



PROPOSED REMEDIAL ACTION PLAN

SITE 0153

INDIANAPOLIS, INDIANA

U.S. EPA ID NUMBER: INN000510936

PREPARED BY:

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

OFFICE OF LAND QUALITY

STATE CLEANUP PROGRAM

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ABBREVIATIONS & ACRONYMS

1,1-DCA	1,1-Dichloroethane
1,1,1-TCA	1,1,1-Trichloroethane
ARAR	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
Citizens	Citizens Water
cis-1,2-DCE	cis-1,2-Dichloroethene
COPCs	Constituents of Potential Concern
cVOC	Chlorinated Volatile Organic Compound
FS	Feasibility Study
GAC	Granular Activated Carbon
HHERA	Human Health and Ecological Risk Assessment
HRS	Hazard Ranking System
IAC	Indiana Administrative Code
IDEM	Indiana Department of Environmental Management
IIEC	Indianapolis Environmental Equity Council, Inc.
MAFR	Site 0153 Monitoring and Future Response Fund
MCL	Maximum Contaminant Level
MCPHD	Marion County Public Health Department
µg/L	Microgram per liter
MOA	Memorandum of Agreement
NAPL	Non-aqueous Phase Liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operations and Maintenance
PA Report	Preliminary Assessment Report
PCE	Perchloroethylene and Tetrachloroethene
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RAP	Remedial Action Plan
RI	Remedial Investigation
RSL	Regional Screening Level
SCP	State Cleanup Program
SDWA	Safe Drinking Water Act
SI Report	Site Inspection Report
Site 0153 or Site	The Site 0153/Riverside Groundwater Contamination Site
State Program	IDEM Remediation Program
TCE	Trichloroethylene
Trans-1,2-DCE	Trans-1,2-Dichloroethene
U.S. EPA	United States Environmental Protection Agency
UV	Ultraviolet Light
VC	Vinyl chloride
VOC	Volatile Organic Compound
Wellfields	Riverside and White River Wellfields



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1.0 INTRODUCTION

The Site 0153/Riverside Groundwater Contamination Site (United States Environmental Protection Agency (U.S. EPA) ID#INN000510936) is located in Indianapolis, Marion County, Indiana and consists of an area of marginally impacted groundwater in the vicinity of the Riverside and White River Municipal Wellfields (Wellfields). The Wellfields are operated by Citizens Water (Citizens) which operates the public drinking water supply utility for the City of Indianapolis. Low levels of chlorinated volatile organic compounds (cVOCs) have been detected in untreated “raw” groundwater samples collected from certain water production wells in the Wellfields. As part of its drinking water operations, Citizens mixes groundwater from the Wellfields with surface water from the Indianapolis Central Canal. The mixed water is then treated and filtered creating the “finished water” distributed to the public. The finished drinking water provided to customers by Citizens has met and continues to meet all the requirements of the Safe Drinking Water Act (SDWA).

cVOCs have migrated to the Wellfields from source(s) within the Site 0153. The Wellfields are located in an urban mixed-use area of the city where dozens of historic industrial facilities, which potentially used cVOCs, operated over the course of several decades. In order to address the impacts to the Wellfields, the Indiana Department of Environmental Management (IDEM) is managing potential individual sources within Site 0153 through one of the various state remediation programs. IDEM initially identified 89 potential sources of cVOC impacts within a 5-year time of groundwater travel to the Wellfields; however, a definitive source(s) of cVOCs impacting the Wellfields has not been identified to-date. It is likely that a number of individual sources have contributed to a commingled groundwater plume which led to the low-level cVOC impacts detected in certain production wells in the Wellfields. Individual Potentially Responsible Parties (PRPs) have been and will be responsible for conducting their own site investigations and remediation, under directive and oversight from the IDEM, to address their cVOC impact contributions to the two Wellfields.

Citizens has continued to monitor cVOC levels in its production wells, while IDEM has actively pursued identifying PRPs within Site 0153, narrowed the list of PRPs, and provided oversight to PRPs currently managed within a remediation program at the IDEM. Concentrations of cVOCs in the Wellfields have been declining over the last several years. Currently, and since 2016, cVOC concentrations in the raw groundwater within the Wellfields are and have been below applicable U.S. EPA Maximum Contaminant Levels (MCLs). Declining cVOC concentrations observed in the Wellfields support the conclusion that PRP investigation/remediation efforts conducted under State Programs to date are already showing a beneficial reduction of cVOC



contributions to raw groundwater. **Table 1** includes cVOC time series graphs of results from testing wells in the Wellfields. These graphs also demonstrate that the cVOC concentrations continue to decline.

Additionally, IDEM completed a Remedial Investigation (RI), Human Health and Ecological Risk Assessment (HHERA), and a Feasibility Study (FS). The RI characterized Site conditions, summarized PRP investigations and investigations within the Wellfields, evaluated the fate and transport and nature and extent of cVOCs affecting the Wellfields, and summarized risk to human health and the environment. The HHERA concluded there is no reasonable potential for adverse effects to human health or the environment associated with the operation of the Wellfields or the water supplied by Citizens. The FS evaluated available remedial technologies to address impacts to the Wellfields in the future, if necessary. These reports, and other documents, are contained in the Administrative Record file for this Site and were made available for public comment from November 10 through December 11, 2020. In addition, a public meeting was held on November 18, 2020 to review the findings of the RI, HHERA, and FS with interested public parties. Due to COVID-19 restrictions, the public meeting used a virtual format to avoid in-person contact.

Utilizing the information and data gathered during the RI, HHERA, and the FS, IDEM has developed this Proposed Remedial Action Plan (“Proposed RAP”, “Proposed Plan”, or “Plan”) to present the Preferred Alternative for Site 0153. The Preferred Alternative, as part of the Proposed RAP, focuses on protecting the Wellfields to ensure the continued supply of safe drinking water from the Wellfields. The Proposed RAP includes rationales for the selection of the Preferred Alternative and includes summaries of other cleanup alternatives evaluated for use at the Wellfields. IDEM will select a final remedy for the Site after reviewing and considering all information submitted during the forthcoming 30-day public comment period. IDEM may modify the Preferred Alternative or select another response action presented in this Plan based on new information or comments received during the public comment period. Therefore, the public is encouraged to review and comment on the Proposed Plan.

IDEM is issuing this Proposed Plan as part of public participation responsibilities as required under the June 8, 2017 Site 0153 Memorandum of Agreement (MOA) between the U.S. EPA and IDEM. The Proposed RAP summarizes information that can be found in greater detail in the RI, FS, and HHERA reports, and other documents contained in the Administrative Record file for this Site available online at www.idem.IN.gov/Site0153, in the IDEM Virtual File Cabinet (VFC) available at <https://vfc.idem.in.gov> under ‘Land Site ID’ 0000635, or through the public document repository on the 12th floor of the Indiana Government Center North, 100 North Senate Avenue, Indianapolis, Indiana.

IDEM encourages the public to review these documents, as needed, for a more comprehensive understanding of the Site 0153 and activities that have been conducted to date.



2.0 SITE 0153 BACKGROUND

2.1 U.S. EPA proposes Site 0153 for the National Priorities List (NPL)

Citizens routinely samples their finished water for over 300 constituents. Finished drinking water provided to customers by Citizens Water has met and continues to meet all requirements of the SDWA.

