

**BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO**

	)	Case No. 14-375-GA-RDR
	)	Case No. 15-452-GA-RDR
In the Matters of the Applications of Duke	)	Case No. 16-542-GA-RDR
Energy Ohio, Inc., for Adjustments to Rider	)	Case No. 17-596-GA-RDR
MGP Rates.	)	Case No. 18-283-GA-RDR
	)	Case No. 19-174-GA-RDR

	)	Case No. 14-376-GA-ATA
	)	Case No. 15-453-GA-ATA
In the Matters of the Applications of Duke	)	Case No. 16-543-GA-ATA
Energy Ohio, Inc. for Tariff Approval.	)	Case No. 17-597-GA-ATA
	)	Case No. 18-284-GA-ATA
	)	Case No. 19-175-GA-ATA

**DIRECT TESTIMONY
OF
JAMES R. CAMPBELL, Ph.D.**

On Behalf of
The Office of the Ohio Consumers' Counsel
65 E. State Street, 7th Floor
Columbus, Ohio 43215

October 8, 2019

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On Behalf of the Office of the Ohio Consumers' Counsel
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I. INTRODUCTION

Q1. PLEASE STATE YOUR NAME, ADDRESS AND POSITION.

A1. My name is James R. Campbell. My business address is Engineering Management, Inc., 1500 Ardmore Blvd., Suite 502, Pittsburgh, PA 15221. I am the President of Engineering Management, Inc. (“EMI”).

Q2. WOULD YOU PLEASE BRIEFLY SUMMARIZE YOUR EDUCATIONAL AND PROFESSIONAL EXPERIENCE?

A2. I have a Bachelor of Engineering degree in Civil Engineering from Youngstown State University (1978), Master of Science (1980) and Ph.D. (1983) degrees in Civil and Environmental Engineering from Carnegie Mellon University. I am a Professional Engineer and Ohio Voluntary Action Program (VAP) Certified Professional (CP).

My professional work experience and certifications are detailed on my Resume, provided as Attachment JRC-1. I have significant experience addressing environmental issues associated with Manufactured Gas Plant (MGP) and coal tar industry sites. That experience spans more than four decades. I began working with coal conversion wastewaters in 1978 while in graduate school and my graduate studies dealt with treatment of coal conversion wastewaters and understanding the environmental chemistry affecting the fate and transport of coal conversion contaminants. I worked for Koppers Company, Inc. (“Koppers”) during the 1980s and early 1990s. Koppers designed and

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1 built many of the MGPs in North America. Koppers also previously operated MGPs and,
2 through subsidiaries, sold gas as a utility. In addition, Koppers operated allied coal tar
3 industry facilities such as tar distillation works and wood treating plants. While at
4 Koppers I worked on over 50 MGP/coal tar sites. Experience at those sites includes
5 investigation, design and remediation activities for tar impacted soil, impacted
6 groundwater, and tar as a dense non-aqueous phase liquid ("DNAPL") – a contaminant
7 commonly found at MGP Sites. I managed all of Koppers' legacy (non-operating) sites
8 on a program level, including reporting on cash flow forecasting and reserve analysis to
9 senior Koppers management (CEO and COO). I started EMI in 1992 to provide project
10 management and expert services related to environmental liabilities. Over my 36-year
11 career, I have worked on the analysis and/or environmental assessment and cleanup of
12 over 100 sites and have provided expert analysis in approximately 20 Superfund cases, 12
13 of which were MGP Sites. My experience includes working with, and interpreting, many
14 federal and state environmental regulations.

15
16 ***Q3. WHAT ARE YOUR RESPONSIBILITIES AS PRESIDENT OF EMI?***

17 ***A3.*** I am responsible for EMI's technical and business affairs. I specialize in providing
18 management and negotiation services associated with environmental liabilities as well as
19 expert services for environmental related dispute resolution. Management activities
20 include coordination and oversight of investigation, design, construction, emergency
21 response and operation and maintenance work. Negotiation services include development
22 of management strategies and negotiation support for technology applications and

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1 remedy selection, construction claims and other disputes. Expert services include analysis, expert
2 reports and testimony regarding industrial operations, environmental conditions, and
3 allocation claims.

