Reduction (anaerobic)
$$Fe^{3+} + e^- \rightarrow Fe^{2+}$$ – Iron Reduction (anaerobic)
$$SO_4^{2-} + 8H^+ + 2e^- \rightarrow S^{2-} + 4H_2O$$ - Sulphate Reduction (anaerobic)

1,2-DCA can be rapidly degraded if oxygen is available. However, the oxygen demand of the competing petroleum hydrocarbons makes it less likely that oxygen will be available in the source area or mid-

gradient portions of the plume (US EPA, 2008). During the anaerobic degradation of 1,2-DCA the electron acceptors would be, in the order of preference, nitrate, ferric iron oxyhydroxide, sulfate, and finally carbon dioxide. The condition during the final stage of anaerobic degradation in which carbon dioxide is the electron acceptor is called methanogenesis (US EPA, 1998).

Generally, where biodegradation is occurring, increases in concentrations of the reduced electron acceptors dissolved iron (Fe^{2+}) and dissolved manganese (Mn^{2+}) will be observed in the groundwater. Similarly, decreases in concentrations of the oxidized electron acceptors dissolved oxygen (O^{2+}), sulfate (SO_4^{2-}), and nitrate (NO_3^-) will be observed in the groundwater. These reactions can be affected by the type of soil in the area, as well as the type and concentration of the contaminants in the soil and groundwater, resulting in variation in the rate of reactions and the order of redox reactions taking place.

Multiple lines of evidence are required to determine if biodegradation is occurring at a Site, including the reduction of contaminant mass, evidence of the redox reactions, and if required, additional testing of biological activity. The reduction of contaminant mass is supported by assessing the concentration trends (*e.g.*, Mann Kendall tests). The monitoring wells in which the contaminant mass is indicated as deceasing may be undergoing biodegradation.

The table below summarizes the average concentrations of benzene and 1,2-DCA as well as key geochemical parameters indicative of natural attenuation obtained during the two groundwater sampling events conducted in 2021. Select wells were not analyzed for routine chemistry during the November 2021 event as a result of a sampling error and so only the June and September 2021 event data is available for those wells in 2021.

Summary of Monitoring Wells Analyzed for Biodegradation Indicators	
Wells Sampled at Plume Extents	BH1918, BH1927, BH1953, BH1958, BH1962, BH1984, BH2003, BH2010, BH2012 and BH3001A
Wells Sampled within Plume	BH1906, BH1910, BH1925, BH1928, BH1944, BH1956, BH1982, BH4007 and EX7
Average Benzene Concentration (plume extents)*	<0.0005 mg/L
Average Benzene Concentration (within plume)	0.55 mg/L
Average 1,2-DCA Concentration (plume	<0.001 mg/L

Summary of Monitoring Wells Analyzed for Biodegradation Indicators	
extents)*	
Average 1,2-DCA Concentration (within plume)	0.029 mg/L
Average Dissolved Oxygen Concentration (plume extents)	4.15 mg/L
Average Dissolved Oxygen Concentration (within plume)	5.89 mg/L
Average Dissolved Nitrate (N) Concentration (plume extents)	5.23 mg/L
Average Dissolved Nitrate (N) Concentration (within plume)	18.63 mg/L
Average Dissolved Iron Concentration (plume extents)	0.105 mg/L
Average Dissolved Iron Concentration (within plume)	0.37mg/L
Average Dissolved Sulphate Concentration (plume extents)	41.4 mg/L
Average Dissolved Sulphate Concentration (within plume)	41.6 mg/L
Average Dissolved Manganese Concentration (plume extents)	0.16 mg/L
Average Dissolved Manganese Concentration (within plume)	0.44 mg/L

NOTES:

Where the result was less than the reportable detection limit (RDL) the RDL was used in the average calculations.

* BH1953 was excluded from the BTEX and VOC sampling event and are not included in the average benzene or 1,2-DCA results.

3.1.4.2 Assessment of Biodegradation of BTEX and PHC F1/F2

Based on a review of the average dissolved oxygen (DO) concentrations, the DO concentrations do appear relatively consistent between the monitoring wells within the plume as well as at the extents of the plume with the in-plume wells actually displaying a higher DO concentration on average.

With respect to biodegradation, the primary mechanism will be through the aerobic pathway as long as there is sufficient dissolved oxygen content within the groundwater. A dissolved oxygen content of 0.5 mg/L or greater is generally sufficient to promote aerobic biodegradation as the primary mechanism of biological decay within the groundwater (US EPA, 2017). All wells which were sampled contained a dissolved oxygen concentration greater than 0.5 mg/L, which suggest that aerobic degradation should not be currently constrained by lack of oxygen.

There is evidence that anaerobic degradation is occurring with the elevated concentrations of manganese and iron within the plume which is consistent with anaerobic manganese and iron reduction. However, the concentrations of nitrate were also greater within the plume which is inconsistent with anaerobic conditions and the concentrations of sulphate did not vary greatly between the extents of the plume and the plume itself. Therefore, the available evidence as to whether the PHCs may be undergoing anaerobic degradation is inconsistent.

3.1.4.3 Assessment of Biodegradation of 1,2-DCA

The degradation of 1,2-DCA varies in comparison to PHCs. Although the mechanisms for aerobic and anerobic biodegradation are similar, the oxygen demand of PHC degradation generally does not allow for aerobic degradation of 1,2-DCA.

Unlike PHCs, 1,2-DCA may also undergo abiotic transformations (US EPA, 2008). As part of the abiotic transformations that occur to 1,2-DCA, the product is slowly hydrolyzed by water. This reaction would produce 2-chloroethanol and vinyl chloride with vinyl chloride being the minor product. Vinyl chloride is a constituent that was included in the VOC analysis. This compound has historically and consistently been below detection limits in all monitoring wells since at least 2018 and is no longer being requested as part of our laboratory analysis. Although detections of vinyl chloride would indicate degradation of 1,2-DCA their absence does not mean this reaction is failing to take place, as vinyl chloride is only the minor product and may be present at concentrations below detection. However, this is a slow process with a half-life of 300 years at 15ºC (US EPA, 2008).

In addition, 1,2-DCA can react with sulfide which is produced at the end of the sulfate reduction reaction through the series of reactions shown below:

$$4H_2 + SO_4^{-2} \rightarrow S^{-2} + 4H_2O$$
$$2Fe^{+3} + 3S^{-2} \rightarrow 2FeS + S^0$$
$$2FeS + S^0 \rightarrow FeS_2$$

This abiotic reaction of 1,2-DCA can occur on the surface of solid iron sulfide. Iron sulfide was not measured directly so it is unknown whether solid iron sulfide is present and how it compares between the plume extents and within the plume. Although iron sulfide was not directly measured, sulphate and iron, the key compounds for the reaction to take place, were analyzed. There was a relatively low presence of iron along with higher concentrations of sulphate. The sulphate concentrations were fairly consistent throughout the Site, with higher iron concentrations within the plume. The availability of these compounds could support the abiotic degradation of 1,2-DCA.

Considering the aerobic and anaerobic degradation of 1,2-DCA, the same factors can be used in the assessment as with PHCs (dissolved oxygen, nitrate, manganese, iron, and sulfate). Nitrate can also be used as an indicator of aerobic degradation of 1,2-DCA. Higher concentrations of nitrate would suggest that aerobic biodegradation is still occurring as the nitrate would not have been consumed yet during anaerobic degradation (US EPA, 2008). Along with the elevated dissolved oxygen concentrations all of the monitoring wells also had elevated nitrate concentrations, with nitrate concentrations within the plume greater than those at the plume extents, which indicate suitable conditions for aerobic degradation.

An additional abiotic transformation that 1,2-DCA can undergo during anaerobic degradation is reductive dechlorination. The products of this reaction would be chloroethane and chloride. Chloroethane was included in the VOCs analysis and was completed on every monitoring well at the Site. The concentrations were below detection in every monitoring well during the June and September 2021 sampling event and were not included in the laboratory analysis for the November 2021 event. Chloride was analyzed as part of the routine water chemistry parameters completed on the 19 monitoring wells used in the assessment of biodegradation. If reductive dechlorination is occurring, we may see increases in chloride within the 1,2-DCA contaminated areas. The average concentration of chloride at the extents of the plume was 212 mg/L and the average concentration of chloride within the plume was 283 mg/L. The concentration within the plume was slightly elevated when compared to the plume extents which may indicate that reductive dechlorination is occurring. However, reductive chlorination may not produce enough of a change in the chloride concentrations to be measurable and the specific stoichiometry of the reaction has not been completed by Clifton. Therefore, the comparison of the concentrations of chloride cannot be used as empirical evidence that reductive dichlorination is in fact occurring.

3.1.5 2021 Groundwater Monitoring and Sampling Conclusions

The data collected during the June and September and November 2021 sampling events are generally consistent with previous sampling events. This groundwater monitoring and sampling program is part of the inferred plume monitoring and risk management component of the Revised Remediation Plan (Version 3.0).

During the November 2021 event, LPH was encountered in monitoring well BH1704 for the first time since May 2019. The LPH thickness was measured at 3 mm compared to 35 mm in May 2019. This monitoring well is located between extraction wells EX4 and EX5 and will continue to be monitored in the future groundwater events to determine if any trends in LPH thickness are observed.

From a risk management perspective, no wells for any parameters exceeded the Tier 2 Site-Specific Guidelines for the protection of human health with the exception of benzene in extraction well EX-5 during the November 2021 sampling event. This location has consistently had relatively higher benzene concentrations which can, in part, be attributed to the operation of EX-5 as an active extraction well, drawing vapour and groundwater towards it.

The trend analysis on select monitoring wells with exceedances of PHCs and 1,2-DCA show that most of the wells are displaying no trend, stable, and/or decreasing trends. However, there are still a few monitoring wells that currently show increasing trends for both benzene and 1,2-DCA which will require further assessment and monitoring. Several of these wells were considered within the Remedial Options Analysis completed in 2021 as potential target areas for additional investigation and potential remediation. In addition to this, a decay rate assessment on select monitoring wells for benzene demonstrated a predicted clean up time of less than 15 years for 11 of the 13 wells. For 1,2-DCA, 12 of the 16 wells assessed had a predicted time to reach the applicable guidelines in less than 15 years. It is important to note that there is still uncertainty around these predicted timeframe ranges, and as more data is gathered the uncertainty will be reduced and a resulting increase in the accuracy of the predicted timeframes can be expected.

Lastly, the on-going assessment of natural attenuation has shown that dissolved oxygen concentrations are potentially high enough to promote aerobic biodegradation of PHCs and 1,2-DCA throughout the Site. Some of the data collected also suggests that anaerobic biodegradation may be occurring, although results are inconsistent depending on the geochemical markers being assessed. Lastly, an assessment of the abiotic transformation of 1,2-DCA did not provide strong evidence for or against this as occurring.

As more data becomes available, a more robust comparison of the biodegradation indicators with decay rates over time can be completed. This comparison will provide more insight into the effect of biodegradation on contaminant decay. Intra and inter well comparisons, over time, will provide the best indicator of whether biodegradation is occurring and if it is occurring at what rate. This evidence will be able to provide additional insight on plume stability, reduction, and the primary mechanisms responsible for this.

A full presentation of all the data from the June and September 2021 program can be found in the report titled *June and September 2021 Groundwater Monitoring and Sampling Event, Hounsfield Heights and Mall Areas, 1620-14th Avenue NW, Calgary, Alberta* dated 24 February 2022. A copy of this report will also be made available on the Suncor Communication Website at http://www.suncor.com/hounsfield-heights under the 2022 tab. The report documenting the November 2021 sampling event will be made available in April 2022.

3.2 Soil Vapour Sampling Program

In 2021, Clifton completed one of the Semi-Annual Soil Vapour Sampling events. The event was completed in July 2021. An event completed in November and December 2020 was reported in 2021 and

is summarized in this report. During 2021, in addition to the Semi-Annual Soil Vapour Sampling Program, the Contingency Plan sampling which was previously triggered by an exceedance within SV-32 was on-going. A summary of the November/December 2020 and July 2021 programs as well as the Contingency Plan sampling program are summarized in the following sections.

3.2.1 General Methodology

A bottom-up approach to soil vapour characterization was selected by Clifton for the Site. Deep, near-source vapour sampling was completed first to assess the need for sub-slab vapour and potentially indoor air sampling. High spatial and temporal variability in soil vapour concentrations were anticipated as part of the design of the soil vapour sampling program.

In addition to the assessment of possible soil vapour intrusion in the Mall Area around Kal-Tire, soil vapour characterization was focused in the Hounsfield Heights Area south of 11th Avenue NW, based on the following reasons:

- Intermittent, thin, or missing clay stratum.
- Imperfectly understood soil stratigraphy.
- Shallow water table; and
- High number of underground utility corridors.

The proposed sampling frequency for collection of soil vapour samples was semi-annually. The semi-annual sampling program should capture temporal fluctuations as a result of seasonal changes in the water table, as well as changing temperatures and saturation of the soil and groundwater. Based on sampling results north of 11th Avenue consistently being below detection limits or an order of magnitude below guidelines, beginning with the November and December 2020 event, the soil vapour sampling program was adjusted to focus on the areas located on 11th Avenue NW and to the south.

The indoor air quality of structures on-Site was predicted using measured soil vapour concentrations and a vapour attenuation factor specific to the soil type, land use, depth to contamination, and contamination source. Indoor air concentration criteria were developed based on key receptors and expected exposure times.

3.2.2 Soil Vapour Sampling Program - November and December 2020

Clifton completed the second event in 2020 between 19 November 2020 and 02 December 2020. Clifton personnel collected samples of subsurface soil vapour from a total of 25 soil vapour probes. All samples were submitted for analysis of BTEX, PHC fractions F1 and F2, naphthalene, and 1,2-DCA. Select samples were also submitted for fixed gases (oxygen, nitrogen, carbon dioxide, and methane), which can provide an indication as to the degree of biodegradation taking place in the subsurface.

The results from the soil vapour sampling program were compared to the Site-specific soil vapour quality guidelines (SVQG) generated for the protection of human health through indoor air quality. All samples were below the Site-specific SVQG.

A full presentation of all the data from the November and December 2020 program can be found in the report dated 20 August 2021, and titled *Soil Vapour Monitoring Report, Winter 2020, Hounsfield Heights, Calgary, Alberta, 9445*, which is located on the Suncor Communication Website at http://www.suncor.com/hounsfield-heights under the 2021 tab at the link titled *Soil Vapour Monitoring Report*.

3.2.3 Soil Vapour Sampling Program - July 2021

Clifton completed the 2021 event during the dates of 7 July to 16 July 2021. Clifton personnel collected samples of subsurface soil vapour from a total of 30 soil vapour probes. All samples were submitted for analysis of BTEX, PHC fractions F1 and F2, naphthalene, and 1,2-DCA. Select samples were also submitted for fixed gases (oxygen, nitrogen, carbon dioxide, and methane), which can provide an indication as to the degree of biodegradation taking place in the subsurface.

The results from the soil vapour sampling program were compared to the Site-specific SVQG generated for the protection of human health through indoor air quality. All samples were below the Site-specific SVQG.

A full presentation of all the data from the July 2021 program can be found in the report dated 20 August 2021, and titled *Soil Vapour Sampling Report, July 2021, Hounsfield Heights, Calgary, Alberta, 9445*, which will also be posted on the Suncor Communication Website at http://www.suncor.com/hounsfield-heights.

3.2.4 Contingency Plan Sampling

During the Winter 2019 Soil Vapour Sampling event, an exceedance of the Site-specific SVQG for select parameters in Soil Vapour probe SV-32 was observed. Exceedances were again observed within this probe in June and July 2020.

As a result of these exceedance, the contingency plan as presented in the approved *Revised Soil Vapour Monitoring Program (Update Fall 2016), Hounsfield Heights and North Hill Mall, Calgary, Alberta (*20 October 2016) was implemented.

The Contingency Plan includes the following protocols:

- Increase sampling frequency of the soil vapour probe which contained the exceedance to quarterly events;
- Contact all residents within a 15 m radius of the observed exceedance and request access to their property for additional investigation which may include one of the following options:
  - Installation of a sub-slab soil vapour sampling point, followed by concurrent sampling of indoor air.

  - Installation of at least one, ideally two, external sampling points between their structure and the location of the exceedance.
- If sampling is approved on private residences, provide a letter reporting the results to the homeowner.
- Continue the Contingency Plan sampling until five consecutive events of results have concentrations below the site-specific SVQG.

Changes to this plan including the removal of indoor air sampling have been implemented into the Revised Remediation Plan (Version 3.0). Additional measures related to the contingency plan are presented in the Revised Soil Vapour Monitoring Program (October 2016SV-32 Sampling Results

Since the original exceedance, soil vapour probe SV-32 has been sampled an additional 11 times. The dates of the sampling events and whether exceedances were observed are provided below:

- 20 March 2019: exceedance
- 16 May 2019: non-exceedance
- 22 August 2019: non-exceedance
- 12 November 2019: non-exceedance
- 29 January 2020: non-exceedance
- 10 June 2020: exceedance
- 06 July 2020: exceedance
- 18 November 2020: non-exceedance
- 12 March 2021: non-exceedance
- 7 July 2021: non-exceedance
- 9 November 2021: exceedance
- 20 December 2021: non-exceedance

In response to the initial exceedances in SV-32 in 2019, Clifton proposed additional delineation within the respective area which included the advancement of four additional soil vapour probes and two additional groundwater monitoring wells. The new soil vapour probes were sampled beginning in March 2021 and did not show any exceedances in that event or the July 2021 event. In the November 2021 event, soil vapour probe SV-402, which was installed directly adjacent to SV-32 also contained exceedances. When this probe was re-sampled in December 2021 no exceedances were observed. The other three additionally installed probes never showed an exceedance in any sampling event. Furthermore, the probes installed within the private residences have never shown an exceedance for any parameter during any sampling event.

It should be mentioned that as follow-up to the exceedances in November 2021, Clifton was informed by a resident within the area of a potential release resulting from work being completed within a garage connecting to the laneway. Some of the product which was being used contained consistent compounds with those observed within the soil vapour sample VOC scan. This is being investigated further and is not conclusive at this point in time.

A full presentation of all the data included in the Contingency Plan sampling can be found in the following report dated 20 August 2021, and titled *Risk Management and Contingency Based Soil Vapour Sampling Report, March 2021, Hounsfield Heights, Adjacent 1620-14th Avenue NW, Calgary, Alberta 9445* as well as the report dated 20 August 2021, and titled *Soil Vapour Sampling Report, July 2021, Hounsfield Heights, Calgary, Alberta, 9445*, which will also be posted on the Suncor Communication Website at http://www.suncor.com/hounsfield-heights

3.2.4.1 Supplemental Soil Vapour Probe Installation and Sampling

Following the initial implementation of the Contingency Plan, six residences were contacted to discuss potential access to their property for additional soil vapour investigation. Following the second exceedance of SV-32 in June/July 2020 and the third exceedance of SV-32 (first exceedance in SV-402) residents which originally opted out of the Contingency Program sampling were once again contacted.

Only the original two homeowners who previously had soil vapour probes installed on their property chose to continue with the contingency sampling program. One of the residences who already had two probes within their property had one replaced in September 2020 as a result of landscaping changes to their property which required the abandonment of one of the previously installed probes.