In addition, Citizens has routinely collected and analyzed raw groundwater samples from individual production wells. In 2013, Citizens notified IDEM that low levels of cVOCs had been detected in the raw groundwater at certain water production wells located within the Wellfields. Following this notification, IDEM commenced investigation activities. As part of the Superfund site assessment process and under a Cooperative Agreement with the U.S. EPA, IDEM prepared a Preliminary Assessment Report (PA Report), dated November 1, 2013 and a Site Inspection Report (SI Report), dated October 23, 2014. Copies of the PA Report and the SI Report are available in the VFC as Document #83049936 and #83049940, respectively. Using data collected during the SI, a Hazard Ranking System (HRS) documentation record was submitted to U.S. EPA determining that the Site qualified for inclusion on the Superfund National Priorities List (NPL). In April 2016, U.S. EPA published a Proposed Rule in the Federal Register, proposing to include Site 0153 on the U.S. EPA's NPL. Proposed inclusion of Site 0153 on the NPL was based on the presence of low-level detections of certain cVOCs in the raw water in some Citizens' production wells. A variety of potential sources of the detected cVOCs were identified within the 5-year time of travel for the Wellfields and are currently under investigation and/or remediation in a State Program.

2.2 Public comments favor the State Cleanup Program

Following publication of the proposed rule, and in response to public and local government concerns, IDEM determined it would be in the best interests of the public, local citizens, the State, and the City of Indianapolis to address Site 0153 at the state level in IDEM's State Cleanup Program (SCP) rather than via the Federal Superfund process. During 2016, IDEM officials, the Governor's Office, the Mayor's office, Citizens, and members of the general public requested in letters, meetings, and formal comments on U.S. EPA's proposed rule that U.S. EPA should not list the Site on the NPL, and instead allow IDEM to manage the investigation and remedial actions of Site 0153 pursuant to a state-lead "Alternative Plan." In an August 2016 letter, IDEM's former Commissioner, Carol Comer, formally withdrew support for and rescinded IDEM's August 2015 request to include Site 0153 on the NPL.

This IDEM withdrawal was based on many factors including additional historic Wellfield data not previously available to U.S. EPA leading up to the proposed rule. The additional data was made available by Citizens and identified that cVOC concentrations in the raw water of the



Wellfields were actually decreasing. Furthermore, with the exception of one production well (WR-3), all cVOC concentrations in raw groundwater were below MCLs. IDEM's withdrawal request also identified that many of the surrounding sites potentially contributing impacts to the Wellfields were already in an IDEM remediation program, making a Superfund designation redundant and unnecessary. Many of the sites had already completed remediation or were on track to do so, which contributed to the decreasing concentrations observed in the Wellfields. IDEM noted that withdrawing Site 0153 from inclusion on the NPL did not eliminate the need to address the cVOC impacts but doing so through the IDEM SCP was potentially more timely and more effective than through the more formal Superfund process. To that end, the Alternative Plan was proposed by IDEM and Citizens to protect human health and the environment. The Alternative Plan, which outlined a plan for addressing Wellfield impacts, was included as an exhibit to the August 2016 IDEM withdrawal letter and to the MOA. The Alternative Plan is described in more detail below.

2.3 EPA negotiates an MOA for a state-lead cleanup

After receipt of public comments opposed to listing the Site on the NPL, U.S. EPA began discussions with IDEM in October 2016 to identify the criteria that IDEM would need to satisfy in order for U.S. EPA to consider allowing IDEM to manage Site 0153 in lieu of U.S. EPA. These discussions resulted in the execution of the Site 0153 MOA on June 8, 2017. The MOA specifies the expectations and obligations of each agency regarding Site 0153 and memorializes the agreements necessary to ensure that the response actions undertaken at Site 0153 achieve a "Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-protective cleanup".

The MOA includes programmatic expectations including implementation requirements, procedural requirements, community participation requirements, and completion of state response action requirements. The MOA also included the Alternative Plan for addressing impacts at Site 0153. As a part of the Alternative Plan, IDEM and Citizens committed to the following response actions to address detections of cVOCs in the Wellfields and ensure protection of human health and the environment:

- IDEM would conduct a comprehensive search for PRPs to identify the potential sources of cVOC impacts identified in the Wellfields.
- IDEM would oversee investigations of the potential sources of cVOC impacts and manage identified sources through one of the various remediation programs at IDEM (e.g., SCP, Voluntary Remediation Program (VRP), Indiana Finance Authority's Brownfields Program (Indiana Brownfields), etc.) to address their contributions to the Wellfields.
- Citizens would remove the only production well above an MCL, WR-3, from service, install aeration equipment to reduce cVOCs, and complete confirmatory sampling of post-treatment water before returning the well to service.



- Citizens would complete the same response action (removal from service, installation of aeration equipment, and completion of confirmatory sampling prior to returning the well to service) if any other production wells exceeded an MCL in the future.
- Citizens would increase the frequency of sampling its production wells for volatile organic compounds (VOCs) from semi-annually to quarterly, and would develop and implement a revised Groundwater Monitoring Plan to monitor concentrations in the Wellfields, provide a plan to address potential detections, and ensure continued safety of the drinking water.

2.4 IDEM's Remedial Investigation

Following execution of the MOA in 2017, IDEM has conducted an exhaustive search for PRPs and potential cVOC sources in the Site 0153 area. IDEM has taken the lead to require that these individual sites are investigated and remediated as appropriate to further reduce the risks to the Wellfields. It is important to note, that while an extensive investigation and evaluation of the area has been performed, no specific cVOC source or combination of sources has been identified as the definitive source of the impacts identified in certain production wells. This supports the conclusion reached by many in 2016 that there is no single source or group of sources that are causing impacts detected in the Wellfields, but rather these low-level impacts have been caused by a large number of individual, disparate sources that were in operation for decades and that have contributed to a widely dispersed, low-level, commingled groundwater plume.

IDEM has undertaken several measures to address these low-level impacts from these disparate sources in several ways. IDEM is managing individual releases through one of the various State remediation programs (*e.g.*, SCP, VRP, Indiana Brownfields, etc.). As part of these State remediation programs, PRPs are responsible for conducting their own site investigations and remediation, under directive from IDEM, to address their potential cVOC impact contributions to the Wellfields.

In addition, IDEM completed and has implemented a Community Involvement Plan, including holding several public information meetings in various neighborhoods within Site 0153, and scheduling bi-monthly stakeholder meetings with the City of Indianapolis, Citizens, and the Marion County Public Health Department (MCPHD) to coordinate responses to public concerns. As detailed in the MOA, seven private wells have been identified within the Site 0153 investigation area. The MCPHD has investigated wells where owners granted access and keeps records of well locations. No cVOCs were detected in private wells sampled by MCPHD. The MCPHD will address private well issues, if any, and attempt to conduct sampling as needed in the future.

IDEM also continues to support all stakeholders to ensure proposed developments in the area of Site 0153 continues while assuring any potential contamination that may be encountered is



addressed responsibly. To facilitate development in the area, a number of production wells within the Riverside Wellfield have been removed from service and abandoned. Due to the loss of production capacity associated with these abandonments, Citizens may need to install additional production wells in the future to meet the needs of the community. These developments have created and will continue to create on-going changes to the composition and hydraulic dynamics of the Wellfields. Throughout development in the area of Site 0153 and the potential subsequent changes to the composition of the Wellfields, Citizens will continue its commitment to providing safe drinking water to the City of Indianapolis.

2.5 Citizens Water's commitment to safe drinking water

Citizens has also completed substantial efforts since the Alternative Plan was submitted in 2016. First and foremost, finished drinking water provided by Citizens to customers has always remained safe for consumption. All historic and current finished drinking water provided by Citizens meets all SDWA MCLs prior to distribution. As identified in the Alternative Plan, Citizens developed and implemented a Groundwater Monitoring Plan with an increased sampling of production wells from semi-annually to quarterly to monitor cVOC concentrations in the Wellfields.