4
5 ***Q4. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY OR TESTIFIED BEFORE***
6 ***THE PUCO?***

7 ***A4.*** Yes. I provided written and oral testimony in Case No. 12-1685-GA-AIR, et al.
8

9 ***Q5. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY IN ANY OTHER FORUMS?***

10 ***A5.*** Yes. I have provided testimony in the U.S. Court of Claims, Clarion County Court of
11 Common Pleas, Pennsylvania, and served as an expert in various Comprehensive
12 Environmental Response, Compensation, and Liability Act (“CERCLA”) cost recovery
13 claims.

II. PURPOSE OF TESTIMONY

Q6. IN ITS REPORTS, THE PUCO STAFF RECOMMENDED THAT DUKE NOT BE ALLOWED TO CHARGE CUSTOMERS FOR REMEDIATION OUTSIDE THE GEOGRAPHIC BOUNDARIES OF THE WEST END AND EAST END SITES. ARE YOU PROVIDING ANY EXPERT OPINION ON THIS ISSUE?

A6. No. I understand that OCC witness Adkins will address this part of the Staff's recommendation.

Q7. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A7. My testimony focuses on the prudence of Duke's remediation efforts based on the VAP Rules¹ and my engineering expertise. I provide two alternative recommendations, one assuming that the PUCO adopts the Staff's Recommendation and one assuming that the PUCO does not.

The purpose of my testimony is to render an opinion on the scope and necessity of the MGP-related investigation and remediation activities at the East End and West End MGP Sites ("MGP Sites"). I also render an opinion on the prudence of the resultant costs that Duke is seeking to charge customers in this proceeding. The MGP-related investigation includes activities Duke performed to identify the nature and extent of the contamination at the MGP Sites. The MGP-related remediation includes activities that Duke performed

¹ "VAP Rules" Ohio Adm. Code 3745-300, et seq.

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1 to clean up the MGP Sites. Duke is seeking to collect \$45,845,772 million from
2 customers for MGP Site investigation and remediation.

3
4 My testimony demonstrates that Duke's expenditures were excessive and imprudent for
5 MGP remediation. If the PUCO adopts the PUCO Staff's recommendation disallowing
6 remediation costs outside the bounds of the MGP Sites, customers should pay no more
7 than an additional \$3,876,102. If the PUCO does not adopt Staff's recommendation,
8 customers should pay no more than an additional \$10,059,313. My recommendation
9 compares to Duke's plan to charge customers significantly more—\$45.8 million for the
10 investigation and remediation efforts.

11
12 It would have been prudent for Duke to have developed remedial action plans
13 incorporating cost-effective, protective measures for the MGP Sites, instead of the much
14 more expensive excavation/disposal and in-situ solidification approach employed by
15 Duke. Duke chose to spend significant dollars—\$45.8 million—for investigation and
16 remediation of the MGP Sites. This amount is far more than is required under Ohio
17 EPA's VAP Rules. In my opinion, Ohio EPA's VAP Rules provide for protective
18 remedial alternatives that are far less costly than the remedial alternatives chosen by
19 Duke.

III. ANALYSIS OF OHIO EPA'S VAP RULES

Q8. DO YOU BELIEVE THE SCOPE AND NECESSITY OF DUKE'S INVESTIGATION AND REMEDIATION EFFORTS SHOULD BE AN IMPORTANT CONSIDERATION FOR THE PUCO TO CONSIDER WHEN DETERMINING WHAT TO CHARGE DUKE'S CUSTOMERS?

A8. Yes.

Q9. WHY SHOULD THE PUCO BE CONCERNED WITH THE SCOPE AND NECESSITY OF THE REMEDIATION WORK THAT DUKE IS SEEKING TO CHARGE ITS CUSTOMERS?

