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WRITER'S DIRECT DIAL NO:
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March 19, 2025

Delivered Electronically

Mr. Clinton Woods, Commissioner
Indiana Department of Environmental Management
100 N. Senate Avenue
Mail Code 50-01
Indianapolis, IN 46204-2251

Dear Mr. Woods,

Re: Indiana-Kentucky Electric Corporation
Notification of CCR Rule Information Posting
Assessment of Corrective Measures Addendum No. 1
Landfill Runoff Collection Pond

As required by 40 CFR 257.106(h)(7), the Indiana-Kentucky Electric Corporation (IKEC) is providing notification to the Commissioner of the Indiana Department of Environmental Management that Addendum No. 1 to the Landfill Runoff Collection Pond (LRCP) Assessment of Corrective Measures (ACM) has been added to the company's publicly accessible internet site. Addendum No. 1 will be used to support the ongoing evaluation of potential corrective measures for the LRCP.

As required by 40 CFR 257.96(d), the addendum provides an update and details of the effectiveness of the potential corrective measures. The addendum was prepared by AGES, Inc., the site's hydrogeologist, using 40 CFR 257.24 as a basis for the selection of potential remedies. Per 40 CFR 257.106(h)(8), this letter provides notification that the report has been placed in the facility's operating record, as well as on the company's publicly accessible internet site and can be viewed at https://www.ovec.com/CCRCompliance.php . As required by 40 CFR 257.96(e), IKEC will discuss the results of the corrective measures at least 30 days prior to the selection of remedy in a public meeting with interested and affected parties.

If you have any questions, or require any additional information, please call me at (740) 289-7259.

Sincerely,

Jeremy Galloway
Environmental Specialist
JDG:zsh

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COAL COMBUSTION RESIDUALS REGULATION ASSESSMENT OF CORRECTIVE MEASURES REPORT ADDENDUM NO. 1

LANDFILL RUNOFF COLLECTION POND (LRCP) INDIANA-KENTUCKY ELECTRIC CORPORATION CLIFTY CREEK STATION MADISON, INDIANA

MARCH 2025

Prepared for:

INDIANA-KENTUCKY ELECTRIC CORPORATION (IKEC)

Prepared by:

APPLIED GEOLOGY AND ENVIRONMENTAL SCIENCE, INC.

COAL COMBUSTION RESIDUALS REGULATION
ASSESSMENT OF CORRECTIVE MEASURES REPORT
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MADISON, INDIANA

MARCH 2025

Prepared for:

INDIANA-KENTUCKY ELECTRIC CORPORATION (IKEC)

Prepared by:

APPLIED GEOLOGY AND ENVIRONMENTAL SCIENCE, INC.

Travis Sitko
Scientist I

Robert W. King, P.G.
Chief Hydrogeologist

COAL COMBUSTION RESIDUALS REGULATION
ASSESSMENT OF CORRECTIVE MEASURES REPORT
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CLIFTY CREEK STATION
MADISON, INDIANA

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CLIFTY CREEK STATION
MADISON, INDIANA

LIST OF ACRONYMS

ACM	Assessment of Corrective Measures
AGES	Applied Geology and Environmental Science, Inc.
ASD	Alternate Source Demonstration
bgs	Below Ground Surface
CCR	Coal Combustion Residuals
ft/day	Feet per Day
GMPP	Groundwater Monitoring Program Plan
GWPS	Groundwater Protection Standard
IDEM	Indiana Department of Environmental Management
IKEC	Indiana-Kentucky Electric Corporation
K	Hydraulic Conductivity
LRCP	Landfill Runoff Collection Pond
MNA	Monitored Natural Attenuation
MW	Megawatt
mV	Millivolts
NPDES	National Pollution Discharge Elimination System
O&M	Operations and Maintenance
ORP	Oxidation Reduction Potential
PRB	Permeable Reactive Barrier
RCRA	Resource Conservation and Recovery Act
SSL	Statistically Significant Level
SSI	Statistically Signifiant Increase
Stantec	Stantec Consulting Services, Inc.
StAP	Statistical Analysis Plan
SU	Standard Unit
Type I Landfill	Type I Residual Waste Landfill
U.S. EPA	United States Environmental Protection Agency
ug/L	Micrograms per Liter
WBSP	West Boiler Slag Pond

COAL COMBUSTION RESIDUALS REGULATION
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ADDENDUM NO. 1
LANDFILL RUNOFF COLLECTION POND (LRCP)
INDIANA-KENTUCKY ELECTRIC CORPORATION
CLIFTY CREEK STATION
MADISON, INDIANA

1.0 INTRODUCTION

The Clifty Creek Station, located in Madison, Indiana, is a 1,304-megawatt (MW) coal-fired generating power plant operated by the Indiana-Kentucky Electric Corporation (IKEC), a subsidiary of the Ohio Valley Electric Corporation. The Clifty Creek Station has six (6) 217.26-MW generating units and has operated since 1955 (Figure 1-1). Beginning in 1955, coal combustion residual (CCR) products were sluiced to disposal ponds in the plant site.

On December 19, 2014, the United States Environmental Protection Agency (U.S. EPA) issued their final CCR regulation which regulates CCR as a non-hazardous waste under Subtitle D of Resource Conservation and Recovery Act (RCRA) and became effective six (6) months from the date of its publication (April 17, 2015) in the Federal Register, referred to as the "CCR Rule." The rule applies to new and existing landfills, and surface impoundments used to dispose of or otherwise manage CCR generated by electric utilities and independent power producers. Because the rule was promulgated under Subtitle D of RCRA, it does not require regulated facilities to obtain permits, does not require state adoption, and cannot be enforced by U.S. EPA.

The CCR Rule in 40 CFR § 257.96(a) requires that an owner or operator initiate an Assessment of Corrective Measures (ACM) to prevent further release, to remediate any releases, and to restore affected area(s) to original conditions in the event that any Appendix IV constituent has been detected at a Statistically Significant Level (SSL) greater than a Groundwater Protection Standard (GWPS). The ACM must be completed within 90 days after initiation. The CCR Rule allows up to an additional 60 days to complete the ACM if a demonstration shows that more time is needed because of site-specific conditions or circumstances. A certification from a qualified professional engineer attesting that the demonstration is accurate is required.

In September 2019, IKEC prepared an ACM Report for the Landfill Runoff Collection Pond (LRCP) in compliance with 40 CFR § 257.90(c) (AGES 2019). The 2019 ACM Report included a summary of groundwater monitoring conducted at the unit, the results of site characterization activities, and a review of potential remedial technologies to address Molybdenum-impacted groundwater at the LRCP. Two (2) property boundary wells (CF-19-14 and CF-19-15) were added to the groundwater monitoring network as part of the site characterization. Assessment Monitoring has continued at the LRCP since 2019. Molybdenum has exceeded the GWPS for all Assessment Monitoring sampling events, and Arsenic exceeded the GWPS in well CF-15-07 during the March and September 2024 sampling events.

This report, Addendum No. 1 to the ACM Report, includes the boundary well sampling and an update on the site characterization related to the Arsenic exceedance. Additionally, IKEC has opted to evaluate whether phytoremediation is feasible as a supplemental remedial technology to augment other primary remedial technologies used to address groundwater at the site. Further information regarding the applicability of phytoremediation is also presented in Section 5.2.1.5 of this addendum.

2.0 BACKGROUND

During the course of plant operations, CCRs have been managed and disposed of in the LRCP at the site (Figure 1-1). To comply with the CCR regulation, IKEC installed a groundwater monitoring network at the LRCP by the requirements of the CCR Rule. As detailed in the Monitoring Well Installation Report (AGES 2018b) and the 2019 Assessment of Corrective Measures Report (AGES 2019), the CCR groundwater monitoring network for the LRCP includes the following ten (10) wells:

- CF-15-04 (Background);
- CF-15-05 (Background);
- CF-15-06 (Background);
- CF-15-07 (Downgradient);
- CF-15-08 (Downgradient);
- CF-15-09 (Downgradient);
- WBSP-15-01 (Background);
- WBSP-15-02 (Background);
- CF-19-14 (Boundary); and
- CF-19-15 (Boundary).

The locations of the wells in the groundwater monitoring network are shown on Figure 2-1. As listed above and shown in Table 2-1, the CCR groundwater monitoring network for the LRCP includes five (5) background, three (3) downgradient, and two (2) boundary monitoring wells, which satisfies the requirements of the CCR Rule. Generalized groundwater flow maps (including the Ohio River) for March 2019 through September 2023 are included in Appendix A.

In accordance with 40 CFR § 257.94 of the CCR Rule, the first round of Detection Monitoring was conducted in March 2018. Based on the results of the statistical evaluation of the Detection Monitoring data, the LRCP entered into Assessment Monitoring in September 2018 and the first round of Assessment Monitoring samples were collected in October 2018.

Assessment Monitoring has continued at the unit on a semi-annual basis. Sampling results are statistically evaluated in accordance with 40 CFR § 257.93 (f) of the Statistical Analysis Plan (StAP) (Stantec Consulting Services, Inc. [Stantec] 2021) and compared to the established GWPS values for all Appendix IV constituents, which were established in accordance with 40 CFR § 257.95 (d) (Table 2-2).

The statistical evaluation of the Appendix IV constituents from the March 2024 Assessment Monitoring event identified a potential SSL for Arsenic in well CF-15-07. In accordance with StAP, IKEC resampled the well on June 11, 2024. Based on the results of the resampling event, the potential SSL in well CF-15-07 was confirmed as Arsenic was detected above the GWPS of 10 micrograms per liter (ug/L) (13 ug/L and 15 ug/L [resampling]) (Figure 2-2 and Tables 2-3 and 2-4).

Following the Arsenic SSL confirmation, an Alternative Source Demonstration (ASD) was attempted to determine if there was an alternate was the source of the Arsenic at the LRCP. As part of the ASD, monitoring well CF-15-07 was resampled on June 23, 2024 utilizing long-purge methodology to potentially reduce the amount of suspended sediment to which Arsenic could adhere. Analytical data from the long-purge sampling event exceeded the GWPS and the ASD attempt was unsuccessful.

During the September 2024 Assessment Monitoring sampling event, Arsenic (Appendix IV constituent) was detected in well CF-15-07 at a concentration of 12 ug/L, which exceeds the GWPS of 10 ug/L. In accordance with StAP, IKEC resampled the well on December 4, 2024. The resampling result of 44 ug/L exceeds the GWPS, therefore, the Arsenic SSL was confirmed in well CF-15-07 (Figure 2-3 and Tables 2-4 and 2-5).

Based on these results, IKEC proceeded to characterize the nature and extent of the release, completed required notifications, and initiated an ACM in accordance with 40 CFR § 257.95 (g). Results of these activities are presented in the following sections of this report.

3.0 GEOLOGY AND HYDROGEOLOGY

3.1 Regional Setting

The site lies in the Central Lowland Physiographic Province along the western flanks of the Cincinnati Arch and within the Central Stable Region. The stratigraphic sequence in the regional area consists of widespread discontinuous layers of Quaternary deposits of alluvial and glacial origin overlying sedimentary rocks generally consisting of limestones, dolomites and interbedded shale. The exposed sedimentary rocks range in age from Mississippian to Ordovician. The Quaternary deposits are largely of glacial origin and consist of loess, till and outwash. Glacial outwash is present in nearly all of the stream valleys north of and including the Ohio River valley. The outwash is covered, in some cases, by a veneer of recent alluvial deposits from active streams.

Unconsolidated alluvial sediments deposited along the Ohio River valley, near or adjacent to the river constitute the major aquifer of the region. These deposits are normally found only within the Ohio River valley and the tributary streams north and northeast of the river. Wells installed in this aquifer typically yield 100 to 1,000 gallons per minute (gpm) depending upon their location and construction. The Ohio River valley is incised into Ordovician bedrock. The low permeability bedrock forms the lateral and underlying confinement to the aquifer.

3.2 Unit-Specific Setting

Bedrock beneath the Type I Residual Waste Landfill (Type I Landfill) and LRCP consists of impermeable limestone and shale of the Ordovician Dillsboro formation, which is overlain by approximately 20 feet of clayey gravel with sand (Applied Geology and Environmental Science, Inc. [AGES] 2018a). The clayey gravel with sand is overlain by a lean clay with sand, which is overlain by a fine to medium sand with gravel, silt and clay (Figure 3-1). The uppermost unit in the area is a surficial layer of silty clay. A limestone ridge known as the Devil's Backbone runs northeast to southwest along the length of the Type I Landfill & LRCP (Figure 3-2). The Devil's Backbone acts as an impermeable barrier that forces groundwater passing beneath the Type I Landfill to flow either toward the northeast or toward the southwest (Figure 3-3).

Based on historic aquifer testing conducted at the site, the upper lean clay deposits exhibit low permeability, do not yield adequate quantities of water to wells, and are considered to be an aquitard. The underlying fine-medium sand with silt is considered to be an unconfined or possibly semi-confined aquifer and is therefore designated as the uppermost aquifer at the LRCP.

3.3 Unit-Specific Hydrogeology

3.3.1 Groundwater Flow

A complete round of groundwater level data was collected in March and September 2024 from the existing, interim, and boundary wells at the LRCP (Table 3-1). A generalized, site-wide groundwater flow map is presented in Figure 3-3. For March and September 2024, groundwater in the uppermost aquifer beneath the LRCP flows to the south toward the Ohio River (Figures 3-4 and 3-5). Historic groundwater elevation data indicates that groundwater flow beneath the LRCP is affected by the flow and water level in the Ohio River and evidence of several flow reversals have been observed in the historic data (AGES 2018a).

3.3.2 Groundwater Flow Velocity

Using water level data collected in September 2024 and hydraulic conductivity data from the recent slug tests (Tables 3-1 and 3-2), the average groundwater flow velocity for the uppermost aquifer beneath the LRCP was estimated. The calculated average groundwater velocity for the shallow aquifer is 0.374 feet per day (ft/day) (Table 3-2). With this flow velocity and a distance between wells CF-15-08 and CF-19-15 (at the property boundary) of approximately 523 feet, the travel time for groundwater to flow between wells CF-15-08 and CF-19-15 is approximately four (4) years.

4.0 SITE CHARACTERIZATION

As specified in the CCR Rule in 40 CFR § 257.95(g)(1), further characterization of the nature and extent of the release to groundwater at the LRCP was required. The objectives of the characterization were to:

- Install additional monitoring wells necessary to define the contaminant plume(s);
- Collect data on the nature of material released including specific information on the constituents listed in Appendix IV and at the levels at which they are present in the material released;
- Install at least one (1) additional monitoring well at the facility boundary in the direction of contaminant migration and sample this well in accordance with § 257.95 (d)(1); and
- Sample all wells in accordance with § 257.95 (d)(1) to characterize the nature and extent of the release.

Given that two (2) wells were already located at the property boundary, additional monitoring wells did not need to be installed.

To evaluate the extent of Arsenic, on December 4, 2024, monitoring wells CF-19-14 and CF-19-15 were sampled in accordance with the Clifty Creek Groundwater Monitoring Program Plan (GMPP) (AGES 2018c) for Arsenic only. The monitoring wells were purged using a pump to remove stagnant water in the casing and to ensure that a representative groundwater sample was collected. Samples were collected in laboratory provided, pre-preserved (if necessary) bottleware. All bottles were labeled with the unique sample number, time and date of sample collection, and the identity of the sampling fraction. Field parameters were measured and recorded on purging forms at the time of sample collection. Following sample collection, the samples were packed on ice in coolers insulated to four (4) degrees centigrade and shipped to the TestAmerica analytical laboratory in Buffalo, New York.

The analytical results from December 2024 did not identify Arsenic above the GWPS of 10 ug/L in either property boundary well (0.55 ug/L [CF-19-14] and 0.56 ug/L [CF-19-15]) (Table 4-1 and Figure 4-1). Based on these results, Arsenic concentrations in the uppermost aquifer exceeding the GWPS of 10 ug/L are confined to the site and are not reaching the Ohio River.

5.0 UPDATED ASSESSMENT OF CORRECTIVE MEASURES

In September 2024, groundwater monitoring of the uppermost aquifer at the LRCP has identified Arsenic (an Appendix IV constituent) at concentrations that exceed the GWPS defined under 40

CFR § 257.95(h); therefore, an ACM is necessary. The ACM requires identification and evaluation of technologies and methods that may be used as elements of remedial actions to meet the requirements of the CCR Rule. These elements include potential source control methods and various groundwater remedial technologies that may be applicable to the LRCP. Additional remedial technologies may also be evaluated at a later date, if determined to be applicable and appropriate. An initial ACM was prepared for the LRCP in March 2019 to address Molybdenum concentrations above the GWPS. As source control measures are the same for Molybdenum and Arsenic, they are discussed in the initial ACM Report (AGES 2019), and will not be discussed as part of this ACM Report.

As noted above, given recent trends in groundwater remediation, IKEC has opted to evaluate whether phytoremediation is feasible as a supplemental remedial technology for both Molybenum and Arsenic to augment other primary remedial technologies used to address groundwater at the site. To support this evaluation, presented below is a discussion of the objectives of the ACM and a summary of the assessment process for phytoremediation alongside the primary remedial technologies.

5.1 Objectives of Remedial Technology Evaluation

Per 40 CFR § 257.96(a), the objectives of the corrective measures evaluated in this ACM Report are "to prevent further releases, to remediate any releases, and to restore affected area to original conditions." As required in 40 CFR § 257.97(b), corrective measures, at minimum, must:

(1) Be protective of human health and the environment;

(2) Attain the groundwater protection standard as specified pursuant to § 257.95(h);

(3) Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix IV to this part into the environment;

(4) Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems;

(5) Comply with standards for management of wastes as specified in § 257.98(d).

5.2 Updated Potential Remedial Technologies

The focus of corrective measures for the LRCP is to address Arsenic in groundwater that exceeded the GWPS. To accomplish this, the following three (3) types of technologies will be presented in Sections 5.2.1 through 5.2.3:

- In-Situ Groundwater Remedial Technologies;
- Ex-Situ Groundwater Remedial Technologies; and
- Treatment of Extracted Groundwater.

During the post-closure monitoring period, the positive impacts of closure and the effects of natural attenuation on groundwater quality will be fully evaluated. The need for more active remedial measures (as discussed below) will be determined after sufficient post-closure groundwater quality data has been collected and evaluated. The final selection of a remedy will be made based on the results of the post-closure groundwater monitoring program.

The detailed ACM evaluation is provided in Table 5-1 and summarized below in Section 5.4. Additional remedial technologies may also be evaluated if determined to be applicable and appropriate.

5.2.1 In-Situ Groundwater Remedial Technologies

In-situ groundwater remediation approach involves treating the groundwater where it is presently situated, rather than removing and transferring it elsewhere for treatment and disposal. Long-term groundwater monitoring would be required to evaluate the effectiveness of any of these technologies. In-situ groundwater remediation technologies are discussed below.

5.2.1.1 Monitored Natural Attenuation (MNA)

MNA is a strategy and set of procedures used to demonstrate that physical, chemical and/or biological processes in an aquifer will reduce concentrations of constituents to levels below applicable standards. These processes attenuate the concentrations of inorganics in groundwater by physical and chemical means (e.g., dispersion, dilution, sorption, and/or precipitation). Dilution from recharge to shallow groundwater, mineral precipitation, and constituent adsorption will occur over time, which will further reduce constituent concentrations through attenuation. Regular monitoring of select groundwater monitoring wells is conducted to ensure constituent concentrations in groundwater are attenuating over time.

5.2.1.2 Groundwater Migration Barriers

Low permeability barriers can be installed below the ground surface to prevent groundwater flow from reaching locations that pose a threat to receptors. Barriers can be installed with continuous trenching techniques using bentonite or other slurries as a barrier material to prevent migration of groundwater. Barriers of cement/concrete and sheet piling can also be used.

Barriers are most effective at preventing flow to relatively small areas or to protect specific receptors. Protecting larger areas is possible if the constituent of concern is not highly soluble and cannot follow a diverted groundwater flow pattern. The barrier will change the groundwater flow conditions, and at some point the increased head (pressure) will cause a change in flow patterns. This will generally be around the flanks or beneath the barrier. To ensure that groundwater will not flow beneath the barrier, it must be sealed at an underlying impermeable layer such as a clay layer.

Groundwater migration barriers are often used in conjunction with groundwater extraction systems. The barriers are used to restrict flow to allow extraction systems upgradient of the barrier to collect groundwater. However, the challenges discussed above for creating a competent seal with any underlying unit may still apply.

5.2.1.3 Permeable Reactive Barriers (PRBs)

PRBs can be an effective in-situ groundwater treatment technology. General design involves excavation of a narrow trench perpendicular to groundwater flow similar to migration barriers and then backfilling the trench with a reactive material that either removes or transforms the constituents as the groundwater passes through the PRB. Unlike simple barriers, the PRB can be designed to include impermeable sections to funnel the flow through a more narrow and permeable reactive zone. The ability to maintain adequate and reactive reagent concentrations at depth over an extended period of time is a significant operational and performance assurance challenge. As with other in-situ approaches, reconstruction or regeneration may be needed on a periodic basis.

5.2.1.4 In-Situ Chemical Stabilization

The placement of chemical reactants to immobilize dissolved phase constituents through precipitation or sorption can be an effective approach to reducing downgradient migration. Reagents such as ferrous sulfate, calcium polysulfide, zero-valent iron, organo-phosphorous mixtures, and sodium dithionate have been evaluated as potentially effective for coal ash related constituents.

Two (2) issues that must be considered with this technology are permanence of the reaction product insolubility and the ability to inject the reactants sufficiently to ensure adequate contact with the constituents. Most stabilization reactions can be reversible depending on environmental conditions such as pH and oxidation state. Given the long periods of time for which the reaction products must remain insoluble, it may be difficult to predict future conditions sufficiently to ensure permanence of this technology. Recurring treatment, based on routine testing, may be an option. Contact between reagents and the constituents must also be evaluated. This technology may need to be considered more as a source reduction technology than a capture or barrier technology, as the reactants may not be viable over an extended period of time.

5.2.1.5 Phytoremediation

Phytoremediation involves the planting of grasses, ferns, and/or trees that are capable of extracting metals and other pollutants from subsurface soils and groundwater. Contaminants are removed by plants without impacting the topsoil and may even improve the fertility and stability of the soils by providing organic matter. The various mechanisms of phytoremediation include:

- Phytoextraction;
- Phytofiltration;
- Phytostabilization;
- Phytovolatilization;
- Phytodegradation;
- Rhizodegradation; and
- Phytodesalination.

All the mechanisms of phytoremediation handle the removal of contaminants in different ways, with phytoextraction likely being the most effective mechanism for the site. Phytoextraction occurs when plant roots take contaminants from soil or water and are converted into waste or energy.

Phytoremediation is typically more expensive and requires maintenance during the initial planting and growth stages, but long term is cost effective and low maintenance. Long-term groundwater monitoring would be required to evaluate the effectiveness of this technology.

5.2.2 Ex-Situ Groundwater Remedial Technologies

Ex-situ remedial technologies require groundwater extraction to remove constituent mass from the groundwater and can provide hydraulic control to reduce or prevent groundwater constituent migration. Groundwater can be removed from the aquifer through the use of conventional vertical extraction wells, horizontal wells, collection trenches and associated pumping systems. The type of well or trench system selected is based upon site-specific conditions. Long-term groundwater monitoring would be required to evaluate the effectiveness of any of these technologies. Ex-situ groundwater remediation technologies are discussed below.

5.2.2.1 Conventional Vertical Well System

Conventional vertical wells can usually be used in most cases unless accessibility is an issue. Well spacing and depths depend upon the aquifer characteristics. If flow production from the aquifer is extremely limited, conventional wells may not be feasible due to the extremely close spacing that would be required. Vertical wells may be used at any depth and can be screened in unconsolidated soils or completed as open-hole borings in bedrock.

5.2.2.2 Horizontal Well Systems

The use of horizontal recovery wells has increased due to development of more efficient horizontal drilling techniques. These systems can cover a significant horizontal cross-section and may be much more efficient than conventional vertical wells. They are not well suited to aquifers with wide variation in water levels, as the horizontal well may end up being dry.

5.2.2.3 Trenching Systems

Horizontal collection trenches function similarly to horizontal wells but are installed with excavation techniques. They can be more effective at shallow depths and with higher flow regimes. However, they may not be practical for deeper installations.

5.2.3 Treatment of Extracted Groundwater

Several technologies exist for treatment of extracted groundwater to remove or immobilize constituents ex-situ. The following technologies would be considered if treatment of extracted groundwater became necessary prior to a permitted discharge. As presented in the following sections, there are five (5) primary treatment technologies that are applicable to Arsenic:

- Filtration;
- Precipitation;
- Biological & Oxidation;
- Ion Exchange; and
- Other Adsorbents.

5.2.3.1 Filtration Technologies

There are a number of permeable membrane technologies that can be used to treat impacted groundwater for metals and other constituents. The most common is reverse osmosis, although microfiltration, ultrafiltration, and nanofiltration are also used. All of these technologies use pressure to force impacted water through a permeable membrane, which filters out the target constituents. The differences in the technologies are based on the filtration size and the corresponding pressure needed to operate the system. These membrane technologies can capture a number of target compounds simultaneously and can achieve low effluent concentrations, but they are also very sensitive to fouling and often require a pretreatment step. Membrane technologies can result in a relatively high volume reject effluent, which may require additional treatment prior to disposal.

5.2.3.2 Precipitation

Treating impacted groundwater through the precipitation of metals is a well proven and often-used technology. In this process, soluble (dissolved) constituents are converted to insoluble particles that will precipitate such as hydroxides, carbonates, or sulfides. Insoluble particles are then removed by physical methods like clarification and/or filtration. The process typically involves pH adjustment, addition of a precipitant, and flocculation. The details of the process are driven by the solubility of the constituents and the effluent limit requirements. For many constituents, low effluent concentrations can be achieved; however, this technology has not been extensively used for all constituents related to coal ash sites.

5.2.3.3 Biological & Oxidation

Several biological treatment methods and other oxidation methods have been used to treat metals and other coal ash constituents. For Arsenic removal, biological systems can require a relatively long residence time (several hours) (Reinsel 2015). Other systems to remove Arsenic use biological formation of Bioscorodite (FeAsO4*2 H2O); in this process bacteria oxidize Iron and available Arsenic to Ferric Iron and Arsenate. In general, biological systems are used to alter the oxidation state of the constituents so that it is less soluble and may be removed through adsorption or other means.

5.2.3.4 Exchange Technologies

Ion exchange is a well proven technology for removing metals from groundwater. With some constituents, ion exchange can achieve very low effluent concentrations. Ion exchange is a physical process in which ions held electrostatically on the surface of a solid are exchanged for target ions of similar charge in a solution. The medium used for ion exchange is typically a resin made from synthetic organic materials, inorganic materials, or natural polymeric materials that contain ionic functional groups to which exchangeable ions are attached. The resin must be regenerated routinely, which involves treatment of the resin with a concentrated solution, often containing sodium or hydrogen ions (acid). There must be a feasible method to dispose of the regeneration effluent for this technology. Pretreatment may be required, based on site specific conditions.

5.2.3.5 Adsorption Technologies

Groundwater containing dissolved constituents can be treated with adsorption media to reduce their concentration. However, the column must be regenerated or disposed of and replaced with new media on a routine basis. Common adsorbent media include activated alumina, copper-zinc granules, granular ferric hydroxide, ferric oxide-coated sand, greensand, zeolite, and other proprietary materials. This technology may also generate a significant regeneration waste stream.

5.3 Evaluation to Meet Requirements in 40 CFR § 257.96(c)

For this evaluation, each of the potential remedial technologies identified above will be screened against evaluation criteria requirements in 40 CFR § 257.96(c) listed below:

The assessment under paragraph (a) of this section must include an analysis of the effectiveness of potential corrective measures in meeting all of the requirements and objectives of the remedy as described under § 257.97 addressing at least the following:

(1) The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;

(2) The time required to begin and complete the remedy;

(3) The institutional requirements, such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(s).

The ACM evaluation is provided in Table 5-1 and detailed below.

5.3.1 Performance

This criterion includes the ability of the technology to effectively achieve the specified goal of corrective measures to prevent further releases, to remediate any releases, and to restore the affected area to original conditions.

5.3.1.1 In-Situ Groundwater Remedial Technologies

MNA is a proven technology that can be implemented to reduce constituent concentrations over time through natural processes of geochemical and physical attenuation. Typical attenuation mechanisms that could affect Arsenic would include adsorption, microbial activity, and dispersion.

Sorption to solid phases is a primary mechanism for removing Arsenic from groundwater. Hydroxides of Iron, Aluminum and Manganese, Sulfide Minerals, and organic matter are known to significantly adsorb Arsenic in groundwater (Wang and Mulligan 2006). The rate and amount of sorption is influenced by groundwater pH, redox potential, other ions, and the associated species of Arsenic (Ford, Wilkin, and Puls 2007). Microbial activity may also catalyze the transformation of Arsenic species, or impact redox reactions; this would also influence the mobility of Arsenic.

In the environment, Arsenic is more mobile at pH values greater than 8.5 Standard Units (SU), when it will desorb from mineral oxides (Smedley and Kinniburgh 2002). Highly reducing conditions at near neutral pH would also lead to mobilization of Arsenic as it desorbs from oxides. In groundwater with high concentrations of Arsenic III and Iron II and low Sulfate concentrations, the reductive dissolution of Iron and Manganese Oxides can also release Arsenic to the environment.