Citizens has always sampled treated finished drinking water to ensure results are below the MCL prior to distribution. IDEM and Citizens participated in a split-sampling event of active production wells in both Wellfields in February and March 2018. Both IDEM and Citizens results of the split-sampling event confirmed that all cVOC concentrations were below MCLs.

As required by the Alternative Plan, Citizens shut down production well WR-3 in September 2016 due to low-level MCL exceedances of trichloroethylene (TCE) in raw groundwater¹. As a presumptive interim measure, Citizens engineered and installed an aeration system for production well WR-3 beginning in September 2019. Aeration system construction was completed in late January 2020. Citizens conducted aeration testing on production well WR-3 from February through April 2020 and production well WR-3 is now back in service. Currently all raw water generated from production well WR-3, even before it is aerated, is below MCLs, providing further evidence that cVOC concentrations in the Wellfields continue to decline. Nevertheless, Citizens continues to treat the production well WR-3 water, providing an extra margin of safety.

As detailed above, both IDEM and Citizens have completed a tremendous amount of work associated with Site 0153 and required by the MOA. As described in the section below, the drinking water supplied to citizens of Indianapolis from the Riverside and White River

¹ Prior to shutting down WR-3, TCE concentrations ranged from 4.43 to 8.18 micrograms per liter ($\mu\text{g/L}$). The MCL for TCE is 5.0 $\mu\text{g/L}$. WR-3 was the only production well that had exceeded an MCL.



Wellfields is and always has been safe. Furthermore, the measures included in this Proposed RAP will ensure this will continue to be the case in the future.

2.6 The Water in the Wellfields Remains Safe

Multiple lines of evidence support the primary conclusion in the RI that raw groundwater drawn from Citizens' production wells in the Wellfields is safe for use and consumption:

- In 2016, Citizens demonstrated to IDEM's and U.S. EPA's satisfaction that levels of cVOCs in raw groundwater drawn from Citizens' production wells in the Wellfields were declining, both in terms of the frequency of wells having cVOCs detected as well as actual concentrations detected.
- Declining concentrations have continued over the last four years:
 - Production well WR-3 was the only well in 2016 with concentrations slightly above MCLs.
 - Citizens tested the raw water in production well WR-3 on multiple occasions in 2020 as part of the aeration installation process. All raw water concentrations prior to aeration were either non-detect or below the MCLs, providing direct evidence of ongoing concentration declines.
 - **Table 1** includes cVOC time series graphs of results from testing wells in the Wellfields. These graphs also demonstrate the concentrations continue to decline.
 - No active production well has exceeded an MCL since production well WR-3 was taken out of service in 2016.
- Citizens' operations at the Wellfields further ensures safety of water supplied to the public:
 - Citizens' commitment as part of the proposed RAP that it will only use raw water from production wells that are already below MCLs, will ensure MCLs can never be exceeded in finished water.
 - Groundwater from the discrete wells in the Wellfields is mixed together and is then mixed with surface water prior to being sent to Citizens' White River Treatment facility for treatment. Surface water makes up approximately 90% and groundwater 10% of the water sent to be treated.
 - This surface water/groundwater mix is then treated and tested routinely before being sent to Citizens' customers.
 - These combinations of agreed-upon measures ensure that the water delivered to the public will always meet MCLs and be safe for consumption. In fact, data from water treated at the White River Treatment facility confirms that cVOCs have been non-detect in finished water.



3.0 SITE CHARACTERISTICS

The definitive source(s) of cVOCs impacting the Wellfields has not been identified to-date; but in an attempt to capture all PRPs, investigations have been focused within a 5-year time of groundwater travel to the Wellfields. In general, as depicted on **Figure 1**, the investigation area for Site 0153 is bordered by 35th Street to the north, Holt Road to the west, Washington Street to the south, and Central Avenue to the east.

The Wellfields are located in an urban mixed-use area of the city where dozens of historic industrial facilities, which potentially used cVOCs, operated over the course of several decades. CVOCs have migrated to the Wellfields from source(s) within Site 0153. The 1-year and 5-year time of travel boundaries for the Wellfields are also depicted on **Figure 1**. The cVOCs have been detected in both the sand and gravel, and limestone bedrock aquifers of the Riverside Wellfield and in the sand and gravel aquifer of the White River Wellfield².

IDEM is managing the characterization and cleanup of potential sources within the area of Site 0153 under individual State Programs. Currently, PRP investigations to define the nature and extent of cVOC impacts in the vicinity of the Wellfields are on-going; thus, both the future concentration and the time over which the production wells will experience continued cVOC input contributions are unknown. However, cVOC concentrations in the untreated raw groundwater of the Wellfields have been declining. Since production well WR-3 was removed from service in 2016, the cVOC concentrations in the raw groundwater from production wells within the Wellfields are below the applicable U.S. EPA MCLs, even before Citizens' standard mixing of groundwater and surface water and treatment at the White River Treatment Facility.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

IDEM is managing investigation and remediation efforts for PRPs and potential sources within the area of Site 0153 individually under State Programs, therefore the scope and role of the Preferred Alternative focuses on protecting the Wellfields to ensure safe drinking water. This focus is most effectively and reliably achieved by providing provisions for continued monitoring and establishing production well head treatment options, if needed in the future, for raw groundwater exhibiting cVOC concentrations greater than MCLs. The Preferred Alternative for Site 0153 involves all work necessary to prevent cVOC-impacted groundwater captured by the Wellfields from adversely affecting human health and the environment. The Preferred Alternative involves using engineering controls, such as aeration treatment or removal of wells from service, to prevent impacted groundwater above MCLs from entering the Citizens mixing and pre-treatment plant.

In addition to the Preferred Alternative, the Proposed RAP also includes provisions for funding for potential future response actions, and community participation and outreach. IDEM will

² The White River Wellfield does not have any production wells installed within the limestone bedrock aquifer.



continue to work with and pursue PRPs under State Programs to investigate and remediate the various discrete and disparate sources of cVOC impacts within the 5-year time of travel of the Wellfields. IDEM's continued efforts under State Programs will ensure the cVOC impacts within the Site continue to diminish while the Preferred Alternative provides protection of risks at the Wellfields and groundwater production wells now and into the future.

5.0 SUMMARY OF SITE RISKS

IDEM, as required by the MOA, has worked diligently to determine the potential risks associated with Site 0153 and the Wellfields. As detailed in prior sections of the Proposed RAP, IDEM has identified numerous PRPs and potential source(s) within Site 0153 and is managing the investigation/remediation efforts under State Programs. Although not all investigation and remediation of discrete PRP sites are complete, IDEM believes that adequate information is available to rely on for decision making purposes as it pertains to the overall protection of the Wellfields and safety of drinking water supply. IDEM will continue to pursue PRPs, as necessary and appropriate, to limit future potential cVOC contributions to Wellfields. Citizens will continue to monitor groundwater, remove production wells above an MCL from service, and install treatment (e.g., aeration or similar), as needed, prior to returning to service. As always, Citizens will continue to ensure that finished drinking water complies with all SDWA requirements prior to distribution.

As part of the Site 0153 process, IDEM conducted a HHERA to determine the overall risk associated with the Wellfields. IDEM prepared the HHERA to provide a qualitative assessment and, where appropriate, quantitative analyses, in a conservative manner, of the potential for adverse health effects from exposure to constituents in environmental media associated with the Wellfields. The HHERA is designed to provide a sound basis for current and future risk management decisions. The purpose of the HHERA is to characterize, assess, and summarize risks to human health and the environment associated with the groundwater produced from the Wellfields. To that end, the HHERA focuses on the Wellfields and does not focus on individual PRP sites in the immediate or surrounding area. Risk Assessment at individual sites within Site 0153 boundaries, if required, will be conducted separately under IDEM programs.