A9. Reviewing the scope and necessity of the remediation work is an important step in ascertaining whether the dollars spent by Duke to investigate and remediate the MGP Sites were prudent. Duke is seeking to collect \$45.8 million in MGP Site investigation and remediation costs from gas customers in this case. But customers should not be charged for costs that were imprudently incurred. Any charges for imprudently incurred costs would be unreasonable to collect from customers.²

The majority of the costs sought by Duke in this proceeding are associated with investigation, design and remediation of the Middle and West of West (WOW) Parcels at the East End MGP Site and Phase 2A, Phase 3 and Tower Areas (investigation and design only) of the West End MGP Site. Duke conducted remedial alternative evaluations

² See R.C. 4905.22, 4909.154.

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1 for the Middle and WOW Parcels as well as Phase 3 and Tower areas, after being heavily
2 criticized by OCC and PUCO for not doing so during previous efforts. However,
3 conducting the alternatives evaluations did not change Duke's pre-conceived notions
4 about the type of remedial options it preferred. Duke again chose to excavate soil to
5 depths of 10 to 20 feet below ground surface as well as solidify deeper soil (by mixing
6 the soil with reagents like portland cement), even in areas where tar (a byproduct of the
7 MGP process) was not indicated by its investigations. In doing so Duke continued to
8 employ remedial approaches that far exceed more cost effective and reasonable remedial
9 options provided for in Ohio EPA's VAP Rules. As a result, Duke spent significantly
10 more money than was necessary. For example, by applying institutional controls and
11 adopting commonly used risk mitigation measures, soil remediation could have been
12 accomplished much more cost-effectively (i.e., without significant excavation) by
13 construction of engineering controls, such as soil or asphalt covers. Duke's current claim,
14 covering calendar years 2013 through 2018, included approximately \$38.3 million in
15 construction cost associated with the West End Phase 2A area and portions of Middle
16 Parcel and the WOW area at the East End MGP Site. If Duke had employed a prudent
17 remedial approach based on engineering controls, such as soil or asphalt covers, and risk
18 mitigation plans the work could have been completed for much less—\$2.2 million.

19
20 The Utility's management decision to exceed reasonable, cost effective and protective
21 VAP requirements, and to spend excessively to conduct remediation that was not
22 necessary under Ohio EPA's VAP Rules, constitutes imprudence on Duke's part.

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1 Customers of Duke should not have to pay for such imprudence. Had Duke more
2 reasonably interpreted and applied the VAP Rules, more cost effective and protective
3 MGP Site remedies could have, and should have, been implemented. The Utility could
4 have avoided making the imprudent expenditures that it did.

5
6 Therefore, in my opinion, the PUCO should deny Duke the opportunity to collect from
7 customers costs that were imprudently spent by the Utility in furtherance of management
8 policies designed to conduct remediation that is not required by the VAP Rules.

9
10 ***Q10. HAVE YOU REVIEWED THE SCOPE OF DUKE'S REMEDIATION EFFORTS***
11 ***RELATIVE TO OHIO EPA'S VAP RULES?***

12 ***A10.*** Yes.

13
14 ***Q11. WHAT HAVE YOU DETERMINED?***

15 ***A11.*** The VAP Rules do not require the extensive remediation efforts that Duke elected to
16 implement. Had Duke more reasonably interpreted and applied the VAP Rules, more cost
17 effective and protective MGP Site remedies could have, and should have, been
18 implemented. The Utility could have avoided making the imprudent expenditures that it
19 did.

20
21 My testimony outlines a more reasonable and cost-effective remedial approach that is
22 consistent with the VAP Rules and protective of human health and the environment. This

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1 remedial approach includes use of engineering controls³ and institutional controls⁴ that
2 are widely employed in the environmental remediation industry. In fact, such controls are
3 specifically called for, under certain circumstances, in Ohio EPA's VAP Rules.