At the LRCP, Oxidation Reduction Potential (ORP) values varied significantly in 2024 with ranges of -118 millivolts (mV) to 345 mV at CF-15-07; 308 mV to 405 mV at CF-15-08; 117 mV to 397 mV at CF-15-09; 414 mV to 420mV at CF-19-14; and 239 mV to 405mV at CF-19-15. (AGES 2025). The pH values at the LRCP were also varied consistently ranging from 6.14 to 7.09 Standard Units (SU) at all five (5) wells over the course of 2024. The wide range of ORP values are likely related to flood events when the groundwater flow direction reverses and water from the Ohio River recharges groundwater at the site. Within this range of values, the mobility of Arsenic would vary (due to ORP variations) and there would be limited adsorption and precipitation (due to the pH range).

Dispersion, the mixing and spreading of constituents due to microscopic variations in velocity within and between interstitial voids in the aquifer, and dilution would reduce Arsenic concentrations but would not destroy the Arsenic. Given groundwater flow conditions, with periodic flood events and flow reversals, dispersion and dilution of Arsenic would likely be a major factor in natural attenuation.

At the LRCP, the existing well network would be used to monitor constituent trends over time. Given that Arsenic concentrations are less than the GWPS at the property boundary, a long-term timeframe would likely be acceptable.

Although migration barriers, PRBs, and in-situ chemical stabilization are proven technologies, conditions at the LRCP would limit the performance of each of these approaches. To be effective, a migration barrier would need to be tied into a lower competent unit at the LRCP; either the lean clay layer at approximately 40 feet below ground surface (bgs) or bedrock at 80 to 90 feet bgs. Given that the LRCP is located within an impermeable bedrock valley, these conditions would be conducive to this approach. Under these conditions, any altered flow paths due to the presence of the barrier could likely be managed. Note that periodic flooding of the area by the Ohio River would also impact the performance of these technologies.

Given site conditions, in-situ chemical stabilization reagents could be injected into the uppermost aquifer and distributed to where impacts occur. It would be critical to fully evaluate future groundwater conditions (i.e., pH, ORP, etc.) to maintain this approach. The effectiveness of this approach to treat Arsenic is not well tested or established.

Phytoremediation is a relatively new remedial technology with sparse case studies with conditions similar those at the LRCP. There are two ways to utilize phytoremediation: plants or trees.

Plants such as grasses and ferns are typically utilized in phytoremediation due to their cost effectiveness and short implementation time. However, due to their shallow root systems, plants are typically utilized whenever contaminants are located primarily in subsurface soil. Additionally, due to the shallow root depths, these plants are vulnerable to flooding, and many of the plants generate hazardous waste, such as biomass, at the surface that would need to be disposed of properly. Given the vulnerability to flooding and excess hazardous waste that would be generated from these plants, this would not be a viable alternative for the site.

Trees are the most common form of phytoremediation for contaminants in groundwater due to their deep average root depth and minimal long-term maintenance needs. The trees utilize their roots to extract contaminants from the subsurface soil and groundwater and do not generate any hazardous waste in the process. The initial planting and growing stages are typically expensive and time consuming as they would need to be regularly checked and treated with fertilizers and pesticides as needed. Additionally, trees typically take years to grow to their full height and may not be as effective during the early stage of remediation. There are three tree species that are typically utilized for phytoremediation: Poplar, Eastern Cottonwood, and Buttonwood trees. These tree species have deep root systems ranging from 10-75 ft bgs and range in vulnerability to flooding during growing seasons (Poplar) to very resilient (Buttonwood). Given the resilience to flooding and root depth, trees could be a viable alternative for the site.

5.3.1.2 Ex-Situ Groundwater Remedial Technologies

Groundwater extraction is a proven technology that has been successfully implemented for decades at many sites. Conventional vertical wells are the most often used approach; although the use of horizontal wells has been increasing. At the LRCP, a series of vertical recovery wells can likely be installed and operated to address impacted groundwater. Horizontal wells operate in a similar manner to vertical wells but are less effective in areas with significant water level fluctuations, like the LRCP. The performance of both types of wells would be significantly impacted by the Iron content of groundwater, which can lead to clogging. Significant levels of operation and maintenance would likely be necessary.

Trenching systems are often used when groundwater impacts are encountered in a shallow unit. The depth to groundwater at the LRCP is 15 to 20 feet bgs and the depth to the lean clay layer is 40 feet bgs. Although these depths are not ideal for a trench, they do not preclude the use of a trench at the LRCP.

Note that periodic flooding of the area by the Ohio River would also impact the performance of these ex-situ technologies.

5.3.1.3 Treatment of Extracted Groundwater

Groundwater treatment is required as a supplemental technology to be used in conjunction with groundwater extraction. The need for treatment depends on permit requirements for discharge of the treated water via a National Pollution Discharge Elimination System (NPDES) permit. The concentrations of Arsenic would need to be reduced to less than the required permit limits. Treatment for other constituents may also be required based on permit requirements.

Several proven methods for Arsenic treatment exist. Precipitation is a frequently used and proven technology to treat Arsenic in water at various concentrations (U.S. EPA 2002). Precipitation systems require skilled operation and are more cost effective at a large scale. The effectiveness of adsorption and ion exchange can be impacted by the presence of other constituents. However, at smaller scales these systems have lower operating and maintenance costs. Adsorption and ion exchange are often used when Arsenic is the only constituent requiring treatment. Filtration is used less frequently because it tends to have higher costs and produce a larger volume of residuals than other technologies that are available for treatment of Arsenic. Several biological treatment methods and other oxidation methods have been used to treat Arsenic. However, most would not likely be practical at the scope of this project due to cost.

5.3.2 Reliability

This criterion includes the degree of certainty that the technology will consistently work toward and achieve the specified goal of corrective measures over time.

5.3.2.1 In-Situ Groundwater Remedial Technologies

As the process of MNA is based on natural processes, this approach would be considered to be reliable. However, as groundwater geochemistry can vary over time, routine monitoring is required to evaluate conditions and ensure the ongoing effectiveness of the MNA process. Geochemical changes in groundwater could significantly impact the effectiveness of MNA, which could lead to the need to implement other remedial measures at the LRCP.

Migration barriers and PRBs are typically reliable technologies; the primary issue being the potential for altered groundwater flow directions and further migration of constituents. In addition, maintaining adequate and reactive reagent concentrations at depth over an extended period of time in a PRB can also be a significant operational and maintenance issue.

For in-situ chemical stabilization, reagents must be injected uniformly and consistently to adequately distribute them into the aquifer. Lack of a uniform and consistent approach could lead to reliability issues. Finally, changes in the geochemistry of the aquifer can lead to the need for adjustments in reagent type, concentrations and injection approach.

Phytoremediation is typically a reliable technology. The primary concern is that any plants and/or trees utilized at the LRCP would need to be resilient to flooding. There are few species of plants and trees that vary in resilience to flooding that would need to be considered prior to implementing this technology. Additionally, soil characterization would need to be completed to determine what species of plant and/or tree would be the most suited for the site.

5.3.2.2 Ex-Situ Groundwater Remedial Technologies

Groundwater extraction solutions are generally considered reliable at controlling and removing constituents from the subsurface. At the LRCP, conventional vertical wells would be the more reliable approach, as the large water level fluctuations at the unit would significantly impact the reliability of horizontal wells. There can be significant operation and maintenance issues associated with both conventional vertical or horizontal wells but these issues are well understood and can be readily addressed. Once in the place, trenching systems would also be reliable at the LRCP although long term Operations and Maintenance (O&M) would be required.

5.3.2.3 Treatment of Extracted Groundwater

Treatment of Arsenic in extracted groundwater would be reliable as long as the treatment process are properly implemented.

5.3.3 Ease of Implementation

This criterion includes the ease with which the technologies can be implemented at the LRCP.

5.3.3.1 In-Situ Groundwater Remedial Technologies

MNA is among the easiest of corrective measures to implement at a site. A sufficient number of monitoring wells already exist at the LRCP, which could be used to monitor the effectiveness of MNA.

Due to the significant amount of time, effort, and disturbance required for implementation at the LRCP, migration barriers, in-situ chemical stabilization and PRBs implementation would be difficult. Difficulties in construction would be related to the depth of installation and the need to install a barrier into the lean clay layer at the site at a depth of 40-feet bgs. Once constructed, the barrier technology would be passive and would operate immediately. The PRB would likely require periodic recharging with appropriate reagents. In-situ chemical stabilization may require less time and effort than with a migration barrier or PRB.

Phytoremediation ranges in difficulty of implementation. If using plants, less surface disturbance would be required, but most plants utilized for phytoremediation generate hazardous waste that would need to be disposed of properly. If using trees, more surface disturbance would be required to remove the existing trees. Additionally, the trees would need to be cared for during growth which could be time consuming.

5.3.3.2 Ex-Situ Technologies for Groundwater Extraction

Implementation of both conventional vertical and horizontal wells at the LCRP would require drilling and limited field construction; however, the conventional vertical wells would be the more easily implemented. The orientation of the horizontal wells could present potential installation issues. Trenching systems would require significant construction and would be difficult to implement at the LRCP.

5.3.3.3 Treatment of Extracted Groundwater

Treatment of Arsenic in extracted groundwater can be implemented, as long as proper processes are used.

5.3.4 Potential Safety Impacts

This criterion includes potential safety impacts that may result from implementation and use of the technology at the LRCP.

5.3.4.1 In-Situ Groundwater Remedial Technologies

Potential safety impacts associated with MNA are very minimal; especially as no additional well installation is required. Minimal safety concerns are therefore associated with the ongoing groundwater monitoring program.

Migration barriers and PRBs require a significant construction effort and use of construction equipment, which would entail a relatively high risk of potential safety impacts. However, neither technology would have any potential significant safety impacts following construction. Potential safety concerns related to in-situ chemical stabilization are moderate. The potential for incidents during injection well construction or unintended worker contact with the chemicals used for treatment would be the primary safety concerns with this technology.

Potential safety concerns associated with phytoremediation are moderate given that existing vegetation may need to be removed, and additional soil characterization would be required prior to implementing the technology.

5.3.4.2 Ex-Situ Groundwater Remedial Technologies

Groundwater extraction through use of wells (conventional vertical or horizontal) would involve drilling, construction, and installation of extraction wells, pumps, and associated control wiring and piping. Potential safety concerns exist with the activities associated with installation of these wells, as well as the ongoing O&M of the system, including inspection, maintenance, or replacement of the various system components.

Trenching systems would require use of significant construction equipment and present worker safety concerns, especially with the depth of the trench. Ongoing operation of the system would present minimal safety concerns.

5.3.4.3 Treatment of Extracted Groundwater

Treatment of extracted Arsenic in groundwater would have minimal safety concerns.

5.3.5 Potential Cross-Media Impacts

This criterion includes the ability to control cross-media impacts during implementation and use of the technology at the LRCP.

5.3.5.1 In-Situ Groundwater Remedial Technologies

MNA poses no significant cross-media impact potential. Migration barriers and PRBs pose minimal risk of cross-media impacts, as they primarily involve an intended modification in groundwater flow. For a barrier technology, there could be some risk with the migration of impacted groundwater to other areas of the site; this concern is minimal. In the case of PRBs, constituents are removed from the groundwater through use of reagents; this includes minimal potential for cross-media impacts.

Phytoremediation poses a moderate cross-media impact potential. This is only the case if plants are chosen as the remedial technology due to the hazardous waste that they generate at the surface. This waste would need to be properly characterized and disposed of regularly.

5.3.5.2 Ex-Situ Groundwater Remedial Technologies

Well and trench systems pose a moderate risk of cross-media impacts.

5.3.5.3 Treatment of Extracted Groundwater

Treatment of extracted groundwater would pose minimal risk of cross-media impacts.

5.3.6 Potential Impacts from Control of Exposure to Residual Constituents

This criterion includes the ability to control exposure of humans and the environment to residual constituents through implementation and use of the technology at the LRCP.

5.3.6.1 In-Situ Groundwater Remedial Technologies

MNA and phytoremediation poses no significant potential for human or environmental exposure to impacted groundwater. Overall, in-situ technologies involve placement or injection of a structure or reagent to treat impacted groundwater in-place. Consequently, there is no increased risk of exposure of humans and the environment to residual contamination.

5.3.6.2 Ex-Situ Groundwater Remedial Technologies

Groundwater extraction involves bringing impacted groundwater from the subsurface to the surface for potential treatment and discharge. This would slightly increase the potential for exposure of humans or the environment to impacted groundwater. The groundwater would be conveyed through an engineered system designed to prevent the release of water into the environment and to limit the potential for human or environmental exposure to the impacted groundwater. The potential for exposure to residual contamination associated with this technology is therefore unlikely.

5.3.6.3 Treatment of Extracted Groundwater

Treatment of extracted groundwater would pose minimal risk of exposure to residual contamination.

5.3.7 <u>Time Required to Begin Remedy</u>

This criterion includes the time necessary for planning, pilot testing, design, permitting, procurement, installation, and startup of this technology at the LRCP. Timeframes presented below and in Table 5-1 reflect the time required to implement the remedy after closure of the unit.

5.3.7.1 In-Situ Groundwater Remedial Technologies

A MNA program could be implemented at the LRCP within three (3) months, as a sufficient monitoring well network already exists at the site and a monitoring program is already established. This potential remedy would require the least amount of time to implement of the technologies considered.

Migration barriers, in-situ chemical stabilization, and PRBs could take a significant amount of time to design and install. Either technology would also involve a significant amount of regulatory permitting. The design and implementation time could take 1 to 1.5 years.

Phytoremediation could be implemented at the site within three (3) months to one (1) year depending on the remedial technology chosen. Plants would be the fastest to implement with trees taking the longest.

5.3.7.2 Ex-Situ Groundwater Remedial Technologies

Design and installation of groundwater extraction systems could be completed in six (6) months to one (1) year. This could vary depending on potential groundwater modeling efforts and regulatory approval and permitting.

5.3.7.3 Treatment of Extracted Groundwater

Design and installation of the system, including bench-scale and pilot testing, could be completed in six (6) months to one (1) year. This would depend on the regulatory approval and permitting process.

5.3.8 Time Required to Complete Remedy

This criterion includes the estimated time necessary to achieve the stated goals of corrective measures to prevent further releases from the LRCP, to remediate any releases, and to restore the affected area to original conditions.

5.3.8.1 In-Situ Groundwater Remedial Technologies

As MNA does not require additional physical or chemical remedial treatment, the timeframe is the longest period to reach remedial goals. A groundwater model would be useful to more accurately predict the anticipated time required to complete the remediation.

A significant amount of time is expected to be required to meet remedial goals with migration barriers and PRB. However, as groundwater modeling has not been performed for the site, an accurate estimate cannot be developed at this time. If in-situ chemical stabilization option can effectively treat Arsenic at the unit boundary, this approach has the potential to treat groundwater more quickly than a barrier or PRB.

Phytoremediation does not have a specific time frame for completion. This is due to the fact that groundwater chemistry can change, and the performance of the technology chosen would need to be evaluated regularly.

5.3.8.2 Ex-Situ Groundwater Remedial Technologies

A significant amount of time is expected to be required to meet remedial goals with ex-situ technologies. However, as groundwater modeling has not been performed for the site, an accurate estimate cannot be developed at this time.

5.3.8.3 Treatment of Extracted Groundwater

The time required to meet remedial goals depends on the type of groundwater extraction system implemented. The time required for treatment of extracted groundwater is insignificant.

5.3.9 State, Local, or Other Environmental Permit Requirements That May Impact Implementation

This criterion includes anticipation of any state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the technology at the LRCP.

5.3.9.1 In-Situ Groundwater Remedial Technologies

A MNA or phytoremediation program would likely require coordination with the Indiana Department of Environmental Management (IDEM) but likely not formal approval. Therefore, it could be implemented in as little as (3) months, as a sufficient monitoring well network already exists at the site.

Migration barriers, in-situ chemical stabilization, and PRBs would require installation of barrier walls and associated components in the aquifer and/or chemical injections, which may require permitting through IDEM. This would require an anticipated minimum of 1 to 1.5 years of review and approval.

5.3.9.2 Ex-Situ Groundwater Remedial Technologies

A groundwater extraction system would require the installation of new wells and a treatment system at the LRCP, which may require permitting through IDEM. This would require an anticipated minimum of 1 to 1.5 years of review and approval.

5.3.9.3 Treatment of Extracted Groundwater

The selection of a treatment system may require permitting through IDEM, especially if a NPDES permit is required. This would require an anticipated minimum of 1 to 1.5 years of review and approval.

5.4 Conclusions

For this evaluation, several in-situ and ex-situ remedial technologies to address Arsenic in groundwater at the LRCP were screened against evaluation criteria requirements in 40 CFR § 257.96(c). The screening of phytoremediation is applied to both Molybdenum and Arsenic. As presented in Table 5-1, during the screening, the technologies were ranked as High, Medium, or

Low using professional judgement and past experience. Based on these rankings, the three (3) technologies that appear to be most likely for selection as a remedy were:

- MNA;
- Phytoremediation; and
- Conventional Vertical Well System (Groundwater Extraction) (Ex-Situ).

Groundwater treatment would be required as a supplemental technology in conjunction with a Conventional Vertical Well System. The selection of a treatment technology would be based on conditions at the time of selection of a final remedy.

The technologies that appear to be less likely for selection as a remedy were:

- Groundwater Migration Barriers (In-Situ);
- PRB (In-Situ);
- In-Situ Chemical Stabilization (In-Situ);
- Horizontal Well Systems (Ex-Situ); and
- Trenching Systems (Ex-Situ).

As groundwater quality near the LRCP is anticipated to significantly improve over time as a result of planned closure activities, a flexible and adaptive approach to groundwater remediation that begins with post-closure groundwater monitoring at the unit is planned. During the post-closure monitoring period, the positive impacts of closure and the effects of natural attenuation on groundwater quality will be fully evaluated. The need for more active remedial measures will be determined after sufficient post-closure groundwater quality data has been collected and evaluated. The final selection of a remedy will be made based on the results of post-closure groundwater monitoring program.

Additional remedial technologies may also be evaluated at a later date if determined to be applicable and appropriate.

6.0 SELECTION OF REMEDY PROCESS

The remedy selection begins following completion of the ACM Report. Per 40 CFR § 257.97(a):

Based on the results of the corrective measures assessment conducted under § 257.96, the owner or operator must, as soon as feasible, select a remedy that, at a minimum, meets the standards listed in paragraph (b) of this section. This requirement applies to, not in place of, any applicable standards under the Occupational Safety and Health Act. The owner or operator must prepare a semiannual report describing the progress in selecting and designing the remedy. Upon selection of a remedy, the owner or operator must prepare a final report describing the selected remedy and how it meets the standards specified in paragraph (b) of this section. The owner or operator must *obtain a certification from a qualified professional engineer that the remedy selected meets the requirements of this section. The report has been completed when it is placed in the operating record as required by § 257.105(h)(12).*

This Addendum ACM Report provides a high-level assessment of groundwater remedial technologies that could potentially address Arsenic concentrations in groundwater that exceed the GWPS at the LRCP. With the submittal of this report, IKEC will begin the remedy selection process and ultimately select a remedy. The remedy selection process and selected remedy will satisfy standards listed in 40 CFR § 257.97(b) with consideration to evaluation factors listed in 40 CFR § 257.97(c). The progress toward selecting a remedy will be documented in semi-annual reports.

6.1 Data Gaps

Based on a review of data to date, the following recommendations for additional data collection/evaluation have been identified:

- The development of a three-dimensional (3-D) groundwater model using Modflow or another commercially available software could be useful in supporting the evaluation of various potential remedial techniques at the LRCP;

- As previously discussed, groundwater quality near the LRCP is anticipated to significantly improve over time as a result of planned closure activities and natural attenuation. Ongoing sampling of monitoring wells prior to and after closure of the LRCP should continue to evaluate whether Arsenic concentrations in groundwater are increasing, decreasing, or asymptotic. This data will be useful in developing time-series evaluations that will support potential groundwater modeling efforts and the final selection of a remedy for the LRCP;

- Given the dynamic nature of groundwater flow at the LRCP, additional depth-to-groundwater data from wells in the area would be useful to support the potential groundwater modeling effort. This data can be most efficiently collected by installing downhole transducers in select wells near the LRCP; and

- For phytoremediation, additional soil sampling may be necessary to determine general soil chemistry in the areas where the trees would be planted to ensure that the correct species is chosen.

6.2 Selection of Remedy

As noted above, IKEC will begin the process of selecting a remedy following submittal of this Addendum ACM Report. Per 40 CFR § 257.97, the remedy will be selected and implemented as soon as feasible and progress toward selecting the remedy will be documented in semiannual reports. As part of the process, one or more preferred remedial approaches will be developed based upon technology effectiveness under site conditions, implementability, and other considerations. As discussed above, a flexible and adaptive approach to groundwater remediation that begins with post-closure monitoring is planned.

6.3 Public Meeting Requirement in 40 CFR § 257.96(e)

Per 40 CFR § 257.96(e), IKEC will hold a public meeting to discuss ACM results, the remedy selection process, and selection of one or more preferred remedial approaches. The public meeting will be conducted at least 30 days prior to selection of a final remedy, in accordance with the above-referenced rule. Prior to the meeting, citizen and governmental stakeholders will be formally notified as to the schedule for the public meeting.

6.4 Final Remedy Selection

After selection of a remedy, a report documenting the remedy selection process will be prepared. The report will demonstrate how the remedy selection process was performed and how the selected remedial approach satisfies 40 CFR § 257.97 requirements.

7.0 REFERENCES

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TABLES

TABLE 2-1
GROUNDWATER MONITORING NETWORK
LANDFILL RUNOFF COLLECTION POND
CCR GROUNDWATER MONITORING PROGRAM
CLIFTY CREEK STATION
MADISON, INDIANA

Monitoring Well ID	Designation	Date of Installation	Coordinates		Ground Elevation (ft)²	Top of Casing Elevation (ft)²	Top of Screen Elevation (ft)	Base of Screen Elevation (ft)	Total Depth From Top of Casing (ft)
			Northing	Easting					
CF-15-04	Background	12/3/2015	451482.81	569307.19	465.55	468.03	439.55	429.55	38.48
CF-15-05	Background	12/1/2015	447491.91	565533.64	439.85	442.58	422.85	412.85	29.73
CF-15-06	Background	11/30/2015	447026.92	565190.31	437.49	440.40	431.49	421.49	18.91
CF-15-07	Downgradient	11/23/2015	443135.08	562259.25	438.61	441.11	432.61	422.61	18.50
CF-15-08	Downgradient	11/19/2015	443219.57	562537.29	460.33	462.79	430.33	420.33	42.46
CF-15-09	Downgradient	11/25/2015	443445.96	562871.69	456.73	459.45	447.73	442.73	16.72
WBSP-15-01	Background	11/30/2015	449072.27	566322.12	466.93	469.36	458.93	448.93	20.43
WBSP-15-02	Background	11/11/2015	449803.91	566987.30	473.83	476.76	457.83	452.83	23.93
CF-19-14	Downgradient/Boundary	3/8/2019	443401.75	562901.93	452.29	454.88	440.05	430.05	24.83
CF-19-15	Downgradient/Boundary	3/13/2019	442704.78	562483.02	441.10	443.61	415.19	405.19	38.42

Notes:

1. The Well locations are referenced to the North American Datum (NAD83), east zone coordinate system.
2. Elevations are referenced to the North American Vertical Datum (NAVD) 1988.

TABLE 2-2
GROUNDWATER PROTECTION STANDARDS
LANDFILL RUNOFF COLLECTION POND
CCR GROUNDWATER MONITORING PROGRAM
CLIFTY CREEK STATION
MADISON, INDIANA

Appendix IV Constituents			
Constituent (Units)	**Background**	**MCL/SMCL**	**GWPS**
Antimony, Sb (µg/L)	2	6	6
Arsenic, As (µg/L)	5	10	10
Barium, Ba (µg/L)	99	2000	2000
Beryllium, Be (µg/L)	1.1	4	4
Cadmium, Cd (µg/L)	1	5	5
Chromium, Cr (µg/L)	3	100	100
Cobalt, Co (µg/L)	1.5	6*	6
Fluoride, F (mg/L)	0.56	4	4
Lead, Pb (µg/L)	1.1	15*	15
Lithium, Li (µg/L)	0.1	40*	40
Mercury, Hg (µg/L)	1.2	2	2
Molybdenum, Mo (µg/L)	6	100*	100
Radium 226 & 228 (combined) (pCi/L)	8	5	8
Selenium, Se (µg/L)	5	50	50
Thallium, Tl (µg/L)	1	2	2

Notes:
1. MCL: Maximum Contaminant Level.
2. SMCL: Secondary Maximum Contaminant Level.
3. *: Established by U.S. EPA as part of 2018 decision.
4. GWPS: Groundwater Protection Standard.
5. µg/L: Micrograms per liter.
6. mg/L: Milligrams per liter.
7. pCi/L: Picocuries per liter.

TABLE 2-3
LANDFILL RUNOFF COLLECTION POND
SUMMARY OF MARCH 2024 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Constituent	Units	CF-15-04	CF-15-05	CF-15-06	CF-15-07	CF-15-08	CF-15-09	WBSP-15-01	WBSP-15-02	CF-19-14	CF-19-15
Appendix III Constituents											
Boron, B	mg/L	0.024	0.13	0.12	0.035	8.5	5.7	NS	3.8	NA	NA
Calcium, Ca	mg/L	64	120	140	180	200	180	NS	270	NA	NA
Chloride, Cl	mg/L	34	33	7.5	5.2	72	4.1	NS	11	NA	NA
Fluoride, F	mg/L	0.17	0.47	0.23	0.37	0.39	0.41	NS	0.41	NA	NA
pH	s.u.	7.41	7.02	7.35	6.94	7.09	7.02	NS	7.73	NA	NA
Sulfate, SO4	mg/L	32	49	93	3.4 J	330	200	NS	570	NA	NA
Total Dissolved Solids (TDS)	mg/L	280	520	570	640	890	630	NS	1200	NA	NA
Appendix IV Constituents											
Antimony, Sb	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	NS	0.5 J	NA	NA
Arsenic, As	ug/L	0.35 J	0.88 J	0.53 J	13	0.68 J	0.35 J	NS	0.47 J	NA	NA
Barium, Ba	ug/L	38	54 B	30 B	90 B	71 B	21	NS	25	NA	NA
Beryllium, Be	ug/L	0.7 U	0.039 J	0.043 J	0.7 U	0.7 U	0.7 U	NS	0.7 U	NA	NA
Cadmium, Cd	ug/L	0.5 U	0.5 U	0.5 U	0.5 U	0.21 J	0.5 U	NS	0.5 U	NA	NA
Chromium, Cr	ug/L	0.75 J B	0.71 J	0.81 J	1.5 U	1.5 U	1.4 J B	NS	0.98 J B	NA	NA
Cobalt, Co	ug/L	0.16 J	0.73	0.8	3	0.49	0.28 J	NS	0.45	NA	NA
Fluoride, F	mg/L	0.17	0.47	0.23	0.37	0.39	0.41	NS	0.41	NA	NA
Lead, Pb	ug/L	1 U	0.45 J	0.83 J	1 U	1 U	1 U	NS	1 U	NA	NA
Lithium, Li	mg/L	0.004 U	0.017	0.024	0.0013 J	0.021	0.01	NS	0.07	NA	NA
Mercury, Hg	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	NS	0.2 U	NA	NA
Molybdenum, Mo	ug/L	0.71 J	0.41 J	0.48 J	5.2	270	90	NS	2.9	24	0.65 J
Radium 226 & 228 (combined)	pCi/L	5 U	1.13	5 U	5 U	0.94	0.589	NS	0.747	NA	NA
Selenium, Se	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	NS	1 U	NA	NA
Thallium, Tl	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	NS	0.2 U	NA	NA

Notes:
NA: Sampling not required for this parameter
NS: Well not sampled
mg/L: Milligrams per liter
pCi/L: Picocuries per liter
s.u.: Standard units
ug/L: Micrograms per liter

TABLE 2-4
SUMMARY OF GWPS EXCEEDANCES
LANDFILL RUNOFF COLLECTION POND
CCR GROUNDWATER MONITORING PROGRAM
CLIFTY CREEK STATION
MADISON, INDIANA

Well ID	Potential Exceedance Parameter (Units)	12th Assessment Monitoring Sampling Event March 2024		12h Assessment Monitoring Resampling Event June 2024		13th Assessment Monitoring Sampling Event September 2024		13th Assessment Monitoring Resampling Event December 2024	
		Potential Exceedance Result	GWPS	Potential Exceedance Result	Confirmed Exceedance (Yes/No)	Potential Exceedance Result	GWPS	Potential Exceedance Result	Confirmed Exceedance (Yes/No)
CF-15-07	Arsenic (ug/L)	13	10	15	**Yes**	12	10	44	**Yes**
CF-15-08	Molybdenum (ug/L)	270	100	420	**Yes**	280	100	230	**Yes**

Notes:
1. GWPS: Groundwater Protection Standard.
2. µg/L: Micrograms per liter.