Key components and conclusions identified in the HHERA include the following:

- Current and historic finished drinking water results are below MCLs, so further risk evaluation of finished drinking water is not warranted or necessary.
- Site 0153 was proposed for the NPL based on groundwater detections of cVOCs in production wells. All evidence developed to date supports the conclusion that these detections are associated with disparate historic releases from off-Site properties in the surrounding area.



- The HHERA focuses on cVOCs associated with chlorinated solvents traditionally utilized in dry cleaning, industrial, and manufacturing activities including tetrachloroethene (PCE), TCE, and 1,1,1-trichloroethane (1,1,1-TCA), as well as the respective degradation by-products.
- Chemicals of Potential Concern (COPCs) for risk assessing purposes were developed utilizing production well analytical results collected from the Wellfields since 2004.
 - This data set provided 486 data points from the Riverside Wellfield and 150 data points from the White River Wellfield for consideration.
 - COPCs utilized in the HHERA include: TCE, cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride (VC).
- An exposure assessment was completed to determine potential exposure pathways, potential future receptors that could be exposed to Wellfield COPCs, and potential exposure routes. The HHERA focused on the public water supply and calculated risk based on the following:
 - Residential (Adult and Child) receptors, and
 - Potential dermal and ingestion exposure routes.
- Operating data, including standard mixing of groundwater and surface water prior to treatment, from 2004 to 2019 were incorporated into the risk calculation to provide accuracy.
- The U.S. EPA Regional Screening Level (RSL) calculator was utilized to determine both carcinogenic risk and non-carcinogenic hazard index for COPCs in the combined, blended Wellfield/Surface Water output.
- HHERA Risk Characterization identified results well within U.S. EPA-acceptable levels (*i.e.*, no unacceptable risks). Results of the HHERA include:
 - Total calculated Carcinogenic Risk of 4.22×10^{-6} . U.S. EPA considers theoretical excess lifetime cancer risks in the range of 1×10^{-6} to 1×10^{-4} to be acceptable under CERCLA. Additionally, the MOA identified the target risk criteria for Site 0153 to be at or below 1×10^{-5} (which the calculated value, 4.22×10^{-6} , falls below).
 - Total calculated Non-Carcinogenic Hazard Index of 0.0250. U.S. EPA considers any Hazard Index of <1.0 acceptable under CERCLA.

As indicated by the results of the HHERA, it is apparent that Citizens can and has safely operated the Wellfields in a manner that protects human health and the environment even though all PRP investigations and remediation efforts are not complete. There are no active production wells in the Wellfields with raw groundwater cVOC concentrations above an MCL. Declining cVOC concentrations observed in the Wellfields support the conclusion that PRP investigation/remediation efforts conducted to date are already showing a beneficial reduction of cVOC contributions to raw groundwater. Furthermore, IDEM can rely on Citizens' operations, and under their Drinking Water permit with IDEM, to ensure that water supply remains safe for public use.



6.0

FEASIBILITY STUDY (REMEDIAL ACTION OBJECTIVES & EVALUATION OF REMEDIAL ALTERNATIVES)

IDEM prepared the FS to identify, screen, and provide a detailed analysis of current potential remedial alternatives for addressing low-level impacts in production wells in the Wellfields. Specifically, the FS focuses on treating the groundwater at the extraction point in the Wellfields (*i.e.*, at production wells that contain cVOCs over the MCL in the raw water). The FS documents the evaluation process and recommends a treatment alternative capable of reducing or eliminating cVOC concentrations from the production wells, if needed in the future. The FS was based on information presented in the RI Report and HHERA and utilized cost estimates generated specific for each remedial alternative reviewed.

Key components and conclusions identified in the FS include the following:

- Remedial Action Objectives (RAOs) for the Wellfields include:
 - Prevent commercial/industrial worker direct contact scenarios and inhalation exposure to groundwater produced from the production wells within the Wellfields with cVOC concentrations in excess of state or federal standards.
 - Treating the raw groundwater at the Wellhead to remove cVOC concentrations to levels that protect human health; and
 - Providing a long-term solution capable of continuing to provide a constant supply of safe drinking water to the public.
- Federal MCLs have been selected as the remediation goals for the cVOC treatment of groundwater.
- Remedial alternatives for treating cVOC impacted groundwater at a production well were identified and initially screened utilizing evaluation criteria (effectiveness, implementability, and cost). Remedial alternatives considered in the FS include: No Action, Aeration, Carbon Absorption, Ozonation, Advanced Oxidation, and Anaerobic Biological Reactor. All remedial alternatives except Anaerobic Biological Reactor passed the initial screening process.
- A detailed analysis of remedial alternatives was completed to select a recommended treatment alternative, if required in the future. Detailed analysis included a comparison of each remedial alternative against the nine U.S. EPA recommended evaluation criteria. Criteria are divided into three groups including:
 - Threshold Criteria - Protection of Human Health and the Environment and Compliance with Applicable or Relevant and Appropriate Requirements (ARARs);
 - Balancing Criteria - Long-term Effectiveness/Permanence; Reduction in Toxicity, Mobility, or Volume; Short-term Effectiveness; Implementability; and Cost; and
 - Modifying Criteria - State and Community Acceptance.
- Based on the results of the FS and utilizing current information, aeration is the recommended remedial alternative that could be utilized if verified concentrations in a production well exceed any MCL, to treat potential future cVOC impacts in the Wellfields.



Aeration is also a common-sense, “presumptive remedy” that has already been implemented at this Site and has shown to be effective. Citizens proactively installed aeration at production well WR-3 prior to development of the FS. Results of the pre- and post-aeration raw water indicates this presumptive remedy successfully reduces cVOC concentrations at the production well even before being mixed with other groundwater/surface water prior to treatment and distribution. There are currently no active production wells in the Wellfields with raw water cVOC concentrations above MCLs.

Additional information regarding the RAOs established for the Wellfields and the specifics of the remedial alternatives reviewed or the evaluation criteria employed by IDEM can be referenced in the FS. A summary table identifying the FS Alternatives Comparison Evaluation completed by IDEM has been included as **Table 2**. This table includes the alternatives considered, comparison criteria utilized, estimated cost to implement (including design, capital and operations/maintenance), and an overall ranking of the Alternatives.

7.0 PREFERRED ALTERNATIVE

Should raw groundwater cVOC concentrations in a production well change in the future, the Preferred Alternative requires removal of the production well from service and either: demonstrating the production well results are reliably and consistently below MCLs; or installing treatment to ensure cVOCs concentrations are reduced to levels below MCLs. As identified above and in **Table 2**, Aeration is the preferred remedial technology to address impacts to the Wellfields, should treatment become necessary in the future. It passes the threshold criteria for acceptance, and scored high for long-term effectiveness and implementability, and medium for reduction in toxicity, mobility, or volume, and short-term effectiveness. Aeration is also a common-sense, “presumptive remedy” that has already been implemented at this Site as an interim measure and shown to be effective at achieving the RAOs. It is also the most cost-effective active remediation alternative.