In 2021, sampling on the private residences was completed in March, July and November and all results were below the Site-specific SVQG.

Individual reports were provided to the homeowners presenting the results of the sampling program completed on their property.

3.3 Dual Phase Vapour Extraction System Operation and Additional Performance Testing

As part of the on-going remedial efforts at the Site, the continued operation of the DPVE system was recommended as a measure to reduce, to the extent practicable, any LPH within the community of Hounsfield Heights. A secondary objective of continuing to operate the DPVE is to remove contaminated groundwater and soil vapour from the subsurface, reducing the overall mass of PHCs within the subsurface.

The DPVE continues to operate on two extraction lines connected to four extraction wells (EX-4 to EX-7). Two of these extraction wells (EX-4 and EX-5) are located in close proximity to the only well (BH1704) on-Site which most recently showed the presence of LPH (BH1704, November 2021). As part of the operations of the DPVE, monthly discharge reports are submitted to the City of Calgary. In 2021, a total of approximately 298,310 L of contaminated groundwater was extracted, treated and discharged to the City sanity sewer system.

During this time, an estimate of LPH removal based on a vapour equivalent was calculated as 607 L between 22 December 2020 and 30 December 2021. It is important to note that these estimates rely on

assumptions such as contaminant composition and density and external factors such as ambient pressures as well as data frequency and averaging which will have an impact on estimated volume removed. Furthermore, these estimates assume all vapours are directly related to LPH when in fact they are also related to the dissolved phase PHCs and VOCs within the groundwater.

As a result, LPH removal is also gauged by observing the presence of it within the monitoring well network to determine if it is being reduced. In the Spring 2019 event an LPH thickness of 35 mm was observed in monitoring well BH1704. No LPH had been observed in any monitoring wells on Site since Spring 2019 until the most recent event completed in November 2021. During this event an LPH thickness of 3 mm was observed in monitoring well BH1704. This well is located between two extraction wells which will continue to operate and the occurrence of LPH within BH1704 will continue to be monitored.

As part of the LPH Assessment completed in 2021, Clifton also conducted additional pneumatic and drawdown testing on the DPVE system to support the header integrity and performance testing completed by Sequoia in 2020.

The pneumatic system testing completed by Clifton involved assessing the pneumatic influence achieved by the system under various operational configurations over a defined period of time. Similarly in nature, the drawdown testing was also completed by Clifton to help to determine the hydraulic influence the system is having on the surrounding water table over varying operational configurations.

The results of the pneumatic testing completed by Clifton were similar to those obtained by Sequoia during their testing in 2020. The results did suggest that a pneumatic influence sufficient of capturing the areas beneath the private residences where LPH may be present is being achieved by the system.

The results from the drawdown testing trials were less revealing in terms of the influence the system is having on groundwater elevations within the surrounding aquifer. The results from the trial conducted with simultaneous header line operation made it difficult to determine whether the changes in water elevation was related to the system or a result of atmospheric pressure changes. On the other hand, the trial conducted with 12-hour cycling of the header lines did produce results in one of the monitoring wells which suggested an influence on groundwater elevation was present.

A full presentation of all the additional pneumatic and drawdown testing is presented in the report titled *Liquid Petroleum Hydrocarbon Assessment, Hounsfield Heights Area, 1620-14th Avenue NW, Calgary, Alberta* dated 29 June 2021. A copy of this report is available on the Suncor Communication Website at http://www.suncor.com/hounsfield-heights under the 2021 tab.

3.4 Liquid Petroleum Hydrocarbon Assessment

Clifton, on behalf of Suncor, conducted a LPH Assessment in the northern portion of Hounsfield Heights, bound by 16th Street to the west, Lion's Park to the north and the laneway between 15th and 16th Street to

the east. The LPH Assessment was a requirement of Ministerial Order 09/2020 to address Item 3 and Item 4 of Environmental Protection Order (EPO) – 2018/01-SSR (and amendments).

Item 3 and Item 4 of EPO 2018/01-SSR state the following:

“3. The Parties shall complete the delineation of the presence of liquid petroleum hydrocarbons in Hounsfield Heights neighborhood, as outlined in the Clifton Report and in accordance with the Remediation Plan approved by the Direction, within 18 months of the date of the Ministerial Order issued in EAB Appeals 17-069-070 and 18-013.”

“4. The Director may extend the 18-month deadline specified in condition 3 if the Parties have difficulty obtaining access to private property, but the intent of the deadline, which is to complete delineation in a timely manner, should remain.”

Based on the requirements set forth in EPO 2018/01- SSR and as outlined in the Revised Remediation Plan (Version 3.0), Clifton conducted a LPH Assessment which involved a review of the historical LPH monitoring data, current LPH monitoring data, Dual Phase Vapour Extraction (DPVE) system operation and performance testing as well as an intrusive subsurface investigation within City of Calgary right-of-ways and parks.

As part of the LPH Assessment, four residents were contacted regarding obtaining access to their property(s) for investigative purposes. Access was not provided at the time of the investigation.

The objectives of the LPH Assessment were to:

1. Complete DPVE performance testing to determine a zone of pneumatic and drawdown influence established through various DPVE operational configurations.
2. Complete a subsurface investigation to determine if LPH is still present in areas where it had been previously identified prior to well decommissioning.
3. Complete an assessment, based on multiple lines of evidence, of the current state of LPH within the investigated area.

In order to complete the objectives, Clifton first completed its DPVE performance testing which involved determining the integrity of the DPVE header network, the pneumatic influence achieved by the system as well as the extent of the hydraulic drawdown created by the system.

Following the performance testing, a historical LPH data review was completed to help form the basis of the subsurface investigation. The subsurface investigation was completed to assess for the presence of LPH in, and adjacent to, areas where it had been previously identified. A total of six boreholes, all completed as monitoring wells were advanced as part of this investigation. The review of the DPVE performance testing data, the historical LPH data and the subsurface investigation data was then assessed to help determine the current presence/absence of LPH within the investigated area through multiple lines of evidence. To provide further context surrounding the results obtained during the

assessment, LPH was classified into the following three categories based on its level of saturation within the soil matrix:

- Migrating: The LPH body moves laterally based on its degree of saturation and LPH-head;
- Mobile: LPH moves vertically and horizontally, at a pore-scale level, under a gradient; and
- Residual: LPH is discontinuous and does not occupy enough pore space to flow.

Based on the findings from the investigation and multiples lines of evidence, Clifton concluded the following:

- Migrating LPH does not appear to be present within the investigated area.
- Mobile LPH does not appear to be present within the newly investigated areas nor in the areas where it had been previously identified.
- There is some evidence to suggest residual LPH is still present in select locations.
- Based on the data, the DPVE appears to have been effective in helping to reduce LPH saturation to a level at, or below, residual phase.
- The DPVE performance testing suggests that the areas beneath the residences would likely be reflective of the surrounding investigated areas based on the radius of influence achieved by the system.
- The data obtained during the assessment should be used as part of the Remedial Options Assessment to help determine how the DPVE system will be used in the future.

Additional details related to the LPH Assessment can obtained in the report titled *Liquid Petroleum Hydrocarbon Assessment, Hounsfield Heights Area, 1620-14th Avenue NW, Calgary, Alberta* dated 29 June 2021. A copy of this report is available on the Suncor Communication Website at http://www.suncor.com/hounsfield-heights under the 2021 tab.

3.5 Remedial Options Analysis

Following the release of the Ministerial Order 09/2020 in February 2020 and the Revised Remediation Plan (Version 3.0), Suncor committed to completing a Remedial Options Analysis (ROA) within 2021, targeted specifically at areas within Lions Park and the community of Hounsfield Heights.

The first component of the ROA was to identify areas beyond the influence of the DPVE system and the Permeable Reactive Barrier that were showing increasing trends in the CoPCs or contained relatively higher concentrations of these contaminants.

Two primary areas of concern were identified including a portion of Lion's north of 13th Avenue between 16th and 17th Street NW and select areas south of 11th Avenue NW including the laneway between 15th and 16th Street NW and the greenspace south of 11th Avenue and to the west of 16th Street NW.

The remedial objective set forth for the ROA was to assess various technologies which could promote the reduction in concentrations of CoPCs at hot-spots as well as to reverse trends in wells displaying an

increasing concentration which would further support the overall Site objective of meeting the regulatory guidelines to achieve Site closure.

A remedial options screening matrix was then used to assess each area against different remedial approaches taking into account their effectiveness, cost, duration, disturbance and regulatory acceptance.

Based on the application of the screening matrix the following technologies, in order of highest rank for each area, were identified:

Lions Park:
- PRB using activated carbon (Highest Ranked)
- Soil Vapour Extraction (2nd Highest Ranked)
- Enhanced Biodegradation (oxygen released compound) (2nd Highest Ranked)
- Chemical Oxidation (2nd Highest Ranked)

South of 11th Avenue
- Enhanced Biodegradation (oxygen release compound) (Highest Ranked)
- Chemical Oxidation (Highest Ranked)
- Soil Vapour Extraction (Second Highest Ranked)

As shown above, several of the technologies resulted in the same ranking when applying them to our remedial options matrix. Furthermore, the scoring between different rankings was also very close, separated by 1 or 2 points out of a possible 24 points. This is a result of us only screening against technologies where we already believed they would feasible and applicable to the Site.

Additional details related to the Remedial Options Analysis can be obtained in the report titled *Remedial Options Analysis, Hounsfield Heights Area, 1620-14th Avenue NW, Calgary, Alberta* dated 14 January 2022. A copy of this report is available on the Suncor Communication Website at http://www.suncor.com/hounsfield-heights under the 2021 tab.

3.6 Permeable Reactive Barrier (PlumeStop™) Performance Monitoring

Following completion of the full-scale application of the permeable reactive barrier (PRB) along 11th Avenue NW in December 2019, Clifton initiated a performance monitoring program. The performance monitoring program included bi-weekly sampling for the first quarter, followed by monthly sampling for the second quarter, followed by quarterly sampling for the remainder of the first year until returning to semi-annual sampling along with the existing monitoring well network.

Prior to injection, the following monitoring wells, located down-gradient of the injection location, were identifed as performance monitoring wells for the application of the PRB:

- BH1928, BH1929, BH1936, BH1937, BH1939, BH1954 and BH1982.

Four of these monitoring wells were used as performance wells during the previous two pilot studies, including BH1929, BH1937, BH1939 and BH1982. A performance monitoring program was initiated in January 2020 following the outline presented within the Revised Remediation Plan.

Monitoring wells BH1939 and BH1982 had previously been the most consistent monitoring wells to have sample results exceed the Tier 2 Site-Specific Guidelines. These two monitoring wells have seen significant contaminant reduction following the pilot studies and full-scale application of the PRB. Monitoring well BH1939 results have now been below the AEP 2019 Tier 1 Guidelines for benzene for the last five sampling events. Concentrations of benzene and 1,2-DCA in BH1982 have both decreased by 95% (May 2019 to November 2021) and 65% (May 2019 to November 2021) since the full scale application however, still exceed the AEP 2019 Tier 1 Guidelines and monitoring well BH1939 still shows exceedances for 1,2-DCA. 1,2- DCA has decreased by 43% in this monitoring well since May 2019. Three (BH1929, BH1936 and BH1937) of the other five monitoring wells included in the program assessing the PRB effectiveness (BH1928, BH1929, BH1936, BH1937, and BH1954) currently show sample results below detection limits for benzene and 1,2-DCA. Monitoring well BH1928 and BH1954 both show concentrations of benzene below the detection limit and 1,2-DCA at a concentration above the regulatory guidelines. The 1,2-DCA concentration in both these wells had increased in the November 2021 event from the previous events in 2020. These wells will continue to be assessed as part of the on-going groundwater monitoring and sampling program. Prior to the installation of the PRB, monitoring well BH1928, BH1929 and BH1936 all showed exceedances of the AEP 2019 Tier 1 Guidelines for benzene and 1,2-DCA.

The effectiveness of the PRB will continue to be assessed as part of the on-going groundwater monitoring and sampling program and a summary will be presented in each subsequent Annual Report.

The data used to summarize the PRB performance presented above can be found in the report titled *June and September 2021 Groundwater Monitoring and Sampling Event, Hounsfield Heights and Mall Areas, 1620-14th Avenue NW, Calgary, Alberta* dated 24 February 2022. A copy of this report will also be made available on the Suncor Communication Website at http://www.suncor.com/hounsfield-heights under the 2022 tab. The report documenting the November 2021 sampling event will be made available in April 2022.

4.0 Data Gaps

Based on the work completed in 2021, the primary data gap which previously existed, the extent of LPH within the community of Hounsfield Heights, has been closed to the extent practicable. A multiple lines of evidence approach was applied to provide a summary of the current state of any remaining LPH on-Site. Areas beneath private residences in the area of potential LPH were not investigated as access was not granted. As a result, lines of evidence based on groundwater concentrations, DPVE system performance

and the presence of LPH within the monitoring well network were used to make assumptions regarding the state of LPH within these areas.

The primary data gap which will be addressed in 2022 is the applicability of the domestic use aquifer pathway across the entire Site. Further information on this assessment will be made available in the 2022 community bulletins and proposed in-person public meeting.

5.0 Future Work and Changes to Program

Based on the current Revised Remediation Plan (Version 4.0) as well as the requirements within the EPO and the MO, the following work is being proposed for 2022:

- Continued development of an effective two-way communication strategy between the parties and all stakeholders, particularly the residents of Hounsfield Heights. This will include an in-person public meeting;
- Continued use of the Suncor communication website which may be adjusted based on the developed communication strategy;
- Adjustment of Site boundaries to better reflect the available soil, groundwater and soil vapour data;
- Continued assessment of the DPVE performance as part of a system optimization process;
- An assessment of the applicability of the domestic use aquifer across the entire Site;
- Further analysis into the potential application of additional remedial options within Lion's Park and Hounsfield Heights;
- On-going groundwater monitoring, sampling and reporting as presented within the Revised Remediation Plan (Version 4.0);
- On-going soil vapour monitoring, sampling and reporting as presented within the Revised Remediation Plan (Version 4.0); and
- Further investigation into the source of the SV-32 and SV-402, intermittent and recurring exceedance;

No changes to the overall 2021 program are recommended in 2022, at this time.

The above scope of work follows the outlined approach presented within the Revised Remediation Plan (Version 4.0) as well as the requirements set forth in the EPO and MO. All technical work will be reported and made available to all stakeholders through the Suncor website.

6.0 Closure

This report was prepared by Clifton Engineering Group on behalf of Suncor Energy Products Partnership. It is intended for the sole use and exclusive use of and Suncor Energy Products Partnership, their affiliated companies and partners and their respective insurers, agents, employees and advisors (collectively known as Suncor). The material in it reflects Clifton Engineering Group best judgment available to it at the time of preparation. Any use that a third party makes of this report, or any reliance on or decisions to be made based on it, other than by Suncor, are the responsibility of such third parties. Clifton Engineering Group and Suncor accept no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report has been prepared in accordance with generally accepted engineering practice common to the local area. No other warranty expressed or implied is made.

No conclusions should be made based on this report regarding any concentrations of substances in other areas of the Site. Other Contaminants of Concern may be present at the Site in areas that were not investigated. Clifton Engineering Group accepts no responsibility for any deficiencies or inaccuracies in the information provided in this report that are the direct result of intentional or unintentional misrepresentations, errors or omissions of the persons interviewed, or information reviewed.

No environmental site investigation or remediation can wholly eliminate uncertainty regarding environmental conditions in connection with a property. This investigation is intended to reduce, but not eliminate the uncertainty regarding environmental conditions. Conclusions regarding the condition of the Site do not represent a warranty that all areas within the site and beneath structures are of the same quality as those sampled. Further, contamination could also exist in forms not indicated by the investigation.

The work was based in part upon the environmental quality guidelines and regulations in effect when the work was begun. Future regulatory changes may require reassessment of the findings of this investigation.

Copying or distributing this report or use of or reliance on the information presented within it, in whole or part, other than by Suncor, is not permitted without written consent from Clifton Engineering Group.

Reference List

Alberta Environment and Parks. 2019. *Alberta Tier 1 Soil and Groundwater Remediation Guidelines.*

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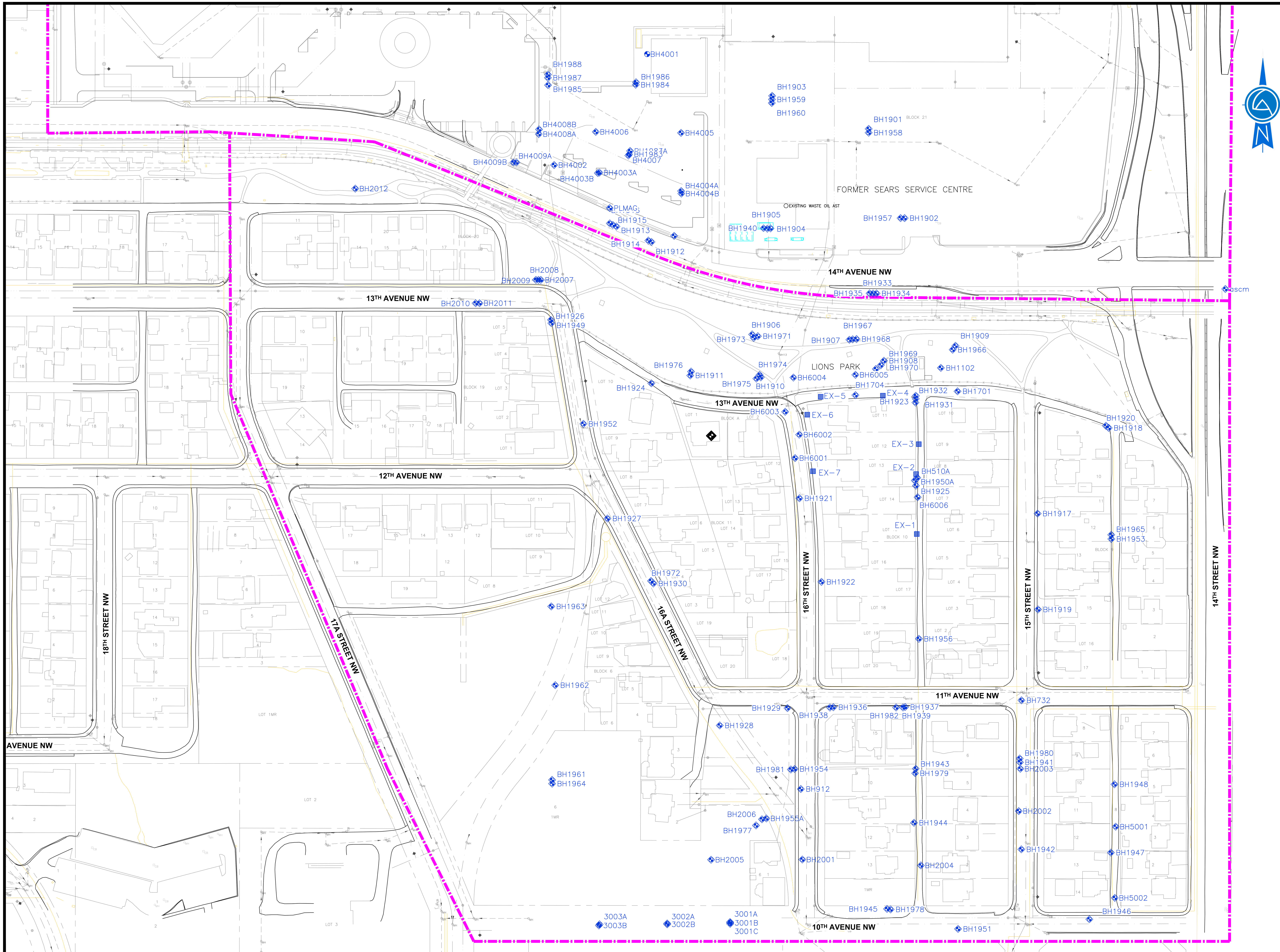
Appendix A

Clifton



LEGEND

SITE BOUNDARY	
EXTRACTION WELL	
LRT TRACKS	
FENCE LINE	
LEGAL LINE	
FORMER FACILITY/FEATURE	
BUILDING	
GROUNDWATER MONITORING WELL	
BOREHOLE	
ABANDONED / DAMAGED MONITORING WELL	

UTILITY LINES & SYMBOLS

- NATURAL GAS LINE
- SANITARY SEWER
- STORM SEWER
- WATER
- CATCH BASIN
- FIRE HYDRANT
- LIGHT STANDARD
- MANHOLE
- UTILITY POLE

NOTES:

1 DRAWING COMPILED FROM PLANIMETRIC FILES SUPPLIED BY THE CITY OF CALGARY (INCLUDING U/G UTILITIES) & FROM SITE ASSESSMENT INFORMATION. ADDITIONAL REFERENCES FROM SEACOR ENVIRONMENTAL ENGINEERING INC., DRAWINGS 149-5A11.DWG, 149-5A6.DWG.