TABLE 2-5
LANDFILL RUNOFF COLLECTION POND
SUMMARY OF SEPTEMBER 2024 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Constituent	Units	CF-15-04	CF-15-05	CF-15-06	CF-15-07	CF-15-08	CF-15-09	WBSP-15-01	WBSP-15-02	CF-19-14	CF-19-15
Appendix III Constituents											
Boron, B	mg/L	0.06	0.12	NS	0.043	7.6	6	NS	NS	NA	NA
Calcium, Ca	mg/L	68	110	NS	160	320	190	NS	NS	NA	NA
Chloride, Cl	mg/L	34	43	NS	5.3	120	5.4	NS	NS	NA	NA
Fluoride, F	mg/L	0.13	0.63	NS	0.36	0.35	0.26	NS	NS	NA	NA
pH	s.u.	7.27	6.49	NS	6.41	6.52	7.03	NS	NS	NA	NA
Sulfate, SO4	mg/L	38	62	NS	3.7 J	910	10 U	NS	NS	NA	NA
Total Dissolved Solids (TDS)	mg/L	320	550	NS	650 B	1700 B	710	NS	NS	NA	NA
Appendix IV Constituents											
Antimony, Sb	ug/L	1 U	1 U	NS	1 U	1 U	1 U	NS	NS	NA	NA
Arsenic, As	ug/L	0.39 J	1.2	NS	12	0.43 J	3.6	NS	NS	NA	NA
Barium, Ba	ug/L	43	48	NS	89	57	44	NS	NS	NA	NA
Beryllium, Be	ug/L	0.70 U	0.70 U	NS	0.70 U	0.70 U	0.29 J	NS	NS	NA	NA
Cadmium, Cd	ug/L	0.50 U	0.50 U	NS	0.50 U	0.18 J B	0.080 J	NS	NS	NA	NA
Chromium, Cr	ug/L	1.2 J	2.9	NS	1.3 J	1.3 J	14	NS	NS	NA	NA
Cobalt, Co	ug/L	0.22 J	1.2	NS	2.8	0.56	4.9	NS	NS	NA	NA
Fluoride, F	mg/L	0.13	0.63	NS	0.36	0.35	0.26	NS	NS	NA	NA
Lead, Pb	ug/L	1 U	0.99 J	NS	0.22 J	1 U	4.3	NS	NS	NA	NA
Lithium, Li	mg/L	0.0014 J	0.019	NS	0.0019 J	0.027	0.02	NS	NS	NA	NA
Mercury, Hg	ug/L	0.20 U	0.20 U	NS	0.02 U	0.20 U	0.20 U	NS	NS	NA	NA
Molybdenum, Mo	ug/L	1.7	0.42 J	NS	5.3	280	85	NS	NS	52	0.47 J
Radium 226 & 228 (combined)	pCi/L	5 U	5 U	NS	5 U	5 U	2	NS	NS	NA	NA
Selenium, Se	ug/L	1 U	1 U	NS	1 U	0.65 J	1 U	NS	NS	NA	NA
Thallium, Tl	ug/L	0.20 U	0.20 U	NS	0.20 U	0.20 U	0.074 J	NS	NS	NA	NA

Notes:
NA: Sampling not required for this parameter
NS: Well not sampled
mg/L: Milligrams per liter
pCi/L: Picocuries per liter
s.u.: Standard units
ug/L: Micrograms per liter

TABLE 3-1
SUMMARY OF GROUNDWATER ELEVATION DATA DURING 2024
LANDFILL RUNOFF COLLECTION POND
CCR GROUNDWATER MONITORING PROGRAM
CLIFTY CREEK STATION
MADISON, INDIANA

Well ID	Mar-24	Jun-24	Sep-24	Dec-24
	Groundwater Elevation (feet)			
CF-15-04	437.48	436.78	454.12	NM
CF-15-05	432.57	431.53	428.14	NM
CF-15-06	428.50	427.35	DRY	NM
CF-15-07	436.40	436.81	436.88	437.28
CF-15-08	443.16	446.79	447.22	447.36
CF-15-09	447.15	447.00	445.43	447.90
WBSP-15-01	452.75	451.61	DRY	NM
WBSP-15-02	465.73	459.06	462.15	NM
CF-19-14	442.76	443.38	441.94	444.98
CF-19-15	429.24	427.86	419.71	420.76

Notes:
1. NM: Not Measured

TABLE 3-2
SUMMARY OF GROUNDWATER VELOCITY CALCULATIONS
SEPTEMBER 2024
LANDFILL RUNOFF COLLECTION POND
CLIFTY CREEK STATION
MADISON, INDIANA

Well Pair		h_1 (feet)	h_2 (feet)	d (feet)	K (feet/day)	n	i	V (feet/day)
Uppermost Aquifer								
CF-15-08 (h_1)	CF-19-15 (h_2)	447.36	420.76	523	1.47	0.2	0.05086	0.374

h_1 = Head elevation in well #1
h_2 = Head elevation in well #2
d = distance between wells
K = Hydraulic conductivity
n = effective porosity
i = Horizontal Hydraulic Gradient
V = Groundwater Velocity

Horizontal Hydraulic Gradient:

$$i = \frac{h_1 - h_2}{d}$$

Groundwater Velocity:

$$V = K\left(\frac{i}{n}\right)$$

TABLE 4-1
LANDFILL RUNOFF COLLECTION POND
SUMMARY OF DECEMBER 2024 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station

Constituent	Units	CF-15-07	CF-15-08	CF-15-09	CF-19-14	CF-19-15
Appendix III Constituents						
Boron, B	mg/L	NA	6.5	4.9	NA	NA
Calcium, Ca	mg/L	NA	360	NA	NA	NA
Chloride, Cl	mg/L	NA	150	NA	NA	NA
Fluoride, F	mg/L	NA	NA	NA	NA	NA
pH	s.u.	NA	NA	NA	NA	NA
Sulfate, SO4	mg/L	NA	940	NA	NA	NA
Total Dissolved Solids (TDS)	mg/L	NA	NA	NA	NA	NA
Appendix IV Constituents						
Antimony, Sb	ug/L	NA	NA	NA	NA	NA
Arsenic, As	ug/L	44	NA	NA	0.55 J	0.56 J
Barium, Ba	ug/L	NA	NA	NA	NA	NA
Beryllium, Be	ug/L	NA	NA	NA	NA	NA
Cadmium, Cd	ug/L	NA	NA	NA	NA	NA
Chromium, Cr	ug/L	NA	NA	NA	NA	NA
Cobalt, Co	ug/L	NA	NA	NA	NA	NA
Fluoride, F	mg/L	NA	NA	NA	NA	NA
Lead, Pb	ug/L	NA	NA	NA	NA	NA
Lithium, Li	mg/L	NA	NA	NA	NA	NA
Mercury, Hg	ug/L	NA	NA	NA	NA	NA
Molybdenum, Mo	ug/L	NA	230	NA	NA	NA
Radium 226 & 228 (combined)	pCi/L	NA	NA	NA	NA	NA
Selenium, Se	ug/L	NA	NA	NA	NA	NA
Thallium, Tl	ug/L	NA	NA	NA	NA	NA

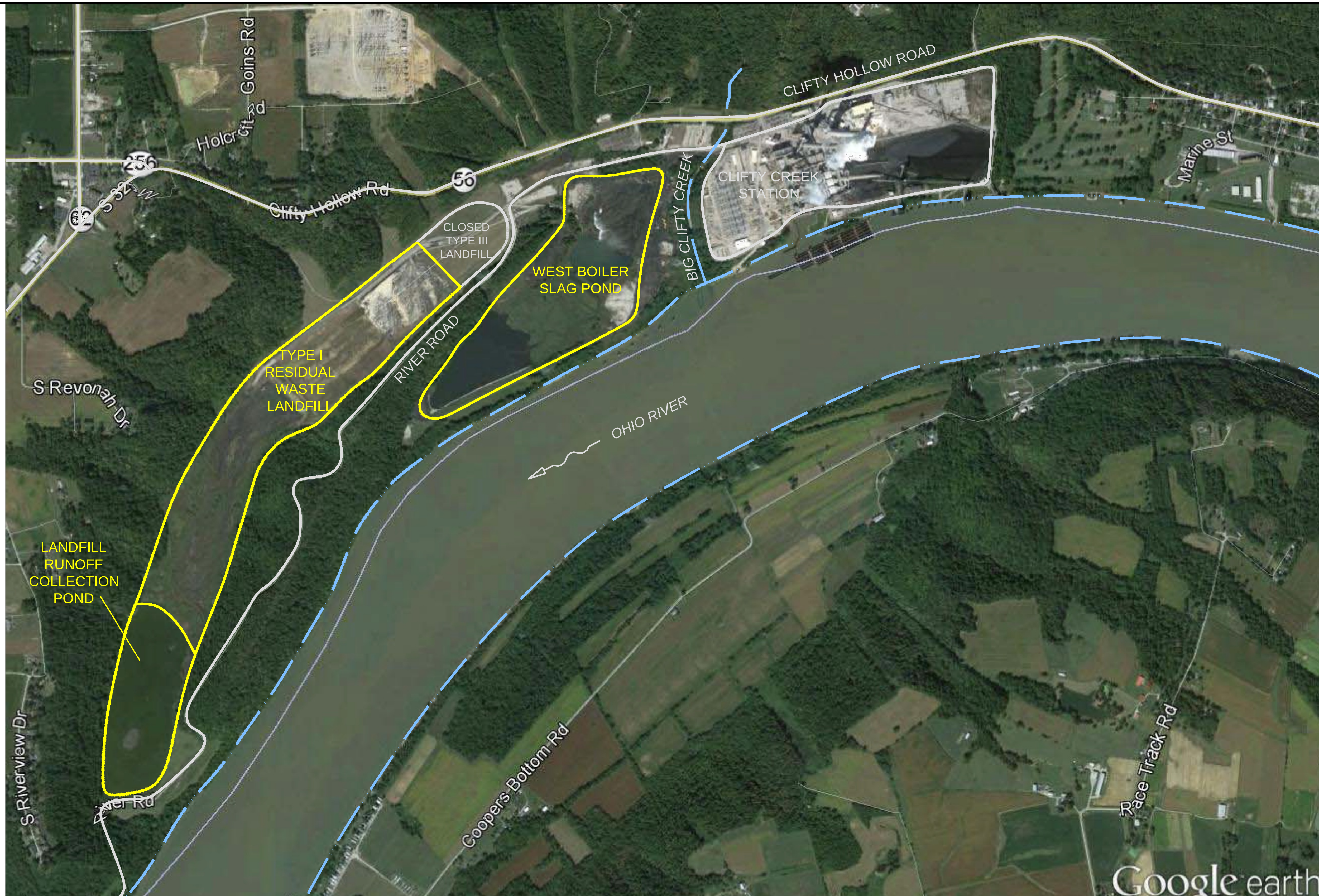
Notes:
NA: Sampling not required for this parameter
NS: Well not sampled
mg/L: Milligrams per liter
pCi/L: Picocuries per liter
s.u.: Standard units
ug/L: Micrograms per liter

TABLE 5-1
IN-SITU AND EX-SITU GROUNDWATER REMEDIAL TECHNOLOGIES SCREENING MATRIX - 40 CFR § 257.96(c) REQUIREMENTS
LANDFILL RUNOFF COLLECTION POND
CLIFTY CREEK STATION
MADISON, INDIANA

	In-Situ Groundwater Remedial Technologies						Ex-Situ Groundwater Remedial Technologies		
	Monitored Natural Attenuation	Groundwater Migration Barriers	In-situ Chemical Stabilization	Permeable Reactive Barrier	Phytoremediation: Grasses and Ferns	Phytoremediation: Trees	Conventional Well System	Horizontal Well System	Trenching System
257.96(c)(1)									
Performance	Medium	Medium	Low	Low	Low	Medium	High	Low Significant Water Level Fluctuations Reduce Effectiveness of Horizontal Wells	High
Reliability	High	Medium	Medium	Medium	Medium	Medium	High Long Term O&M Required	Low Significant Issues with Water Level Fluctuations	High Long Term O&M Required
Ease of Implementation	High	Low	Low	Low	Medium	Medium	High Drilling and Limited Field Construction Required	Medium Drilling and Limited Field Construction Required	Low Trench Construction Required
Potential Safety Impacts	Low	Medium Field Construction Required	Medium Field Construction Required	Medium Field Construction Required	Low	Medium Initial Removal of Current Trees Required	Medium Drilling Required	Medium Drilling Required	Medium Trench Construction Required
Potential Cross-Media Impacts	Low	Low	Low	Low	High	Low	Medium	Medium	Medium
Potential Impacts from Control of Exposure to Residual Constituents	Low	Low	Low	Low	Low	Low	Medium	Medium	Medium
257.96(c)(2)									
Time To Begin Remedy	3 months	1 to 1.5 years	1 to 1.5 years	1 to 1.5 years	3 months	6 months	6 months to 1 year	6 months to 1 year	6 months to 1 year
Time To Complete Remedy	Highly Variable Further Evaluation Required	Highly Variable Further Evaluation Required	Highly Variable Further Evaluation Required	Highly Variable Further Evaluation Required	Highly Variable Further Evaluation Required	Highly Variable Further Evaluation Required	Highly Variable Further Evaluation Required	Highly Variable Further Evaluation Required	Highly Variable Further Evaluation Required
257.96(c)(3)									
State, Local or other Environmental Permit Requirements that May Impact Implementation	Requires Coordination with IDEM	Requires Approval from IDEM	Requires Approval from IDEM	Requires Approval from IDEM	No	No	Requires Approval from IDEM	Requires Approval from IDEM	Requires Approval from IDEM
Additional Information	Groundwater F&T Modeling Required to Evaluate the Timing for This Approach for Molybdenum	Groundwater Flow Modeling Required to Fully Evaluate This Approach	Bench Scale Testing Required to Further Evaluate Applicability for Molybdenum	Bench Scale Testing Required to Further Evaluate Applicability for Molybdenum	Additional Soil Sampling required to Determine Plant Species	Additional Soil Sampling required to Determine Tree Species	Groundwater Flow Modeling Required to Fully Evaluate This Approach	Groundwater Flow Modeling Required to Fully Evaluate This Approach	Groundwater Flow Modeling Required to Fully Evaluate This Approach

Notes:
Relative assessments (low, medium, high) are based on experience and professional judgement

FIGURES



1200' 0' 1200' 2400'

SCALE: 1"= 1200'

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INDIANA–KENTUCKY ELECTRIC CORPORATION

CLIFTY CREEK STATION
MADISON, INDIANA
SITE LOCATION MAP

DRAWING NAME: FIGURE 1–1

REV. 0

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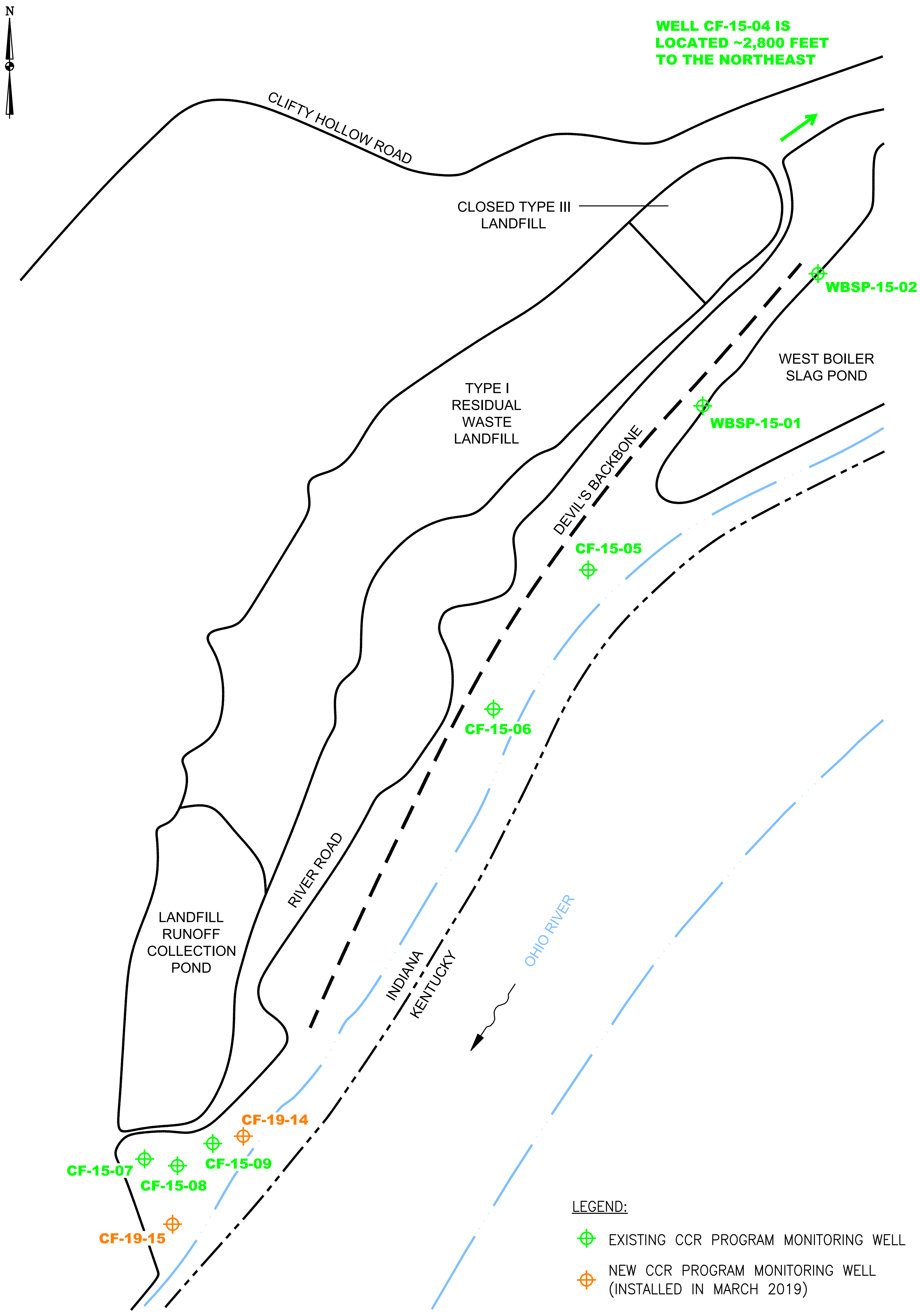

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CLIFTY CREEK STATION
MADISON, INDIANA
LANDFILL RUNOFF COLLECTION POND MONITORING WELL LOCATIONS

DRAWING NAME: FIGURE 2–1
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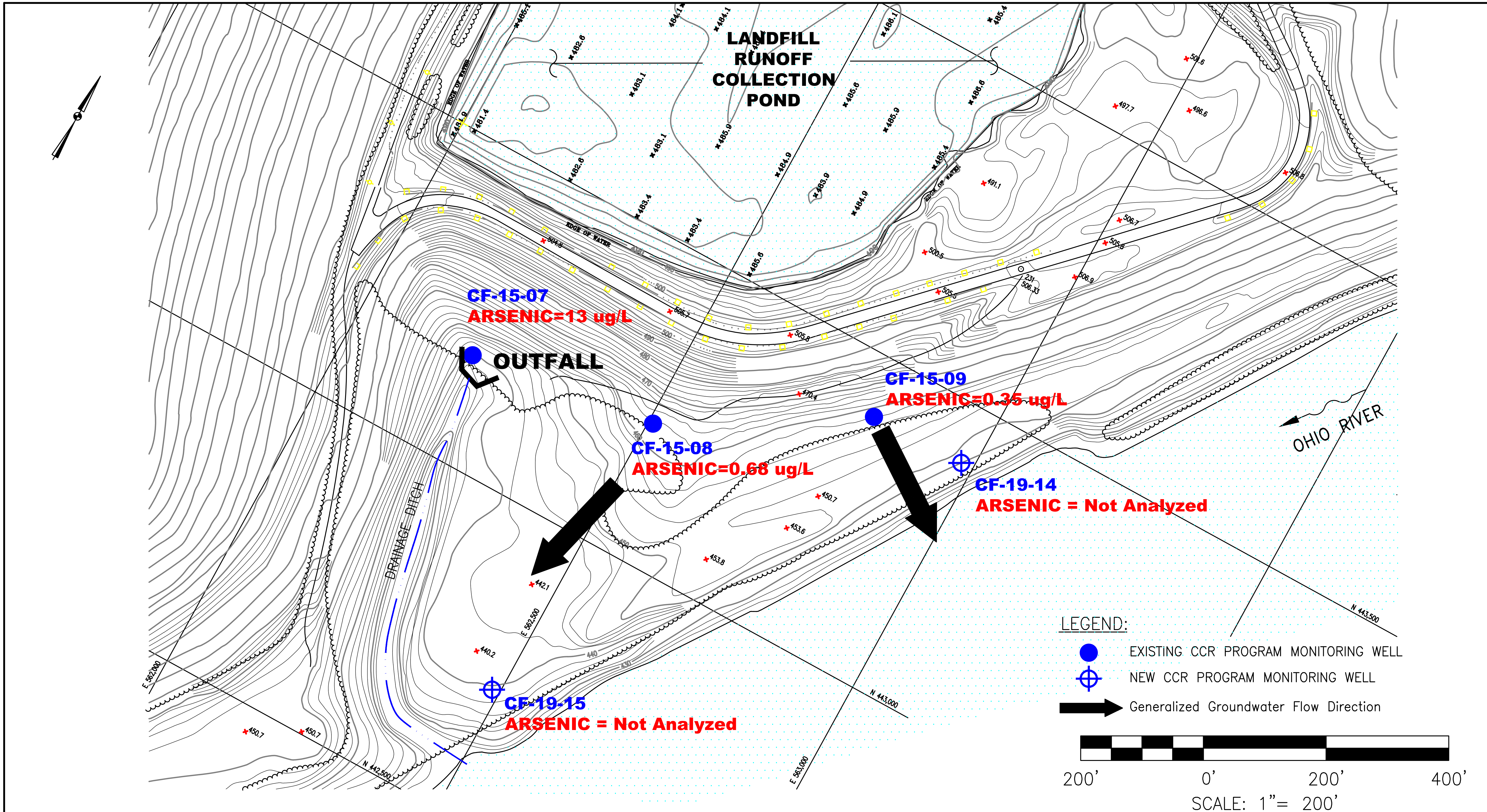

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CLIFTY CREEK STATION
MADISON, INDIANA
CCR PROGRAM
ARSENIC CONCENTRATIONS IN GROUNDWATER
MARCH 2024

DRAWING NAME: FIGURE 2-2
REV. 0

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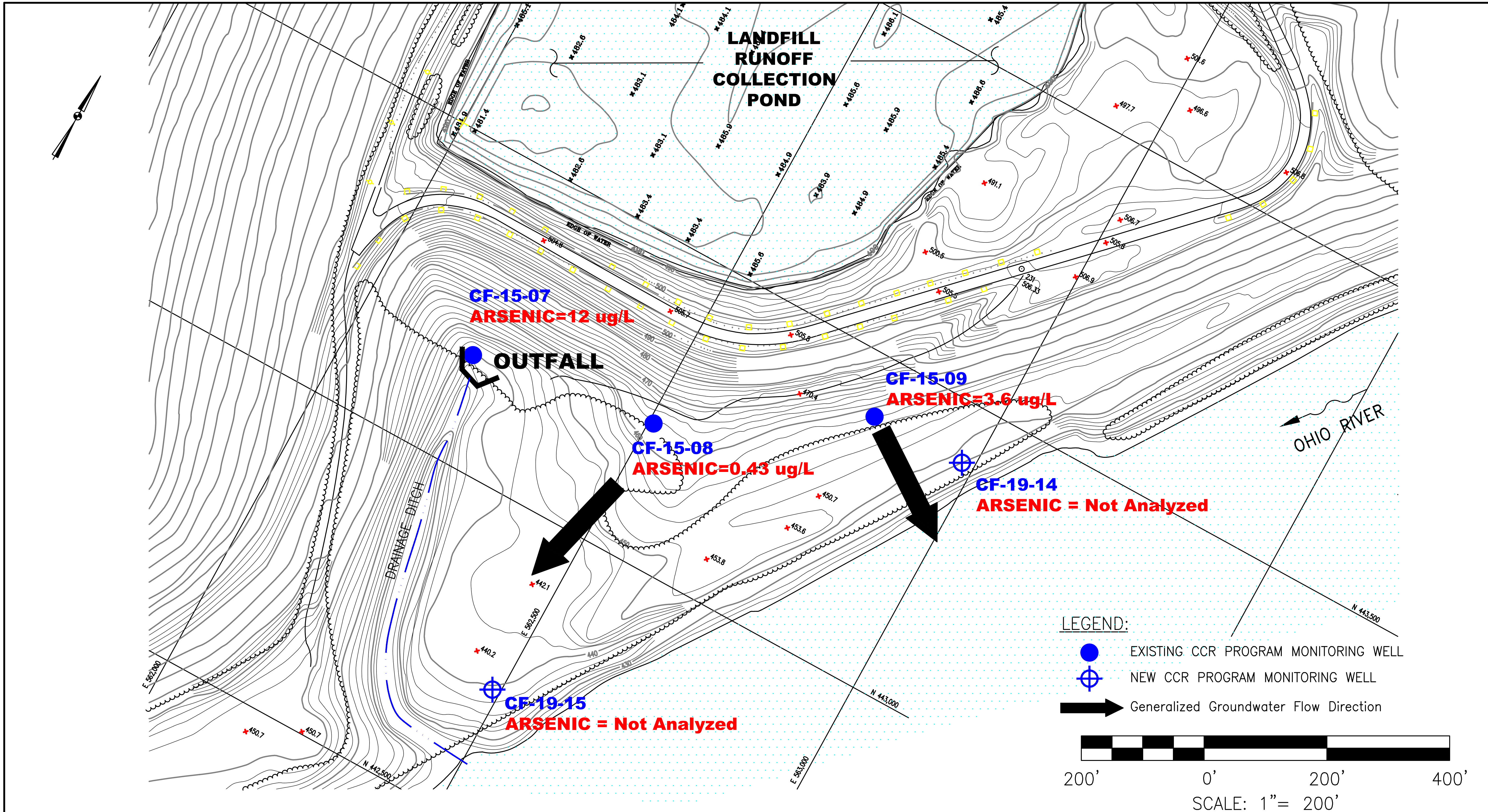

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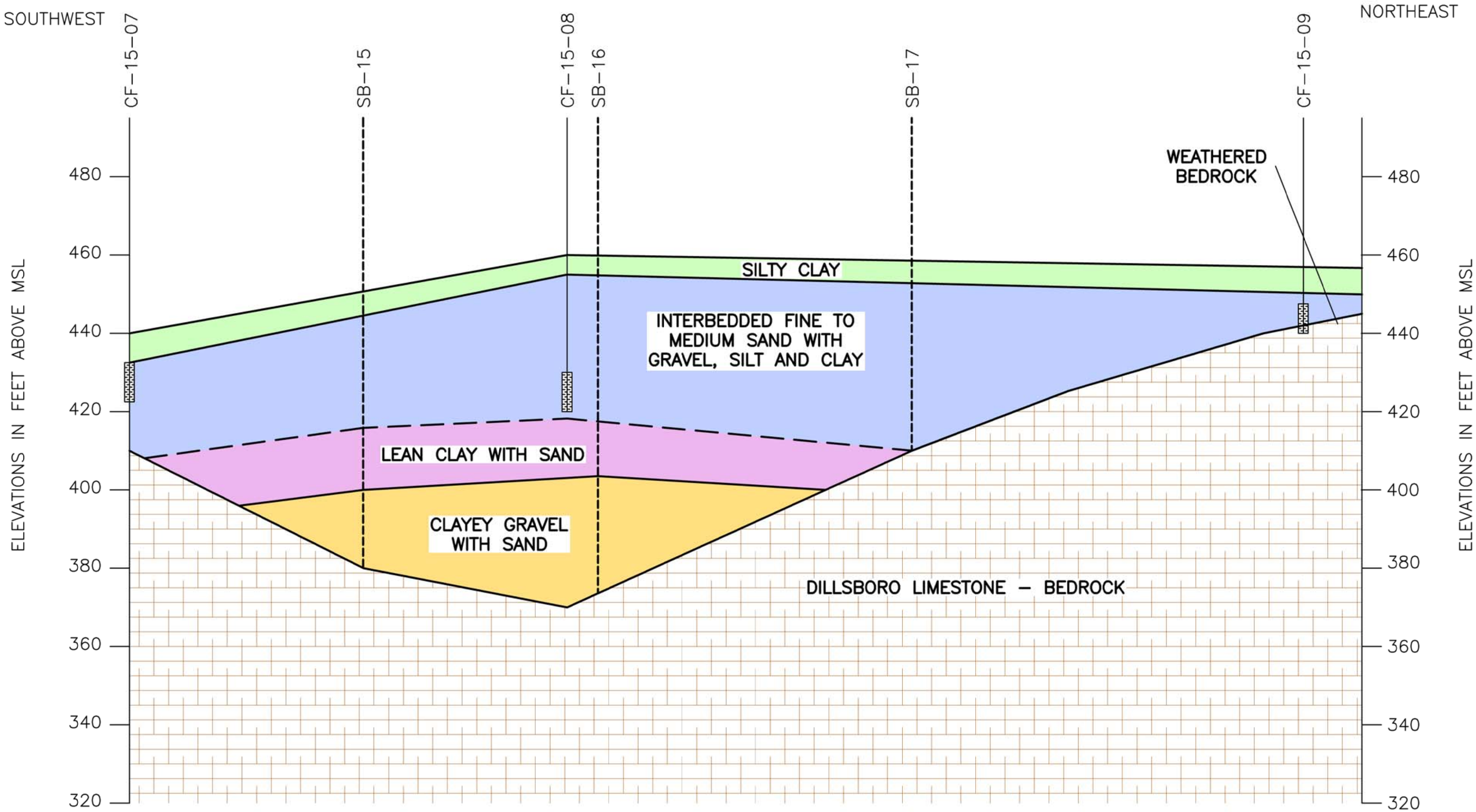
CLIFTY CREEK STATION
MADISON, INDIANA
CCR PROGRAM
ARSENIC CONCENTRATIONS IN GROUNDWATER
SEPTEMBER 2024

DRAWING NAME: FIGURE 2-3

REV. 0

PLOTTED: 2/21/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 2-5-2025\DWG FILES\2024-145-0-CLI__IKEC_CLIFTY_FIG 2-3_ARSENIC CONCENTRATIONS.DWG



NOTES:

1) CROSS–SECTION COMPILED USING AGES BORING AND WELL LOGS, SOIL BORING INFORMATION FROM THE 2007 LITIGATION REPORT AND STANTEC DATA FROM THE LRCP STABILITY ASSESSMENT REPORT.