8.0 REMEDIAL ACTION PLAN

Currently, cVOC concentrations in the raw groundwater within the Wellfields are either non-detect or below all of the applicable U.S. EPA MCLs. This Proposed RAP was developed to ensure protection of human health and the environment by requiring the raw groundwater cVOC concentrations in all production wells to be below the applicable MCLs. Should raw groundwater cVOC concentrations in a production well change in the future, the Preferred Alternative presented in this Proposed RAP requires removal of the production well from service and either: demonstrating the production well results are reliably and consistently below MCLs; or installing treatment to ensure cVOCs concentrations are reduced to levels below MCLs. The Proposed RAP also ensures that IDEM continues to pursue PRPs, as necessary and appropriate, to limit future potential cVOC contributions to Wellfields. Considering the declining cVOC concentrations in the Wellfields, a successful presumptive remedy already installed and



operating in production well WR-3, and a recommended treatment alternative should production well cVOCs exceed an MCL in the future, IDEM's Preferred Alternative includes the following elements:

- Remove from service any production well where untreated raw groundwater cVOC concentrations exceed an MCL³ and either:
 - Remain out of service until multiple⁴ resampling efforts, completed on separate occasions, have demonstrated that production well results are reliably and consistently below MCLs; or
 - Install treatment (*e.g.*, aeration or similar⁵) to reduce concentrations and complete confirmatory sampling of post-treatment water to ensure results are below MCLs before returning the well to service.
- Continue operation and maintenance of the aeration equipment installed for production well WR-3 (or any other well that requires it) until aeration is no longer necessary, to ensure all untreated raw water in active wells is below MCLs.
- Continue routine Wellfield quarterly sampling⁶ of active production wells for cVOCs until monitoring has demonstrated that untreated raw water is below MCLs.

In addition to the elements of the Preferred Alternative detailed above, additional measures of the Proposed Plan that will be undertaken to further ensure protection of human health and the environment include the following:

- IDEM will enter into settlements with willing Site 0153 PRPs to create a settlement fund entitled "Site 0153 Monitoring and Future Response Fund (MAFR)." For the first 5 years, all settlement payments will be dedicated to funding future response actions within Site 0153, including:
 - Monitoring related to protecting Citizens production wells from cVOCs;
 - Collecting new evidence to determine whether cVOCs released from any PRP's facility threaten or impact any production wells in use within the Wellfields;

³ Exceedances of an MCL will be determined through quarterly sampling conducted by Citizens Water. An MCL exceedance will be determined by a running annual average of all samples taken from an individual production well. If any sample result will cause the running annual average to exceed the MCL, the production well will be considered above the MCL. The MCL exceedance criteria is adapted from 327 Indiana Administrative Code (IAC) 8-2-5.5 (15)(A) and (C).

⁴ "Multiple resampling events" means a minimum of two consecutive resampling events resulting in cVOC concentrations below the MCL that result in a reduction in the running annual average to below the MCL. The resampling criteria is adapted from 327 IAC 8-2-5.5 (11)(B)

⁵ The FS evaluated currently available remedial technologies and associated criteria for reduction of cVOCs from a production well and concluded that aeration treatment was a reliable, effective technology. Since the Preferred Alternative for treatment of groundwater from production wells is a commitment for the future, remedial alternatives may change over time, and re-evaluation may be warranted based on newly available technologies.

⁶ If future quarterly sampling events consistently demonstrate cVOC concentrations in the Wellfields are below MCLs, even before standard mixing and treatment operations, sampling frequency could be reduced.



- Funding or installing suitable water treatment equipment to remove any cVOCs from water extracted from Citizens' production wells; and
- If both remediation and treatment are not cost effective, funding the relocation of any production wells as necessary to maintain use of the Wellfields or development of a new wellfield.
- If the MAFR Fund is not needed for these purposes, in years 6 to 10 IDEM may begin spending the fund on IDEM oversight costs, as specified in the Agreed Order.
- IDEM will continue to work closely with the public, community organizations, governmental entities (including the City of Indianapolis and the MCPHD), and other stakeholders to ensure their involvement in both the Proposed Plan and the progress of any discrete PRP site remediation and/or monitoring program within Site 0153.
- IDEM and the MCPHD will continue to ensure that any private wells within Site 0153 meet MCLs including sampling the wells if requested by the property owner.
- IDEM will provide annual reports⁷ to the U.S. EPA detailing IDEM's progress in regards to the investigation and remediation of PRP sites in the immediate or surrounding areas of the Wellfields, the quality of the drinking water supplied to customers from the Wellfields, and community participation in the Site. In addition, IDEM will continue to maintain and update the website for Site 0153 at: www.idem.IN.gov/Site0153 until the Site is de-proposed from the NPL.
- Citizens will provide IDEM with routine updates regarding quarterly sampling results and annual rolling cVOC averages for operating production wells in the Wellfields. Routine updates will continue for a period of 5 years from the date the Selected Remedy for Site 0153 is executed in the (ROD) or until IDEM and Citizens agree that updates are no longer necessary (whichever is sooner).

The elements of the Proposed RAP are designed to provide protection of risks at the Wellfields, while ensuring the cVOC impacts within the Site continue to decline. IDEM believes that the elements of the Proposed RAP are the most effective way to protect human health and the environment from potential risks at the Wellfields, would comply with Federal and State environmental statutes and regulations, would be cost-effective, and would utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. The Preferred Alternative and Proposed RAP can change in response to public comments or new information prior to execution of the Selected Remedy in the ROD for Site 0153.

⁷ In accordance with the Memorandum of Agreement (MOA), once the Site remedial action is successfully completed, it is expected that the U.S. EPA will have no further interest in considering the Site for final listing on the NPL and that the Site will be de-proposed from the NPL. Therefore, annual reports will continue until remedial action has been successfully completed and/or the Site has been de-proposed from the NPL.



9.0 COMMUNITY PARTICIPATION

IDEM completed and implemented a Community Involvement Plan, including holding several public information meetings in various neighborhoods within Site 0153 and scheduling bi-monthly stakeholder meetings with the City of Indianapolis, Citizens, and the MCPHD to coordinate responses to public concerns. IDEM has also established a public document repository on the 12th Floor of Indiana Government Center North, 100 North Senate Avenue, Indianapolis and maintains a website and interactive map for Site 0153 at: www.idem.IN.gov/Site0153.

The RI Report, HHERA, and FS were made available to the public on November 9, 2020. These reports can be found in the Administrative Record file for the Site or online at: www.idem.IN.gov/Site0153. A public comment period for the RI, HHERA, and FS was held from November 10, 2020 to December 11, 2020. In addition, a public meeting was held on November 18, 2020 to review the findings of the RI, HHERA, and FS with interested public parties. Due to COVID-19 restrictions, the public meeting used a virtual format to avoid in-person contact.

IDEM received written comments on the FS via IDEM's Site 0153 website and via electronic mail. In total comments were received from two (2) different individuals or organizations, including concerned citizens and environmental organizations. A copy of the comments received are available in the Administrative Record file for the Site IDEM reviewed all comments submitted during the public comment periods and the public meetings. Based upon review of the written and oral comments received during the public comment periods and public meetings for the RI, HHERA, and FS, IDEM determined no significant changes to the remedy, presented in this Proposed RAP, were necessary or appropriate.

9.1 **Public Comment Period and Public Meeting**

The RAP was made available to the public on January 13, 2021 and can be found in the Administrative Record file for the Site or online at: www.idem.IN.gov/Site0153. Concurrently, the RAP was submitted to the U.S. EPA for review. A public comment period will be held from January 13, 2021 – February 11, 2021. In addition, a public meeting will be held during the public comment period.

Written comments on the Proposed RAP can be submitted to IDEM via the Site 0153 website electronic mail portal or by mail. A copy of the comments received will be made available in the Administrative Record file for the Site. IDEM will review all comments submitted during the public comment period and will address/consider changes to the Proposed RAP as appropriate.