0 10 20 30 40 50 m

PLOT SIZE 22x34

ENGINEER

Clifton

CLIENT

SUNCOR ENERGY PRODUCTS PARTNERSHIP

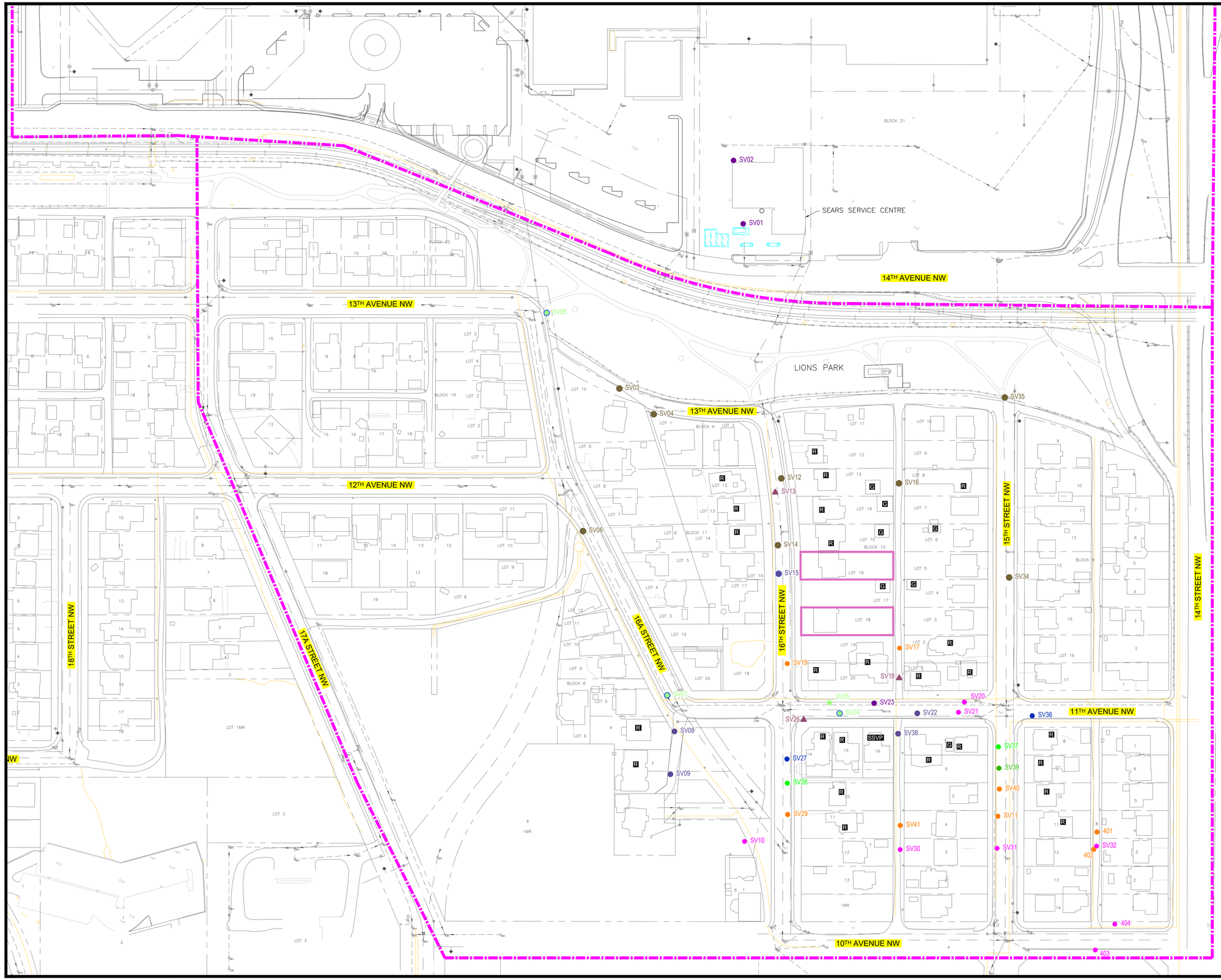
PROJECT

2021 ANNUAL REPORT
HOUNSFIELD HEIGHTS AND NORTH HILL MALL
1620-14th AVE NW CALGARY, ALBERTA

TITLE

MONITORING WELL LOCATION PLAN

DESIGNED	SCALE 1:1000	DATE 2022-03-21
DRAWN IW	PROJECT NO. CG3418 E19	FIG. 1
CHECKED SDA	FILE NO. CG3418 E19-01	



LEGEND

- SITE BOUNDARY
- LRT TRACKS
- FENCE LINE
- LEGAL LINE
- FORMER FACILITY/FEATURE
- BUILDING
- SOIL VAPOUR PROBES INSTALLED AT 1.0 mbgs — SV#
- SOIL VAPOUR PROBES INSTALLED AT 1.5 mbgs — SV#
- SOIL VAPOUR PROBES INSTALLED AT 2.0 mbgs — SV#
- SOIL VAPOUR PROBES INSTALLED AT 2.5 mbgs — SV#
- SOIL VAPOUR PROBES INSTALLED AT 3.0 mbgs — SV#
- SOIL VAPOUR PROBES INSTALLED AT 3.5 mbgs — SV#
- SOIL VAPOUR PROBES INSTALLED AT 4.0 mbgs — SV#
- SOIL VAPOUR PROBES INSTALLED AT 4.5 mbgs — SV#
- SOIL VAPOUR PROBES INSTALLED AT 5.0 mbgs — SV#
- SOIL VAPOUR PROBES INSTALLED AT 5.5 mbgs — SV#
- SOIL VAPOUR PROBES INSTALLED AT 6.0 mbgs — SV#
- NESTED SOIL VAPOUR SAMPLING POINT — SV#
- ADDITIONAL SOIL VAPOUR SAMPLING POINTS INSTALLED IN MAY 2019 — SV#
- RESIDENTIAL STRUCTURES WITH REPORTED UNUSUAL FEATURES (EARTHEN FLOORS)

- RESIDENTIAL — R
- DETACHED GARAGE — G
- SUB-SLAB SOIL VAPOUR POINT — SSVP

UTILITY LINES & SYMBOLS

- NATURAL GAS LINE
- SANITARY SEWER
- STORM SEWER
- WATER
- CATCH BASIN
- FIRE HYDRANT
- LIGHT STANDARD
- MANHOLE
- UTILITY POLE

NOTES:

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0 10 20 30 40 50 m

PLOT SIZE 22x34

ENGINEER

Clifton

CLIENT

SUNCOR ENERGY PRODUCTS PARTNERSHIP

PROJECT

2021 ANNUAL REPORT
HOUNSFIELD HEIGHTS AND NORTH HILL MALL
1620-14th AVE NW CALGARY, ALBERTA

TITLE

SOIL VAPOUR SAMPLING POINT
LOCATION MAP

DESIGNED	SCALE	DATE
	1:1000	2022-03-21
DRAWN: IW	PROJECT NO. CG3418E19	DWG NO. 2
CHECKED: SDA	FILE NO. CG3418 E19-02	

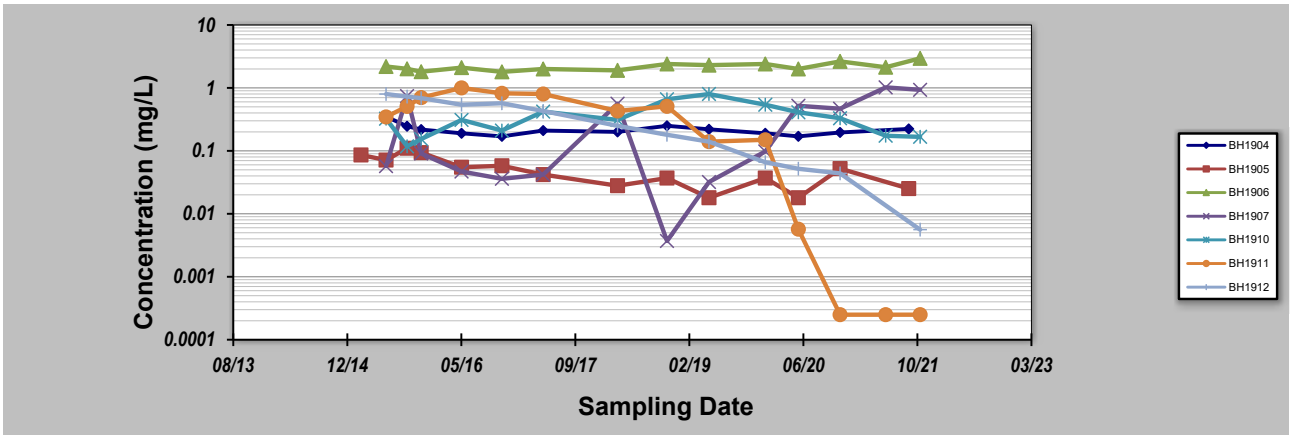
Appendix B

Clifton

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-Mar-22	Job ID:	Suncor
Facility Name:	Hounsfield Heights and North Hill Mall	Constituent:	Benzene
Conducted By:	Stephen d'Abadie	Concentration Units:	mg/L

Sampling Point ID:	BH1904	BH1905	BH1906	BH1907	BH1910	BH1911	BH1912
Sampling Event	Sampling Date	BENZENE CONCENTRATION (mg/L)						
1	25-Feb-15		0.086					
2	15-Jun-15	0.35	0.0714	2.19	0.0572	0.324	0.346	0.799
3	15-Sep-15	0.246	0.11	2.01	0.742	0.118	0.509	0.727
4	16-Nov-15	0.218	0.0938	1.81	0.0909	0.154	0.701	0.688
5	11-May-16	0.19	0.055	2.1	0.047	0.31	1.0	0.54
6	4-Nov-16	0.17	0.058	1.8	0.036	0.21	0.82	0.57
7	4-May-17	0.21	0.042	2.0	0.042	0.42	0.8	0.43
8	26-Mar-18	0.20	0.028	1.9	0.56	0.31	0.43	0.25
9	29-Oct-18	0.25	0.037	2.4	0.0037	0.66	0.51	0.18
10	1-May-19	0.22	0.018	2.3	0.032	0.8	0.14	0.14
11	3-Jan-20	0.19	0.037	2.4	0.098	0.54	0.15	0.066
12	27-May-20	0.17	0.018	2.0	0.52	0.41	0.0057	0.052
13	26-Nov-20	0.196	0.0523	2.64	0.467	0.33	0.00025	0.0439
14	14-Jun-21			2.13	1.02	0.174	0.00025	
15	23-Sep-21	0.223	0.0252					
16	12-Nov-21			2.95	0.932	0.167	0.00025	0.0056
17								
18								
19								
20								
Coefficient of Variation:		0.21	0.55	0.15	1.10	0.57	0.90	0.84
Mann-Kendall Statistic (S):		-18	-57	35	21	12	-54	-76
Confidence Factor:		84.7%	99.9%	96.9%	86.0%	72.3%	99.9%	>99.9%
Concentration Trend:		Stable	Decreasing	Increasing	No Trend	No Trend	Decreasing	Decreasing



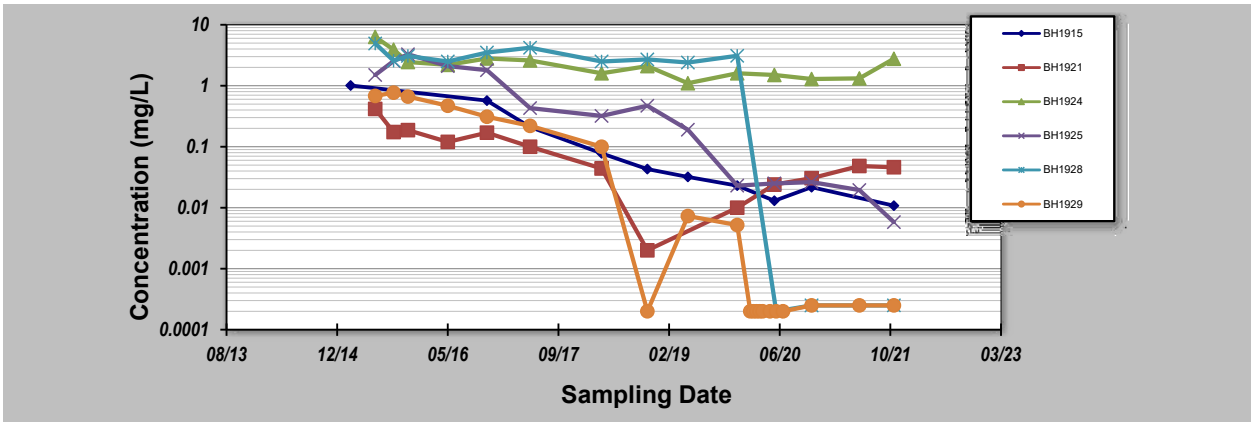
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-Mar-22	Job ID:	Suncor
Facility Name:	Hounsfield Heights and North Hill Mall	Constituent:	Benzene
Conducted By:	Stephen d'Abadie	Concentration Units:	mg/L

Sampling Point ID:	BH1915	BH1921	BH1924	BH1925	BH1928	BH1929	BH1974
Sampling Event	Sampling Date	BENZENE CONCENTRATION (mg/L)						
1	26-Feb-15	1.01						
2	17-Jun-15		0.417	6.32	1.5	4.93	0.681	
3	8-Sep-15		0.174	3.9	2.54	2.57	0.77	
4	12-Nov-15		0.187	2.45	3.28	3.08	0.664	
5	10-May-16		0.12	2.2	2.1	2.5	0.47	
6	3-Nov-16	0.57	0.17	2.8	1.8	3.5	0.31	
7	17-May-17	0.21	0.1	2.6	0.43	4.2	0.22	
8	5-Apr-18	0.078	0.044	1.6	0.32	2.5	0.1	0.00082
9	29-Oct-18	0.043	0.002	2.1	0.47	2.7	0.0002	0.0002
10	30-Apr-19	0.032		1.1	0.19	2.4	0.0073	0.0002
11	9-Dec-19	0.023	0.010	1.6	0.023	3.1	0.0052	0.0016
12	6-Feb-20						0.0002	
13	20-Feb-20						0.0002	
14	5-Mar-20						0.0002	
15	19-Mar-20						0.0002	
16	2-Apr-20						0.0002	
17	5-May-20						0.0002	0.00086
18	25-May-20	0.013	0.024	1.5	0.025			
19	2-Jun-20					0.0002	0.0002	
20	3-Jul-20						0.0002	
21	9-Nov-20	0.0217	0.0305	1.29	0.0263	0.00025	0.0003	0.0022
22	13-Jun-21		0.0483	1.32	0.0195		0.00025	0.0023
23	16-Nov-21	0.0108	0.0461	2.77	0.0058	0.00025	0.00025	0.0054
24								
25								
Coefficient of Variation:		1.65	1.08	0.57	1.22	0.64	1.71	1.00
Mann-Kendall Statistic (S):		-43	-42	-50	-71	-38	-111	21
Confidence Factor:		>99.9%	99.5%	99.8%	>99.9%	98.9%	>99.9%	99.6%
Concentration Trend:		Decreasing	Decreasing	Decreasing	Decreasing	Decreasing	Decreasing	Increasing



Notes:

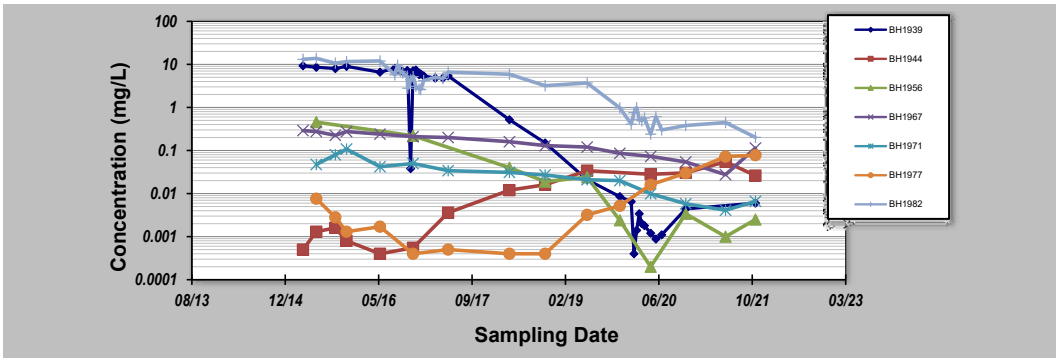
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 1-Mar-22
Facility Name: Hounsfield Heights and North Hill Mall
Conducted By: Stephen d'Abadie