2) THE APPROXIMATE LOCATION OF THE CROSS–SECTION IS ILLUSTRATED ON FIGURE 3–2.

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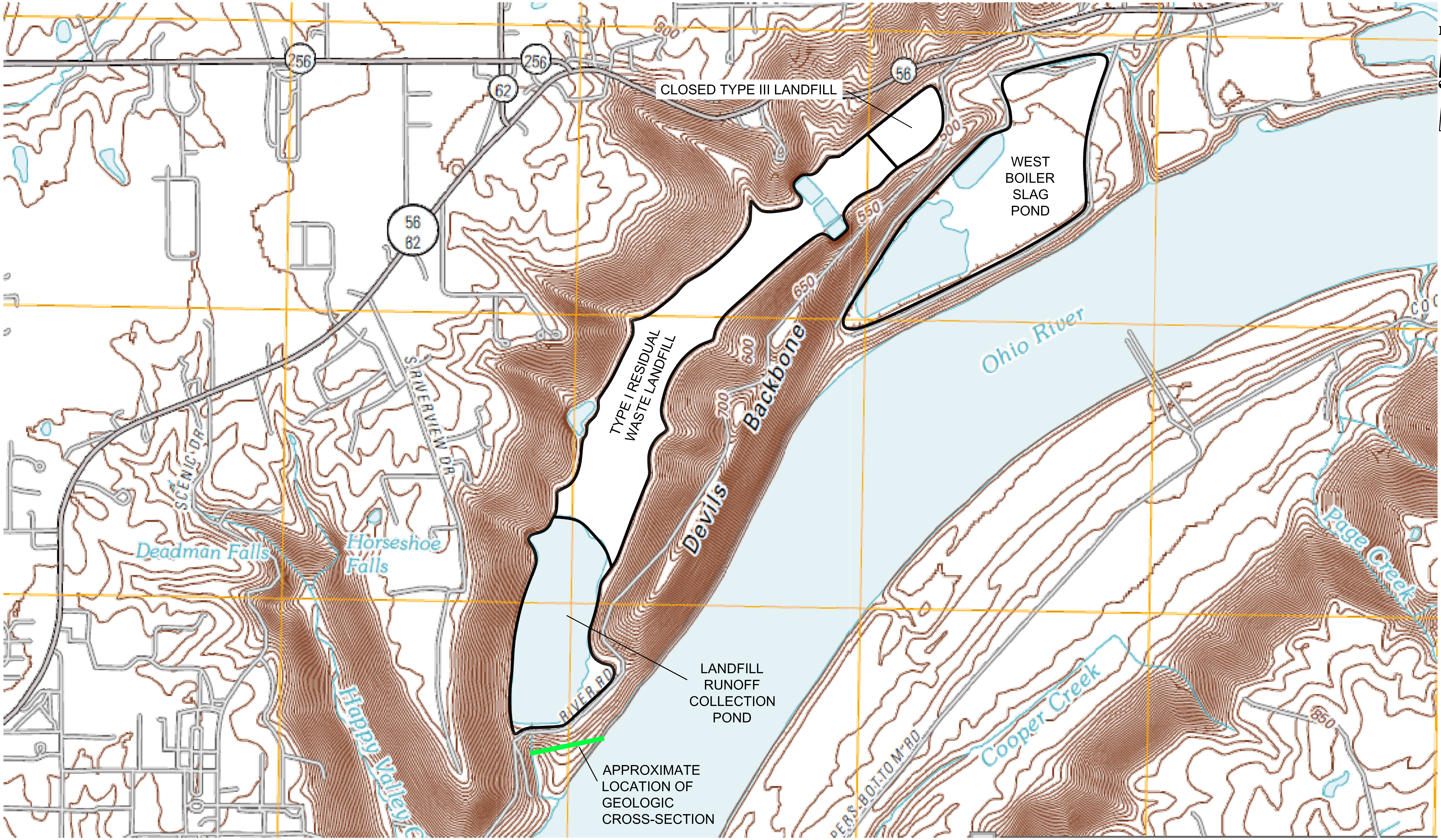
CLIFTY CREEK STATION
MADISON, INDIANA
GEOLOGIC CROSS–SECTION AT
LANDFILL RUNOFF COLLECTION POND

DRAWING NAME: FIGURE 3–1

REV. 0

Plot: 09/09/2019 14:37 _PROGRAM–IKEC\Clifty Creek–CCR Program\CAD\2019 Assessment of Corrective Measures\2019_IKEC_Clifty_ACM_Fig 3–1_X–Section_LRCP.dwg



APPROXIMATE LOCATION OF THE GEOLOGIC CROSS-SECTION (FIGURE 3-1).

SOURCE: USGS MADISON WEST 7.5 MINUTE TOPOGRAHIC QUADRANGLE, 2010.

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DWG FILE	2019_IKEC_Clifty_ACM_Fig 3-2_USGS_topo_map.dwg
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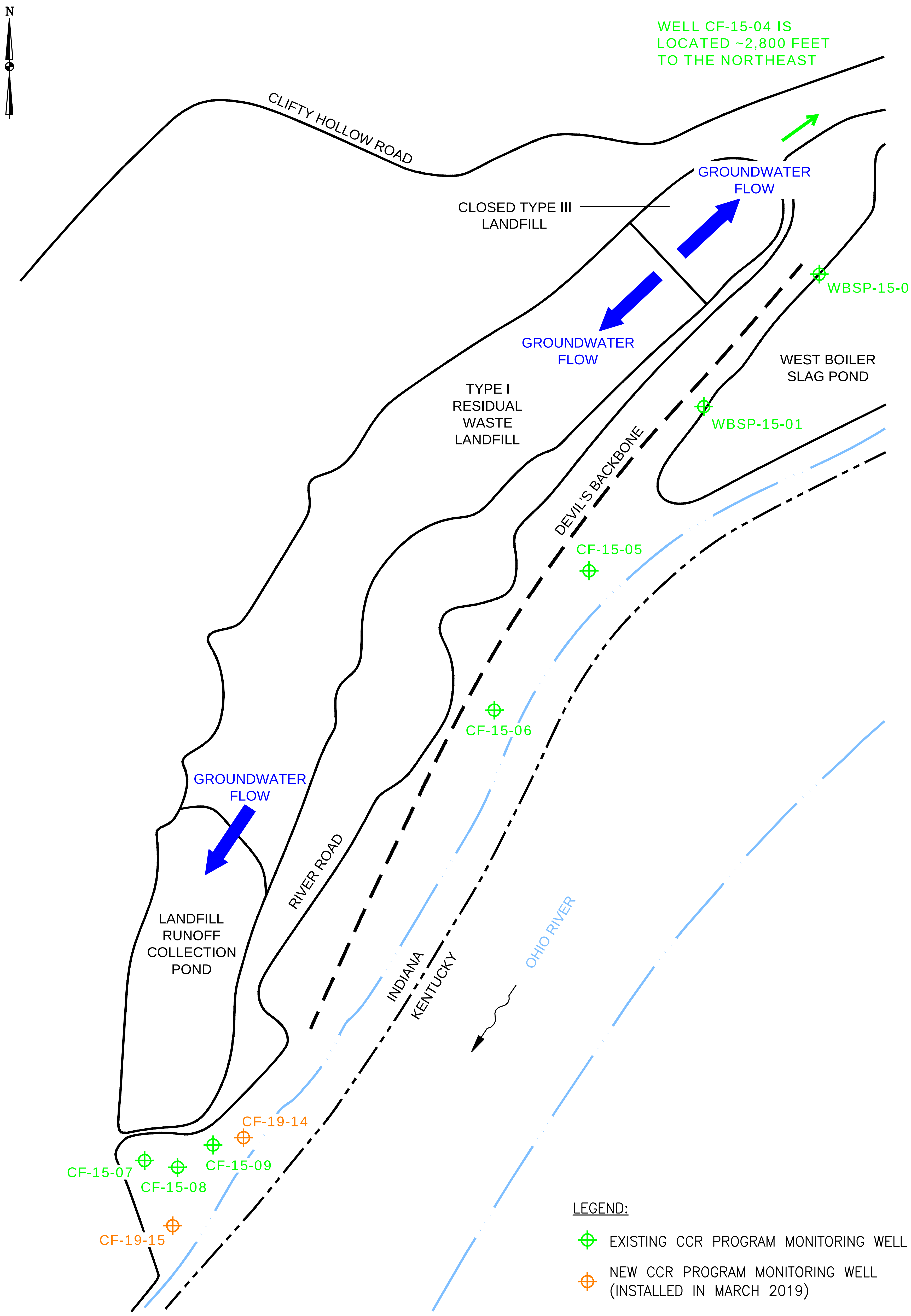
CLIFTY CREEK STATION
MADISON, INDIANA
TOPOGRAPHIC MAP

DRAWING NAME: FIGURE 3-2

REV. 0

Plot: 09/09/2019 14:51 _PROGRAMS-IKEC\Clifty Creek-CCR Program\CAD\2019 Assessment of Corrective Measures\2019_IKEC_Clifty_ACM_Fig 3-2_USGS_topo_map.dwg



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DRAWING SCALE	AS SHOWN

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CLIFTY CREEK STATION
MADISON, INDIANA
LANDFILL RUNOFF COLLECTION POND MONITORING WELL
LOCATIONS AND GENERALIZED FLOW MAP

DRAWING NAME: FIGURE 3–3
REV.: 0

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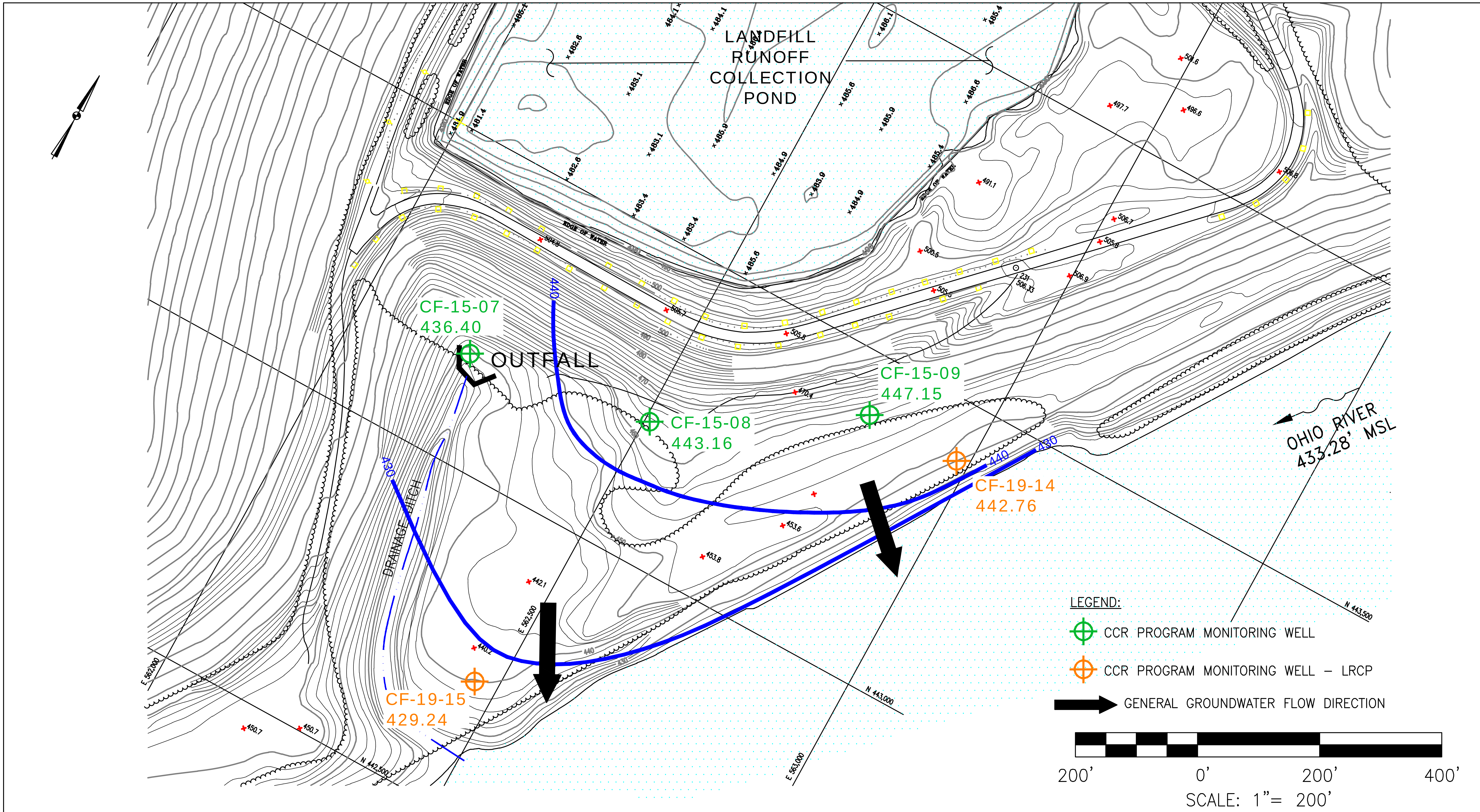

NOTE:
WELLS CF-19-14 AND CF-19-15 WERE INSTALLED IN MARCH 2019 DURING THE CHARACTERIZATION OF THE LRCP.

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DATE	1-29-2025
CHECKED BY	
JOB NO.	2024145-0-CLI
DWG FILE	2024145-0-CLI_IKEC_CLIFTY_ FIG 3-4.DWG
DRAWING SCALE	AS SHOWN

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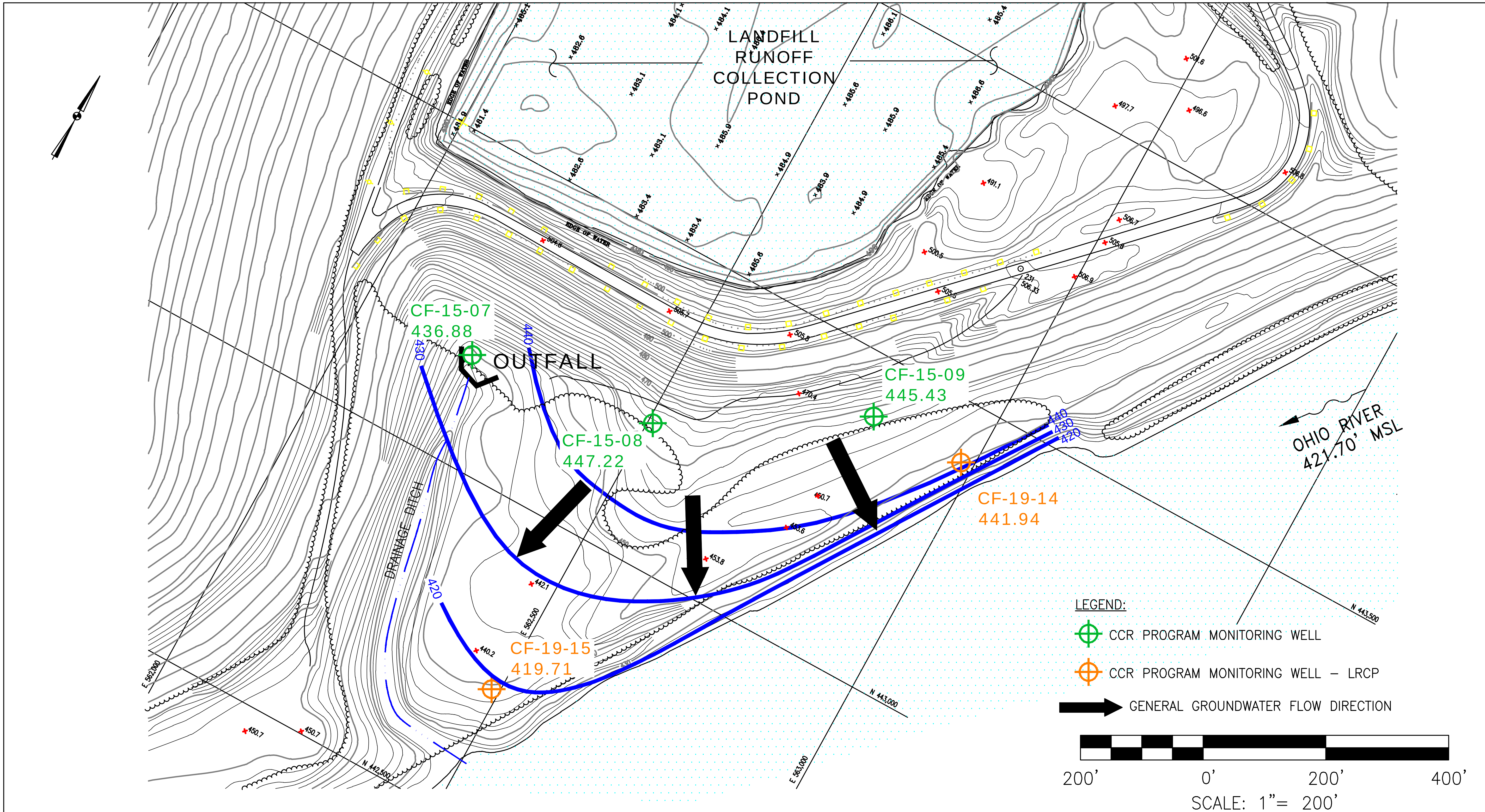
INDIANA–KENTUCKY ELECTRIC CORPORATION
CLIFTY CREEK STATION
MADISON, INDIANA
CCR PROGRAM
TYPE I RESIDUAL WASTE LANDFILL AND LANDFILL RUNOFF COLLECTION POND
GROUNDWATER FLOW – UPPERMOST AQUIFER
MARCH 2024

DRAWING NAME: FIGURE 3-4
REV. 0

PLOTTED: 2/12/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 2-5-2025\DWG FILES\2024145-0-CLI_IKEC_CLIFTY_ FIG 3-4.DWG



NOTE:
WELLS CF-19-14 AND CF-19-15 WERE INSTALLED IN MARCH 2019 DURING THE CHARACTERIZATION OF THE LRCP.

DRAWN BY	GRM
DATE	1-29-2025
CHECKED BY	
JOB NO.	2024145-0-CLI
DWG FILE	2024145-0-CLI_IKEC_CLIFTY_ FIG 3-5.DWG
DRAWING SCALE	AS SHOWN

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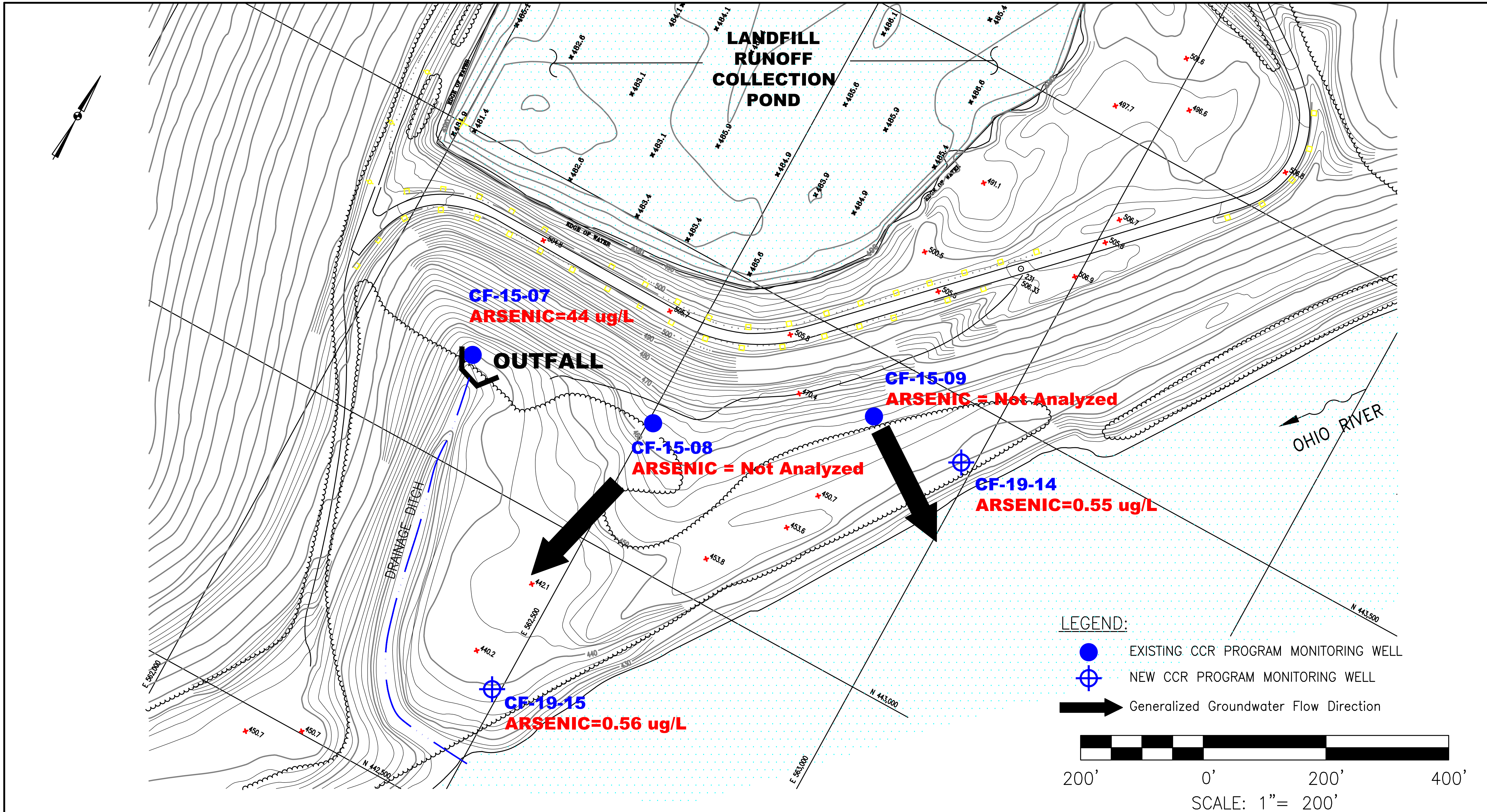
INDIANA-KENTUCKY ELECTRIC CORPORATION
CLIFTY CREEK STATION
MADISON, INDIANA
CCR PROGRAM
TYPE I RESIDUAL WASTE LANDFILL AND LANDFILL RUNOFF COLLECTION POND
GROUNDWATER FLOW – UPPERMOST AQUIFER
SEPTEMBER 2024

DRAWING NAME: FIGURE 3-5 REV. 0

PLOTTED: 2/12/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 2-5-2025\DWG FILES\2024145-0-CLI_IKEC_CLIFTY_ FIG 3-5.DWG



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CHECKED BY	
JOB NO.	2024145-0-CLI
DWG FILE	X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 2-5-2025\DWG FILES\2024-145-0-CLI__IKEC_CLIFTY_FIG 4-1_ARSENIC CONCENTRATIONS.DWG
DRAWING SCALE	AS SHOWN

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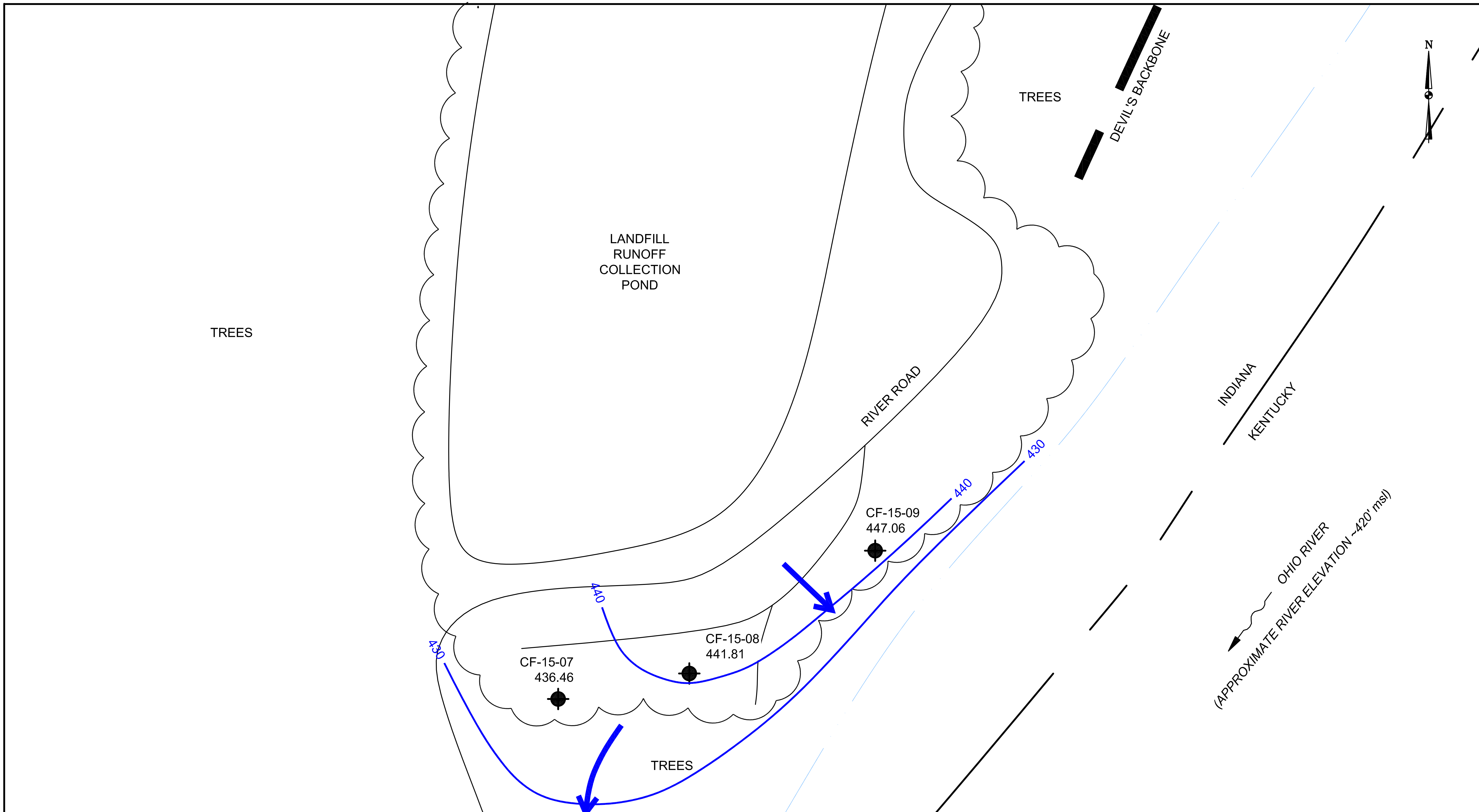
INDIANA-KENTUCKY ELECTRIC CORPORATION
CLIFTY CREEK STATION
MADISON, INDIANA
CCR PROGRAM
ARSENIC CONCENTRATIONS IN GROUNDWATER
DECEMBER 2024

DRAWING NAME: FIGURE 4-1
REV. 0

PLOTTED: 2/21/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 2-5-2025\DWG FILES\2024-145-0-CLI__IKEC_CLIFTY_FIG 4-1_ARSENIC CONCENTRATIONS.DWG

APPENDIX A

GENERALIZED GROUNDWATER FLOW MAPS FOR 2018-2023



LEGEND:
- MONITORING WELL LOCATION
- GROUNDWATER FLOW DIRECTION

200' 0' 200' 400'

SCALE: 1"= 200'

DRAWN BY	JM
DATE	
CHECKED BY	
JOB NO.	2019042-8-CLIFTY
DWG FILE	2019_IKEC_Clifty_ACM_Appx A_MAR18.dwg
DRAWING SCALE	AS SHOWN