9.2 Administrative Record File / Information Repositories

IDEM maintains a website and interactive map for Site 0153 at: www.idem.IN.gov/Site0153

In addition, copies of all documents related to this project can be viewed at:

IDEM - Office of Records Management

Indiana Government Center North, Room 1207

100 North Senate Avenue

Indianapolis, Indiana 46204

(317) 232-8667

idemfileroom@idem.IN.gov

9.3 Contacts

For more information about the public comment period, public meeting, Proposed RAP, or any other aspects of Site 0153, please contact:

<u>Lead Agency</u>	<u>Support Agency</u>
IDEM	U.S. EPA, Region 5
Ryan Groves	Katherine Thomas
Senior Environmental Manager	Remedial Project Manager
State Cleanup Program	(312) 353-5878
(800) 451-6027	Thomas.Katherine@epa.gov
Site0153@idem.IN.gov	

9.4 Local Community Advisory Group

IDEM solicited and awarded a Technical Assistance Grant to the Indianapolis Environmental Equity Council, Inc. (IEEC), a nonprofit organization composed of several neighborhood organizations. Contact information for the IEEC is provided below.

Paula Brooks, Registered Agent

(317) 685-8800 ext. 1013

PBrooks@hecweb.org



10.0 REFERENCES

U.S. EPA, 1989. *Risk Assessment Guidance for Superfund. Volume I, Part A. Human Health Evaluation Manual (EPA 540-1-89-002)*. U.S. EPA Office of Emergency and Remedial Response. December 1989. Available at: <https://www.epa.gov/>

U.S. EPA, 1988. U.S. Environmental Protection Agency. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. U.S. EPA Office of Emergency and Remedial Response, Washington D.C. U.S. EPA/540/G-89/004. October 1988.

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IDEM, 2020. *Site 0153: Remedial Investigation Report*. Indiana Department of Environmental Management. November 2020.

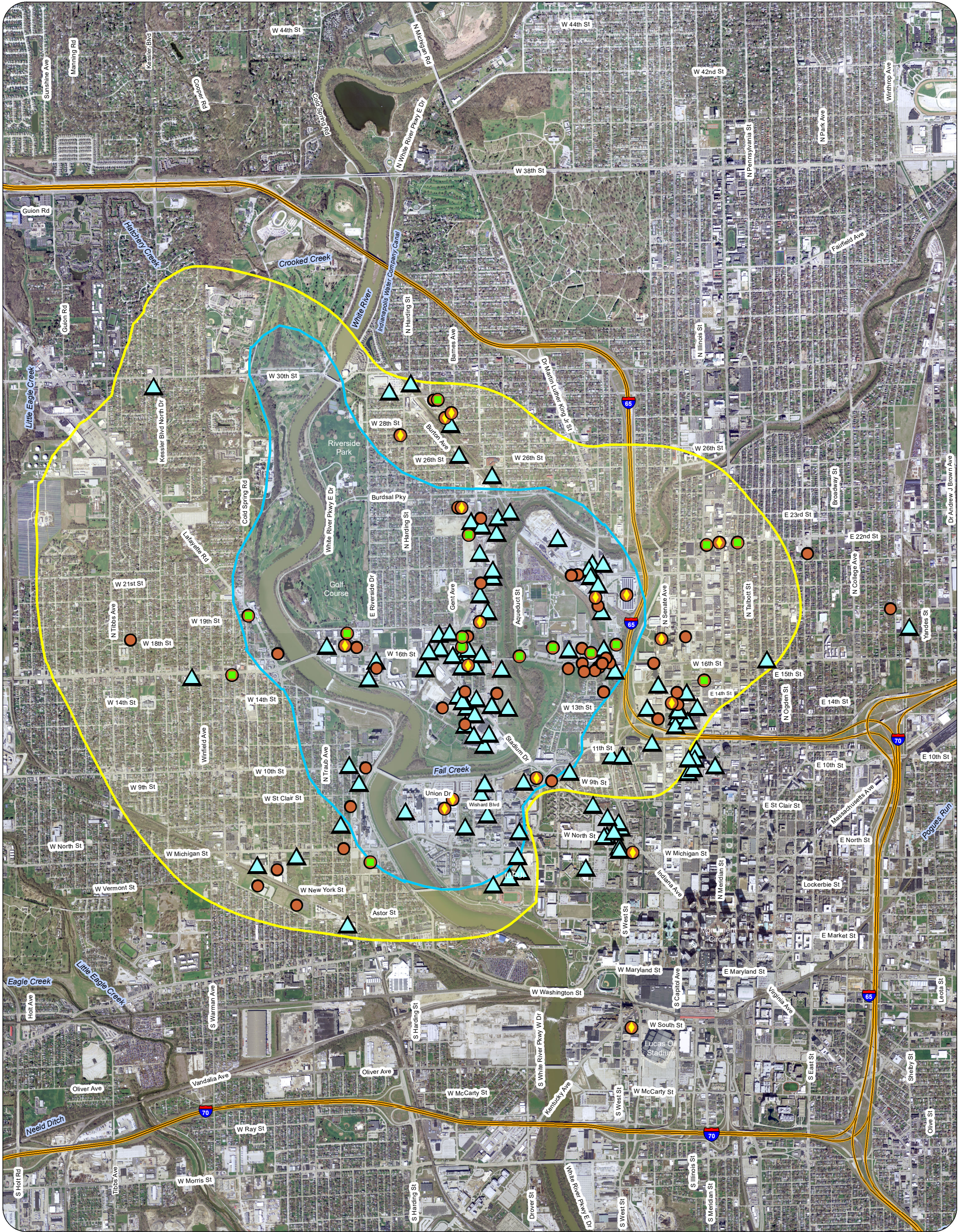
IDEM, 2020. *Site 0153: Human Health and Ecological Risk Assessment*. Indiana Department of Environmental Management. November 2020.

IDEM, 2020. *Site 0153: Feasibility Study Report*. Indiana Department of Environmental Management. November 2020.

FIGURES

Figure 1: Site 0153 Time of Travel Map

Figure 1 - Site 0153 Time of Travel Map



Non Orthophotography Data
State of Indiana Geographic Information Office Library

Orthophotography
Obtained from 2016 Indiana Map Framework Data
(www.indianamap.org)

Map Projection: UTM Zone 16 N
Map Datum: NAD83

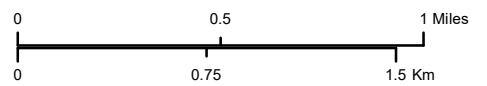
This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

- Documented Chlorinated Solvent Management or Release
65 Sites at this status
- Information Request Sent
21 Sites at this status
- Notice of Liability Sent
19 Sites at this status
- ▲ Documented Contributor to Well Field Impact
No sites at this status
- ▲ No Further Evaluation for Well Field Impact
131 Sites at this status
- Wellhead 1 Year Delineation
- Wellhead 5 Year Delineation