Job ID: Suncor
Constituent: Benzene
Concentration Units: mg/L

Sampling Point ID:	BH1939	BH1944	BH1956	BH1967	BH1971	BH1977	BH1982
Sampling Event	Sampling Date	BENZENE CONCENTRATION (mg/L)						
1	1-Apr-15	9.31	0.0005		0.291			13.1
2	11-Jun-15	8.57	0.0013	0.456	0.276	0.0474	0.0076	13.8
3	21-Sep-15	8.00	0.0016		0.225	0.0795	0.0028	10.7
4	20-Nov-15	8.99	0.0008		0.275	0.108	0.0013	11.6
5	17-May-16	6.6	0.0004		0.24	0.042	0.0017	12
6	5-Aug-16	8.1						5.7
7	19-Aug-16	7.4						9.6
8	3-Sep-16	7.1						6.9
9	16-Sep-16	6.8						6.3
10	10-Oct-16	7.2						5.3
11	13-Oct-16	5.9						2.8
12	28-Oct-16	0.038						4.4
13	10-Nov-16	7.1	0.00055	0.22	0.21	0.05	0.0004	5.2
14	25-Nov-16	7.4						3.1
15	12-Dec-16	5.8						2.7
16	21-Dec-16	6						2.6
17	6-Jan-17	5.4						4.2
18	9-Mar-17	4.8						5.0
19	19-Apr-17	4.8						4.7
20	17-May-17	5.4	0.0036		0.20	0.034	0.0005	6.6
21	10-Apr-18	0.52	0.012	0.040	0.16	0.031	0.0004	5.9
22	18-Oct-18	0.15	0.016	0.019	0.13	0.027	0.0004	3.2
23	31-May-19	0.021	0.034	0.024	0.12	0.021	0.0032	3.7
24	22-Nov-19	0.0085	0.021	0.0024	0.086	0.020	0.0052	0.98
25	22-Jan-20	0.0065						0.41
26	6-Feb-20	0.0004						0.76
27	20-Feb-20	0.0014						0.99
28	5-Mar-20	0.0034						0.53
29	19-Mar-20	0.002						0.49
30	2-Apr-20	0.0018						0.57
31	5-May-20	0.0012	0.028	0.0002	0.073	0.0099	0.016	0.24
32	2-Jun-20	0.00088						0.61
33	3-Jul-20	0.0011						0.3
34	9-Nov-20	0.0044	0.0302	0.0034	0.0542	0.0058	0.0298	0.380
35	10-Jun-21		0.055	0.001	0.0275	0.0041	0.072	0.446
36	17-Nov-21	0.006	0.0261	0.0025	0.114	0.0066	0.0777	0.202
37								
38								
39								
40								
Coefficient of Variation:		0.96	1.14	1.94	0.52	0.86	1.69	0.93
Mann-Kendall Statistic (S):		-469	67	-31	-93	-77	38	-470
Confidence Factor:		>99.9%	>99.9%	99.8%	>99.9%	>99.9%	97.9%	>99.9%
Concentration Trend:		Decreasing	Increasing	Decreasing	Decreasing	Decreasing	Increasing	Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
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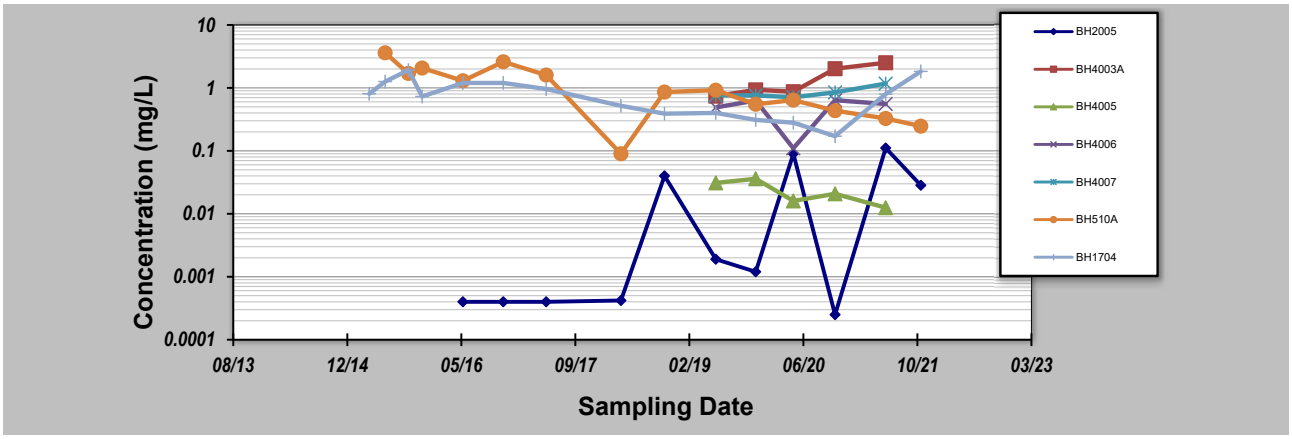
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-Mar-22	Job ID:	Suncor
Facility Name:	Hounsfield Heights and North Hill Mall	Constituent:	Benzene
Conducted By:	Stephen d'Abadie	Concentration Units:	mg/L

Sampling Point ID:	BH2005	BH4003A	BH4005	BH4006	BH4007	BH510A	BH1704
Sampling Event	Sampling Date	BENZENE CONCENTRATION (mg/L)						
1	2-Apr-15							0.806
2	11-Jun-15						3.61	1.26
3	21-Sep-15						1.7	1.92
4	20-Nov-15						2.07	0.731
5	17-May-16	0.0004					1.3	1.2
6	10-Nov-16	0.0004					2.6	1.2
7	17-May-17	0.0004					1.6	0.96
8	10-Apr-18	0.00042					0.09	0.52
9	18-Oct-18	0.04					0.86	0.39
10	31-May-19	0.0019	0.74	0.031	0.49	0.76	0.92	0.4
11	22-Nov-19	0.0012	0.93	0.036	0.63	0.76	0.55	0.31
12	5-May-20	0.09	0.87	0.016	0.11	0.71	0.64	0.28
13	4-Nov-20	0.00025	2.02	0.0208	0.638	0.85	0.435	0.171
14	14-Jun-21	0.111	2.51	0.0125	0.556	1.17	0.327	0.798
15	15-Nov-21	0.0284					0.247	1.83
16								
17								
18								
19								
20								
Coefficient of Variation:		1.60	0.56	0.43	0.45	0.22	0.84	0.64
Mann-Kendall Statistic (S):		24	8	-6	2	5	-63	-44
Confidence Factor:		96.4%	95.8%	88.3%	59.2%	82.1%	>99.9%	98.4%
Concentration Trend:		Increasing	Increasing	Stable	No Trend	No Trend	Decreasing	Decreasing



Notes:

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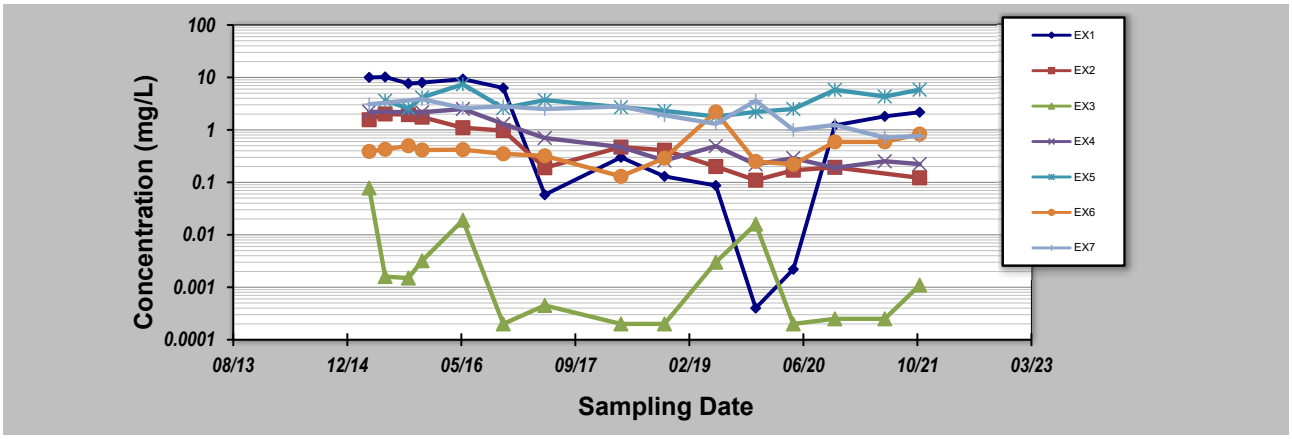
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-Mar-22	Job ID:	Suncor
Facility Name:	Hounsfield Heights and North Hill Mall	Constituent:	Benzene
Conducted By:	Stephen d'Abadie	Concentration Units:	mg/L

Sampling Point ID:	EX1	EX2	EX3	EX4	EX5	EX6	EX7
Sampling Event	Sampling Date	BENZENE CONCENTRATION (mg/L)						
1	2-Apr-15	10.0	1.56	0.078	2.21		0.389	3.08
2	11-Jun-15	10.2	2.01	0.0016		3.61	0.426	
3	21-Sep-15	7.66	1.95	0.0015		2.57	0.497	
4	20-Nov-15	7.97	1.75	0.0032	2.17	4.17	0.414	3.86
5	17-May-16	9.3	1.1	0.019	2.5	7.4	0.42	2.6
6	10-Nov-16	6.3	0.97	0.0002	1.3	2.6	0.35	2.8
7	11-May-17	0.058	0.19	0.00045	0.7	3.7	0.32	2.5
8	10-Apr-18	0.3	0.47	0.0002	0.47	2.7	0.13	2.8
9	18-Oct-18	0.13	0.41	0.0002	0.26	2.3	0.29	1.9
10	31-May-19	0.087	0.20	0.003	0.49	1.8	2.2	1.3
11	22-Nov-19	0.0004	0.11	0.016	0.22	2.2	0.25	3.6
12	5-May-20	0.0022	0.17	0.0002	0.29	2.5	0.22	1.0
13	3-Nov-20	1.22	0.193	0.00025	0.189	5.79	0.591	1.24
14	10-Jun-21	1.81		0.00025	0.252	4.33	0.591	0.715
15	10-Nov-21	2.17	0.122	0.0011	0.223	5.82	0.834	0.762
16								
17								
18								
19								
20								
Coefficient of Variation:		1.09	0.92	2.41	1.00	0.45	0.94	0.50
Mann-Kendall Statistic (S):		-47	-69	-28	-58	3	2	-51
Confidence Factor:		99.0%	>99.9%	90.8%	>99.9%	54.3%	52.0%	100.0%
Concentration Trend:		Decreasing	Decreasing	Prob. Decreasing	Decreasing	No Trend	No Trend	Decreasing



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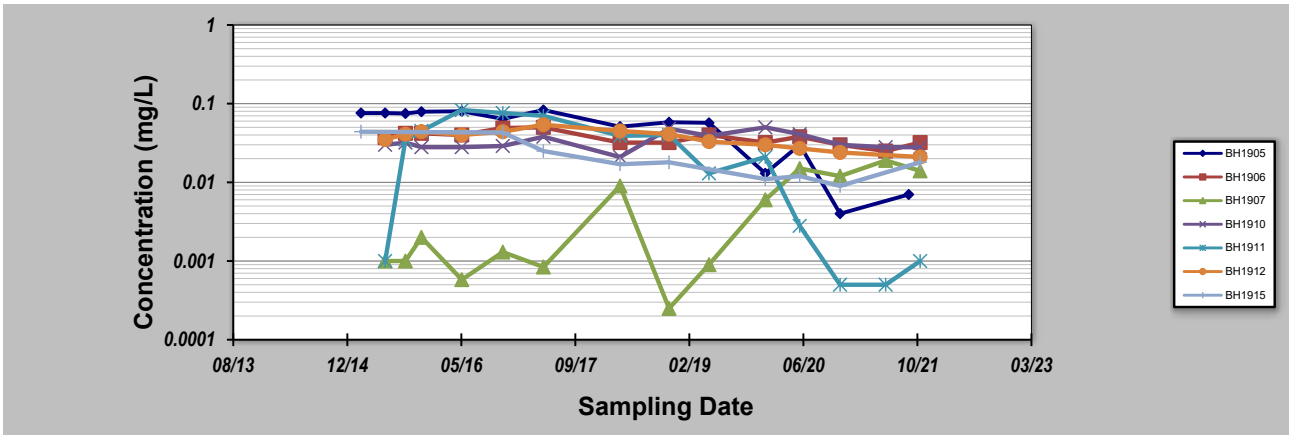
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-Mar-22	Job ID:	Suncor
Facility Name:	Hounsfield Heights and North Hill Mall	Constituent:	1,2 -DCA
Conducted By:	Matthew Foulkes	Concentration Units:	mg/L

Sampling Point ID:	BH1905	BH1906	BH1907	BH1910	BH1911	BH1912	BH1915
Sampling Event	Sampling Date	1,2 -DCA CONCENTRATION (mg/L)						
1	25-Feb-15	0.076						0.044
2	11-Jun-15	0.076	0.037	0.001	0.03	0.001	0.035	
3	8-Sep-15	0.075	0.042	0.001	0.032	0.035	0.041	
4	17-Nov-15	0.079	0.042	0.002	0.028	0.045	0.044	
5	12-May-16	0.08	0.04	0.00058	0.028	0.083	0.04	
6	8-Nov-16	0.064	0.049	0.0013	0.029	0.076	0.044	0.043
7	5-May-17	0.083	0.05	0.00084	0.038	0.07	0.054	0.025
8	6-Apr-18	0.051	0.032	0.009	0.021	0.039	0.045	0.017
9	7-Nov-18	0.058	0.032	0.00025	0.048	0.04	0.041	0.018
10	1-May-19	0.057	0.04	0.0009	0.039	0.013	0.033	
11	3-Jan-20	0.013	0.032	0.006	0.050	0.021	0.03	0.011
12	2-Jun-20	0.030	0.038	0.015	0.041	0.0028	0.027	0.012
13	26-Nov-20	0.004	0.030	0.012	0.030	0.0005	0.024	0.009
14	14-Jun-21		0.025	0.019	0.028	0.0005		
15	23-Sep-21	0.007						
16	12-Nov-21		0.032	0.014	0.028	0.001	0.021	0.018
17								
18								
19								
20								
Coefficient of Variation:		0.53	0.19	1.11	0.25	0.97	0.26	0.60
Mann-Kendall Statistic (S):		-56	-41	42	6	-43	-38	-23
Confidence Factor:		99.9%	98.7%	98.9%	60.6%	99.0%	98.9%	99.1%
Concentration Trend:		Decreasing	Decreasing	Increasing	No Trend	Decreasing	Decreasing	Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
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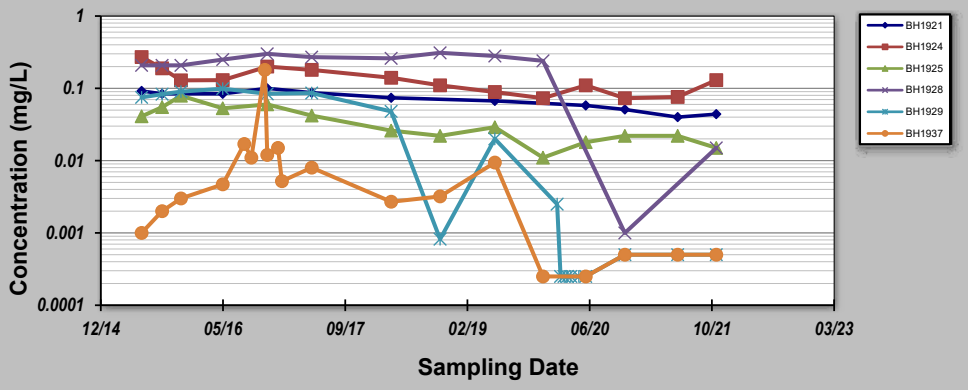
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-Mar-22	Job ID:	Suncor
Facility Name:	Hounsfield Heights and North Hill Mall	Constituent:	1,2 -DCA
Conducted By:	Stephen d'Abadie	Concentration Units:	mg/L

Sampling Point ID:		BH1921	BH1924	BH1925	BH1928	BH1929	BH1937
Sampling Event	Sampling Date	1,2 -DCA CONCENTRATION (mg/L)					
1	12-Jun-15	0.092	0.271	0.041	0.208	0.075	0.001
2	4-Sep-15	0.084	0.189	0.055	0.208	0.083	0.002
3	20-Nov-15	0.084	0.129	0.079	0.208	0.090	0.003
4	9-May-16	0.084	0.13	0.053	0.25	0.099	0.0047
5	5-Aug-16						0.017
6	3-Sep-16						0.011
7	28-Oct-16						0.18
8	7-Nov-16	0.1	0.2	0.06	0.30	0.084	0.012
9	21-Dec-16						0.015
10	6-Jan-17						0.0052
11	8-May-17	0.087	0.18	0.042	0.27	0.086	0.0080
12	29-Mar-18	0.074	0.14	0.026	0.26	0.048	0.0027
13	15-Oct-18	0.068	0.11	0.022	0.31	0.00082	0.0032
14	27-May-19	0.067	0.089	0.029	0.28	0.02	0.0094
15	10-Dec-19	0.085	0.073	0.011	0.24	0.013	0.00025
16	6-Feb-20					0.0025	
17	20-Feb-20					0.00025	
18	5-Mar-20					0.00025	
19	19-Mar-20					0.00025	
20	2-Apr-20					0.00025	
21	5-May-20					0.00025	
22	2-Jun-20	0.058	0.11	0.018		0.0003	0.00025
23	9-Nov-20	0.051	0.073	0.022	0.001	0.0005	0.0005
24	13-Jun-21	0.04	0.076	0.022		0.0005	0.0005
25	18-Nov-21	0.044	0.13	0.015	0.015	0.0005	0.0005
26							
27							
28							
29							
30							
Coefficient of Variation:		0.27	0.42	0.57	0.48	1.29	2.78
Mann-Kendall Statistic (S):		-40	-50	-56	1	-92	-47
Confidence Factor:		99.7%	99.8%	99.9%	50.0%	100.0%	94.6%
Concentration Trend:		Decreasing	Decreasing	Decreasing	No Trend	Decreasing	Prob. Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
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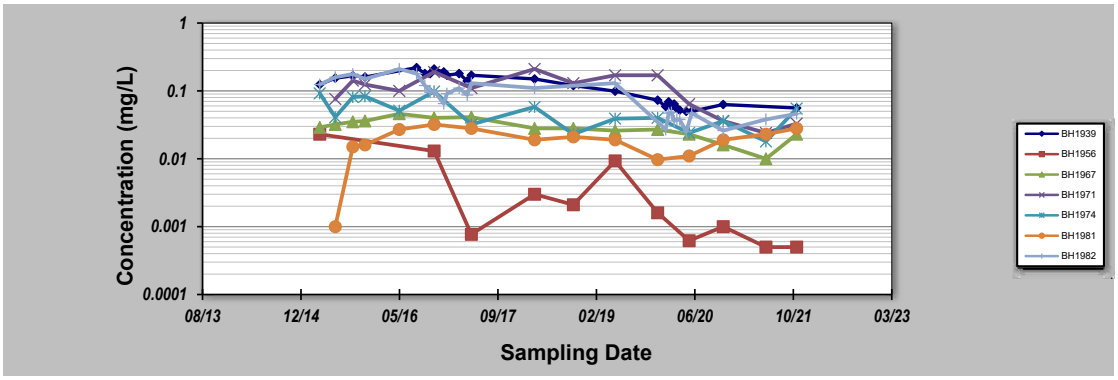
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-Mar-22	Job ID:	Suncor
Facility Name:	Hounsfield Heights and North Hill Mall	Constituent:	1,2 - DCA
Conducted By:	Stephen d'Abadie	Concentration Units:	mg/L