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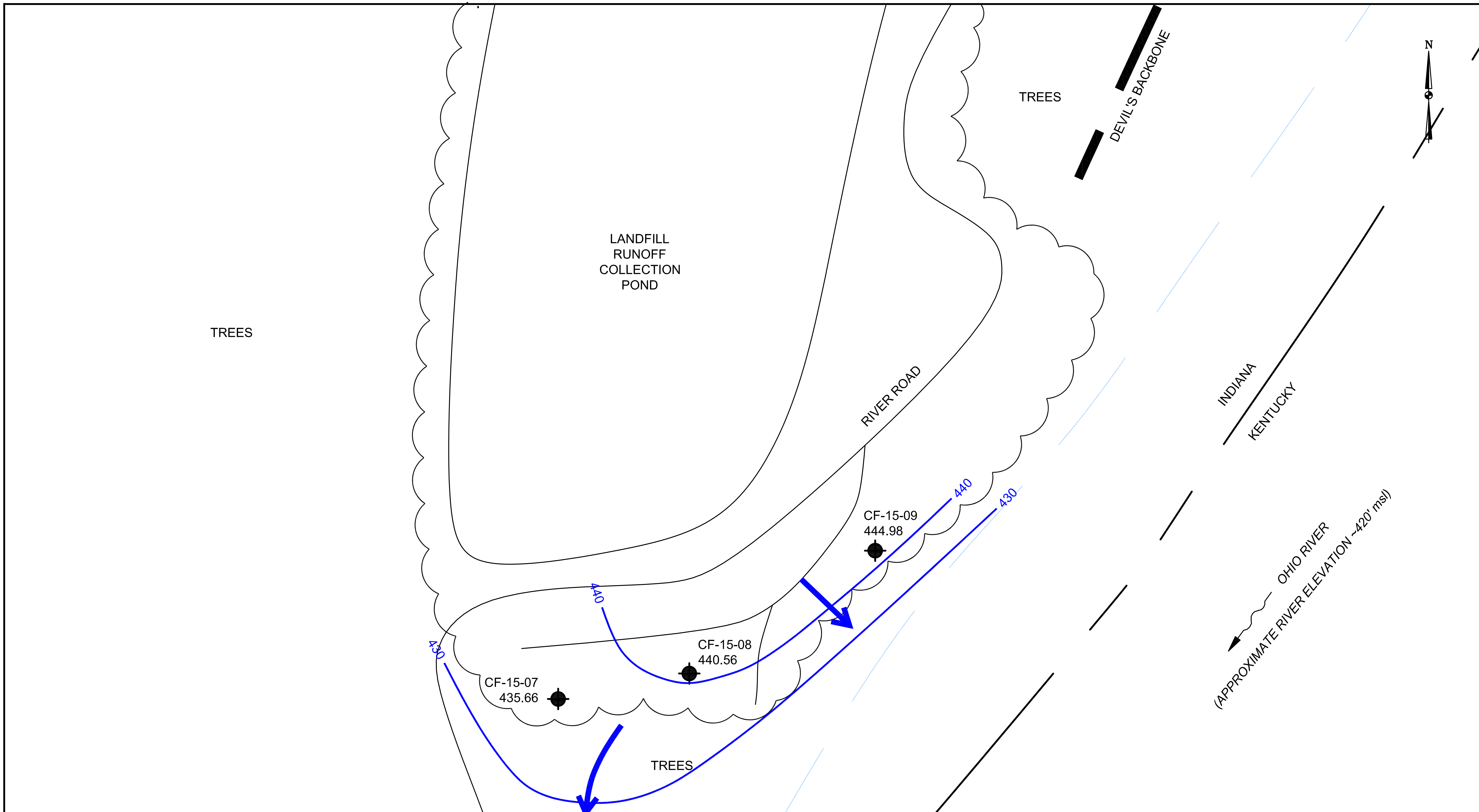
MADISON, INDIANA
LANDFILL RUNOFF COLLECTION POND
GENERALIZED GROUNDWATER FLOW MAP
MARCH 2018

DRAWING NAME: FIGURE A–1

REV. 0

Plot: 08/09/2019 13:20 _PROGRAMS–IKEC\Clifty Creek–CCR Program\CAD\2019 Assessment of Corrective Measures\Appx A\2019_IKEC_Clifty_ACM_Appx A_MAR18.dwg\A–1



LEGEND:

- MONITORING WELL LOCATION
- GROUNDWATER FLOW DIRECTION

200' 0' 200' 400'

SCALE: 1"= 200'

DRAWN BY	JM
DATE	
CHECKED BY	
JOB NO.	2019042-8-CLIFTY
DWG FILE	2019_IKEC_Clifty_ACM_Appx A_OCT18.dwg
DRAWING SCALE	AS SHOWN

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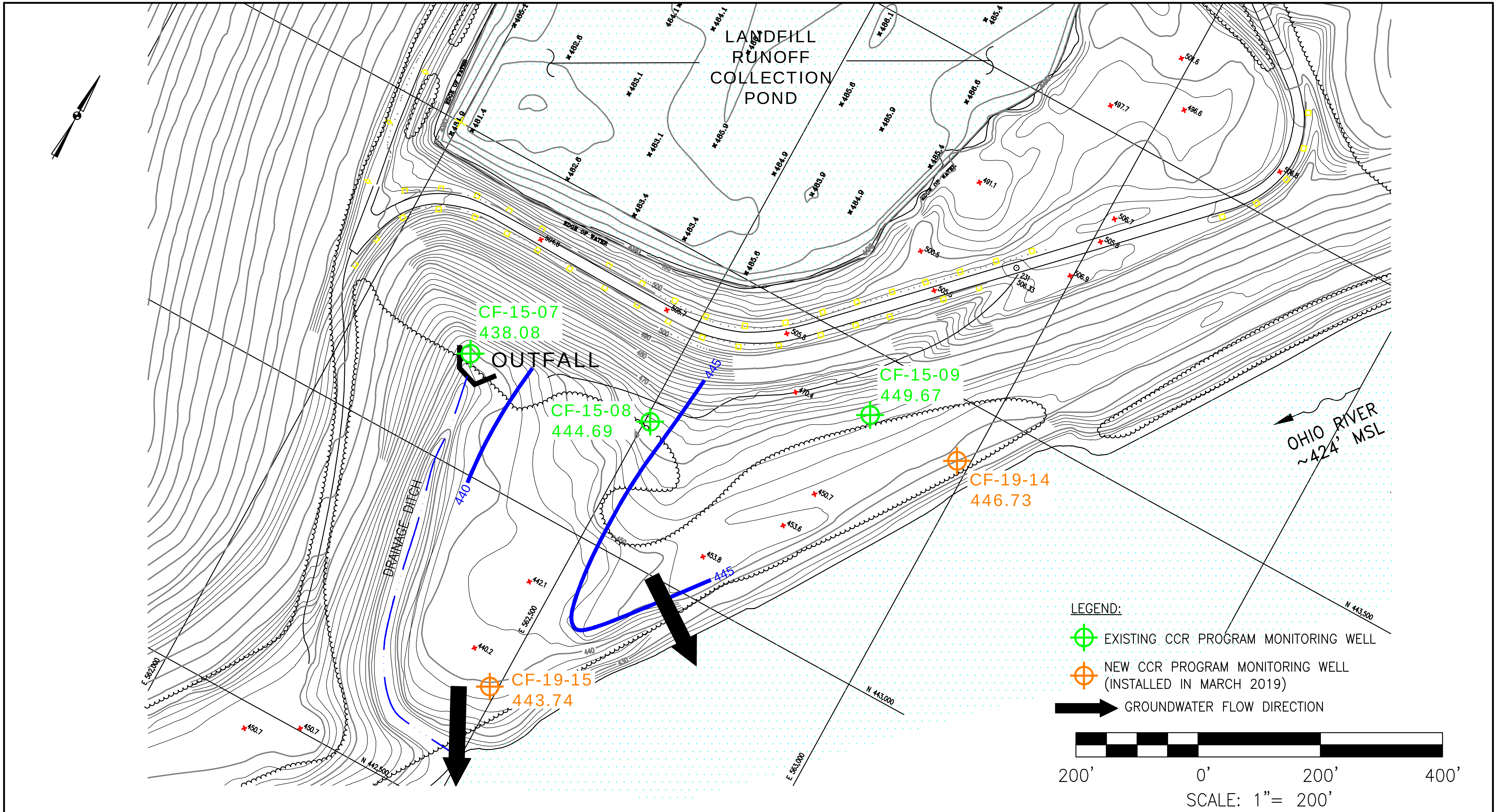
CLIFTY CREEK STATION
MADISON, INDIANA
LANDFILL RUNOFF COLLECTION POND
GENERALIZED GROUNDWATER FLOW MAP
OCTOBER 2018

DRAWING NAME: FIGURE A–2

REV. 0

Plot: 08/09/2019 13:23 _PROGRAMS–IKEC\Clifty Creek–CCR Program\CAD\2019 Assessment of Corrective Measures\Appx A\2019_IKEC_Clifty_ACM_Appx A_OCT18.dwg\A–2



NOTE:
WELLS CF-19-14 AND CF-19-15 WERE INSTALLED IN MARCH 2019.

DRAWN BY	GRM
DATE	1-29-2025
CHECKED BY	
JOB NO.	2024145-0-CLI
DWG FILE	2024145-0-CLI_IKEC_CLIFTY_ FIG A-3.DWG
DRAWING SCALE	AS SHOWN

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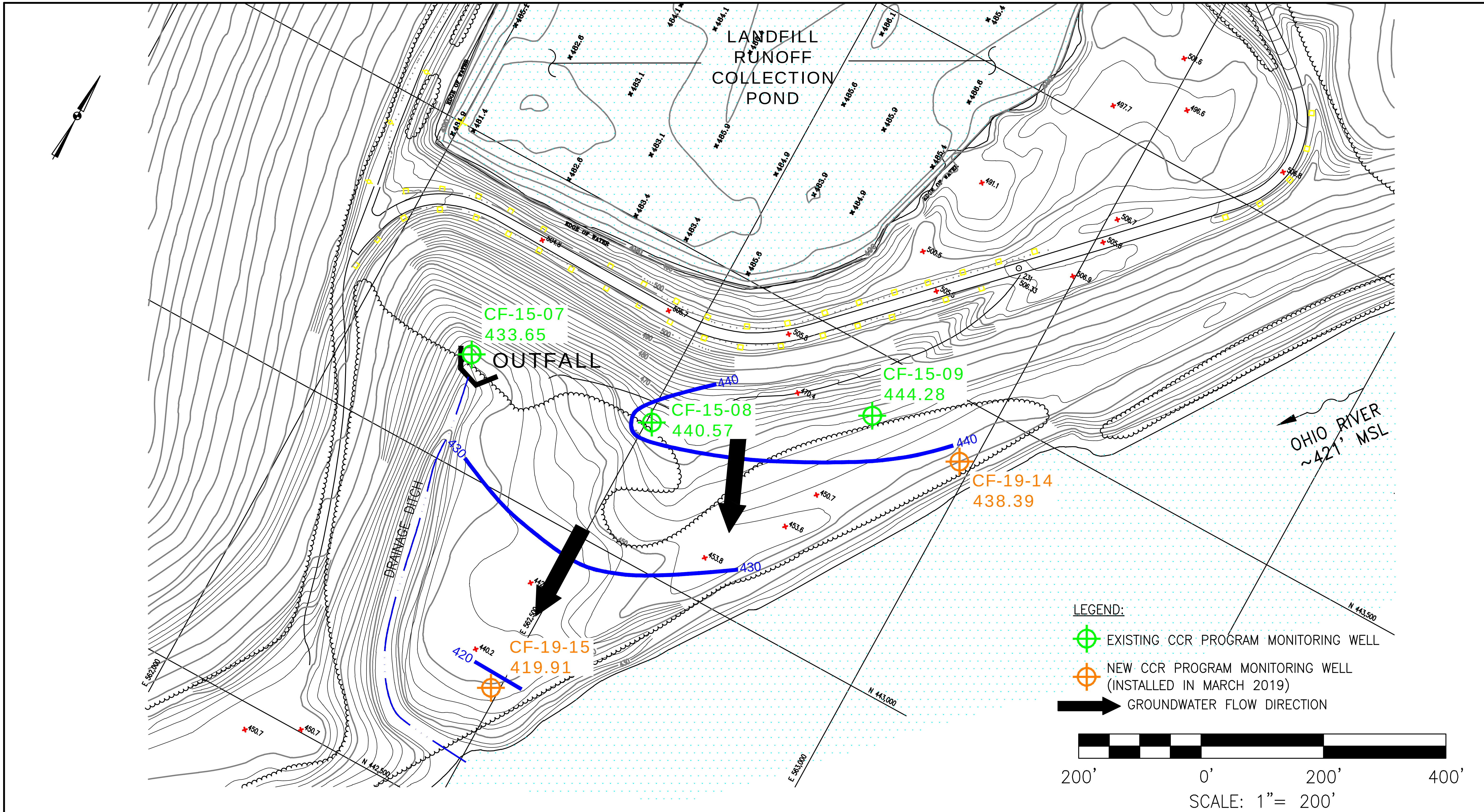
INDIANA-KENTUCKY ELECTRIC CORPORATION

CLIFTY CREEK STATION
MADISON, INDIANA
CCR PROGRAM
LANDFILL RUNOFF COLLECTION POND
GROUNDWATER FLOW – UPPERMOST AQUIFER
MARCH 2019

DRAWING NAME: FIGURE A-3
REV. 0

PLOTTED: 1/29/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 1-29-2025\DWG FILES\2024145-0-CLI_IKEC_CLIFTY_ FIG A-3.DWG



NOTE:
WELLS CF-19-14 AND CF-19-15 WERE INSTALLED IN MARCH 2019.

DRAWN BY	GRM
DATE	1-29-2025
CHECKED BY	
JOB NO.	2024145-0-CLI
DWG FILE	2024145-0-CLI_IKEC_CLIFTY_ FIG A-4.DWG
DRAWING SCALE	AS SHOWN

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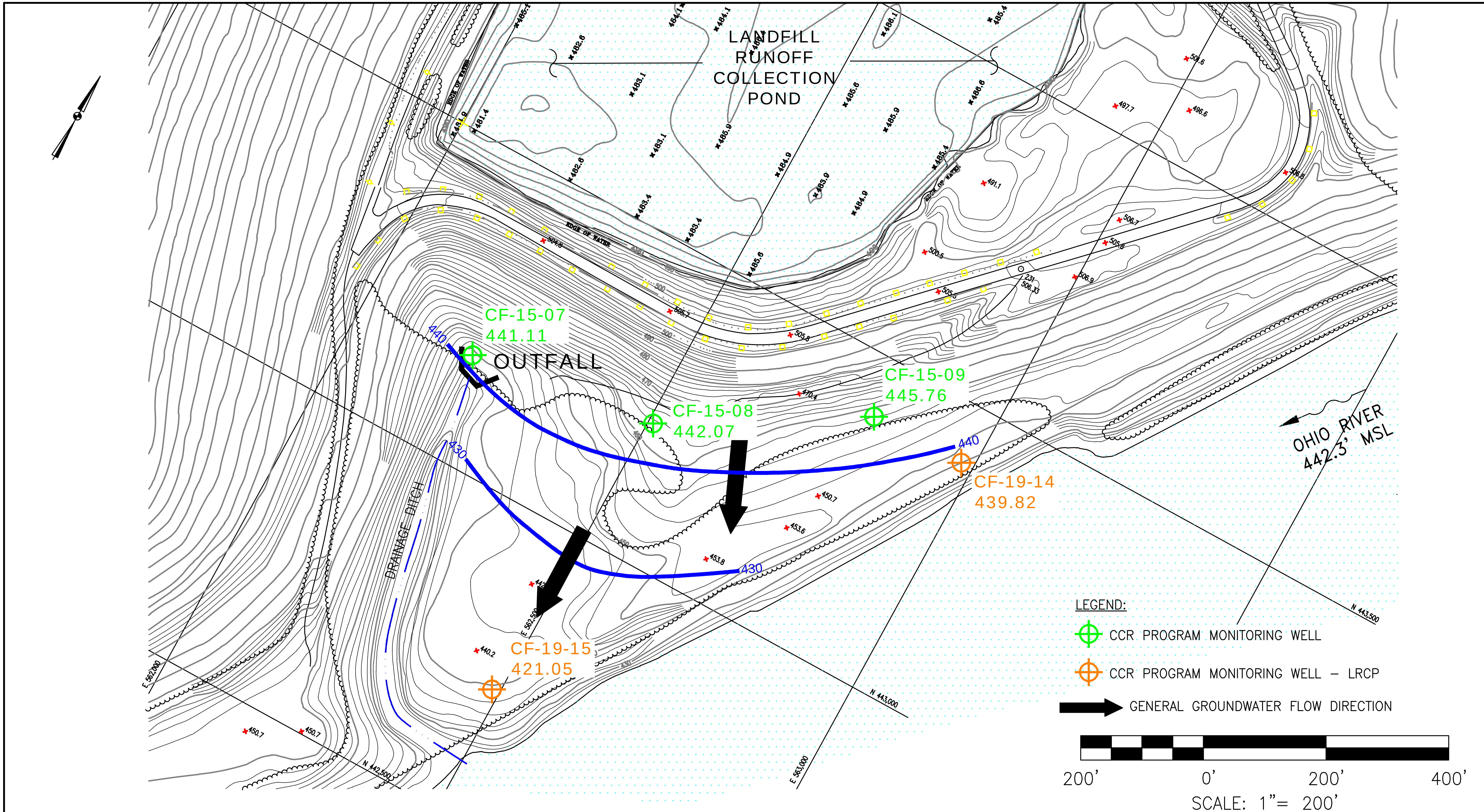
CCR PROGRAM
LANDFILL RUNOFF COLLECTION POND
GROUNDWATER FLOW – UPPERMOST AQUIFER
OCTOBER 2019

DRAWING NAME: FIGURE A-4
REV. 0

PLOTTED: 1/29/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 1-29-2025\DWG FILES\2024145-0-CLI_IKEC_CLIFTY_ FIG A-4.DWG



NOTE:
WELLS CF-19-14 AND CF-19-15 WERE INSTALLED IN MARCH 2019 DURING THE CHARACTERIZATION OF THE LRCP.

DRAWN BY	GRM
DATE	1-29-2025
CHECKED BY	
JOB NO.	2024145-0-CLI
DWG FILE	2024145-0-CLI_IKEC_CLIFTY_ FIG A-5.DWG
DRAWING SCALE	AS SHOWN

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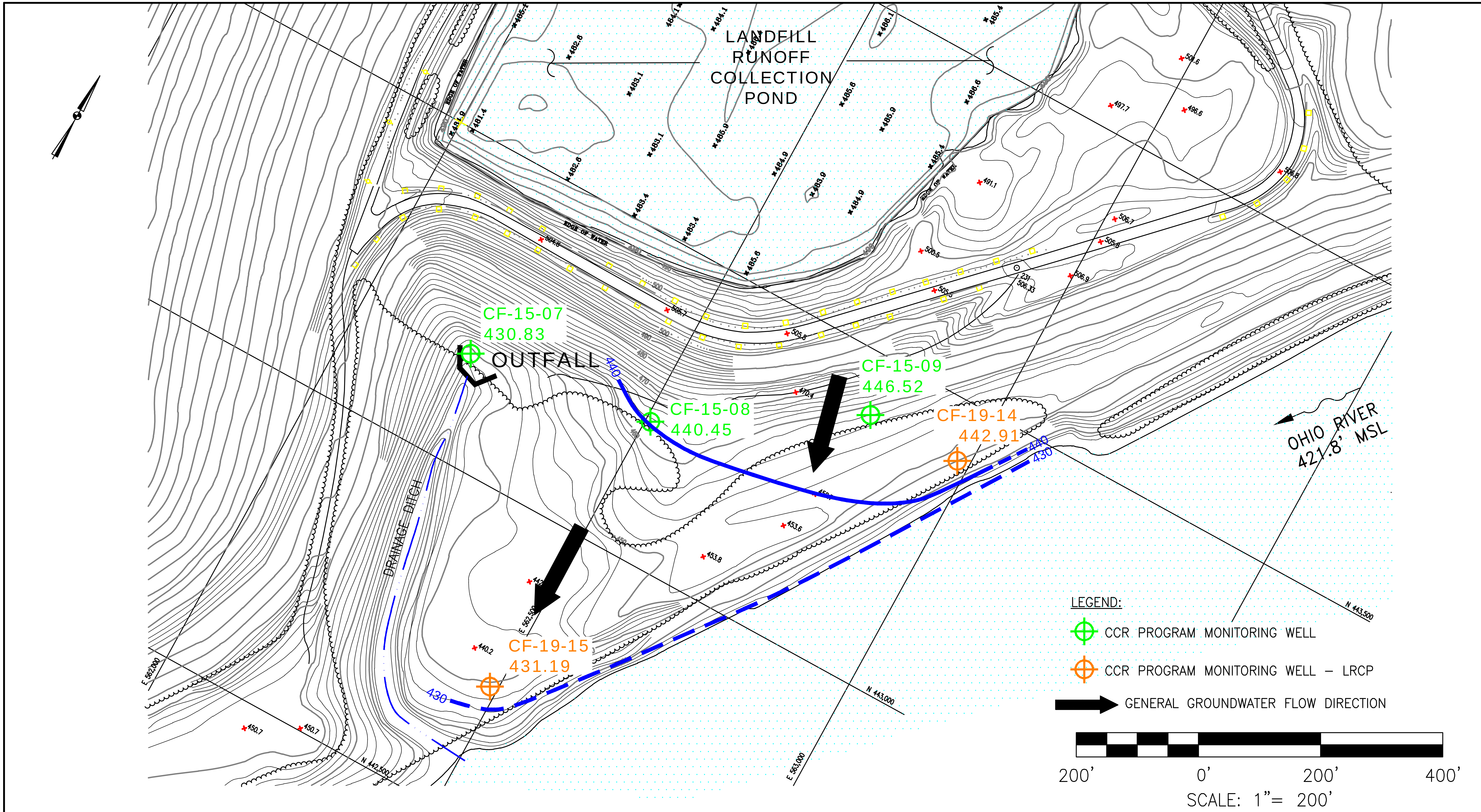
INDIANA-KENTUCKY ELECTRIC CORPORATION

CLIFTY CREEK STATION
MADISON, INDIANA
CCR PROGRAM
LANDFILL RUNOFF COLLECTION POND
GROUNDWATER FLOW – UPPERMOST AQUIFER
MARCH 2020

DRAWING NAME: FIGURE A-5
REV. 0

PLOTTED: 1/29/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 1-29-2025\DWG FILES\2024145-0-CLI_IKEC_CLIFTY_ FIG A-5.DWG



NOTE:
WELLS CF–19–14 AND CF–19–15
WERE INSTALLED IN MARCH 2019.

DRAWN BY	GRM
DATE	1–29–2025
CHECKED BY	
JOB NO.	2024145–0–CLI
DWG FILE	2024145–0–CLI_IKEC_CLIFTY_ FIG A–6.DWG
DRAWING SCALE	AS SHOWN

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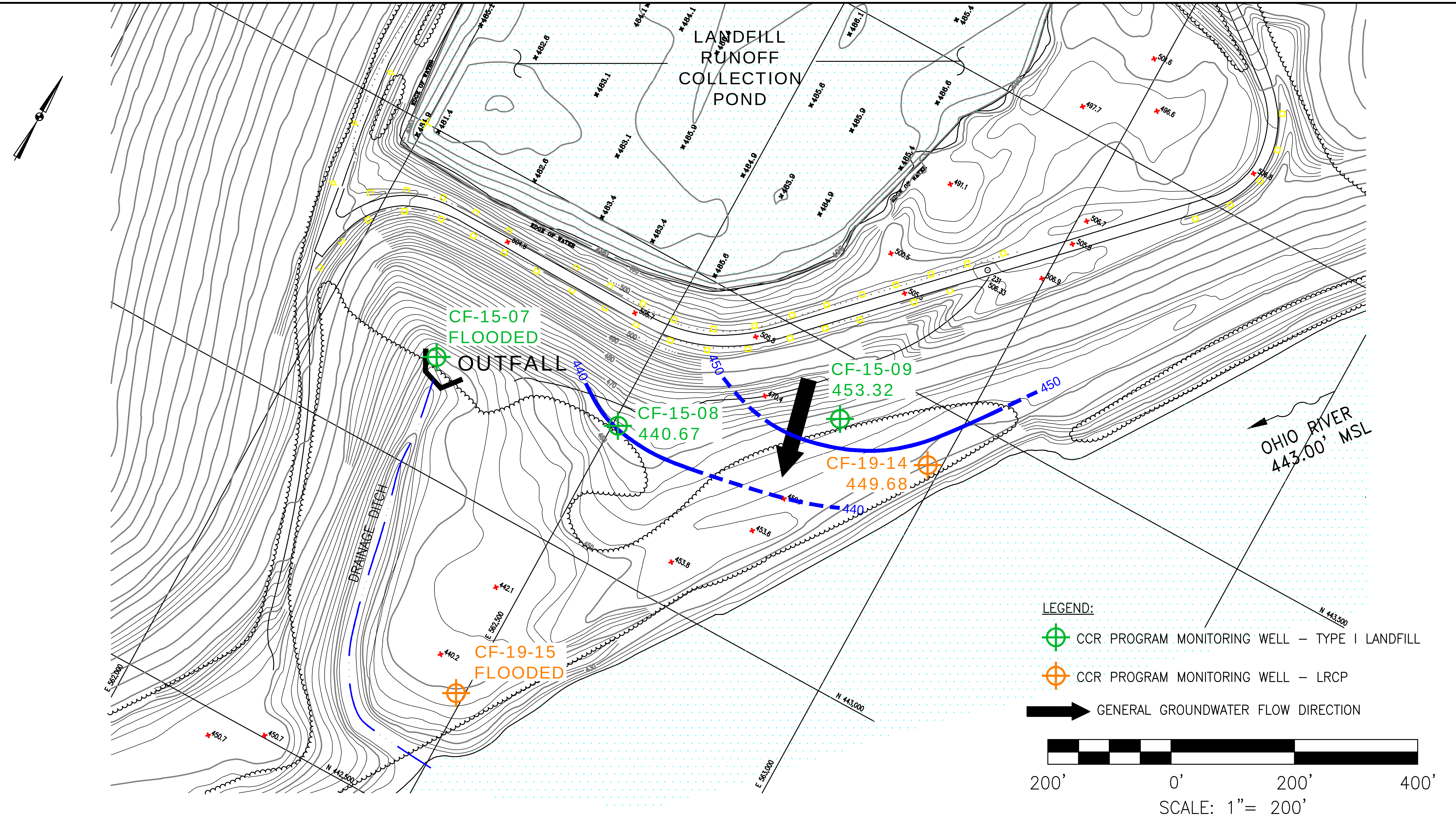
INDIANA–KENTUCKY ELECTRIC CORPORATION

CLIFTY CREEK STATION
MADISON, INDIANA
CCR PROGRAM
LANDFILL RUNOFF COLLECTION POND
GROUNDWATER FLOW – UPPERMOST AQUIFER
SEPTEMBER 2020

DRAWING NAME: FIGURE A–6
REV. 0



NOTE:
WELLS CF–19–14 AND CF–19–15 WERE INSTALLED IN MARCH 2019 DURING THE CHARACTERIZATION OF THE LRCP.

DRAWN BY	GRM
DATE	1–29–2025
CHECKED BY	
JOB NO.	2024145–0–CLI
DWG FILE	2024145–0–CLI_IKEC_CLIFTY_ FIG A–7.DWG
DRAWING SCALE	AS SHOWN

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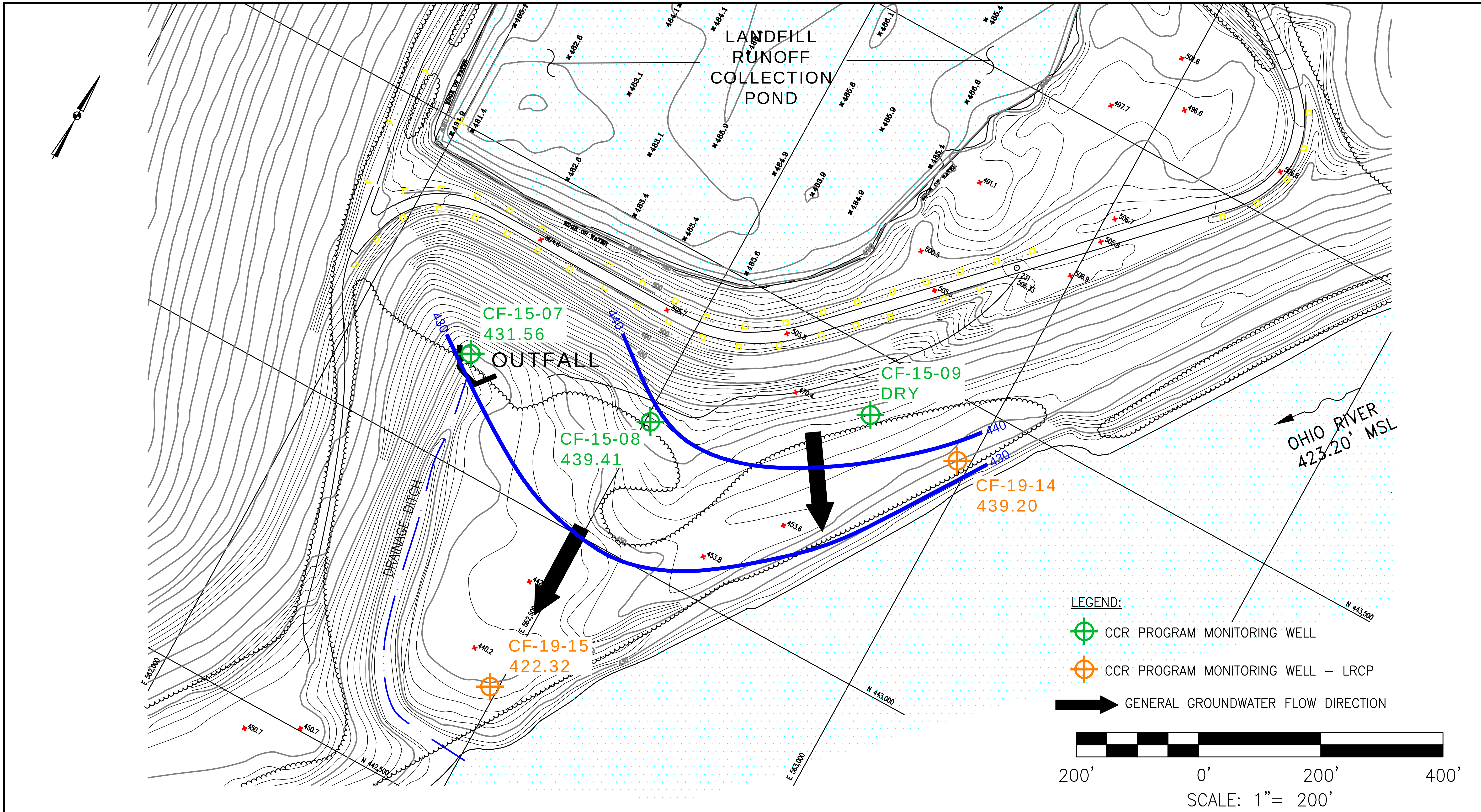
INDIANA–KENTUCKY ELECTRIC CORPORATION

CLIFTY CREEK STATION
MADISON, INDIANA
CCR PROGRAM
LANDFILL RUNOFF COLLECTION POND
GROUNDWATER FLOW – UPPERMOST AQUIFER
MARCH 2021

DRAWING NAME: FIGURE A–7
REV. 0

PLOTTED: 1/29/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 1–29–2025\DWG FILES\2024145–0–CLI_IKEC_CLIFTY_ FIG A–7.DWG



NOTE:
WELLS CF–19–14 AND CF–19–15 WERE INSTALLED IN MARCH 2019 DURING THE CHARACTERIZATION OF THE LRCP.