August 5, 2020

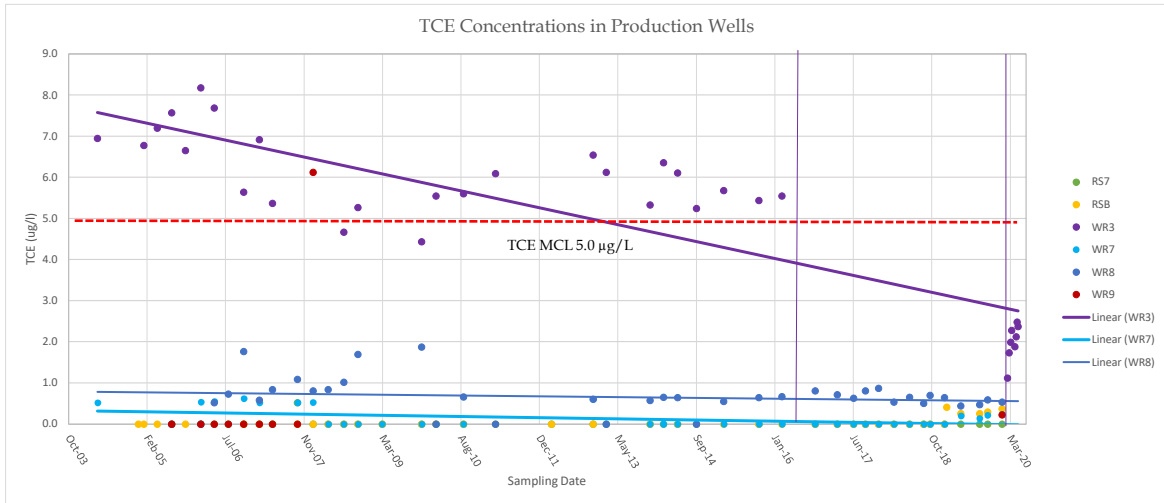
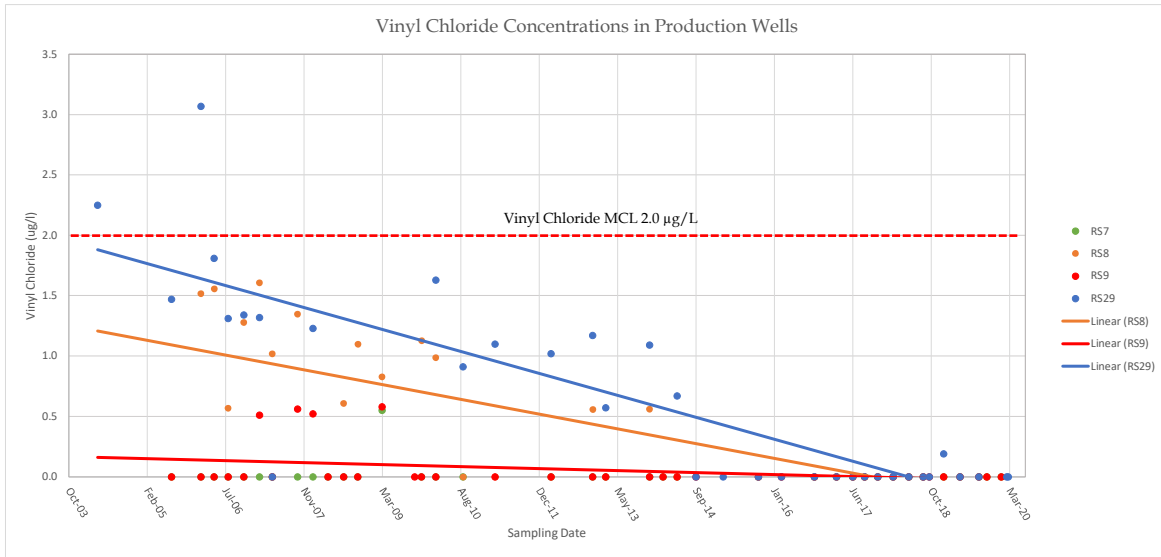
Diane Osborn, LPG, GISP
Indiana Department of Environmental Management
Office of Land Quality - Engineering & GIS Services



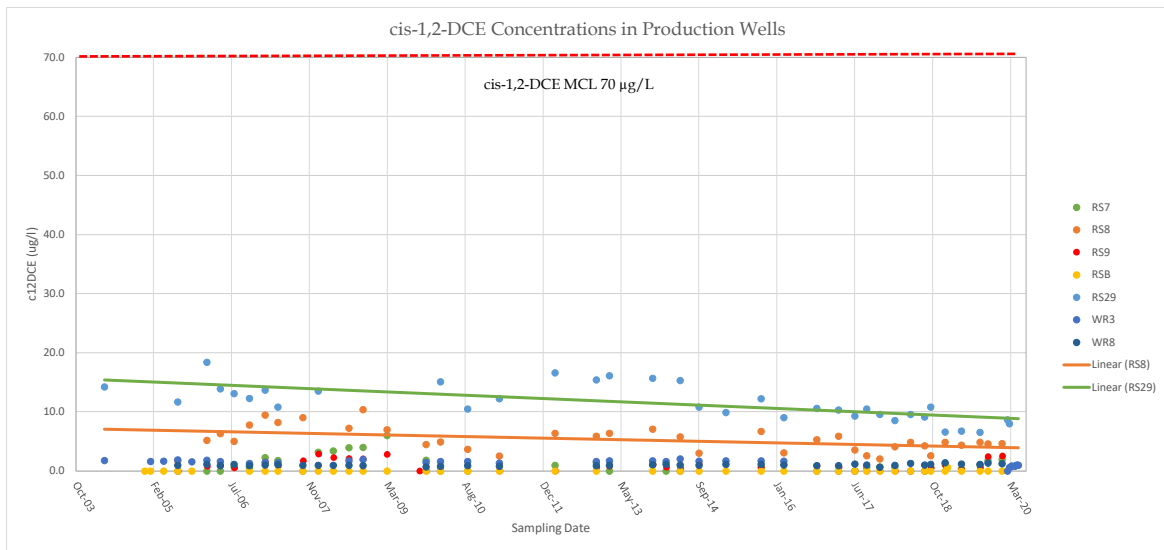
TABLES

- Table 1:** cVOC Time Series Concentration Graphs
Table 2: Alternatives Comparative Evaluation

TABLE 1
cVOC CONCENTRATIONS VS. TIME



Note: WR3 was taken offline in March 2016. Aeration treatment was installed on WR-3 in January 2020 and testing of post aeration water was completed between February and April 2020. WR-3 is currently back in service. The vertical lines denote when WR-3 was taken out of service, and when confirmatory sampling commenced, respectively.



Note
For each compound, wells that are historically non-detect are not presented.