Sampling Point ID:	BH1939	BH1956	BH1967	BH1971	BH1974	BH1981	BH1982
Sampling Event	Sampling Date	1,2 - DCA CONCENTRATION (mg/L)						
1	1-Apr-15	0.124	0.023	0.029		0.092		0.124
2	19-Jun-15	0.154		0.032	0.076	0.041	0.001	0.159
3	16-Sep-15	0.167		0.035	0.142	0.081	0.015	0.177
4	17-Nov-15	0.16		0.036	0.124	0.083	0.016	0.150
5	9-May-16			0.046	0.1	0.051	0.027	0.21
6	5-Aug-16	0.22						0.18
7	16-Sep-16	0.18						0.12
8	13-Oct-16	0.18						0.095
9	2-Nov-16	0.21	0.013	0.04	0.19	0.098	0.032	0.099
10	21-Dec-16	0.19						0.065
11	6-Jan-17	0.17						0.091
12	9-Mar-17	0.18						0.11
13	19-Apr-17	0.14						0.087
14	10-May-17	0.17	0.00077	0.041	0.11	0.032	0.028	0.13
15	27-Mar-18	0.15	0.003	0.028	0.21	0.058	0.019	0.11
16	10-Oct-18	0.12	0.0021	0.028	0.13	0.023	0.021	0.068
17	10-May-19	0.099	0.0093	0.026	0.17	0.039	0.019	0.13
18	12-Dec-19	0.073	0.0016	0.027	0.17	0.04	0.0097	0.042
19	22-Jan-20	0.059						0.027
20	6-Feb-20	0.069						0.047
21	20-Feb-20	0.06						0.048
22	5-Mar-20	0.064						0.036
23	19-Mar-20	0.055						0.038
24	2-Apr-20	0.052						0.038
25	5-May-20	0.05						0.025
26	20-May-20		0.00062	0.023	0.064	0.024	0.011	
27	2-Jun-20	0.05						0.047
28	9-Nov-20	0.063	0.001	0.016	0.036	0.036	0.019	0.026
29	14-Jun-21		0.0005	0.01	0.024	0.018	0.023	0.038
30	17-Nov-21	0.056	0.0005	0.023	0.033	0.055	0.028	0.046
31								
32								
33								
34								
35								
Coefficient of Variation:		0.48	1.44	0.32	0.53	0.50	0.44	0.59
Mann-Kendall Statistic (S):		-226	-38	-59	-26	-45	17	-206
Confidence Factor:		>99.9%	99.9%	99.9%	91.3%	98.6%	80.6%	>99.9%
Concentration Trend:		Decreasing	Decreasing	Decreasing	Prob. Decreasing	Decreasing	No Trend	Decreasing



Notes:

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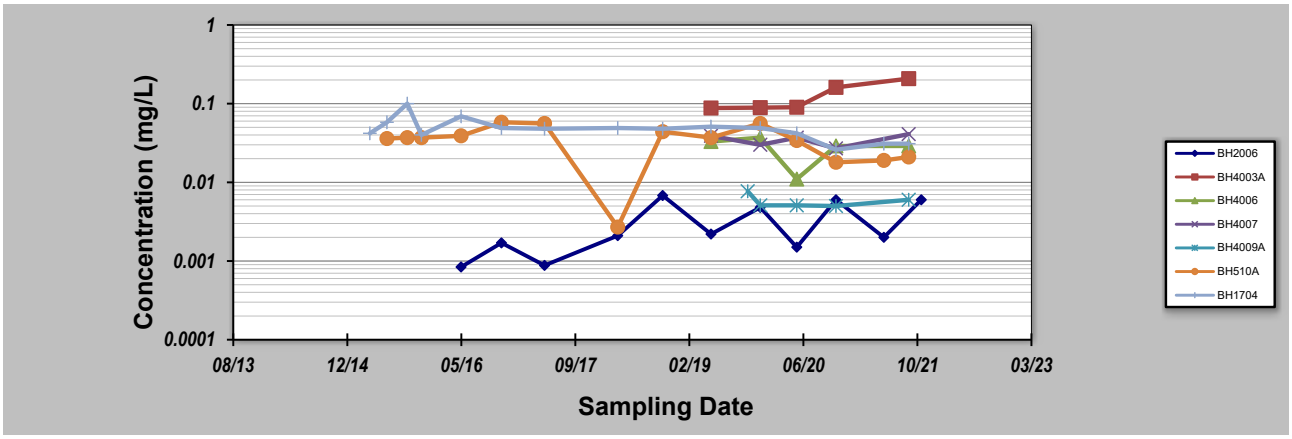
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-Mar-22	Job ID:	Suncor
Facility Name:	Hounsfield Heights and North Hill Mall	Constituent:	1,2-DCA
Conducted By:	Stephen d'Abadie	Concentration Units:	mg/L

Sampling Point ID:	BH2006	BH4003A	BH4006	BH4007	BH4009A	BH510A	BH1704
Sampling Event	Sampling Date	1,2-DCA CONCENTRATION (mg/L)						
1	5-Apr-15							0.042
2	19-Jun-15						0.036	0.058
3	16-Sep-15						0.037	0.1
4	17-Nov-15						0.037	0.04
5	9-May-16	0.00084					0.039	0.069
6	2-Nov-16	0.0017					0.058	0.049
7	10-May-17	0.00088					0.056	0.048
8	27-Mar-18	0.0021					0.0027	0.049
9	10-Oct-18	0.0068					0.044	0.048
10	10-May-19	0.0022	0.088	0.033	0.039		0.037	0.051
11	18-Oct-19					0.0077		
12	12-Dec-19	0.0048	0.089	0.037	0.030	0.0051	0.056	0.049
13	20-May-20	0.0015	0.090	0.011	0.037	0.0051	0.034	0.042
14	8-Nov-20	0.006	0.161	0.029	0.027	0.005	0.018	0.026
15	6-Jun-21	0.002					0.019	0.031
16	23-Sep-21		0.208	0.029	0.041	0.006	0.021	0.031
17	17-Nov-21	0.006						
18								
19								
20								
Coefficient of Variation:		0.71	0.43	0.36	0.17	0.20	0.45	0.36
Mann-Kendall Statistic (S):		24	10	-3	0	-3	-19	-43
Confidence Factor:		96.4%	99.2%	67.5%	40.8%	67.5%	83.5%	98.2%
Concentration Trend:		Increasing	Increasing	Stable	Stable	Stable	Stable	Decreasing



Notes:

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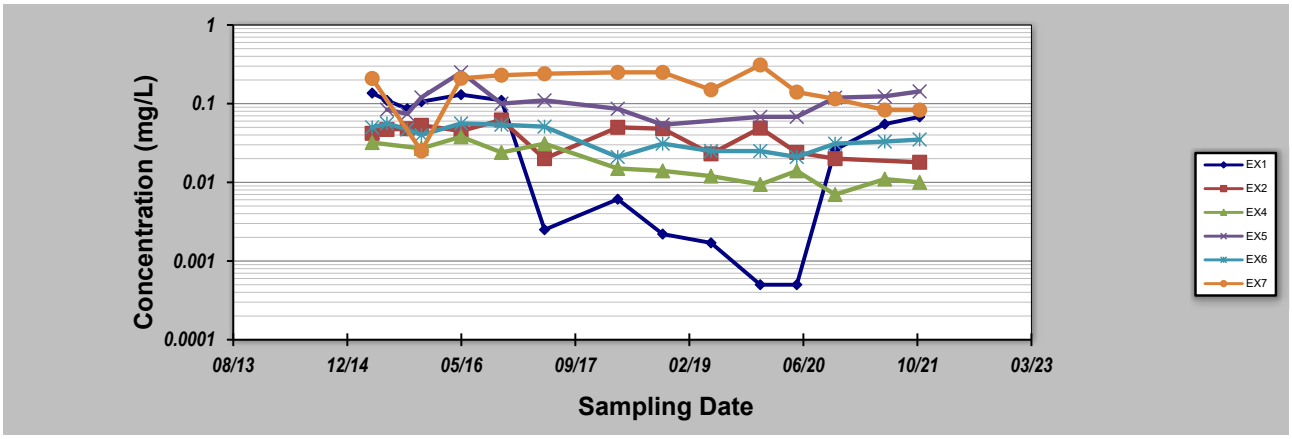
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-Mar-22	Job ID:	Suncor
Facility Name:	Hounsfield Heights and North Hill Mall	Constituent:	1,2 - DCA
Conducted By:	Stephen d'Abadie	Concentration Units:	mg/L

Sampling Point ID:	EX1	EX2	EX4	EX5	EX6	EX7	
Sampling Event	Sampling Date	1,2 - DCA CONCENTRATION (mg/L)						
1	15-Apr-15	0.136	0.042	0.032		0.050	0.209	
2	19-Jun-15	0.11	0.047		0.084	0.056		
3	16-Sep-15	0.086	0.048		0.074	0.047		
4	17-Nov-15	0.106	0.053	0.027	0.120	0.04	0.025	
5	9-May-16	0.13	0.045	0.038	0.25	0.056	0.21	
6	2-Nov-16	0.11	0.062	0.024	0.10	0.054	0.23	
7	10-May-17	0.0025	0.020	0.031	0.11	0.051	0.24	
8	27-Mar-18	0.0061	0.050	0.015	0.086	0.021	0.25	
9	10-Oct-18	0.0022	0.048	0.014	0.054	0.031	0.25	
10	10-May-19	0.0017	0.023	0.012		0.025	0.15	
11	12-Dec-19	0.0005	0.049	0.0094	0.068	0.025	0.31	
12	20-May-20	0.0005	0.024	0.014	0.068	0.021	0.14	
13	4-Nov-20	0.026	0.02	0.007	0.119	0.031	0.115	
14	10-Jun-21	0.055		0.011	0.124	0.033	0.083	
15	10-Nov-21	0.068	0.018	0.01	0.143	0.035	0.083	
16								
17								
18								
19								
20								
Coefficient of Variation:		0.95	0.38	0.54	0.47	0.34	0.47	
Mann-Kendall Statistic (S):		-47	-27	-57	9	-41	-12	
Confidence Factor:		99.0%	92.1%	>99.9%	68.4%	97.7%	74.5%	
Concentration Trend:		Decreasing	Prob. Decreasing	Decreasing	No Trend	Decreasing	Stable	



Notes:

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3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

Appendix C

Clifton

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1911

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A: Benzene	Constituent B: 1,2-DCA	Constituent C	Constituent D
1	9/15/2015	0.509	0.035		
2	11/16/2015	0.701	0.045		
3	5/11/2016	1	0.083		
4	11/4/2016	0.82	0.076		
5	5/4/2017	0.8	0.07		
6	3/26/2018	0.43	0.039		
7	11/7/2018	0.51	0.04		
8	5/1/2019	0.14	0.013		
9	1/3/2020	15	0.021		
10	5/27/2020	0.0057	0.0028		
11	11/26/2020	0.00025	0.0005		
12	6/14/2021	0.00025	0.0005		
13	11/12/2021	0.00025	0.001		
14					
15					

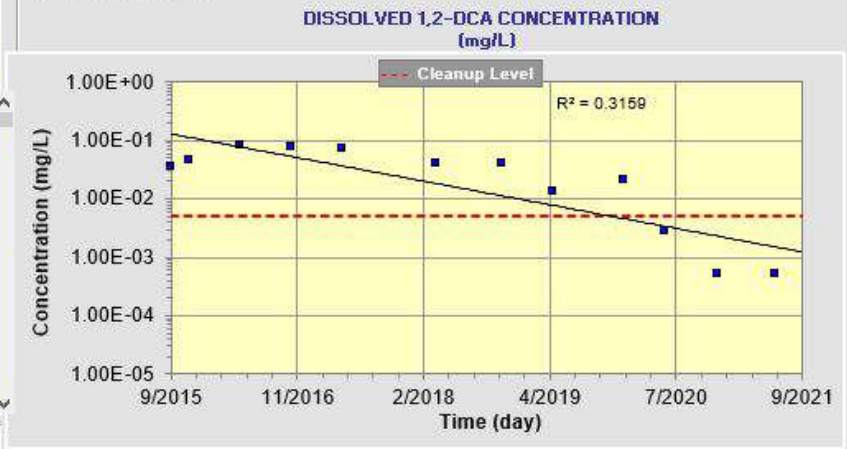
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005	(mg/L)
◉	**1,2-DCA**	0.005	(mg/L)
○	Constituent C		(mg/L)
○	Constituent D		(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 (yr) — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2019**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2017 (Lower Limit on Confidence Interval) to **2024** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **7.76E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1911

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A: Benzene	Constituent B: 1,2-DCA	Constituent C	Constituent D
1	9/15/2015	0.509	0.035		
2	11/16/2015	0.701	0.045		
3	5/11/2016	1	0.083		
4	11/4/2016	0.82	0.076		
5	5/4/2017	0.8	0.07		
6	3/26/2018	0.43	0.039		
7	11/7/2018	0.51	0.04		
8	5/1/2019	0.14	0.013		
9	1/2/2020	15	0.021		
10	5/27/2020	0.0057	0.0028		
11	11/26/2020	0.00025	0.0005		
12	6/14/2021	0.00025	0.0005		
13	11/12/2021	0.00025	0.001		
14					
15					

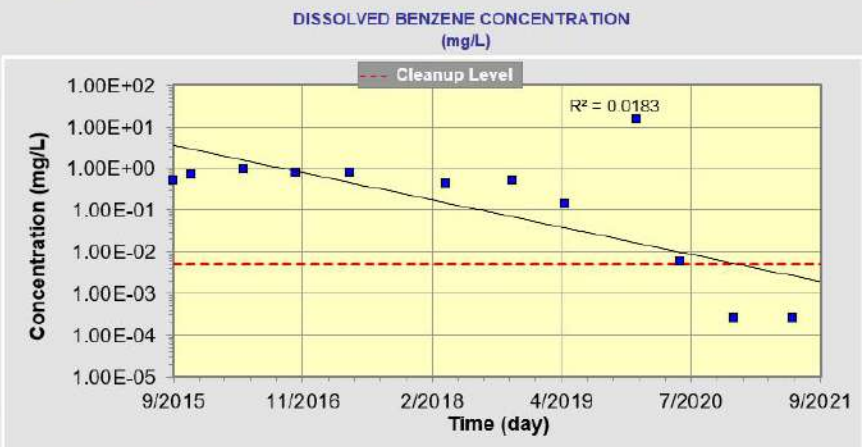
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

(•)	Benzene	0.005 (mg/L)
( )	1,2-DCA	0.005 (mg/L)
( )	Constituent C	(mg/L)
( )	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 (yr) — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2020**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

( ) 90 % Confidence Interval
(•) 95 % Confidence Interval

2017 (Lower Limit on Confidence Interval) to **2035** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **1.26E+00**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1912

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***1,2-DCA***		
1	6/17/2015	0.727			
2	9/8/2015	0.688			
3	11/12/2015	0.54			
4	5/10/2016	0.57			
5	11/3/2016	0.43			
6	5/17/2017	0.25	0.054		
7	4/5/2018	0.18	0.045		
8	10/29/2018	0.14	0.041		
9	4/30/2019	0.066	0.033		
10	12/9/2019	0.066	0.03		
11	5/25/2020	0.052	0.027		
12	11/5/2020	0.0439	0.024		
13	11/12/2021	0.0056	0.021		
14					
15					

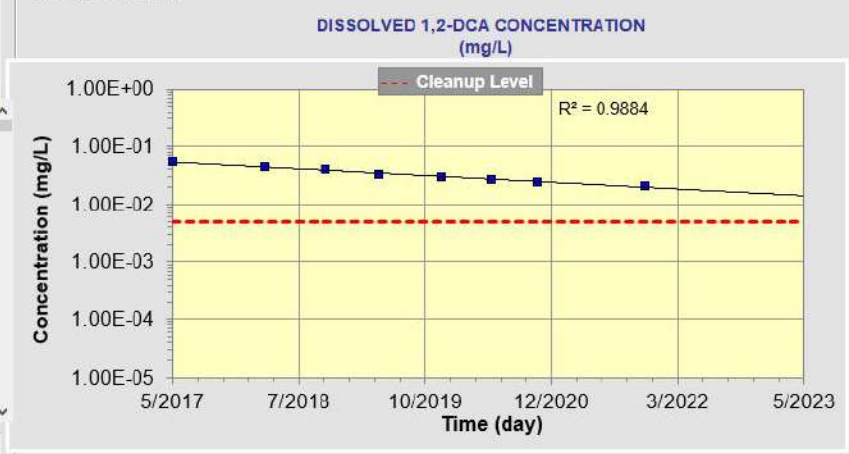
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005 (mg/L)
◉	**1,2-DCA**	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2028**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2026 (Lower Limit on Confidence Interval) to **2029** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **2.22E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1912

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***1,2-DCA***		
1	6/17/2015	0.727			
2	9/8/2015	0.688			
3	11/12/2015	0.54			
4	5/10/2016	0.57			
5	11/3/2016	0.43			
6	5/17/2017	0.25	0.054		
7	4/5/2018	0.18	0.045		
8	10/29/2018	0.14	0.041		
9	4/30/2019	0.066	0.033		
10	12/9/2019	0.066	0.03		
11	5/25/2020	0.052	0.027		
12	11/5/2020	0.0439	0.024		
13	11/12/2021	0.0056	0.021		
14					
15					

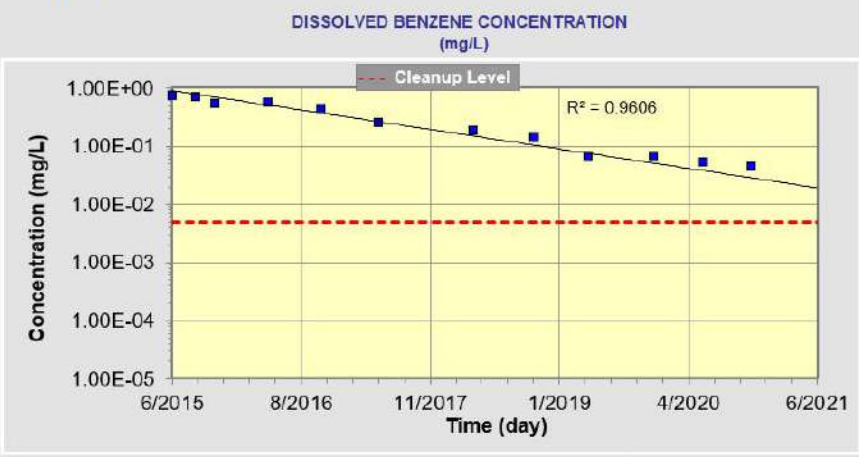
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

(•)	**Benzene**	0.005 (mg/L)
( )	1,2-DCA	0.005 (mg/L)
( )	Constituent C	(mg/L)
( )	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2023**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

( ) 90 % Confidence Interval
(•) 95 % Confidence Interval

2021 (Lower Limit on Confidence Interval) to **2026** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **6.43E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Site Location and I.D.: BH1915

Constituent of Interest:

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***1,2 - DCA***		
1	2/26/2015	1.01	0.044		
2	11/4/2016	0.57	0.043		
3	5/4/2017	0.21	0.025		
4	4/5/2018	0.078	0.017		
5	10/29/2018	0.043	0.018		
6	4/30/2019	0.032	0.022		
7	12/9/2019	0.023	0.011		
8	5/27/2020	0.013	0.012		
9	11/5/2020	0.0217	0.009		
10	11/16/2021	0.0108	0.018		
11					
12					
13					
14					
15					