DRAWN BY	GRM
DATE	1–29–2025
CHECKED BY	
JOB NO.	2024145–0–CLI
DWG FILE	2024145–0–CLI_IKEC_CLIFTY_ FIG A–8.DWG
DRAWING SCALE	AS SHOWN

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CLIFTY CREEK STATION
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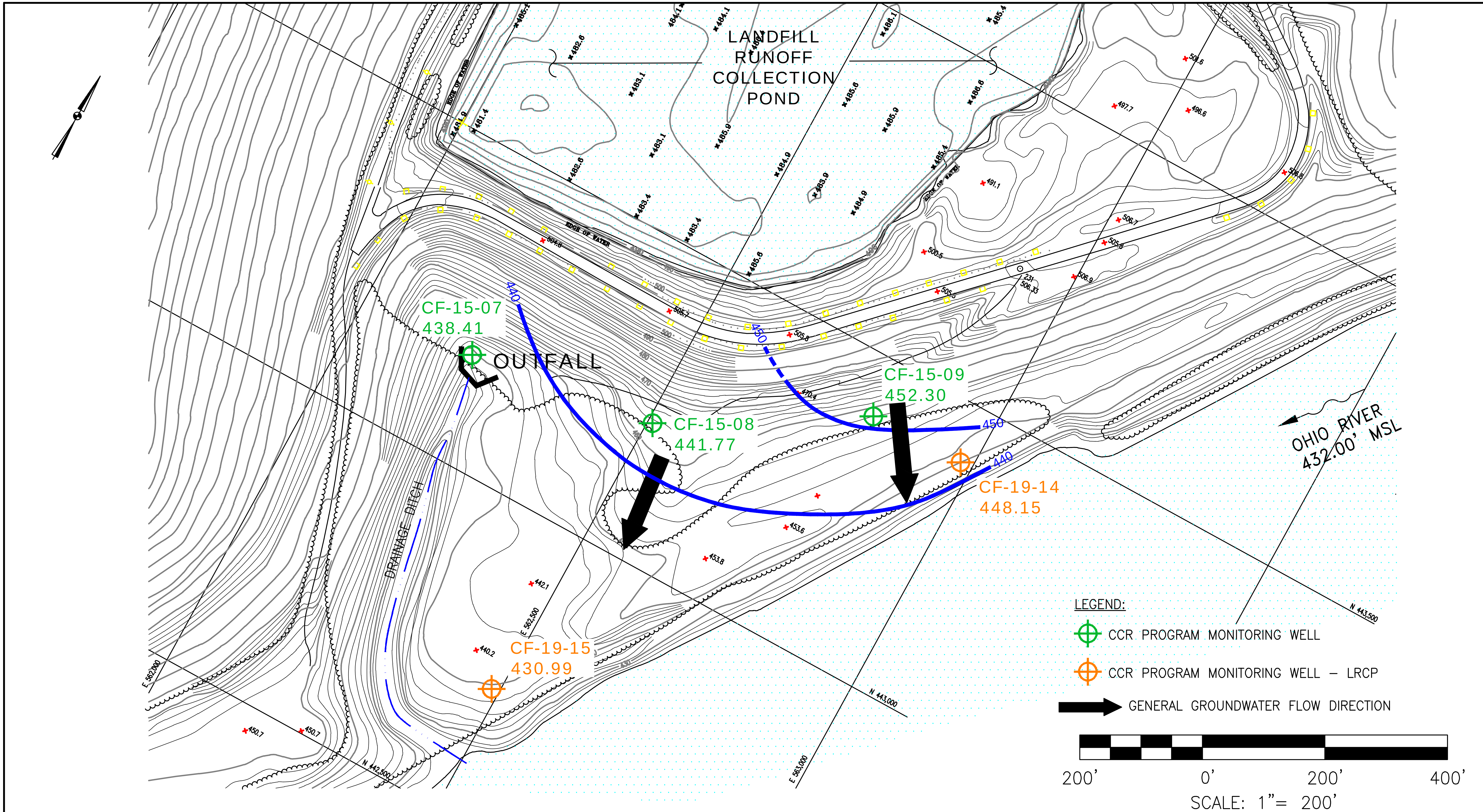
LANDFILL RUNOFF COLLECTION POND
GROUNDWATER FLOW – UPPERMOST AQUIFER
SEPTEMBER 2021

DRAWING NAME: FIGURE A–8
REV. 0

PLOTTED: 1/29/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 1–29–2025\DWG FILES\2024145–0–CLI_IKEC_CLIFTY_ FIG A–8.DWG



NOTE:
WELLS CF–19–14 AND CF–19–15 WERE INSTALLED IN MARCH 2019 DURING THE CHARACTERIZATION OF THE LRCP.

DRAWN BY	GRM
DATE	1–29–2025
CHECKED BY	
JOB NO.	2024145–0–CLI
DWG FILE	2024145–0–CLI_IKEC_CLIFTY_ FIG A–9.DWG
DRAWING SCALE	AS SHOWN

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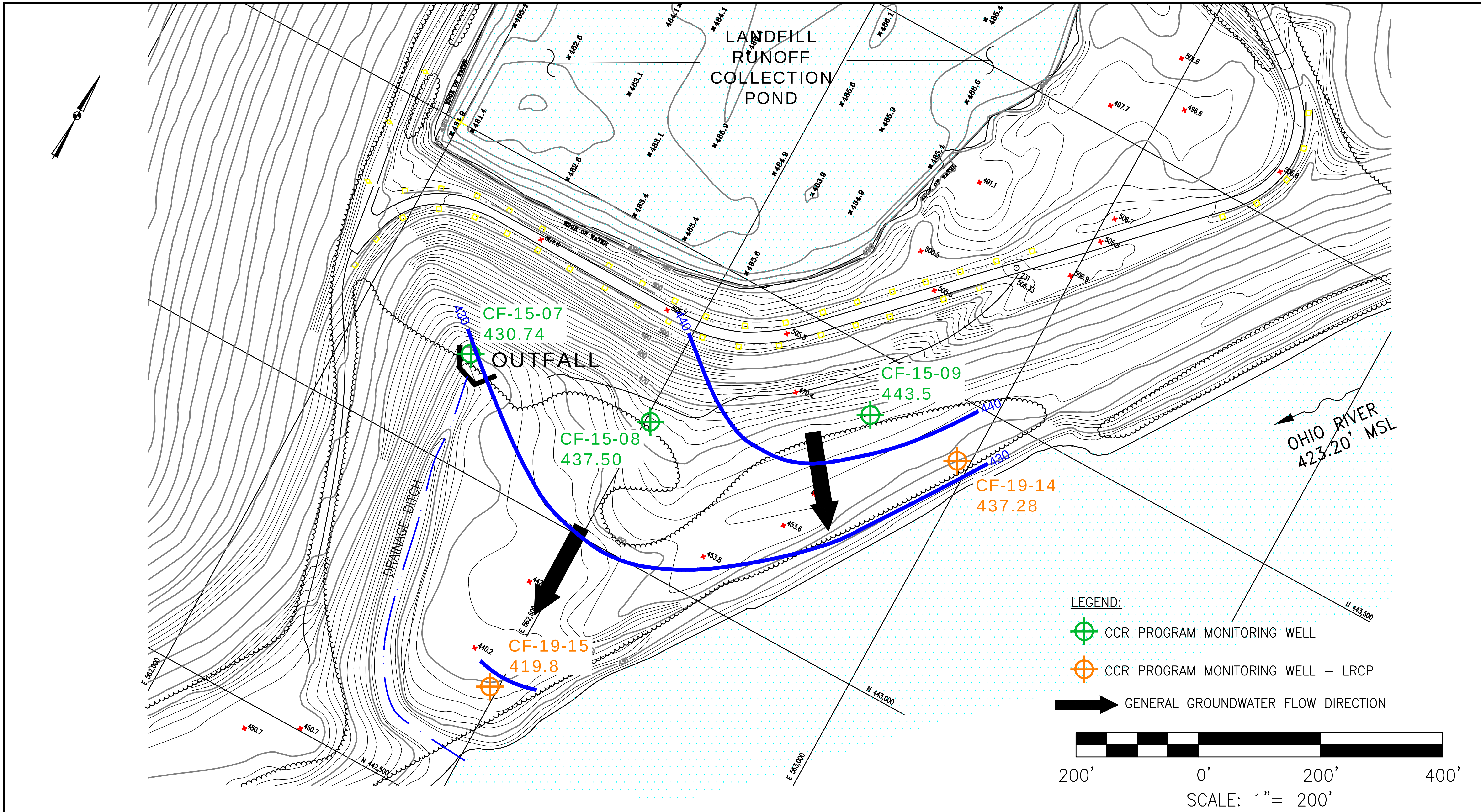
LANDFILL RUNOFF COLLECTION POND
GROUNDWATER FLOW – UPPERMOST AQUIFER
MARCH 2022

DRAWING NAME: FIGURE A–9
REV. 0

PLOTTED: 1/29/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 1-29-2025\DWG FILES\2024145-0-CLI_IKEC_CLIFTY_ FIG A-9.DWG



NOTE:
WELLS CF-19-14 AND CF-19-15 WERE INSTALLED IN MARCH 2019 DURING THE CHARACTERIZATION OF THE LRCP.

DRAWN BY	GRM
DATE	1-29-2025
CHECKED BY	
JOB NO.	2024145-0-CLI
DWG FILE	2024145-0-CLI_IKEC_CLIFTY_ FIG A-10.DWG
DRAWING SCALE	AS SHOWN

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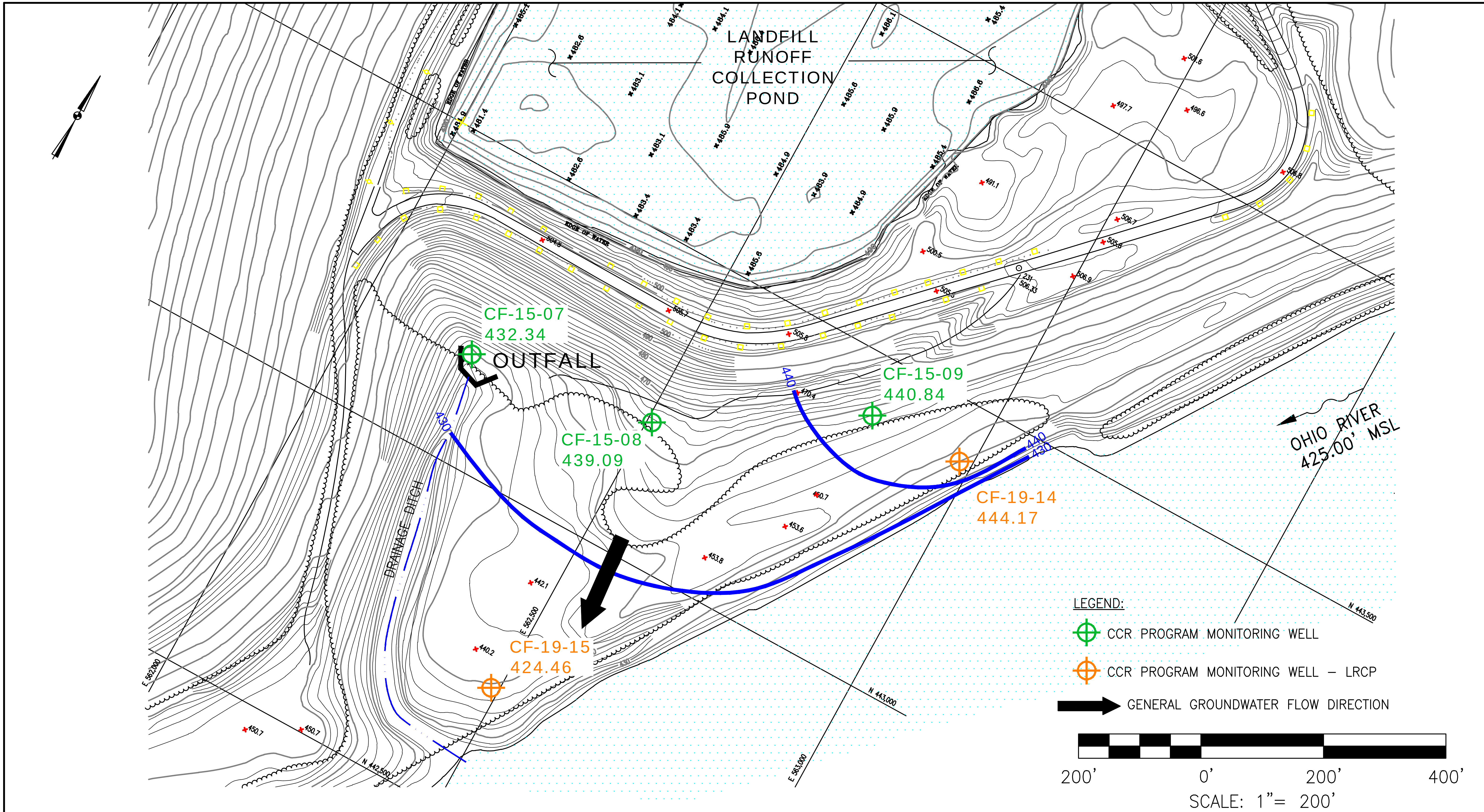
LANDFILL RUNOFF COLLECTION POND
GROUNDWATER FLOW – UPPERMOST AQUIFER
SEPTEMBER 2022

DRAWING NAME: FIGURE A-10
REV. 0

PLOTTED: 1/29/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 1-29-2025\DWG FILES\2024145-0-CLI_IKEC_CLIFTY_ FIG A-10.DWG



NOTE:
WELLS CF-19-14 AND CF-19-15 WERE INSTALLED IN MARCH 2019 DURING THE CHARACTERIZATION OF THE LRCP.

DRAWN BY	GRM
DATE	1-29-2025
CHECKED BY	
JOB NO.	2024145-0-CLI
DWG FILE	
DRAWING SCALE	AS SHOWN

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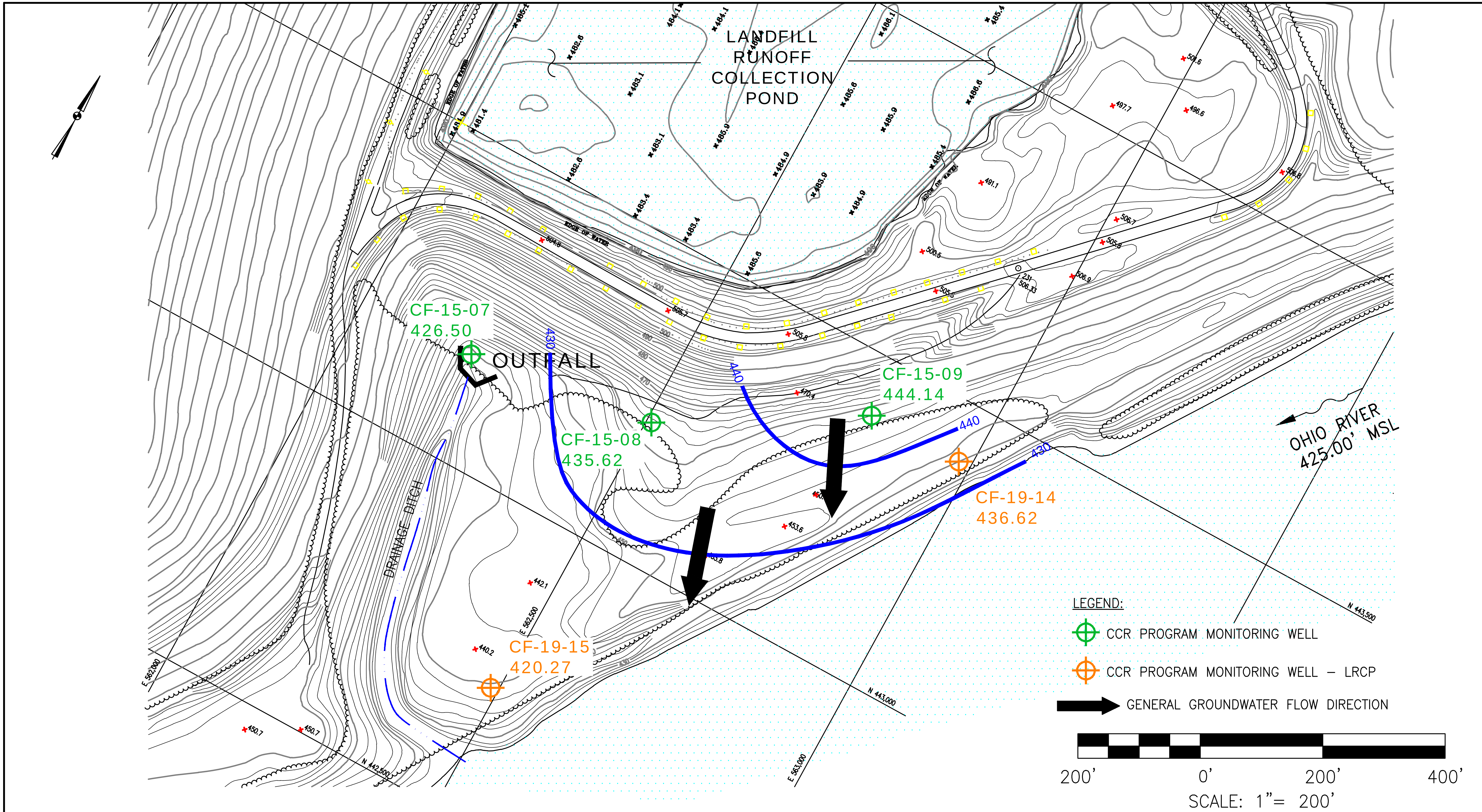
MADISON, INDIANA
CCR PROGRAM
LANDFILL RUNOFF COLLECTION POND
GROUNDWATER FLOW – UPPERMOST AQUIFER
MARCH 2023

DRAWING NAME: FIGURE A-11
REV. 0

PLOTTED: 1/29/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 1-29-2025\DWG FILES\2024145-0-CLI_IKEC_CLIFTY_ FIG A-11.DWG



NOTE:
WELLS CF-19-14 AND CF-19-15 WERE INSTALLED IN MARCH 2019 DURING THE CHARACTERIZATION OF THE LRCP.

DRAWN BY	GRM
DATE	1-29-2025
CHECKED BY	
JOB NO.	2024145-0-CLI
DWG FILE	2024145-0-CLI_IKEC_CLIFTY_ FIG A-12.DWG
DRAWING SCALE	AS SHOWN

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INDIANA-KENTUCKY ELECTRIC CORPORATION

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MADISON, INDIANA
CCR PROGRAM
LANDFILL RUNOFF COLLECTION POND
GROUNDWATER FLOW - UPPERMOST AQUIFER
SEPTEMBER 2023

DRAWING NAME: FIGURE A-12
REV. 0

PLOTTED: 1/29/2025 X:\SHARED\CLIENT_SHARE\GARYMALARKEY\2024 CLIFTY CREEK\CAD 1-29-2025\DWG FILES\2024145-0-CLI_IKEC_CLIFTY_ FIG A-12.DWG

APPENDIX B

ANALYTICAL RESULTS FOR 2018-2023 GROUNDWATER MONITORING

TABLE B-1
CF-15-04
SUMMARY OF 2018 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-18	Oct-18
Appendix III Constituents			
Boron, B	mg/L	0.043	0.09 J
Calcium, Ca	mg/L	106	74.2
Chloride, Cl	mg/L	282	50.2
Fluoride, F	mg/L	0.09	0.12
pH	s.u.	10.06	7.76
Sulfate, SO4	mg/L	35.2	34.4
Total Dissolved Solids (TDS)	mg/L	788	377
Appendix IV Constituents			
Antimony, Sb	ug/L	NA	0.1 J
Arsenic, As	ug/L	NA	0.38
Barium, Ba	ug/L	NA	57.5
Beryllium, Be	ug/L	NA	0.1 U
Cadmium, Cd	ug/L	NA	0.05 U
Chromium, Cr	ug/L	NA	0.2 J
Cobalt, Co	ug/L	NA	0.114
Fluoride, F	mg/L	NA	0.12
Lithium, Li	mg/L	NA	0.009 J
Lead, Pb	ug/L	NA	0.141
Mercury, Hg	ug/L	NA	0.003 J
Molybdenum, Mo	ug/L	NA	2.54
Radium 226 & 228 (combined)	pCi/L	NA	0.62
Selenium, Se	ug/L	NA	0.2 J
Thallium, Tl	ug/L	NA	0.5 U

Notes:
NA = Sample not analyzed for the parameter

TABLE B-1 (continued)
CF-15-05
SUMMARY OF 2018 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-18	Oct-18
Appendix III Constituents			
Boron, B	mg/L	0.209	0.174
Calcium, Ca	mg/L	103	113
Chloride, Cl	mg/L	31.5	30.2
Fluoride, F	mg/L	0.47	0.48
pH	s.u.	9.56	7.18
Sulfate, SO4	mg/L	44.3	40.9
Total Dissolved Solids (TDS)	mg/L	528	502
Appendix IV Constituents			
Antimony, Sb	ug/L	NA	0.02 J
Arsenic, As	ug/L	NA	0.91
Barium, Ba	ug/L	NA	58.8
Beryllium, Be	ug/L	NA	0.1 U
Cadmium, Cd	ug/L	NA	0.04 J
Chromium, Cr	ug/L	NA	0.228
Cobalt, Co	ug/L	NA	0.463
Fluoride, F	mg/L	NA	0.48
Lithium, Li	mg/L	NA	0.01 J
Lead, Pb	ug/L	NA	0.21
Mercury, Hg	ug/L	NA	0.003 J
Molybdenum, Mo	ug/L	NA	2.94
Radium 226 & 228 (combined)	pCi/L	NA	0.484
Selenium, Se	ug/L	NA	0.06 J
Thallium, Tl	ug/L	NA	0.5 U

Notes:
NA = Sample not analyzed for the parameter

TABLE B-1 (continued)
CF-15-06
SUMMARY OF 2018 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-18	Oct-18
Appendix III Constituents			
Boron, B	mg/L	0.16	0.05 J
Calcium, Ca	mg/L	125	184
Chloride, Cl	mg/L	7.76	8.21
Fluoride, F	mg/L	0.2	0.21
pH	s.u.	10.36	7.89
Sulfate, SO4	mg/L	112	102
Total Dissolved Solids (TDS)	mg/L	630	696
Appendix IV Constituents			
Antimony, Sb	ug/L	NA	0.07 J
Arsenic, As	ug/L	NA	1.21
Barium, Ba	ug/L	NA	149
Beryllium, Be	ug/L	NA	0.934
Cadmium, Cd	ug/L	NA	0.3
Chromium, Cr	ug/L	NA	6.81
Cobalt, Co	ug/L	NA	8.27
Fluoride, F	mg/L	NA	0.21
Lithium, Li	mg/L	NA	0.02 J
Lead, Pb	ug/L	NA	15.7
Mercury, Hg	ug/L	NA	0.006
Molybdenum, Mo	ug/L	NA	3.02
Radium 226 & 228 (combined)	pCi/L	NA	NA
Selenium, Se	ug/L	NA	1.9
Thallium, Tl	ug/L	NA	0.5 U

Notes:
NA = Sample not analyzed for the parameter

TABLE B-1 (continued)
CF-15-07
SUMMARY OF 2018 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-18	Oct-18
Appendix III Constituents			
Boron, B	mg/L	0.204	0.112
Calcium, Ca	mg/L	123	168
Chloride, Cl	mg/L	10.6	5.34
Fluoride, F	mg/L	0.2	0.24
pH	s.u.	10.12	7.29
Sulfate, SO4	mg/L	32.7	2.7
Total Dissolved Solids (TDS)	mg/L	548	1240
Appendix IV Constituents			
Antimony, Sb	ug/L	NA	0.06 J
Arsenic, As	ug/L	NA	6.81
Barium, Ba	ug/L	NA	92.4
Beryllium, Be	ug/L	NA	0.1 U
Cadmium, Cd	ug/L	NA	0.07
Chromium, Cr	ug/L	NA	0.36
Cobalt, Co	ug/L	NA	2.41
Fluoride, F	mg/L	NA	0.24
Lithium, Li	mg/L	NA	0.03 U
Lead, Pb	ug/L	NA	0.336
Mercury, Hg	ug/L	NA	0.004 J
Molybdenum, Mo	ug/L	NA	12.8
Radium 226 & 228 (combined)	pCi/L	NA	0.387
Selenium, Se	ug/L	NA	0.2 J
Thallium, Tl	ug/L	NA	0.5 U

Notes:
NA = Sample not analyzed for the parameter

TABLE B-1 (continued)
CF-15-08
SUMMARY OF 2018 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-18	May-18	Oct-18
Appendix III Constituents				
Boron, B	mg/L	8.5	8.6	11.9
Calcium, Ca	mg/L	123	NA	145
Chloride, Cl	mg/L	14.7	NA	17.4
Fluoride, F	mg/L	0.41	NA	0.41
pH	s.u.	10.21	7.45	7.53
Sulfate, SO4	mg/L	203	NA	257
Total Dissolved Solids (TDS)	mg/L	588	NA	636
Appendix IV Constituents				
Antimony, Sb	ug/L	NA	NA	0.07 J
Arsenic, As	ug/L	NA	NA	0.94
Barium, Ba	ug/L	NA	NA	51.4
Beryllium, Be	ug/L	NA	NA	0.1 U
Cadmium, Cd	ug/L	NA	NA	0.02 J
Chromium, Cr	ug/L	NA	NA	0.385
Cobalt, Co	ug/L	NA	NA	0.547
Fluoride, F	mg/L	NA	NA	0.41
Lithium, Li	mg/L	NA	NA	0.02 J
Lead, Pb	ug/L	NA	NA	0.457
Mercury, Hg	ug/L	NA	NA	0.004 J
Molybdenum, Mo	ug/L	NA	NA	524
Radium 226 & 228 (combined)	pCi/L	NA	NA	0.437
Selenium, Se	ug/L	NA	NA	0.07 J
Thallium, Tl	ug/L	NA	NA	0.5 U

Notes:
NA = Sample not analyzed for the parameter

TABLE B-1 (continued)
CF-15-09
SUMMARY OF 2018 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-18	May-18	Oct-18
Appendix III Constituents				
Boron, B	mg/L	5.86	6.1	7.59
Calcium, Ca	mg/L	184	NA	250
Chloride, Cl	mg/L	3.52	NA	3.47
Fluoride, F	mg/L	0.3	NA	0.32
pH	s.u.	10.85	7.09	7.05
Sulfate, SO4	mg/L	287	NA	274
Total Dissolved Solids (TDS)	mg/L	710	NA	790
Appendix IV Constituents				
Antimony, Sb	ug/L	NA	NA	0.16
Arsenic, As	ug/L	NA	NA	4.67
Barium, Ba	ug/L	NA	NA	38.2
Beryllium, Be	ug/L	NA	NA	0.261
Cadmium, Cd	ug/L	NA	NA	0.05 J
Chromium, Cr	ug/L	NA	NA	14.9
Cobalt, Co	ug/L	NA	NA	7.45
Fluoride, F	mg/L	NA	NA	0.32
Lithium, Li	mg/L	NA	NA	0.02 J
Lead, Pb	ug/L	NA	NA	6.25
Mercury, Hg	ug/L	NA	NA	0.007
Molybdenum, Mo	ug/L	NA	NA	85.9
Radium 226 & 228 (combined)	pCi/L	NA	NA	NA
Selenium, Se	ug/L	NA	NA	1.3
Thallium, Tl	ug/L	NA	NA	0.5 U

Notes:
NA = Sample not analyzed for the parameter

TABLE B-1 (continued)
WBSP-15-01
SUMMARY OF 2018 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-18	Oct-18
Appendix III Constituents			
Boron, B	mg/L	0.1	0.134
Calcium, Ca	mg/L	157	164
Chloride, Cl	mg/L	9.45	25.3
Fluoride, F	mg/L	0.27	0.31
pH	s.u.	6.65	6.37
Sulfate, SO4	mg/L	139	146
Total Dissolved Solids (TDS)	mg/L	685	711
Appendix IV Constituents			
Antimony, Sb	ug/L	NA	0.09 J
Arsenic, As	ug/L	NA	1.52
Barium, Ba	ug/L	NA	25.3
Beryllium, Be	ug/L	NA	0.144
Cadmium, Cd	ug/L	NA	0.03 J
Chromium, Cr	ug/L	NA	4.76
Cobalt, Co	ug/L	NA	2.91
Fluoride, F	mg/L	NA	0.31
Lithium, Li	mg/L	NA	0.034
Lead, Pb	ug/L	NA	2.63
Mercury, Hg	ug/L	NA	NA
Molybdenum, Mo	ug/L	NA	0.7 J
Radium 226 & 228 (combined)	pCi/L	NA	NA
Selenium, Se	ug/L	NA	0.6
Thallium, Tl	ug/L	NA	0.5 U