TABLE 1
cVOC CONCENTRATIONS VS. TIME

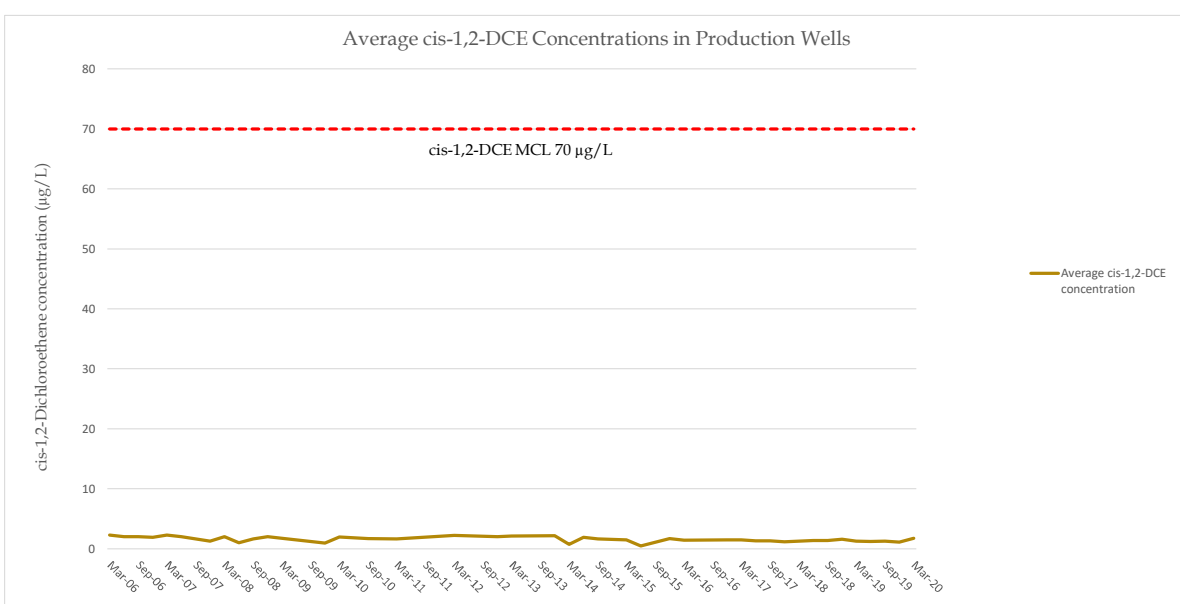
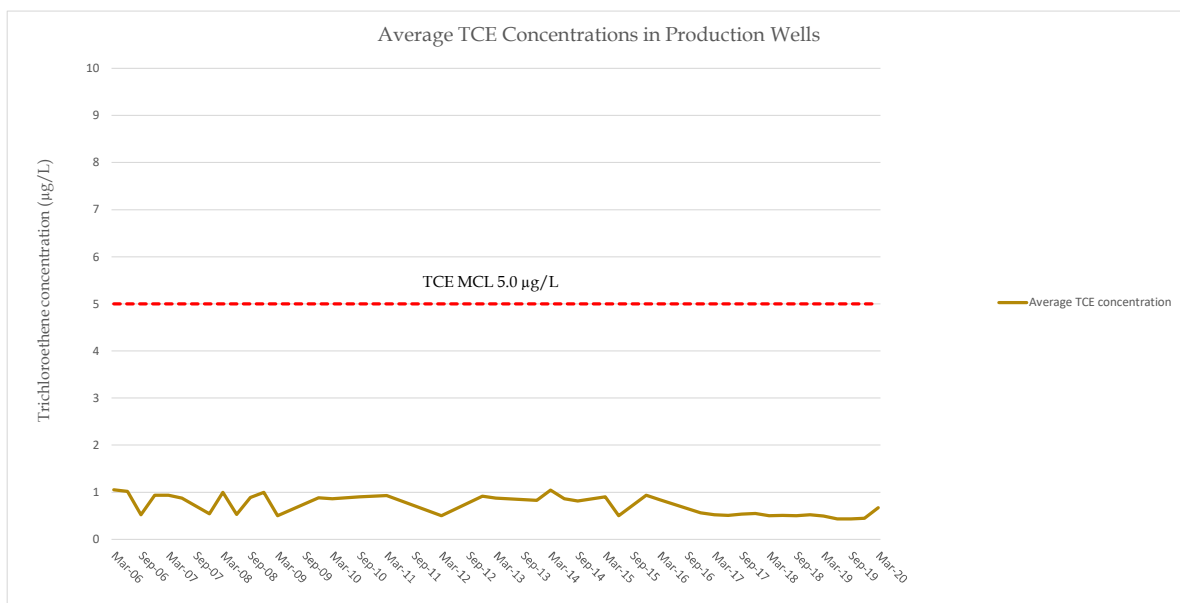
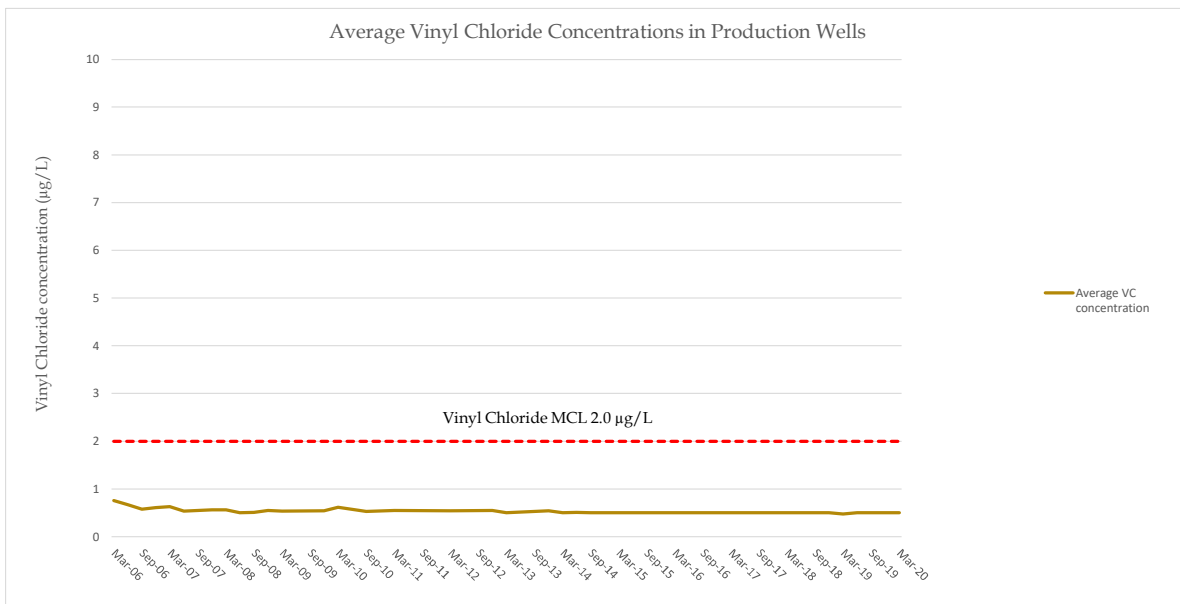


Table 2
Alternatives Comparative Evaluation

Criterion	Baseline	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	Aeration	Carbon Adsorption	Ozonation	Advanced Oxidation
Evaluation Criteria¹ with Assigned Scoring					
Protection of Human Health and Environment	Fail	Pass	Pass	Pass	Pass
Compliance with ARARs/TBCs	Fail	Pass	Pass	Pass	Pass
Long-Term Effectiveness	Low	High - 3 pts	Medium - 2 pts	Medium - 2 pts	High - 3 pts
Reduction in Toxicity, Mobility, or Volume	None	Medium - 2 pts	Medium - 2 pts	High - 3 pts	High - 3 pts
Short-Term Effectiveness	Low	Medium - 2 pts	High - 3 pts	Medium - 2 pts	Low - 1 pt
Implementability	High	High - 3 pts	Medium - 2 pts	Low - 1 pts	Low - 1 pt
Community Acceptance	Low	Medium - 2 pts	Medium - 2 pts	Medium - 2 pts	Medium - 2 pts
Score Total	NA	12	11	10	10
Estimated Costs²					
Design	\$0	\$50,000	\$50,000	\$75,000	\$85,000
Capital Costs	\$0	\$880,000	\$815,000	\$791,000	\$1,012,000
O&M (30 Years)	\$0	\$964,000	\$3,198,000	1,320,000	\$6,300,000
Total	\$0	\$1,894,000	\$4,063,000	\$2,186,000	\$7,397,000
Cost Rank (Low to High)	1st	2nd	4th	3rd	5th

Notes: ¹ = Refer to Section 4.3 of the Feasibility Study for details of the evaluation.
² = Refer to **Table E-1** in **Appendix E** of the Feasibility Study for costing details.
ARARs = Applicable or Relevant and Appropriate Requirements; TBCs= to be considered.
NA - Not scored since it failed one or more threshold criterion.