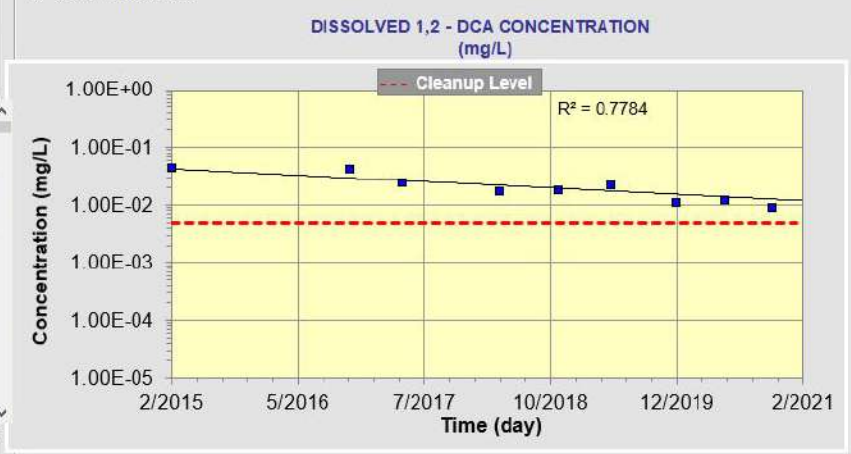
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005 (mg/L)
◉	**1,2 - DCA**	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2025**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2019 (Lower Limit on Confidence Interval) to **2044** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **2.14E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | *HELP*

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1915

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	1,2 - DCA		
1	2/26/2015	1.01	0.044		
2	11/4/2016	0.57	0.043		
3	5/4/2017	0.21	0.025		
4	4/5/2018	0.078	0.017		
5	10/29/2018	0.043	0.018		
6	4/30/2019	0.032	0.022		
7	12/9/2019	0.023	0.011		
8	5/27/2020	0.013	0.012		
9	11/5/2020	0.0217	0.009		
10	11/16/2021	0.0108	0.018		
11					
12					
13					
14					
15					

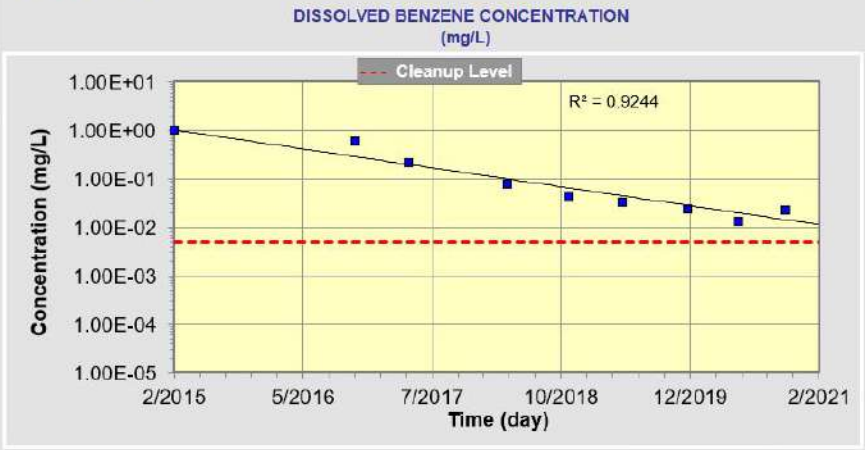
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

(•)	Benzene	0.005 (mg/L)
( )	1,2 - DCA	0.005 (mg/L)
( )	Constituent C	(mg/L)
( )	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 8 (yr) — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2022**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

( ) 90 % Confidence Interval
(•) 95 % Confidence Interval

2020 (Lower Limit on Confidence Interval) to **2025** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **7.50E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1921

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***1,2 -DCA***		
1	6/22/2015	0.417	0.092		
2	9/4/2015	0.174	0.084		
3	11/20/2015	0.187	0.084		
4	5/13/2016	0.12	0.084		
5	11/10/2016	0.17	0.1		
6	5/11/2017	0.1	0.087		
7	3/29/2018	0.044	0.074		
8	10/16/2018	0.002	0.068		
9	5/24/2019	0.015	0.067		
10	11/27/2019	0.01	0.085		
11	6/3/2020	0.024	0.058		
12	11/9/2020	0.0305	0.051		
13	6/13/2021	0.0217	0.04		
14	11/16/2021	0.0108	0.044		
15					

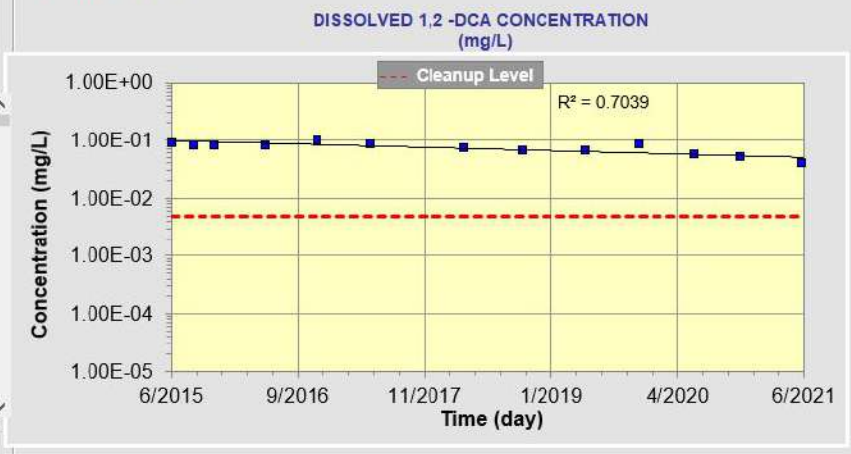
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005 (mg/L)
◉	**1,2 -DCA**	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2042**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2034 (Lower Limit on Confidence Interval) to **2060** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **1.10E-01**
(postive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1921

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

	Date (mm/dd/yy)	Concentration (mg/L) Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	1,2 -DCA		
1	6/22/2015	0.417	0.092		
2	9/4/2015	0.174	0.084		
3	11/20/2015	0.187	0.084		
4	5/13/2016	0.12	0.084		
5	11/10/2016	0.17	0.1		
6	5/11/2017	0.1	0.087		
7	3/29/2018	0.044	0.074		
8	10/16/2018	0.002	0.068		
9	5/24/2019	0.015	0.067		
10	11/27/2019	0.01	0.085		
11	6/3/2020	0.024	0.058		
12	11/9/2020	0.0305	0.051		
13	6/13/2021	0.0217	0.04		
14	11/16/2021	0.0108	0.044		
15					

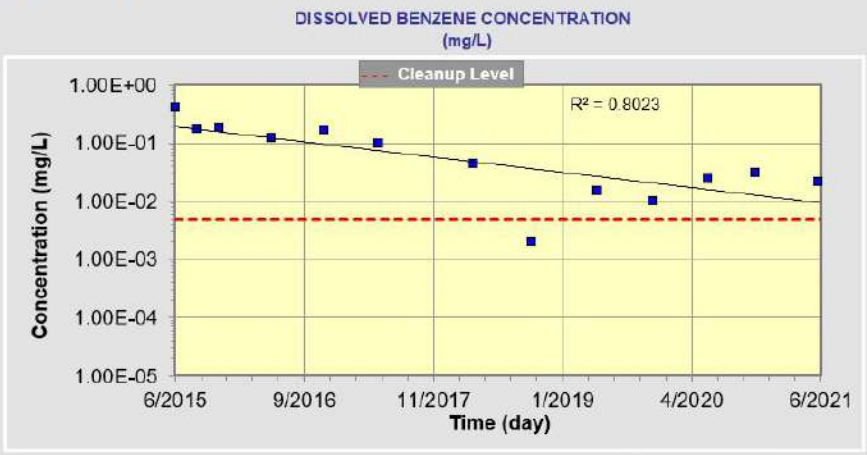
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

◉	**Benzene**	0.005 (mg/L)
○	1,2 -DCA	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 (yr) — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2022**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2018 (Lower Limit on Confidence Interval) to **2035** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **5.03E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1924

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***1,2 - DCA***		
1	6/15/2015	6.32	0.271		
2	9/15/2015	3.9	0.189		
3	11/16/2015	2.45	0.129		
4	5/11/2016	2.2	0.13		
5	11/4/2016	2.8	0.2		
6	5/4/2017	2.6	0.18		
7	3/26/2018	1.6	0.14		
8	10/29/2018	2.1	0.11		
9	5/1/2019	1.1	0.089		
10	12/9/2019	1.6	0.13		
11	5/27/2020	1.5	0.11		
12	11/5/2020	1.29	0.073		
13	6/13/2021	1.32	0.076		
14	11/16/2021	2.77	0.13		
15					

Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005 (mg/L)
◉	**1,2 - DCA**	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH

Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2044**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2032 (Lower Limit on Confidence Interval) to **2088** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **1.23E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | *HELP*

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1924

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A: Benzene	Constituent B: 1,2 - DCA	Constituent C	Constituent D
1	6/15/2015	6.32	0.271		
2	9/15/2015	3.9	0.189		
3	11/16/2015	2.45	0.129		
4	5/11/2016	2.2	0.13		
5	11/4/2016	2.8	0.2		
6	5/4/2017	2.6	0.18		
7	3/26/2018	1.6	0.14		
8	10/29/2018	2.1	0.11		
9	5/1/2019	1.1	0.089		
10	12/9/2019	1.6	0.13		
11	5/27/2020	1.5	0.11		
12	11/5/2020	1.29	0.073		
13	6/13/2021	1.32	0.076		
14	11/16/2021	2.77	0.13		
15					

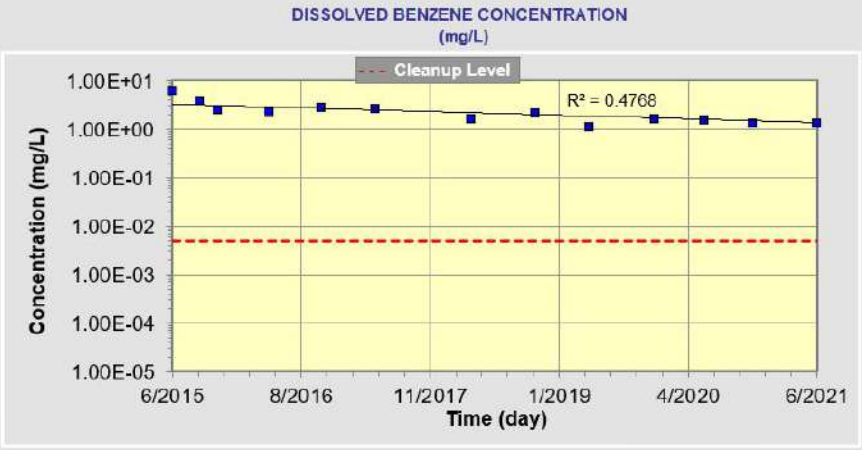
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

(•)	Benzene	0.005 (mg/L)
( )	1,2 - DCA	0.005 (mg/L)
( )	Constituent C	(mg/L)
( )	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 (yr) — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2060**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

( ) 90 % Confidence Interval
(•) 95 % Confidence Interval

2040 (Lower Limit on Confidence Interval) to **2164** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **1.45E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1939

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A: 1,2-DCA	Constituent B: Benzene	Constituent C	Constituent D
1	8/5/2016	0.22	8.1		
2	9/16/2016	0.18	6.8		
3	10/13/2016	0.18	5.9		
4	11/10/2016	0.21	7.1		
5	12/12/2016	0.19	5.8		
6	1/6/2017	0.17	5.4		
7	3/9/2017	0.18	4.8		
8	4/19/2017	0.14	4.8		
9	5/10/2017	0.17	5.4		
10	3/27/2018	0.15	0.52		
11	10/10/2018	0.12	0.15		
12	5/10/2019	0.099	0.021		
13	11/22/2019	0.073	0.0085		
14	1/22/2020	0.059	0.0065		
15	2/6/2020	0.069	0.0004		

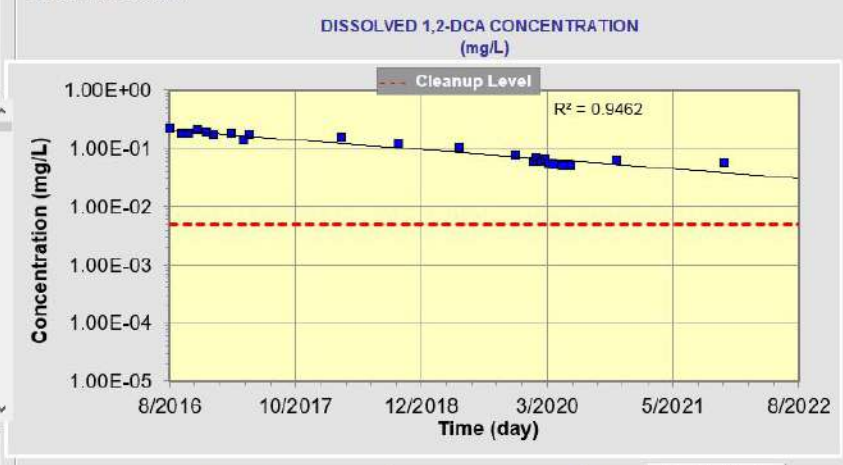
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

- (●) **1,2-DCA** — 0.005 (mg/L)
- ( ) Benzene — 0.005 (mg/L)
- ( ) Constituent C — (mg/L)
- ( ) Constituent D — (mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2028**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

- ( ) 90 % Confidence Interval
- (●) 95 % Confidence Interval

2026 (Lower Limit on Confidence Interval) to **2030** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **3.17E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1939

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A: 1,2-DCA	Constituent B: Benzene	Constituent C	Constituent D
1	8/5/2016	0.22	8.1		
2	9/16/2016	0.18	6.8		
3	10/13/2016	0.18	5.9		
4	11/10/2016	0.21	7.1		
5	12/12/2016	0.19	5.8		
6	1/6/2017	0.17	5.4		
7	3/9/2017	0.18	4.8		
8	4/19/2017	0.14	4.8		
9	5/10/2017	0.17	5.4		
10	3/27/2018	0.15	0.52		
11	10/10/2018	0.12	0.15		
12	5/10/2019	0.099	0.021		
13	11/22/2019	0.073	0.0085		
14	1/22/2020	0.059	0.0065		
15	2/6/2020	0.069	0.0004		

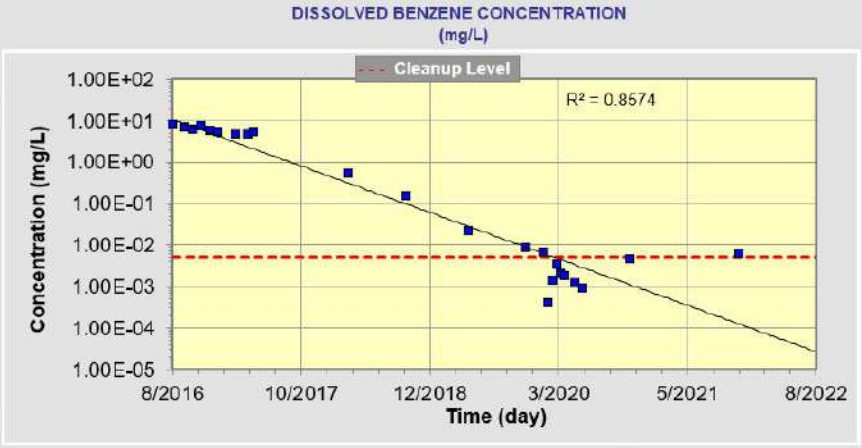
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	1,2-DCA	0.005 (mg/L)
◉	**Benzene**	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2020**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2019 (Lower Limit on Confidence Interval) to **2021** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **2.15E+00**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | *HELP*

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH510A

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene			
1	6/15/2015	3.61			
2	9/15/2015	1.7			
3	11/16/2015	2.07			
4	5/11/2016	1.3			
5	11/4/2016	2.6			
6	5/4/2017	1.6			
7	3/26/2018	0.09			
8	10/18/2018	0.86			
9	5/1/2019	0.92			
10	12/2/2019	0.55			
11	5/27/2020	0.64			
12	11/4/2020	0.435			
13	6/14/2021	0.327			
14	11/15/2021	0.247			
15					

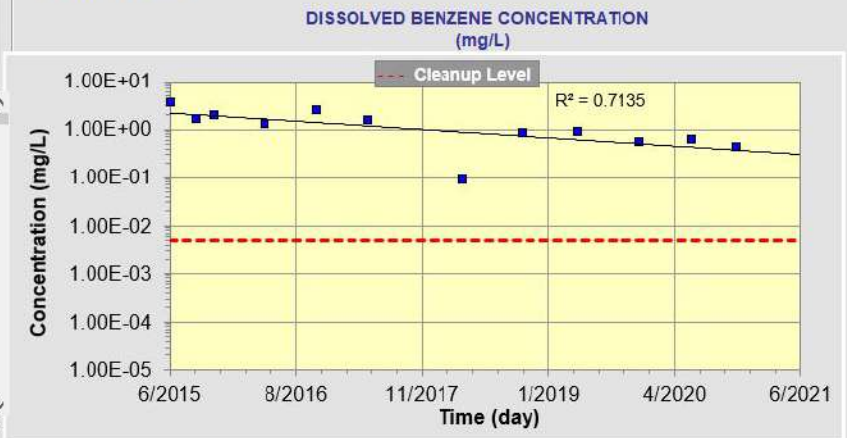
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

◉	**Benzene**	0.005 (mg/L)
○	Constituent B	(mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2033**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2025 (Lower Limit on Confidence Interval) to **2067** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **3.28E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | *HELP*

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1704

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A: Benzene	Constituent B: 1,2-dca	Constituent C	Constituent D
1	9/15/2015	1.92	0.1		
2	11/16/2015	0.731	0.04		
3	5/11/2016	1.2	0.069		
4	11/4/2016	1.2	0.049		
5	5/4/2017	0.96	0.048		
6	3/26/2018	0.52	0.049		
7	10/18/2018	0.39	0.048		
8	5/1/2019	0.4	0.051		
9	12/2/2019	0.31	0.049		
10	5/27/2020	0.28	0.042		
11	11/3/2020	0.171	0.026		
12	6/6/2021	0.798	0.031		
13	11/1/2021	1.83	0.031		
14					
15					

Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005 (mg/L)
◉	**1,2-dca**	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH

DISSOLVED 1,2-DCA CONCENTRATION (mg/L)

Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2036**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2027 (Lower Limit on Confidence Interval) to **2073** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **1.21E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Site Location and I.D.: BH1704

Constituent of Interest:

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data)*

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***1,2-dca***		
1	9/15/2015	1.92	0.1		
2	11/16/2015	0.731	0.04		
3	5/11/2016	1.2	0.069		
4	11/4/2016	1.2	0.049		
5	5/4/2017	0.96	0.048		
6	3/26/2018	0.52	0.049		
7	10/18/2018	0.39	0.048		
8	5/1/2019	0.4	0.051		
9	12/2/2019	0.31	0.049		
10	5/27/2020	0.28	0.042		
11	11/3/2020	0.171	0.026		
12	6/6/2021	0.798	0.031		
13	11/1/2021	1.83	0.031		
14					
15					