Notes:
NA = Sample not analyzed for the parameter

TABLE B-1 (continued)
WBSP-15-02
SUMMARY OF 2018 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-18	Oct-18
Appendix III Constituents			
Boron, B	mg/L	3.98	4.36
Calcium, Ca	mg/L	231	277
Chloride, Cl	mg/L	12.1	11.3
Fluoride, F	mg/L	0.37	0.36
pH	s.u.	7.34	6.64
Sulfate, SO4	mg/L	607	515
Total Dissolved Solids (TDS)	mg/L	1200	1190
Appendix IV Constituents			
Antimony, Sb	ug/L	NA	0.14
Arsenic, As	ug/L	NA	0.44
Barium, Ba	ug/L	NA	22.6
Beryllium, Be	ug/L	NA	0.1 U
Cadmium, Cd	ug/L	NA	0.03 J
Chromium, Cr	ug/L	NA	0.788
Cobalt, Co	ug/L	NA	0.081
Fluoride, F	mg/L	NA	0.36
Lithium, Li	mg/L	NA	0.088
Lead, Pb	ug/L	NA	0.09 J
Mercury, Hg	ug/L	NA	0.002 J
Molybdenum, Mo	ug/L	NA	2.45
Radium 226 & 228 (combined)	pCi/L	NA	0.3588
Selenium, Se	ug/L	NA	0.06 J
Thallium, Tl	ug/L	NA	0.5 U

Notes:
NA = Sample not analyzed for the parameter

TABLE B-2
CF-15-04
SUMMARY OF 2019 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-19	Oct-19
Appendix III Constituents			
Boron, B	mg/L	0.045 J	0.058 J
Calcium, Ca	mg/L	85	74
Chloride, Cl	mg/L	11	37
Fluoride, F	mg/L	0.085	0.11
pH	s.u.	6.65	7.23
Sulfate, SO4	mg/L	28	37
Total Dissolved Solids (TDS)	mg/L	340	360
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	2 U
Arsenic, As	ug/L	5 U	5 U
Barium, Ba	ug/L	50	46
Beryllium, Be	ug/L	1 U	1 U
Cadmium, Cd	ug/L	1 U	1 U
Chromium, Cr	ug/L	2 U	2 U
Cobalt, Co	ug/L	1 U	1 U
Fluoride, F	mg/L	0.085	0.11
Lithium, Li	mg/L	1 U	1 U
Lead, Pb	ug/L	0.008 U	0.008 U
Mercury, Hg	ug/L	0.2 U	0.2 U
Molybdenum, Mo	ug/L	5 U	1.1 J
Radium 226 & 228 (combined)	pCi/L	5 U	0.519
Selenium, Se	ug/L	5 U	5 U
Thallium, Tl	ug/L	1 U	1 U

TABLE B-2 (continued)
CF-15-05
SUMMARY OF 2019 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-19	Oct-19
Appendix III Constituents			
Boron, B	mg/L	0.14	0.13
Calcium, Ca	mg/L	120	110
Chloride, Cl	mg/L	31	33
Fluoride, F	mg/L	0.5	0.5
pH	s.u.	6.77	7.12
Sulfate, SO4	mg/L	49	51
Total Dissolved Solids (TDS)	mg/L	520	520
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	2 U
Arsenic, As	ug/L	0.77 J	0.92 J
Barium, Ba	ug/L	59	48
Beryllium, Be	ug/L	0.47 J	1 U
Cadmium, Cd	ug/L	1 U	1 U
Chromium, Cr	ug/L	2 U	2 U
Cobalt, Co	ug/L	0.49 J	0.46 J
Fluoride, F	mg/L	0.5	0.5
Lithium, Li	mg/L	1 U	1 U
Lead, Pb	ug/L	0.014	0.016
Mercury, Hg	ug/L	0.2 U	0.2 U
Molybdenum, Mo	ug/L	5 U	5 U
Radium 226 & 228 (combined)	pCi/L	5 U	0.46
Selenium, Se	ug/L	5 U	5 U
Thallium, Tl	ug/L	1 U	1 U

TABLE B-2 (continued)
CF-15-06
SUMMARY OF 2019 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-19
Appendix III Constituents		
Boron, B	mg/L	0.24
Calcium, Ca	mg/L	120
Chloride, Cl	mg/L	4.2
Fluoride, F	mg/L	0.2
pH	s.u.	6.99
Sulfate, SO4	mg/L	95
Total Dissolved Solids (TDS)	mg/L	560
Appendix IV Constituents		
Antimony, Sb	ug/L	2 U
Arsenic, As	ug/L	5 U
Barium, Ba	ug/L	30
Beryllium, Be	ug/L	1 U
Cadmium, Cd	ug/L	1 U
Chromium, Cr	ug/L	1.1 J
Cobalt, Co	ug/L	0.22 J
Fluoride, F	mg/L	0.2
Lithium, Li	mg/L	1 U
Lead, Pb	ug/L	0.015 B
Mercury, Hg	ug/L	0.2 U
Molybdenum, Mo	ug/L	5 U
Radium 226 & 228 (combined)	pCi/L	5 U
Selenium, Se	ug/L	5 U
Thallium, Tl	ug/L	1 U

TABLE B-2 (continued)
CF-15-07
SUMMARY OF 2019 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-19	Oct-19
Appendix III Constituents			
Boron, B	mg/L	0.045 J	0.08 J
Calcium, Ca	mg/L	150	160
Chloride, Cl	mg/L	5.6	5
Fluoride, F	mg/L	0.21	0.26
pH	s.u.	7.04	7.02
Sulfate, SO4	mg/L	11	5.9
Total Dissolved Solids (TDS)	mg/L	620	600
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	2 U
Arsenic, As	ug/L	4.6 J	7.5
Barium, Ba	ug/L	81	80
Beryllium, Be	ug/L	1 U	1 U
Cadmium, Cd	ug/L	1 U	1 U
Chromium, Cr	ug/L	2 U	2 U
Cobalt, Co	ug/L	2.4	2.6
Fluoride, F	mg/L	0.21	0.26
Lithium, Li	mg/L	1 U	1 U
Lead, Pb	ug/L	0.0017 J	0.0031 J
Mercury, Hg	ug/L	0.2 U	0.2 U
Molybdenum, Mo	ug/L	4.9 J	9.5 B
Radium 226 & 228 (combined)	pCi/L	2.34	0.329 U
Selenium, Se	ug/L	5 U	5 U
Thallium, Tl	ug/L	1 U	1 U

TABLE B-2 (continued)
CF-15-08
SUMMARY OF 2019 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-19	Jun-19	Oct-19	Nov-19
Appendix III Constituents					
Boron, B	mg/L	9.8	8.5	11	9
Calcium, Ca	mg/L	140	NA	140	NA
Chloride, Cl	mg/L	14	NA	16	NA
Fluoride, F	mg/L	0.37	NA	0.4	NA
pH	s.u.	7.05	NA	7.29	NA
Sulfate, SO4	mg/L	240	NA	230	NA
Total Dissolved Solids (TDS)	mg/L	680	NA	650	NA
Appendix IV Constituents					
Antimony, Sb	ug/L	2 U	NA	2 U	NA
Arsenic, As	ug/L	5 U	NA	1.3 J	NA
Barium, Ba	ug/L	60	NA	59	NA
Beryllium, Be	ug/L	1 U	NA	0.76 J B	NA
Cadmium, Cd	ug/L	1 U	NA	0.24 J	NA
Chromium, Cr	ug/L	2 U	NA	2 U	NA
Cobalt, Co	ug/L	0.19 J	NA	0.48 J	NA
Fluoride, F	mg/L	0.37	NA	0.4	NA
Lithium, Li	mg/L	1 U	NA	0.5 J	NA
Lead, Pb	ug/L	0.017	NA	0.019	NA
Mercury, Hg	ug/L	0.2 U	NA	0.2 U	NA
Molybdenum, Mo	ug/L	380	360	390 B	360
Radium 226 & 228 (combined)	pCi/L	0.413	NA	0.329 U	NA
Selenium, Se	ug/L	5 U	NA	1 J	NA
Thallium, Tl	ug/L	1 U	NA	0.76 J B	NA

Notes:
NA: Sampling not required for this parameter.

TABLE B-2 (continued)
CF-15-09
SUMMARY OF 2019 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-19	Jun-19
Appendix III Constituents			
Boron, B	mg/L	6.7	6.5
Calcium, Ca	mg/L	160	NA
Chloride, Cl	mg/L	3	NA
Fluoride, F	mg/L	0.31	NA
pH	s.u.	7.19	NA
Sulfate, SO4	mg/L	260	NA
Total Dissolved Solids (TDS)	mg/L	620	NA
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	NA
Arsenic, As	ug/L	5 U	NA
Barium, Ba	ug/L	14	NA
Beryllium, Be	ug/L	1.5	NA
Cadmium, Cd	ug/L	0.23 J	NA
Chromium, Cr	ug/L	2 U	NA
Cobalt, Co	ug/L	0.38 J	NA
Fluoride, F	mg/L	0.31	NA
Lithium, Li	mg/L	1 U	NA
Lead, Pb	ug/L	0.0087	NA
Mercury, Hg	ug/L	0.2 U	NA
Molybdenum, Mo	ug/L	100	87
Radium 226 & 228 (combined)	pCi/L	5 U	NA
Selenium, Se	ug/L	1.2 J	NA
Thallium, Tl	ug/L	0.2 J	NA

Notes:
NA: Sampling not required for this parameter.

TABLE B-2 (continued)
WBSP-15-01
SUMMARY OF 2019 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-19
Appendix III Constituents		
Boron, B	mg/L	0.082 J
Calcium, Ca	mg/L	160
Chloride, Cl	mg/L	7.1
Fluoride, F	mg/L	0.24
pH	s.u.	6.76
Sulfate, SO4	mg/L	130
Total Dissolved Solids (TDS)	mg/L	670
Appendix IV Constituents		
Antimony, Sb	ug/L	2 U
Arsenic, As	ug/L	5 U
Barium, Ba	ug/L	13
Beryllium, Be	ug/L	1.1
Cadmium, Cd	ug/L	1 U
Chromium, Cr	ug/L	1.7 J
Cobalt, Co	ug/L	0.78 J
Fluoride, F	mg/L	0.24
Lithium, Li	mg/L	0.76 J
Lead, Pb	ug/L	0.021
Mercury, Hg	ug/L	0.2 U
Molybdenum, Mo	ug/L	5 U
Radium 226 & 228 (combined)	pCi/L	5 U
Selenium, Se	ug/L	5 U
Thallium, Tl	ug/L	1 U

TABLE B-2 (continued)
WBSP-15-02
SUMMARY OF 2019 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-19
Appendix III Constituents		
Boron, B	mg/L	3.3
Calcium, Ca	mg/L	250
Chloride, Cl	mg/L	6.5
Fluoride, F	mg/L	0.35
pH	s.u.	6.85
Sulfate, SO4	mg/L	500
Total Dissolved Solids (TDS)	mg/L	1100
Appendix IV Constituents		
Antimony, Sb	ug/L	2 U
Arsenic, As	ug/L	5 U
Barium, Ba	ug/L	19
Beryllium, Be	ug/L	1 U
Cadmium, Cd	ug/L	1 U
Chromium, Cr	ug/L	2 U
Cobalt, Co	ug/L	1 U
Fluoride, F	mg/L	0.35
Lithium, Li	mg/L	1 U
Lead, Pb	ug/L	0.071 B
Mercury, Hg	ug/L	0.2 U
Molybdenum, Mo	ug/L	2.3 J
Radium 226 & 228 (combined)	pCi/L	5 U
Selenium, Se	ug/L	5 U
Thallium, Tl	ug/L	1 U

TABLE B-2 (continued)
CF-19-14
SUMMARY OF 2019 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Oct-19
Appendix IV Constituents		
Molybdenum, Mo	ug/L	15

TABLE B-2 (continued)
CF-19-15
SUMMARY OF 2019 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Oct-19
Appendix IV Constituents		
Molybdenum, Mo	ug/L	1.1 J

TABLE B-3
CF-15-04
SUMMARY OF 2020 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-20	Sep-20
Appendix III Constituents			
Boron, B	mg/L	0.1	0.062 J
Calcium, Ca	mg/L	82	73
Chloride, Cl	mg/L	6.9	30
Fluoride, F	mg/L	0.11	0.12
pH	s.u.	6.52	7.08
Sulfate, SO4	mg/L	26	34
Total Dissolved Solids (TDS)	mg/L	290	320
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	2 U
Arsenic, As	ug/L	5 U	5 U
Barium, Ba	ug/L	46	51
Beryllium, Be	ug/L	1 U	1 U
Cadmium, Cd	ug/L	1 U	1 U
Chromium, Cr	ug/L	2 U	2 U
Cobalt, Co	ug/L	1 U	1 U
Fluoride, F	mg/L	0.11	0.12
Lithium, Li	mg/L	0.0017 J	0.0031 J
Lead, Pb	ug/L	1 U	1 U
Mercury, Hg	ug/L	0.2 U	0.2 U
Molybdenum, Mo	ug/L	1.7 J	1.6 J
Radium 226 & 228 (combined)	pCi/L	5 U	0.297 U
Selenium, Se	ug/L	5 U	5 U
Thallium, Tl	ug/L	1 U	1 U

TABLE B-3 (continued)
CF-15-05
SUMMARY OF 2020 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-20	Sep-20
Appendix III Constituents			
Boron, B	mg/L	0.19	0.097 J
Calcium, Ca	mg/L	100	100
Chloride, Cl	mg/L	35	25
Fluoride, F	mg/L	0.5	0.51
pH	s.u.	7.59	6.93
Sulfate, SO4	mg/L	53	36
Total Dissolved Solids (TDS)	mg/L	520	460
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	2 U
Arsenic, As	ug/L	5 U	1.7 J
Barium, Ba	ug/L	51	79
Beryllium, Be	ug/L	1 U	1 U
Cadmium, Cd	ug/L	1 U	1 U
Chromium, Cr	ug/L	2 U	2.2
Cobalt, Co	ug/L	0.92 J	1.2
Fluoride, F	mg/L	0.5	0.51
Lithium, Li	mg/L	0.017	0.013
Lead, Pb	ug/L	1 U	1.2
Mercury, Hg	ug/L	0.2 U	0.2 U
Molybdenum, Mo	ug/L	3.7 J	1.6 J
Radium 226 & 228 (combined)	pCi/L	0.439	0.961
Selenium, Se	ug/L	5 U	5 U
Thallium, Tl	ug/L	1 U	1 U

TABLE B-3 (continued)
CF-15-06
SUMMARY OF 2020 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-20	Sep-20
Appendix III Constituents			
Boron, B	mg/L	0.21	NA
Calcium, Ca	mg/L	120	NA
Chloride, Cl	mg/L	5.1	NA
Fluoride, F	mg/L	0.22	NA
pH	s.u.	7.56	NA
Sulfate, SO4	mg/L	88	NA
Total Dissolved Solids (TDS)	mg/L	530	NA
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	NA
Arsenic, As	ug/L	5 U	NA
Barium, Ba	ug/L	30	NA
Beryllium, Be	ug/L	1 U	NA
Cadmium, Cd	ug/L	1 U	NA
Chromium, Cr	ug/L	0.98 J	NA
Cobalt, Co	ug/L	0.59 J	NA
Fluoride, F	mg/L	0.22	NA
Lithium, Li	mg/L	0.014	NA
Lead, Pb	ug/L	0.48 J	NA
Mercury, Hg	ug/L	0.2 U	NA
Molybdenum, Mo	ug/L	23	NA
Radium 226 & 228 (combined)	pCi/L	0.449	NA
Selenium, Se	ug/L	5 U	NA
Thallium, Tl	ug/L	1 U	NA

Notes:
NA: Well dry.

TABLE B-3 (continued)
CF-15-07
SUMMARY OF 2020 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-20	Jun-20	Sep-20
Appendix III Constituents				
Boron, B	mg/L	0.42	NA	0.047 J
Calcium, Ca	mg/L	150	NA	160
Chloride, Cl	mg/L	11	NA	16
Fluoride, F	mg/L	0.22	NA	0.42
pH	s.u.	7.49	NA	6.81
Sulfate, SO4	mg/L	63	NA	240
Total Dissolved Solids (TDS)	mg/L	620	NA	560
Appendix IV Constituents				
Antimony, Sb	ug/L	2 U	NA	2 U
Arsenic, As	ug/L	3.7 J	NA	7.6
Barium, Ba	ug/L	74	NA	81
Beryllium, Be	ug/L	1 U	NA	1 U
Cadmium, Cd	ug/L	1 U	NA	1 U
Chromium, Cr	ug/L	2 U	NA	0.98 J
Cobalt, Co	ug/L	2.1	NA	2.8
Fluoride, F	mg/L	0.22	NA	0.42
Lithium, Li	mg/L	0.005 J	NA	0.008 U
Lead, Pb	ug/L	1 U	NA	5.1
Mercury, Hg	ug/L	0.2 U	NA	0.2 U
Molybdenum, Mo	ug/L	110	10	5.3
Radium 226 & 228 (combined)	pCi/L	0.884	NA	0.808
Selenium, Se	ug/L	1.1 J	NA	5 U
Thallium, Tl	ug/L	1 U	NA	1 U

Notes:
NA: Sampling not required for this parameter.

TABLE B-3 (continued)
CF-15-08
SUMMARY OF 2020 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-20	Jun-20	Sep-20	Dec-20
Appendix III Constituents					
Boron, B	mg/L	8.2	9.6	10	11
Calcium, Ca	mg/L	130	NA	120	NA
Chloride, Cl	mg/L	15	NA	16	NA
Fluoride, F	mg/L	0.43	NA	0.42	NA
pH	s.u.	7.79	NA	6.71	NA
Sulfate, SO4	mg/L	240	NA	240	NA
Total Dissolved Solids (TDS)	mg/L	640	NA	640	NA
Appendix IV Constituents					
Antimony, Sb	ug/L	2 U	NA	2 U	NA
Arsenic, As	ug/L	0.76 J	NA	5 U	NA
Barium, Ba	ug/L	56	NA	48	NA
Beryllium, Be	ug/L	0.4 J	NA	1 U	NA
Cadmium, Cd	ug/L	0.27 J	NA	1 U	NA
Chromium, Cr	ug/L	2 U	NA	2 U	NA
Cobalt, Co	ug/L	0.57 J	NA	0.27 J	NA
Fluoride, F	mg/L	0.43	NA	0.42	NA
Lithium, Li	mg/L	0.017	NA	0.018	NA
Lead, Pb	ug/L	1 U	NA	1 U	NA
Mercury, Hg	ug/L	0.2 U	NA	0.2 U	NA
Molybdenum, Mo	ug/L	240	400	400	330
Radium 226 & 228 (combined)	pCi/L	5 U	NA	0.242 U	NA
Selenium, Se	ug/L	5 U	NA	5 U	NA
Thallium, Tl	ug/L	0.54 J	NA	0.25 J	NA

Notes:
NA: Sampling not required for this parameter.

TABLE B-3 (continued)
CF-15-09
SUMMARY OF 2020 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-20	Jun-20	Sep-20	Dec-20
Appendix III Constituents					
Boron, B	mg/L	5.7	5.9	6.9	6.4
Calcium, Ca	mg/L	170	NA	240	NA
Chloride, Cl	mg/L	2.7	NA	2.8	NA
Fluoride, F	mg/L	0.3	NA	0.32	NA
pH	s.u.	7.59	NA	7.57	NA
Sulfate, SO4	mg/L	280	NA	260	NA
Total Dissolved Solids (TDS)	mg/L	640	NA	690	NA
Appendix IV Constituents					
Antimony, Sb	ug/L	2 U	NA	2 U	NA
Arsenic, As	ug/L	5 U	NA	9.5	NA
Barium, Ba	ug/L	18	NA	60	NA
Beryllium, Be	ug/L	1 U	NA	0.64 J	NA
Cadmium, Cd	ug/L	1 U	NA	1 U	NA
Chromium, Cr	ug/L	1.1 J	NA	43	NA
Cobalt, Co	ug/L	1 U	NA	12	1 U
Fluoride, F	mg/L	0.3	NA	0.32	NA
Lithium, Li	mg/L	0.0081	NA	0.029	NA
Lead, Pb	ug/L	1 U	NA	13	NA
Mercury, Hg	ug/L	0.2 U	NA	0.2 U	NA
Molybdenum, Mo	ug/L	85	NA	100	NA
Radium 226 & 228 (combined)	pCi/L	5 U	NA	2.01	NA
Selenium, Se	ug/L	5 U	NA	5 U	NA
Thallium, Tl	ug/L	1 U	NA	1 U	NA

Notes:
NA: Sampling not required for this parameter.

TABLE B-3 (continued)
WBSP-15-01
SUMMARY OF 2020 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-20	Sep-20
Appendix III Constituents			
Boron, B	mg/L	0.066 J	0.13
Calcium, Ca	mg/L	160	170
Chloride, Cl	mg/L	6.7	19
Fluoride, F	mg/L	0.26	0.25
pH	s.u.	6.81	6.85
Sulfate, SO4	mg/L	120	140
Total Dissolved Solids (TDS)	mg/L	630	650
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	2 U
Arsenic, As	ug/L	5 U	2 J
Barium, Ba	ug/L	17	32
Beryllium, Be	ug/L	1 U	0.39 J
Cadmium, Cd	ug/L	1 U	1 U
Chromium, Cr	ug/L	3.4	9.2
Cobalt, Co	ug/L	0.76 J	4
Fluoride, F	mg/L	0.26	0.25
Lithium, Li	mg/L	0.013	0.032
Lead, Pb	ug/L	0.74 J	3.8
Mercury, Hg	ug/L	0.2 U	0.2 U
Molybdenum, Mo	ug/L	1.6 J	5 U
Radium 226 & 228 (combined)	pCi/L	5 U	NS
Selenium, Se	ug/L	5 U	5 U
Thallium, Tl	ug/L	1 U	0.37 J

TABLE B-3 (continued)
WBSP-15-02
SUMMARY OF 2020 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-20	Sep-20
Appendix III Constituents			
Boron, B	mg/L	4	3
Calcium, Ca	mg/L	270	220
Chloride, Cl	mg/L	10	8
Fluoride, F	mg/L	0.37	0.31
pH	s.u.	7.35	7.41
Sulfate, SO4	mg/L	520	490
Total Dissolved Solids (TDS)	mg/L	1200	1000
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	2 U
Arsenic, As	ug/L	5 U	5 U
Barium, Ba	ug/L	23	19
Beryllium, Be	ug/L	1 U	1 U
Cadmium, Cd	ug/L	1 U	1 U
Chromium, Cr	ug/L	2 U	2 U
Cobalt, Co	ug/L	1 U	1 U
Fluoride, F	mg/L	0.37	0.31
Lithium, Li	mg/L	0.078	0.075
Lead, Pb	ug/L	1 U	1 U
Mercury, Hg	ug/L	0.2 U	0.2 U
Molybdenum, Mo	ug/L	4.1 J	2.7 J
Radium 226 & 228 (combined)	pCi/L	5 U	5 U
Selenium, Se	ug/L	5 U	5 U
Thallium, Tl	ug/L	1 U	0.25 J

TABLE B-3 (continued)
CF-19-14
SUMMARY OF 2020 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-20	Sep-20
Appendix IV Constituents			
Molybdenum, Mo	ug/L	9.5	9

TABLE B-3 (continued)
CF-19-15
SUMMARY OF 2020 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-20	Sep-20
Appendix IV Constituents			
Molybdenum, Mo	ug/L	6.1	1.4 J

TABLE B-4
CF-15-04
SUMMARY OF 2021 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-21	Sep-21
Appendix III Constituents			
Boron, B	mg/L	0.028 J	0.71
Calcium, Ca	mg/L	87	76
Chloride, Cl	mg/L	100	66
Fluoride, F	mg/L	0.11	0.14
pH	s.u.	7.85	7.57
Sulfate, SO4	mg/L	38	46
Total Dissolved Solids (TDS)	mg/L	420	420
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	2 U
Arsenic, As	ug/L	5 U	5 U
Barium, Ba	ug/L	56	59
Beryllium, Be	ug/L	0.68 J	1 U
Cadmium, Cd	ug/L	1 U	1 U
Chromium, Cr	ug/L	2 U	5 U
Cobalt, Co	ug/L	0.3 J	1 U
Fluoride, F	mg/L	0.11	0.14
Lithium, Li	mg/L	0.008 U	8 U
Lead, Pb	ug/L	1 U	1 U
Mercury, Hg	ug/L	0.2 U	0.2 U
Molybdenum, Mo	ug/L	5 U	1.3 J
Radium 226 & 228 (combined)	pCi/L	5 U	5 U
Selenium, Se	ug/L	1.1 J	5 U
Thallium, Tl	ug/L	0.61 J	1 U

TABLE B-4 (continued)
CF-15-05
SUMMARY OF 2021 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-21	Sep-21
Appendix III Constituents			
Boron, B	mg/L	0.061 J	0.12
Calcium, Ca	mg/L	56	100
Chloride, Cl	mg/L	24	32
Fluoride, F	mg/L	0.18	0.54
pH	s.u.	7.59	6.58
Sulfate, SO4	mg/L	39	49
Total Dissolved Solids (TDS)	mg/L	300	510
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	2 U
Arsenic, As	ug/L	1.5 J	5 U
Barium, Ba	ug/L	66	47
Beryllium, Be	ug/L	1 U	1 U
Cadmium, Cd	ug/L	1 U	1 U
Chromium, Cr	ug/L	3.9	5 U
Cobalt, Co	ug/L	2	0.64 J
Fluoride, F	mg/L	0.18 F1	0.54
Lithium, Li	mg/L	0.0063 J	16
Lead, Pb	ug/L	2.5	1 U
Mercury, Hg	ug/L	0.2 U	0.2 U
Molybdenum, Mo	ug/L	5 U	5 U
Radium 226 & 228 (combined)	pCi/L	5 U	0.708
Selenium, Se	ug/L	5 U	5 U
Thallium, Tl	ug/L	1 U	1 U

TABLE B-4 (continued)
CF-15-06
SUMMARY OF 2021 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-21	Sep-21
Appendix III Constituents			
Boron, B	mg/L	0.096 J	WELL DRY
Calcium, Ca	mg/L	120	
Chloride, Cl	mg/L	4.1	
Fluoride, F	mg/L	0.21	
pH	s.u.	7.56	
Sulfate, SO4	mg/L	84	
Total Dissolved Solids (TDS)	mg/L	550	
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	WELL DRY
Arsenic, As	ug/L	5 U	
Barium, Ba	ug/L	32	
Beryllium, Be	ug/L	1 U	
Cadmium, Cd	ug/L	1 U	
Chromium, Cr	ug/L	1.6 J	
Cobalt, Co	ug/L	0.71 J	
Fluoride, F	mg/L	0.21	
Lithium, Li	mg/L	0.011	
Lead, Pb	ug/L	0.66 J	
Mercury, Hg	ug/L	0.2 U	
Molybdenum, Mo	ug/L	5 U	
Radium 226 & 228 (combined)	pCi/L	5 U	
Selenium, Se	ug/L	5 U	
Thallium, Tl	ug/L	1 U	

TABLE B-4 (continued)
CF-15-07
SUMMARY OF 2021 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-21	Sep-21
Appendix III Constituents			
Boron, B	mg/L	0.36	0.061 J
Calcium, Ca	mg/L	110	160
Chloride, Cl	mg/L	19	6.2
Fluoride, F	mg/L	0.19	0.29
pH	s.u.	7.46	6.78
Sulfate, SO4	mg/L	49	6.3
Total Dissolved Solids (TDS)	mg/L	480	580
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	2 U
Arsenic, As	ug/L	5 U	7.3
Barium, Ba	ug/L	61	87
Beryllium, Be	ug/L	1 U	1 U
Cadmium, Cd	ug/L	1 U	1 U
Chromium, Cr	ug/L	2 U	5 U
Cobalt, Co	ug/L	0.33 J	2.8
Fluoride, F	mg/L	0.19	0.29
Lithium, Li	mg/L	0.008 U	1.8 J
Lead, Pb	ug/L	1 U	1 U
Mercury, Hg	ug/L	0.2 U	0.2 U
Molybdenum, Mo	ug/L	34	8.2
Radium 226 & 228 (combined)	pCi/L	5 U	1.19
Selenium, Se	ug/L	5 U	5 U
Thallium, Tl	ug/L	1 U	1 U

TABLE B-4 (continued)
CF-15-08
SUMMARY OF 2021 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-21	Jun-21	Sep-21	Dec-21
Appendix III Constituents					
Boron, B	mg/L	11	10	13	12
Calcium, Ca	mg/L	130	NA	120	NA
Chloride, Cl	mg/L	17	NA	13	NA
Fluoride, F	mg/L	0.39	NA	0.42	NA
pH	s.u.	7.62	NA	6.84	NA
Sulfate, SO4	mg/L	280	NA	200	NA
Total Dissolved Solids (TDS)	mg/L	690	NA	570	NA
Appendix IV Constituents					
Antimony, Sb	ug/L	2 U	NA	2 U	NA
Arsenic, As	ug/L	5 U	NA	0.84 J	NA
Barium, Ba	ug/L	48	NA	32	NA
Beryllium, Be	ug/L	0.68 J	NA	1 U	NA
Cadmium, Cd	ug/L	0.32 J	NA	0.5 J	NA
Chromium, Cr	ug/L	2 U	NA	5 U	NA
Cobalt, Co	ug/L	0.33 J	NA	0.9 J	NA
Fluoride, F	mg/L	0.39	NA	0.42	NA
Lithium, Li	mg/L	0.019	NA	21	NA
Lead, Pb	ug/L	1 U	NA	0.7 J	NA
Mercury, Hg	ug/L	0.2 U	NA	0.2 U	NA
Molybdenum, Mo	ug/L	340	480	880	500
Radium 226 & 228 (combined)	pCi/L	5 U	NA	0.73	NA
Selenium, Se	ug/L	5 U	NA	5 U	NA
Thallium, Tl	ug/L	0.65 J	NA	1	NA

Notes:
NA: Sampling not required for this parameter.

TABLE B-4 (continued)
CF-15-09
SUMMARY OF 2021 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-21	Jun-21	Sep-21
Appendix III Constituents				
Boron, B	mg/L	6	6.2	WELL DRY
Calcium, Ca	mg/L	170	NA	
Chloride, Cl	mg/L	2.3	NA	
Fluoride, F	mg/L	0.32	NA	
pH	s.u.	7.41	NA	
Sulfate, SO4	mg/L	210	NA	
Total Dissolved Solids (TDS)	mg/L	630	NA	
Appendix IV Constituents				
Antimony, Sb	ug/L	2 U	NA	WELL DRY
Arsenic, As	ug/L	5 U	NA	
Barium, Ba	ug/L	26	NA	
Beryllium, Be	ug/L	1 U	NA	
Cadmium, Cd	ug/L	1 U	NA	
Chromium, Cr	ug/L	8.9	NA	
Cobalt, Co	ug/L	1.4	NA	
Fluoride, F	mg/L	0.32	NA	
Lithium, Li	mg/L	0.0065 J	NA	
Lead, Pb	ug/L	1.3	NA	
Mercury, Hg	ug/L	0.2 U	NA	
Molybdenum, Mo	ug/L	100	NA	
Radium 226 & 228 (combined)	pCi/L	5 U	NA	
Selenium, Se	ug/L	5 U	NA	
Thallium, Tl	ug/L	1 U	NA	

Notes:
NA: Sampling not required for this parameter.

TABLE B-4 (continued)
WBSP-15-01
SUMMARY OF 2021 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-21	Sep-21
Appendix III Constituents			
Boron, B	mg/L	0.075 J	WELL DRY
Calcium, Ca	mg/L	160	
Chloride, Cl	mg/L	8.7	
Fluoride, F	mg/L	0.27	
pH	s.u.	6.89	
Sulfate, SO4	mg/L	120	
Total Dissolved Solids (TDS)	mg/L	630	
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	WELL DRY
Arsenic, As	ug/L	5 U	
Barium, Ba	ug/L	13	
Beryllium, Be	ug/L	1 U	
Cadmium, Cd	ug/L	1 U	
Chromium, Cr	ug/L	1 J	
Cobalt, Co	ug/L	0.36 J	
Fluoride, F	mg/L	0.27	
Lithium, Li	mg/L	0.013	
Lead, Pb	ug/L	1 U	
Mercury, Hg	ug/L	0.2 U	
Molybdenum, Mo	ug/L	5 U	
Radium 226 & 228 (combined)	pCi/L	5 U	
Selenium, Se	ug/L	5 U	
Thallium, Tl	ug/L	1 U	

TABLE B-4 (continued)
WBSP-15-02
SUMMARY OF 2021 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-21	Sep-21
Appendix III Constituents			
Boron, B	mg/L	4.3	3.5
Calcium, Ca	mg/L	260	220
Chloride, Cl	mg/L	9.1	10
Fluoride, F	mg/L	0.35	0.4
pH	s.u.	6.67	7.37
Sulfate, SO4	mg/L	570	560
Total Dissolved Solids (TDS)	mg/L	1300	1100
Appendix IV Constituents			
Antimony, Sb	ug/L	2 U	2 U
Arsenic, As	ug/L	5 U	1.2 J
Barium, Ba	ug/L	25	33
Beryllium, Be	ug/L	1 U	1 U
Cadmium, Cd	ug/L	1 U	1 U
Chromium, Cr	ug/L	2 U	4.7 J
Cobalt, Co	ug/L	0.26 J	1.6
Fluoride, F	mg/L	0.35	0.4
Lithium, Li	mg/L	0.078	76
Lead, Pb	ug/L	1 U	1.7
Mercury, Hg	ug/L	0.2 U	0.2 U
Molybdenum, Mo	ug/L	5	2.9 J
Radium 226 & 228 (combined)	pCi/L	0.931	0.568
Selenium, Se	ug/L	5 U	5 U
Thallium, Tl	ug/L	1 U	1 U

TABLE B-4 (continued)
CF-19-14
SUMMARY OF 2021 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-21	Sep-21
Appendix IV Constituents			
Molybdenum, Mo	ug/L	28	69

TABLE B-4 (continued)
CF-19-15
SUMMARY OF 2021 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-21	Sep-21
Appendix IV Constituents			
Molybdenum, Mo	ug/L	1.5 J	5 U

TABLE B-5
CF-15-04
SUMMARY OF 2022 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-22	Sep-22
Appendix III Constituents			
Boron, B	mg/L	0.034	0.039
Calcium, Ca	mg/L	88	75
Chloride, Cl	mg/L	15	39
Fluoride, F	mg/L	0.12	0.14
pH	s.u.	7.69	8.3
Sulfate, SO4	mg/L	26	36
Total Dissolved Solids (TDS)	mg/L	370	130
Appendix IV Constituents			
Antimony, Sb	ug/L	1.0 U	1.0 U
Arsenic, As	ug/L	0.56	0.58
Barium, Ba	ug/L	49	49
Beryllium, Be	ug/L	0.70 U	0.70 U
Cadmium, Cd	ug/L	0.50 U	0.50 U
Chromium, Cr	ug/L	1.3	1.2
Cobalt, Co	ug/L	0.17	0.23
Fluoride, F	mg/L	0.12	0.14
Lead, Pb	ug/L	1.0 U	1.0 U
Lithium, Li	mg/L	0.004 U	0.0013
Mercury, Hg	ug/L	0.2 U	0.00020 U
Molybdenum, Mo	ug/L	1.7	1.3
Radium 226 & 228 (combined)	pCi/L	5 U	0.676
Selenium, Se	ug/L	1.0 U	1.0 U
Thallium, Tl	ug/L	0.20 U	0.20 U

TABLE B-5 (continued)
CF-15-05
SUMMARY OF 2022 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-22	Sep-22
Appendix III Constituents			
Boron, B	mg/L	NS	0.097
Calcium, Ca	mg/L	NS	110
Chloride, Cl	mg/L	NS	29
Fluoride, F	mg/L	NS	0.46
pH	s.u.	NS	8.2
Sulfate, SO4	mg/L	NS	41
Total Dissolved Solids (TDS)	mg/L	NS	70
Appendix IV Constituents			
Antimony, Sb	ug/L	NS	1.0 U
Arsenic, As	ug/L	NS	5.6
Barium, Ba	ug/L	NS	82
Beryllium, Be	ug/L	NS	0.11
Cadmium, Cd	ug/L	NS	0.50 U
Chromium, Cr	ug/L	NS	2.9
Cobalt, Co	ug/L	NS	1.9
Fluoride, F	mg/L	NS	0.46
Lead, Pb	ug/L	NS	1.1
Lithium, Li	mg/L	NS	0.015
Mercury, Hg	ug/L	NS	0.00020 U
Molybdenum, Mo	ug/L	NS	1.1
Radium 226 & 228 (combined)	pCi/L	NS	0.66
Selenium, Se	ug/L	NS	1.0 U
Thallium, Tl	ug/L	NS	0.045

Notes:
NS: Well not sampled.

TABLE B-5 (continued)
CF-15-06
SUMMARY OF 2022 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-22	Sep-22
Appendix III Constituents			
Boron, B	mg/L	NS	NS
Calcium, Ca	mg/L	NS	NS
Chloride, Cl	mg/L	NS	NS
Fluoride, F	mg/L	NS	NS
pH	s.u.	NS	NS
Sulfate, SO4	mg/L	NS	NS
Total Dissolved Solids (TDS)	mg/L	NS	NS
Appendix IV Constituents			
Antimony, Sb	ug/L	NS	NS
Arsenic, As	ug/L	NS	NS
Barium, Ba	ug/L	NS	NS
Beryllium, Be	ug/L	NS	NS
Cadmium, Cd	ug/L	NS	NS
Chromium, Cr	ug/L	NS	NS
Cobalt, Co	ug/L	NS	NS
Fluoride, F	mg/L	NS	NS
Lead, Pb	ug/L	NS	NS
Lithium, Li	mg/L	NS	NS
Mercury, Hg	ug/L	NS	NS
Molybdenum, Mo	ug/L	NS	NS
Radium 226 & 228 (combined)	pCi/L	NS	NS
Selenium, Se	ug/L	NS	NS
Thallium, Tl	ug/L	NS	NS

Notes:
NS: Well not sampled.

TABLE B-5 (continued)
CF-15-07
SUMMARY OF 2022 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-22	Sep-22	Dec-22
Appendix III Constituents				
Boron, B	mg/L	0.09	0.036	NA
Calcium, Ca	mg/L	150	170	NA
Chloride, Cl	mg/L	7.3	6.2	NA
Fluoride, F	mg/L	0.27	0.26	NA
pH	s.u.	7.52	7.7	NA
Sulfate, SO4	mg/L	11	5.1	NA
Total Dissolved Solids (TDS)	mg/L	580	120	NA
Appendix IV Constituents				
Antimony, Sb	ug/L	1.0 U	1.0 U	NA
Arsenic, As	ug/L	6.7	12	40
Barium, Ba	ug/L	74	85	NA
Beryllium, Be	ug/L	0.70 U	0.70 U	NA
Cadmium, Cd	ug/L	0.50 U	0.50 U	NA
Chromium, Cr	ug/L	0.97	1.1	NA
Cobalt, Co	ug/L	2.6	2.6	NA
Fluoride, F	mg/L	0.27	0.26	NA
Lead, Pb	ug/L	0.19	1.0 U	NA
Lithium, Li	mg/L	0.0013	0.004 U	NA
Mercury, Hg	ug/L	0.2 U	0.00020 U	NA
Molybdenum, Mo	ug/L	9.3	5.3	NA
Radium 226 & 228 (combined)	pCi/L	5 U	0.824	NA
Selenium, Se	ug/L	1.0 U	1.0 U	NA
Thallium, Tl	ug/L	0.024	0.021	NA

Notes:
NA: Sampling not required for this parameter.

TABLE B-5 (continued)
CF-15-08
SUMMARY OF 2022 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-22	Jun-22	Sep-22	Dec-22
Appendix III Constituents					
Boron, B	mg/L	12	11	10	13
Calcium, Ca	mg/L	140	NA	120	NA
Chloride, Cl	mg/L	15	NA	17	NA
Fluoride, F	mg/L	0.47	NA	0.41	NA
pH	s.u.	7.8	NA	8	NA
Sulfate, SO4	mg/L	230	NA	250	NA
Total Dissolved Solids (TDS)	mg/L	610	NA	250	NA
Appendix IV Constituents					
Antimony, Sb	ug/L	1.0 U	NA	1.0 U	NA
Arsenic, As	ug/L	0.91	NA	1.3	NA
Barium, Ba	ug/L	41	NA	48	NA
Beryllium, Be	ug/L	0.70 U	NA	0.70 U	NA
Cadmium, Cd	ug/L	0.23	NA	0.26	NA
Chromium, Cr	ug/L	1	NA	1.3	NA
Cobalt, Co	ug/L	0.48	NA	0.75	NA
Fluoride, F	mg/L	0.47	NA	0.41	NA
Lead, Pb	ug/L	0.21	NA	0.46	NA
Lithium, Li	mg/L	0.016	NA	0.018	NA
Mercury, Hg	ug/L	0.2 U	NA	0.00020 U	NA
Molybdenum, Mo	ug/L	430	540	540	620
Radium 226 & 228 (combined)	pCi/L	0.433	NA	0.473 U	NA
Selenium, Se	ug/L	1.0 U	NA	1.0 U	NA
Thallium, Tl	ug/L	0.036	NA	0.04	NA

Notes:
NA: Sampling not required for this parameter.

TABLE B-5 (continued)
CF-15-09
SUMMARY OF 2022 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-22	Jun-22	Sep-22	Dec-22
Appendix III Constituents					
Boron, B	mg/L	6.2	5.9	3.8	5.5
Calcium, Ca	mg/L	170	NA	120	NA
Chloride, Cl	mg/L	1.6	NA	2.9	NA
Fluoride, F	mg/L	0.34	NA	0.28	NA
pH	s.u.	7.75	NA	7.1	NA
Sulfate, SO4	mg/L	170	NA	230	NA
Total Dissolved Solids (TDS)	mg/L	510	NA	700	NA
Appendix IV Constituents					
Antimony, Sb	ug/L	1.0 U	NA	1.0 U	NA
Arsenic, As	ug/L	0.57	NA	1.1	NA
Barium, Ba	ug/L	19	NA	65	NA
Beryllium, Be	ug/L	0.70 U	NA	0.072	NA
Cadmium, Cd	ug/L	0.50 U	NA	0.50 U	NA
Chromium, Cr	ug/L	1.2	NA	2.3	NA
Cobalt, Co	ug/L	0.26	NA	1.1	NA
Fluoride, F	mg/L	0.34	NA	0.28	NA
Lead, Pb	ug/L	1.0 U	NA	0.59	NA
Lithium, Li	mg/L	0.0084	NA	0.0038	NA
Mercury, Hg	ug/L	0.2 U	NA	0.00020 U	NA
Molybdenum, Mo	ug/L	150	120	31	NA
Radium 226 & 228 (combined)	pCi/L	5 U	NA	NS	NA
Selenium, Se	ug/L	1.0 U	NA	1.0 U	NA
Thallium, Tl	ug/L	0.20 U	NA	0.021	NA

Notes:
NA: Sampling not required for this parameter.

TABLE B-5 (continued)
WBSP-15-01
SUMMARY OF 2022 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-22	Sep-22
Appendix III Constituents			
Boron, B	mg/L	0.07	NS
Calcium, Ca	mg/L	160	NS
Chloride, Cl	mg/L	7.2	NS
Fluoride, F	mg/L	0.62	NS
pH	s.u.	7.31	NS
Sulfate, SO4	mg/L	100	NS
Total Dissolved Solids (TDS)	mg/L	560	NS
Appendix IV Constituents			
Antimony, Sb	ug/L	1.0 U	NS
Arsenic, As	ug/L	0.49	NS
Barium, Ba	ug/L	14	NS
Beryllium, Be	ug/L	0.70 U	NS
Cadmium, Cd	ug/L	0.50 U	NS
Chromium, Cr	ug/L	1.5	NS
Cobalt, Co	ug/L	0.34	NS
Fluoride, F	mg/L	0.62	NS
Lead, Pb	ug/L	0.34	NS
Lithium, Li	mg/L	0.016	NS
Mercury, Hg	ug/L	0.2 U	NS
Molybdenum, Mo	ug/L	0.18	NS
Radium 226 & 228 (combined)	pCi/L	5 U	NS
Selenium, Se	ug/L	1.0 U	NS
Thallium, Tl	ug/L	0.20 U	NS

Notes:
NS: Well not sampled.

TABLE B-5 (continued)
WBSP-15-02
SUMMARY OF 2022 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-22	Sep-22
Appendix III Constituents			
Boron, B	mg/L	3.9	3.7
Calcium, Ca	mg/L	260	260
Chloride, Cl	mg/L	8.1	9.7
Fluoride, F	mg/L	0.41	0.36
pH	s.u.	7.42	7.2
Sulfate, SO4	mg/L	500	550
Total Dissolved Solids (TDS)	mg/L	1200	1100
Appendix IV Constituents			
Antimony, Sb	ug/L	1.0 U	1.0 U
Arsenic, As	ug/L	0.64	0.52
Barium, Ba	ug/L	24	29
Beryllium, Be	ug/L	0.70 U	0.70 U
Cadmium, Cd	ug/L	0.50 U	0.50 U
Chromium, Cr	ug/L	1.3	1.5
Cobalt, Co	ug/L	0.45	0.52
Fluoride, F	mg/L	0.41	0.36
Lead, Pb	ug/L	0.2	1.0 U
Lithium, Li	mg/L	0.073	0.073
Mercury, Hg	ug/L	0.2 U	0.00020 U
Molybdenum, Mo	ug/L	4.2	2.9
Radium 226 & 228 (combined)	pCi/L	5 U	0.802
Selenium, Se	ug/L	1.0 U	1.0 U
Thallium, Tl	ug/L	0.20 U	0.2 U

TABLE B-5 (continued)
CF-19-14
SUMMARY OF 2022 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-22	Sep-22
Appendix IV Constituents			
Molybdenum, Mo	ug/L	48	32

TABLE B-5 (continued)
CF-19-15
SUMMARY OF 2022 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-22	Sep-22
Appendix IV Constituents			
Molybdenum, Mo	ug/L	0.62	0.63

TABLE B-6
CF-15-04
SUMMARY OF 2023 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-23	Sep-23
Appendix III Constituents			
Boron, B	mg/L	0.038	0.059
Calcium, Ca	mg/L	76	82
Chloride, Cl	mg/L	30	36
Fluoride, F	mg/L	0.1	0.17
pH	s.u.	7.89	7.98
Sulfate, SO4	mg/L	32	35
Total Dissolved Solids (TDS)	mg/L	420	280
Appendix IV Constituents			
Antimony, Sb	ug/L	1 U	1 U
Arsenic, As	ug/L	0.39	0.37
Barium, Ba	ug/L	44	42
Beryllium, Be	ug/L	0.7 U	0.7 U
Cadmium, Cd	ug/L	0.5 U	0.5 U
Chromium, Cr	ug/L	1	0.85
Cobalt, Co	ug/L	0.17	0.14
Fluoride, F	mg/L	0.1	0.17
Lead, Pb	ug/L	1 U	1 U
Lithium, Li	mg/L	0.0014	0.004 U
Mercury, Hg	ug/L	0.0002 U	0.078
Molybdenum, Mo	ug/L	0.91	1.2
Radium 226 & 228 (combined)	pCi/L	5 U	2.13
Selenium, Se	ug/L	1 U	1 U
Thallium, Tl	ug/L	0.2 U	0.2 U

TABLE B-6 (continued)
CF-15-05
SUMMARY OF 2023 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-23	Sep-23
Appendix III Constituents			
Boron, B	mg/L	0.13	0.12
Calcium, Ca	mg/L	110	100
Chloride, Cl	mg/L	34	31
Fluoride, F	mg/L	0.44	0.56
pH	s.u.	7.64	7.56
Sulfate, SO4	mg/L	49	47
Total Dissolved Solids (TDS)	mg/L	500	560
Appendix IV Constituents			
Antimony, Sb	ug/L	1 U	1 U
Arsenic, As	ug/L	0.35	0.88
Barium, Ba	ug/L	49	49
Beryllium, Be	ug/L	0.7 U	0.7 U
Cadmium, Cd	ug/L	0.5 U	0.5 U
Chromium, Cr	ug/L	0.67	0.79
Cobalt, Co	ug/L	0.41	0.44
Fluoride, F	mg/L	0.44	0.56
Lead, Pb	ug/L	1 U	1 U
Lithium, Li	mg/L	0.016	0.016
Mercury, Hg	ug/L	0.0002 U	0.2 U
Molybdenum, Mo	ug/L	1 U	1.4
Radium 226 & 228 (combined)	pCi/L	5 U	5 U
Selenium, Se	ug/L	1 U	1 U
Thallium, Tl	ug/L	0.2 U	0.019

Notes:
NS: Well not sampled.

TABLE B-6 (continued)
CF-15-06
SUMMARY OF 2023 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-23	Sep-23
Appendix III Constituents			
Boron, B	mg/L	0.11	NS
Calcium, Ca	mg/L	150	NS
Chloride, Cl	mg/L	5.3	NS
Fluoride, F	mg/L	0.2	NS
pH	s.u.	7.53	NS
Sulfate, SO4	mg/L	85	NS
Total Dissolved Solids (TDS)	mg/L	550	NS
Appendix IV Constituents			
Antimony, Sb	ug/L	1 U	NS
Arsenic, As	ug/L	4.8	NS
Barium, Ba	ug/L	82	NS
Beryllium, Be	ug/L	0.36	NS
Cadmium, Cd	ug/L	0.11	NS
Chromium, Cr	ug/L	9.4	NS
Cobalt, Co	ug/L	9.5	NS
Fluoride, F	mg/L	0.2	NS
Lead, Pb	ug/L	6.7	NS
Lithium, Li	mg/L	0.016	NS
Mercury, Hg	ug/L	0.000047	NS
Molybdenum, Mo	ug/L	0.64	NS
Radium 226 & 228 (combined)	pCi/L	3.29	NS
Selenium, Se	ug/L	1 U	NS
Thallium, Tl	ug/L	0.08	NS

Notes:
NS: Well not sampled.

TABLE B-6 (continued)
CF-15-07
SUMMARY OF 2023 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-23	Nov-23	Jan-24
Appendix III Constituents				
Boron, B	mg/L	0.043	0.047	NA
Calcium, Ca	mg/L	170	170	NA
Chloride, Cl	mg/L	5.9	5.2	NA
Fluoride, F	mg/L	0.22	0.22	NA
pH	s.u.	7.59	6.83	NA
Sulfate, SO4	mg/L	3.9	3.5	NA
Total Dissolved Solids (TDS)	mg/L	500	610	NA
Appendix IV Constituents				
Antimony, Sb	ug/L	1 U	1 U	NA
Arsenic, As	ug/L	8.6	15	9.9
Barium, Ba	ug/L	78	85	NA
Beryllium, Be	ug/L	0.7 U	0.7 U	NA
Cadmium, Cd	ug/L	0.5 U	0.5 U	NA
Chromium, Cr	ug/L	0.81	1.5 U	NA
Cobalt, Co	ug/L	2.6	2.5	NA
Fluoride, F	mg/L	0.22	0.22	NA
Lead, Pb	ug/L	1 U	1 U	NA
Lithium, Li	mg/L	0.0014	0.004 U	NA
Mercury, Hg	ug/L	0.0002 U	0.2 U	NA
Molybdenum, Mo	ug/L	4.5	5.6	NA
Radium 226 & 228 (combined)	pCi/L	5 U	5 U	NA
Selenium, Se	ug/L	1 U	1 U	NA
Thallium, Tl	ug/L	0.2 U	0.028	NA

Notes:
NA: Sampling not required for this parameter.
Due to access restrictions (construction) in September, well CF-15-07 was sampled in November and resampling occurred in January 2024.

TABLE B-6 (continued)
CF-15-08
SUMMARY OF 2023 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-23	Jun-23	Sep-23	Nov-23
Appendix III Constituents					
Boron, B	mg/L	12	11	11	12
Calcium, Ca	mg/L	140	NA	130	NA
Chloride, Cl	mg/L	15	NA	17	NA
Fluoride, F	mg/L	0.39	NA	0.45	NA
pH	s.u.	7.95	NA	7.72	NA
Sulfate, SO4	mg/L	240	NA	260	NA
Total Dissolved Solids (TDS)	mg/L	240	NA	730	NA
Appendix IV Constituents					
Antimony, Sb	ug/L	1 U	NA	1 U	NA
Arsenic, As	ug/L	0.58	NA	0.51	NA
Barium, Ba	ug/L	39	NA	42	NA
Beryllium, Be	ug/L	0.7 U	NA	0.7 U	NA
Cadmium, Cd	ug/L	0.2	NA	0.22	NA
Chromium, Cr	ug/L	0.71	NA	0.84	NA
Cobalt, Co	ug/L	0.29	NA	0.38	NA
Fluoride, F	mg/L	0.39	NA	0.45	NA
Lead, Pb	ug/L	1 U	NA	1 U	NA
Lithium, Li	mg/L	0.017	NA	0.018	NA
Mercury, Hg	ug/L	0.0002 U	NA	0.2 U	NA
Molybdenum, Mo	ug/L	590	570	650	730
Radium 226 & 228 (combined)	pCi/L	5 U	NA	5 U	NA
Selenium, Se	ug/L	1 U	NA	1 U	NA
Thallium, Tl	ug/L	0.2 U	NA	0.021	NA

Notes:
NA: Sampling not required for this parameter.

TABLE B-6 (continued)
CF-15-09
SUMMARY OF 2023 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-23	Jun-23	Sep-23	Nov-23
Appendix III Constituents					
Boron, B	mg/L	5.1	5.5	5.4	7.0
Calcium, Ca	mg/L	290	0.18	270	NA
Chloride, Cl	mg/L	2.8	NA	3.9	NA
Fluoride, F	mg/L	0.25	NA	0.31	NA
pH	s.u.	7.71	NA	NS	NA
Sulfate, SO4	mg/L	170	NA	220	NA
Total Dissolved Solids (TDS)	mg/L	610	NA	670	NA
Appendix IV Constituents					
Antimony, Sb	ug/L	1 U	NA	1 U	NA
Arsenic, As	ug/L	9.1	NA	6.4	NA
Barium, Ba	ug/L	50	NA	39	NA
Beryllium, Be	ug/L	0.43	NA	0.27	NA
Cadmium, Cd	ug/L	0.092	NA	0.077	NA
Chromium, Cr	ug/L	17	NA	8.8	NA
Cobalt, Co	ug/L	14	0.4	9.5	1.8
Fluoride, F	mg/L	0.25	NA	0.31	NA
Lead, Pb	ug/L	11	NA	9.3	NA
Lithium, Li	mg/L	0.022	NA	0.018	NA
Mercury, Hg	ug/L	0.0002 U	NA	0.2 U	NA
Molybdenum, Mo	ug/L	88	NA	59	NA
Radium 226 & 228 (combined)	pCi/L	5 U	NA	1.44	NA
Selenium, Se	ug/L	1 U	NA	1 U	NA
Thallium, Tl	ug/L	0.087	NA	0.062	NA

Notes:
NA: Sampling not required for this parameter.

TABLE B-6 (continued)
WBSP-15-01
SUMMARY OF 2023 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-23	Sep-23
Appendix III Constituents			
Boron, B	mg/L	NS	NS
Calcium, Ca	mg/L	NS	NS
Chloride, Cl	mg/L	NS	NS
Fluoride, F	mg/L	NS	NS
pH	s.u.	NS	NS
Sulfate, SO4	mg/L	NS	NS
Total Dissolved Solids (TDS)	mg/L	NS	NS
Appendix IV Constituents			
Antimony, Sb	ug/L	NS	NS
Arsenic, As	ug/L	NS	NS
Barium, Ba	ug/L	NS	NS
Beryllium, Be	ug/L	NS	NS
Cadmium, Cd	ug/L	NS	NS
Chromium, Cr	ug/L	NS	NS
Cobalt, Co	ug/L	NS	NS
Fluoride, F	mg/L	NS	NS
Lead, Pb	ug/L	NS	NS
Lithium, Li	mg/L	NS	NS
Mercury, Hg	ug/L	NS	NS
Molybdenum, Mo	ug/L	NS	NS
Radium 226 & 228 (combined)	pCi/L	NS	NS
Selenium, Se	ug/L	NS	NS
Thallium, Tl	ug/L	NS	NS

Notes:
NS: Well not sampled.

TABLE B-6 (continued)
WBSP-15-02
SUMMARY OF 2023 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-23	Sep-23
Appendix III Constituents			
Boron, B	mg/L	4.1	NS
Calcium, Ca	mg/L	280	NS
Chloride, Cl	mg/L	8.9	NS
Fluoride, F	mg/L	0.28	NS
pH	s.u.	7.27	NS
Sulfate, SO4	mg/L	550	NS
Total Dissolved Solids (TDS)	mg/L	1100	NS
Appendix IV Constituents			
Antimony, Sb	ug/L	1 U	NS
Arsenic, As	ug/L	0.54	NS
Barium, Ba	ug/L	24	NS
Beryllium, Be	ug/L	0.7 U	NS
Cadmium, Cd	ug/L	0.5 U	NS
Chromium, Cr	ug/L	1.2	NS
Cobalt, Co	ug/L	0.43	NS
Fluoride, F	mg/L	0.28	NS
Lead, Pb	ug/L	0.2	NS
Lithium, Li	mg/L	0.069	NS
Mercury, Hg	ug/L	0.0002 U	NS
Molybdenum, Mo	ug/L	3.8	NS
Radium 226 & 228 (combined)	pCi/L	5 U	NS
Selenium, Se	ug/L	1 U	NS
Thallium, Tl	ug/L	0.2 U	NS

TABLE B-6 (continued)
CF-19-14
SUMMARY OF 2023 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-23	Sep-23
Appendix IV Constituents			
Molybdenum, Mo	ug/L	14	48

TABLE B-6 (continued)
CF-19-15
SUMMARY OF 2023 ANALYTICAL RESULTS
Indiana-Kentucky Electric Corporation
Clifty Creek Station
Madison, Indiana

Parameter	Units	Mar-23	Sep-23
Appendix IV Constituents			
Molybdenum, Mo	ug/L	1.2	0.53