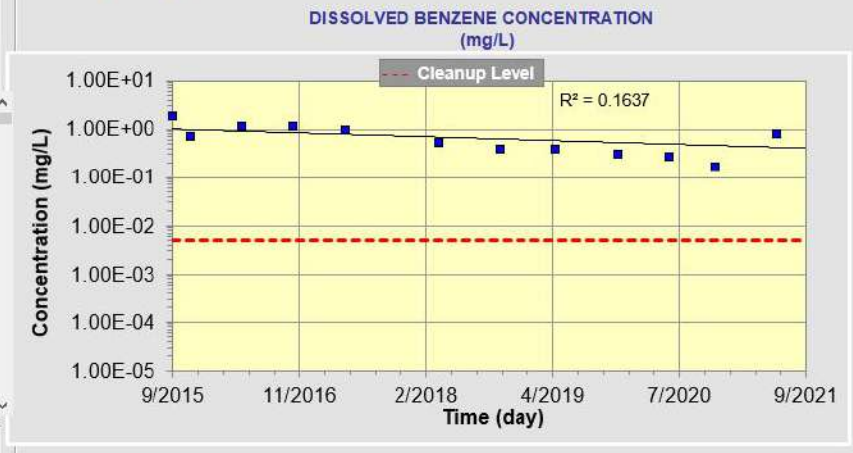
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

◉	**Benzene**	0.005 (mg/L)
○	1,2-dca	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2050**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2028 (Lower Limit on Confidence Interval) to **Can't Calc (+ve Trend)** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **1.52E-01**
(positive numbers represent shrinkng plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | *HELP*

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Site Location and I.D.: BH1905

Constituent of Interest:

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A: Benzene	Constituent B: Benzene	Constituent C: 1,2 - DCA	Constituent D
1	3/15/2015	0.11	0.11	0.075	
2	11/16/2015	0.0938	0.0938	0.079	
3	5/11/2016	0.055	0.055	0.08	
4	11/4/2016	0.058	0.058	0.064	
5	5/4/2017	0.042	0.042	0.083	
6	3/26/2018	0.028	0.028	0.051	
7	11/7/2018	0.037	0.037	0.053	
8	5/1/2019	0.018	0.018	0.057	
9	12/1/2020	0.037	0.037	0.013	
10	5/27/2020	0.018	0.018	0.03	
11	11/26/2020	0.0523	0.0523	0.004	
12	11/23/2021	0.0252	0.0252	0.007	
13					
14					
15					

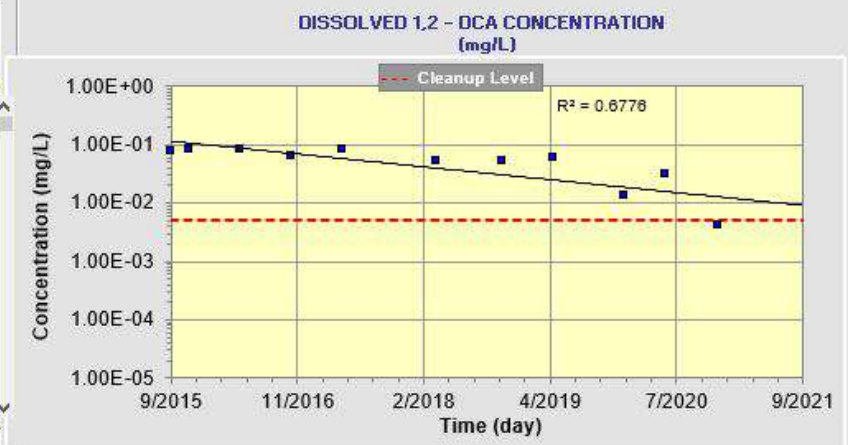
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005 (mg/L)
○	Benzene	0.005 (mg/L)
◉	**1,2 - DCA**	0.005 (mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 (yr) — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2023**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2019 (Lower Limit on Confidence Interval) to **2031** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **4.23E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Site Location and I.D.: BH1905

Constituent of Interest:

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***Benzene***	***1,2 - DCA***	
1	9/15/2015	0.11	0.11	0.075	
2	11/16/2015	0.0938	0.0938	0.079	
3	5/11/2016	0.055	0.055	0.08	
4	11/4/2016	0.058	0.058	0.064	
5	5/4/2017	0.042	0.042	0.083	
6	3/26/2018	0.028	0.028	0.051	
7	11/7/2018	0.037	0.037	0.053	
8	5/1/2019	0.018	0.018	0.057	
9	1/2/2020	0.037	0.037	0.013	
10	5/27/2020	0.018	0.018	0.03	
11	11/26/2020	0.0523	0.0523	0.004	
12	11/23/2021	0.0252	0.0252	0.007	
13					
14					
15					

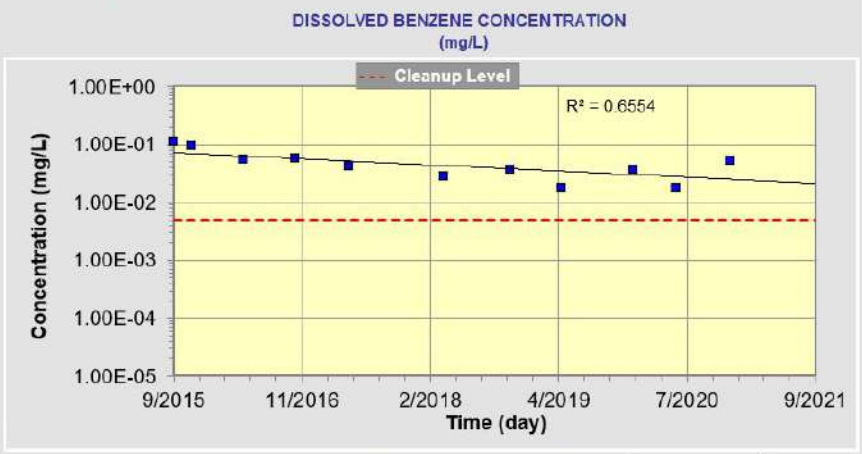
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005 (mg/L)
◉	**Benzene**	0.005 (mg/L)
○	1,2 - DCA	0.005 (mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2028**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2022 (Lower Limit on Confidence Interval) to **2062** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **2.02E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | *HELP*

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Site Location and I.D.: BH1906

Constituent of Interest:

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		1,2-DCA			
1	6/15/2015	0.037			
2	9/17/2015	0.042			
3	11/17/2015	0.042			
4	5/9/2016	0.04			
5	11/2/2016	0.049			
6	5/10/2017	0.05			
7	3/27/2018	0.032			
8	10/18/2018	0.032			
9	5/13/2019	0.04			
10	12/4/2019	0.032			
11	5/26/2020	0.038			
12	11/8/2020	0.03			
13	6/14/2021	0.025			
14	11/12/2021	0.032			
15					

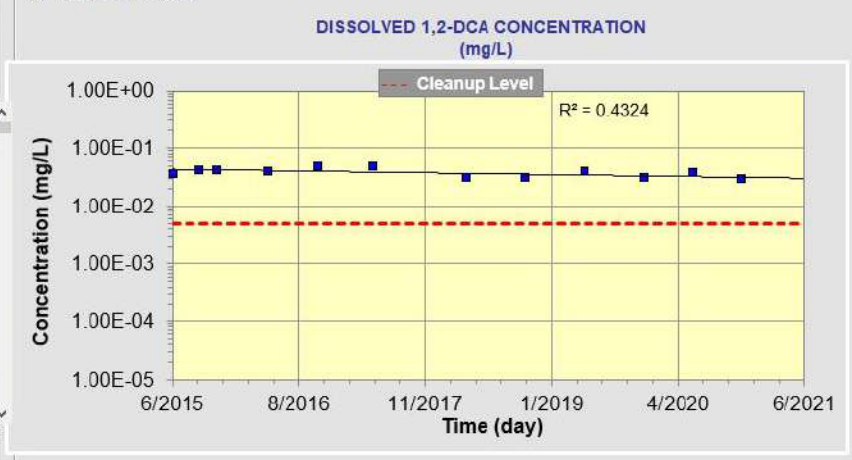
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

◉	1,2-DCA	0.005 (mg/L)
○	Constituent B	(mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2051**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2035 (Lower Limit on Confidence Interval) to **2128** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **6.03E-02**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1925

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	1,2 - DCA		
1	11/16/2015	3.28	0.079		
2	5/11/2016	2.1	0.053		
3	11/4/2016	1.8	0.06		
4	5/4/2017	0.43	0.042		
5	3/26/2018	0.32	0.026		
6	10/23/2018	0.47	0.022		
7	5/1/2019	0.19	0.029		
8	12/9/2020	0.023	0.011		
9	5/27/2020	0.025	0.018		
10	11/4/2020	0.0263	0.022		
11	6/13/2021	0.0135	0.022		
12	11/18/2021	0.0058	0.015		
13					
14					
15					

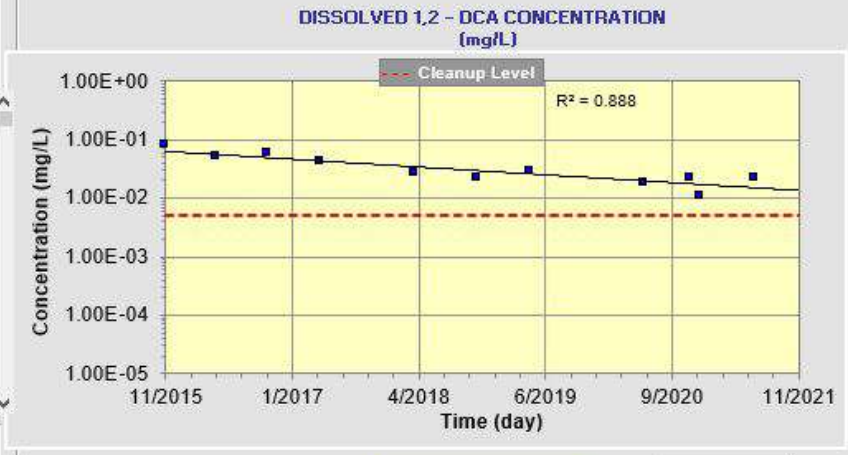
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005	(mg/L)
◉	1,2 - DCA	0.005	(mg/L)
○	Constituent C		(mg/L)
○	Constituent D		(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2025**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval

◉ 95 % Confidence Interval

2022 (Lower Limit on Confidence Interval) to **2032** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **2.57E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1925

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***1,2 - DCA***		
1	11/16/2015	3.28	0.079		
2	5/11/2016	2.1	0.053		
3	11/4/2016	1.8	0.06		
4	5/4/2017	0.43	0.042		
5	3/26/2018	0.32	0.026		
6	10/29/2018	0.47	0.022		
7	5/1/2019	0.19	0.029		
8	12/9/2020	0.023	0.011		
9	5/27/2020	0.025	0.018		
10	11/4/2020	0.0263	0.022		
11	6/13/2021	0.0195	0.022		
12	11/18/2021	0.0058	0.015		
13					
14					
15					

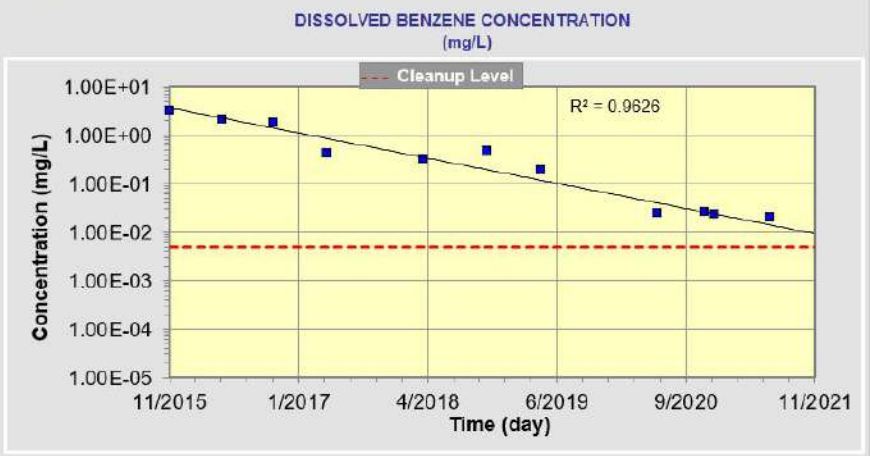
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

◉	**Benzene**	0.005 (mg/L)
○	1,2 - DCA	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2022**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2021 (Lower Limit on Confidence Interval) to **2024** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **9.97E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | **HELP**

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1967

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***1,2 - DCA***		
1	6/15/2015	0.276			
2	9/15/2015	0.225			
3	11/16/2015	0.275			
4	5/11/2016	0.24	0.046		
5	11/4/2016	0.21	0.04		
6	5/4/2017	0.2	0.041		
7	3/26/2018	0.16	0.028		
8	10/18/2018	0.13	0.028		
9	5/1/2019	0.12	0.026		
10	12/2/2019	0.086	0.027		
11	5/27/2020	0.073	0.023		
12	11/4/2020	0.0542	0.016		
13	6/14/2021	0.0275	0.01		
14	11/17/2021	0.114	0.023		
15					

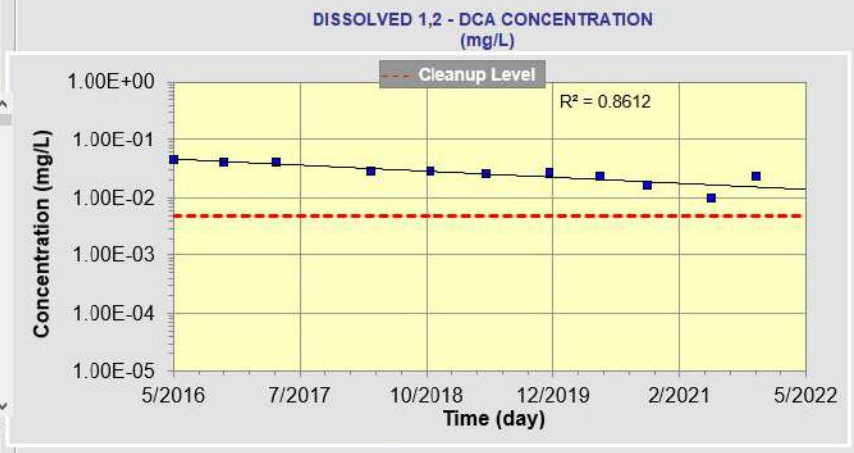
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005 (mg/L)
◉	**1,2 - DCA**	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2027**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2022 (Lower Limit on Confidence Interval) to **2039** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **1.99E-01**
(postive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1967

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A: Benzene	Constituent B: 1,2 - DCA	Constituent C	Constituent D
1	6/15/2015	0.276			
2	9/15/2015	0.225			
3	11/16/2015	0.275			
4	5/11/2016	0.24	0.046		
5	11/4/2016	0.21	0.04		
6	5/4/2017	0.2	0.041		
7	3/26/2018	0.16	0.028		
8	10/18/2018	0.13	0.028		
9	5/1/2019	0.12	0.026		
10	12/2/2019	0.086	0.027		
11	5/27/2020	0.073	0.023		
12	11/4/2020	0.0542	0.016		
13	6/14/2021	0.0275	0.01		
14	11/17/2021	0.114	0.023		
15					

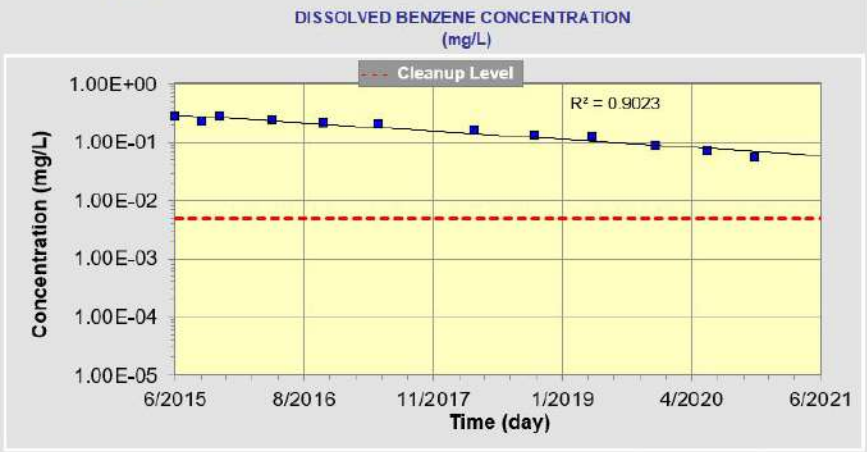
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

(•)	**Benzene**	0.005 (mg/L)
( )	1,2 - DCA	0.005 (mg/L)
( )	Constituent C	(mg/L)
( )	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2030**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

( ) 90 % Confidence Interval
(•) 95 % Confidence Interval

2025 (Lower Limit on Confidence Interval) to **2040** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **2.67E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Site Location and I.D.: BH1971

Constituent of Interest:

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***1,2-dca***		
1	11/16/2015	0.108	0.124		
2	5/11/2016	0.042	0.1		
3	11/4/2016	0.05	0.19		
4	5/4/2017	0.034	0.11		
5	3/26/2018	0.031	0.21		
6	10/18/2018	0.027	0.13		
7	5/1/2019	0.021	0.17		
8	12/2/2019	0.02	0.17		
9	5/27/2020	0.0099	0.064		
10	11/5/2020	0.0058	0.036		
11	6/10/2021	0.0041	0.024		
12	11/17/2021	0.0066	0.033		
13					
14					
15					

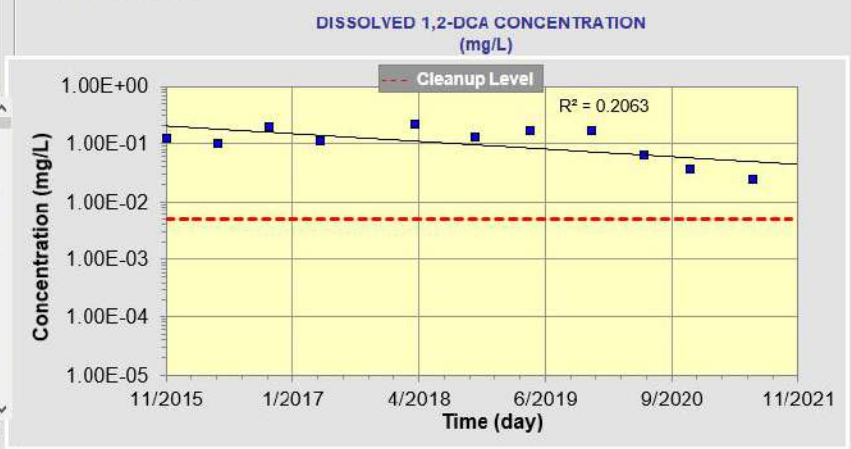
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005 (mg/L)
◉	**1,2-dca**	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2030**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2022 (Lower Limit on Confidence Interval) to **2083** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **2.52E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | *HELP*

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Site Location and I.D.: BH1971

Constituent of Interest:

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	1,2-dca		
1	11/16/2015	0.108	0.124		
2	5/11/2016	0.042	0.1		
3	11/4/2016	0.05	0.19		
4	5/4/2017	0.034	0.11		
5	3/26/2018	0.031	0.21		
6	10/18/2018	0.027	0.13		
7	5/1/2019	0.021	0.17		
8	12/2/2019	0.02	0.17		
9	5/27/2020	0.0099	0.064		
10	11/5/2020	0.0058	0.036		
11	6/10/2021	0.0041	0.024		
12	11/17/2021	0.0066	0.033		
13					
14					
15					

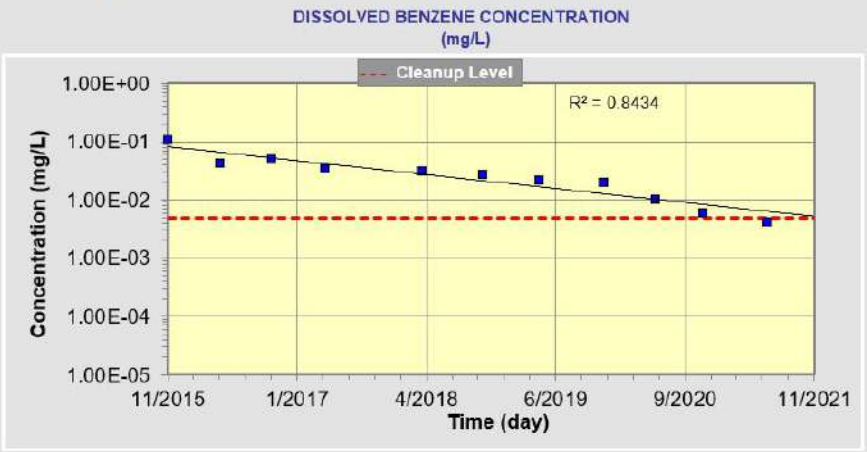
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

◉	Benzene	0.005 (mg/L)
○	1,2-dca	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 (yr) — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2021**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2020 (Lower Limit on Confidence Interval) to **2024** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **4.59E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Site Location and I.D.: BH1974

Constituent of Interest:

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration: mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		1,2-DCA	Benzene		
1	11/16/2015				
2	5/11/2016				
3	11/4/2016	0.098			
4	5/4/2017	0.032			
5	3/26/2018	0.058			
6	10/18/2018	0.023			
7	5/1/2019	0.039			
8	12/2/2019	0.04			
9	5/27/2020	0.024			
10	11/4/2020	0.036			
11	6/14/2021	0.018			
12	11/17/2021	0.055			
13					
14					
15					

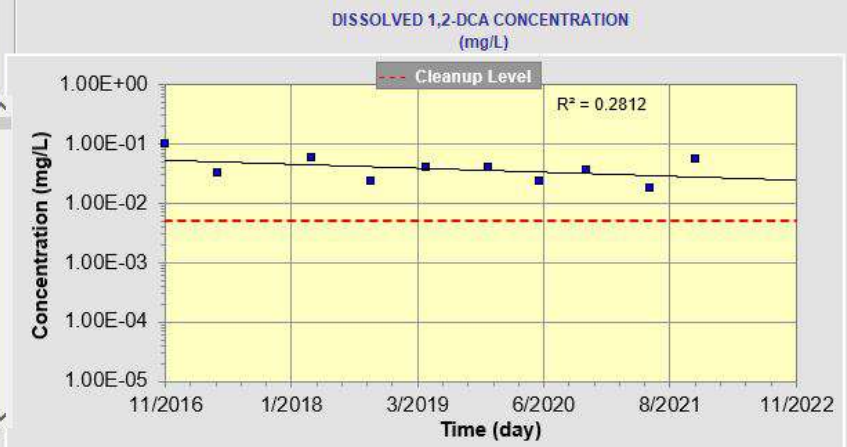
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

◉	1,2-DCA	0.005 (mg/L)
○	Benzene	(mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2035**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2021 (Lower Limit on Confidence Interval) to **Can't Calc (+ve Trend)** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **1.29E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | *HELP*

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1982

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***1,2-DCA***		
1	4/1/2015	13.1			
2	6/11/2015	13.8			
3	9/21/2015	10.7			
4	11/20/2015	11.6			
5	5/17/2016	12	0.21		
6	8/19/2016	9.6	0.18		
7	9/3/2016	6.9	0.12		
8	10/3/2016	5.3	0.095		
9	11/10/2016	5.2	0.099		
10	12/12/2016	2.7	0.065		
11	1/6/2017	4.2	0.091		
12	3/9/2017	5	0.11		
13	4/19/2017	4.7	0.087		
14	5/10/2017	6.6	0.13		
15	4/10/2018	5.9	0.11		

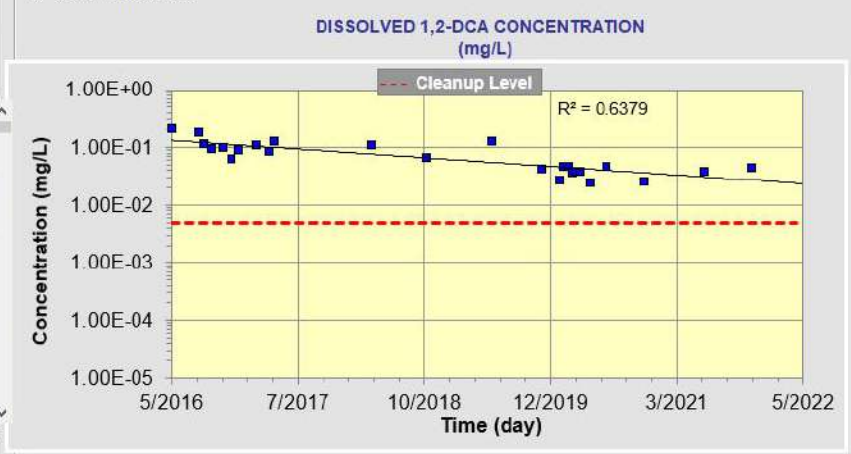
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005 (mg/L)
◉	**1,2-DCA**	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2027**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2024 (Lower Limit on Confidence Interval) to **2033** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **2.90E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | *HELP*

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: BH1982

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A: Benzene	Constituent B: 1,2-DCA	Constituent C	Constituent D
1	4/1/2015	13.1			
2	6/11/2015	13.8			
3	9/21/2015	10.7			
4	11/20/2015	11.6			
5	5/17/2016	12	0.21		
6	8/19/2016	9.6	0.18		
7	9/3/2016	6.9	0.12		
8	10/3/2016	5.3	0.095		
9	11/10/2016	5.2	0.099		
10	12/12/2016	2.7	0.065		
11	1/6/2017	4.2	0.091		
12	3/9/2017	5	0.11		
13	4/19/2017	4.7	0.087		
14	5/10/2017	6.6	0.13		
15	4/10/2018	5.9	0.11		

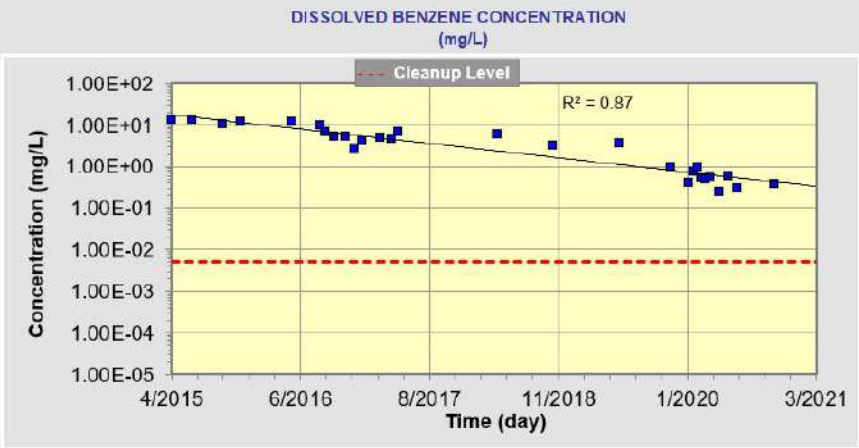
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

(•)	Benzene	0.005 (mg/L)
( )	1,2-DCA	0.005 (mg/L)
( )	Constituent C	(mg/L)
( )	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 (yr) — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2027**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

( ) 90 % Confidence Interval
(•) 95 % Confidence Interval

2025 (Lower Limit on Confidence Interval) to **2030** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **6.62E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: EX1

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

	Date (mm/dd/yy)	Concentration (mg/L) Constituent A: Benzene	Constituent B: 1,2-DCA	Constituent C	Constituent D
1	4/15/2015		0.136		
2	6/19/2015	10.2	0.11		
3	9/15/2015	7.66	0.086		
4	11/16/2015	7.97	0.106		
5	5/11/2016	9.3	0.13		
6	11/4/2016	6.3	0.11		
7	5/4/2017	0.058	0.0025		
8	3/26/2018	0.3	0.0061		
9	10/18/2018	0.13	0.0022		
10	5/1/2019	0.087	0.0017		
11	12/2/2019	0.0004	0.0005		
12	5/27/2020	0.0022	0.0005		
13	11/3/2020	1.22	0.026		
14	6/10/2021	1.81	0.055		
15	11/10/2021	2.17	0.068		

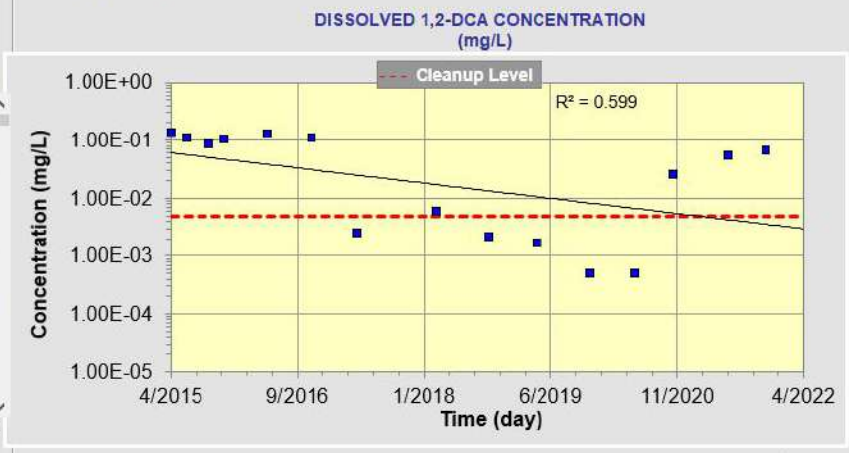
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005 (mg/L)
◉	**1,2-DCA**	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 7 (yr) — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2021**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

○ 90 % Confidence Interval
◉ 95 % Confidence Interval

2016 (Lower Limit on Confidence Interval) to **Can't Calc (+ve Trend)** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **4.30E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | New Site/Clear Screen | Paste Example Data Set | HELP

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model (Don't enter any data)*

Site Location and I.D.: EX1

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

	Date (mm/dd/yy)	Concentration (mg/L) Constituent A — Benzene	Constituent B — 1,2-DCA	Constituent C	Constituent D
1	4/15/2015		0.136		
2	6/19/2015	10.2	0.11		
3	9/15/2015	7.66	0.086		
4	11/16/2015	7.97	0.106		
5	5/11/2016	9.3	0.13		
6	11/4/2016	6.3	0.11		
7	5/4/2017	0.058	0.0025		
8	3/26/2018	0.3	0.0061		
9	10/18/2018	0.13	0.0022		
10	5/1/2019	0.087	0.0017		
11	12/2/2019	0.0004	0.0005		
12	5/27/2020	0.0022	0.0005		
13	11/3/2020	1.22	0.026		
14	6/10/2021	1.81	0.055		
15	11/10/2021	2.17	0.068		

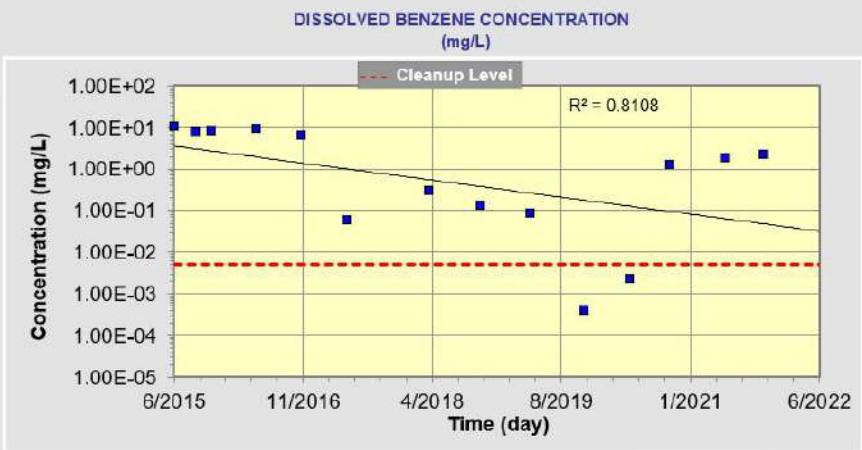
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

(•)	Benzene	0.005 (mg/L)
( )	1,2-DCA	0.005 (mg/L)
( )	Constituent C	(mg/L)
( )	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 7 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2025**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

( ) 90 % Confidence Interval
(•) 95 % Confidence Interval

2017 (Lower Limit on Confidence Interval) to **Can't Calc (+ve Trend)** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **6.73E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | **HELP**

SourceDK — TIER 1 Empirical Data

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

Site Location and I.D.: EX2

Constituent of Interest:

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***1,2-DCA***		
1	6/15/2015	2.01	0.047		
2	9/15/2015	1.95	0.048		
3	11/16/2015	1.75	0.053		
4	5/11/2016	1.1	0.045		
5	11/4/2016	0.97	0.062		
6	5/4/2017	0.19	0.02		
7	3/26/2018	0.47	0.05		
8	10/18/2018	0.41	0.048		
9	5/1/2019	0.2	0.023		
10	12/2/2019	0.11	0.049		
11	5/27/2020	0.17	0.024		
12	11/4/2020	0.193	0.02		
13	6/10/2021				
14	11/10/2021	0.122	0.018		
15					

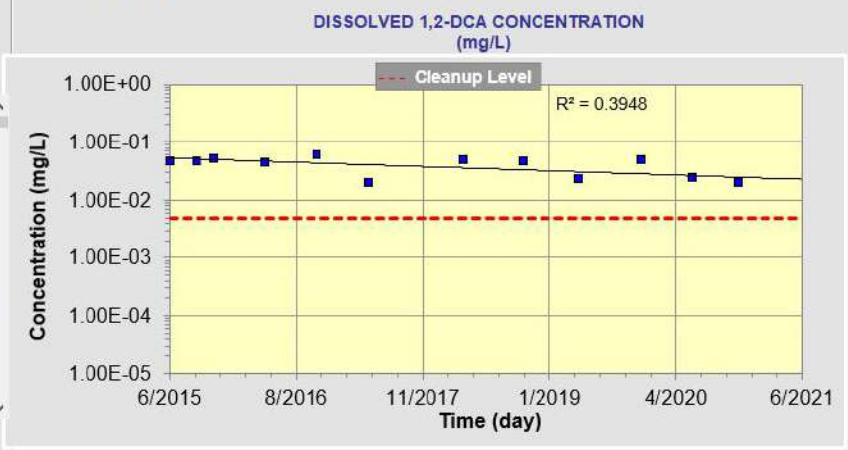
Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

○	Benzene	0.005 (mg/L)
◉	**1,2-DCA**	0.005 (mg/L)
○	Constituent C	(mg/L)
○	Constituent D	(mg/L)

3. OUTPUT GRAPH



Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2032**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

◉ 90 % Confidence Interval
○ 95 % Confidence Interval

2024 (Lower Limit on Confidence Interval) to **2063** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **1.41E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | *HELP*

SourceDK

Remediation Timeframe Decision Support System

Air Force Center for Engineering and Environment — *Version 2.0*

TIER 1 Empirical Data

Data Input Instructions:

10.80 → *Enter value directly.*

10.80 → *Value calculated by model. (Don't enter any data).*

Site Location and I.D.: EX2

Constituent of Interest:

1. ENTER CONSTITUENT NAME AND HISTORICAL DATA

Concentration mg/L

	Date (mm/dd/yy)	Constituent A	Constituent B	Constituent C	Constituent D
		Benzene	***1,2-DCA***		
1	6/15/2015	2.01	0.047		
2	9/15/2015	1.95	0.048		
3	11/16/2015	1.75	0.053		
4	5/11/2016	1.1	0.045		
5	11/4/2016	0.97	0.062		
6	5/4/2017	0.19	0.02		
7	3/26/2018	0.47	0.05		
8	10/18/2018	0.41	0.048		
9	5/1/2019	0.2	0.023		
10	12/2/2019	0.11	0.049		
11	5/27/2020	0.17	0.024		
12	11/4/2020	0.193	0.02		
13	6/10/2021				
14	11/10/2021	0.122	0.018		
15					

Print Historical Data

2. WHICH CONSTITUENT TO PLOT?

What is the cleanup level?

(•)	**Benzene**	0.005 (mg/L)
( )	1,2-DCA	0.005 (mg/L)
( )	Constituent C	(mg/L)
( )	Constituent D	(mg/L)

3. OUTPUT GRAPH

DISSOLVED BENZENE CONCENTRATION

(mg/L)

Number of Years Over Which to Plot Graph: 6 *(yr)* — Update Graph

4. RESULTS

Predicted Date to Achieve Cleanup: **2027**

Confidence Interval on Predicted Cleanup Date:
(at least 3 data points needed to calculate confidence intervals)

(•) 90 % Confidence Interval
( ) 95 % Confidence Interval

2024 (Lower Limit on Confidence Interval) to **2033** (Upper Limit on Confidence Interval)

Source Decay Rate Constant (1/year): **4.62E-01**
(positive numbers represent shrinking plumes while negative numbers represent expanding plumes)

Return To Main Screen | *New Site/Clear Screen* | *Paste Example Data Set* | **HELP**

Clifton

Vancouver Office
#230, 171 West Esplanade
North Vancouver, BC
V7M 3J9
T (604) 283-9822

Calgary Office
2222 – 30th Avenue NE
Calgary, AB T2E 7K9
T (403) 263-2556
F (403) 234-9033

Edmonton Office
#101, 9636 – 51st Avenue NW
Edmonton, AB T6E 6A5
T (780) 432-6441
F (780) 432-6271

Lloydminster Office
#10, 6309 – 43rd Street W
Lloydminster, AB T9V 2W9
T (780) 872-5980
F (780) 872-5983

Regina Office
340 Maxwell Crescent
Regina, SK S4N 5Y5
T (306) 721-7611
F (306) 721-8128

Saskatoon Office
#4, 1925 – 1st Avenue N
Saskatoon, SK S7K 6W1
T (306) 975-0401
F (306) 975-1076

North Battleford Office
#2, 9802 – 27th Avenue
North Battleford, SK S9A 1K5
T (306) 445-1621
F (306) 937-3731

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