4
5 ***Q12. DO OHIO EPA'S VAP RULES SPECIFY HOW OR WHEN REMEDIATION***
6 ***SHOULD BE CONDUCTED?***

7 ***A12.*** No. The VAP Rules require that a remedy be implemented for a site if chemicals of
8 concern⁵ are present in soil, sediment or groundwater (media) at concentrations above
9 applicable standards for a complete exposure pathway.⁶ Applicable standards for a
10 remedy are developed based on existing or reasonably anticipated future exposure
11 pathways⁷ for each media. However, the VAP Rules do not mandate a specific approach
12 or time frame for how and when remediation should be conducted. Instead, the entity that
13 is implementing VAP Rules is responsible for determining what specific actions are
14 necessary, and when. My experience with MGP-related remedial activities that have not
15 involved public utilities is that such remedies are conducted in a more practical, cost

³ VAP Rule 3745-300-01 defines an engineering control as "any structure, system, or barrier that effectively and reliably eliminates or mitigates human or important ecological resource exposure to hazardous substances or petroleum on, underlying or emanating from a property, which is protective of human health, safety and the environment."

⁴ VAP Rule 3745-300-01 defines an institutional control as "a restriction that is recorded in the same manner as a deed which limits access to or use of the property such that exposure to hazardous substances or petroleum are effectively and reliably eliminated or mitigated. Examples of institutional controls include land and water use restrictions."

⁵ For example, polycyclic aromatic hydrocarbons (PAHs) common to MGP tars.

⁶ VAP Rule 3745-300-07 (Phase II Property Assessments).

⁷ An exposure pathway is an environmental term of art that describes how a person (or flora or fauna) could be exposed to contaminated media. For example, a construction worker could be exposed to contaminated soil through direct dermal contact or inhalation of dust. These exposure pathways would be referred to as direct contact and inhalation exposure pathways.

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1 effective manner than employed by Duke. Duke's approach to remediation of the MGP
2 Sites does not appear to have sufficiently emphasized or considered cost as a relevant
3 factor. However, cost is an especially important evaluation factor where Duke seeks to
4 charge customers for the cost it incurs.

5
6 ***Q13. HOW IS THE SCOPE OF A REMEDY DETERMINED UNDER OHIO EPA'S VAP?***

7 ***A13.*** Under the VAP Rules, applicable standards and points of compliance (i.e., the location
8 where remediation standards are applied) are developed for each media (e.g., soil or
9 groundwater) to guide the scope and extent of the remediation necessary for a site.⁸

10
11 ***Q14. DID DUKE USE THE APPROPRIATE POINTS OF COMPLIANCE FOR***
12 ***REMEDATION BASED ON DIRECT CONTACT WITH SOIL?***

13 ***A14.*** No. Duke determined that direct contact points of compliance for soil at the MGP Sites
14 should be based on commercial and industrial use (i.e., non-residential) and trespasser
15 exposure pathways, including construction and excavation exposures.⁹ The VAP Rules
16 identify the soil media points of compliance that can be applicable—but may be
17 modified—to these exposure pathways as follows:¹⁰

⁸ VAP Rule 3745-300-08 (Generic Numerical Standards).

⁹ OCC-POD-01-001(q) Attachment East End at 27, attached as Attachment JRC-7.

¹⁰ VAP Rule 3745-300-07 (Phase II Property Assessments).

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- 1 • If institutional controls¹¹ limiting a property's land use are applied, the
2 point of compliance is from the ground surface to a minimum depth of two
3 feet and at depths greater than two feet when it is reasonably anticipated
4 that exposure to soil will occur through excavation, grading or utilities
5 maintenance.
- 6 • Where it is reasonably anticipated that excavation, grading, or other
7 construction activities will occur, the point of compliance is from the
8 ground surface to a minimum depth equal to the maximum depth
9 reasonably anticipated for activities at the property. However, a Risk
10 Mitigation Plan may be used to protect construction workers if excavation
11 extends below two feet into contaminated material.¹²

12

13 Duke chose to excavate soil to a depth of 10-20 feet below ground surface as well as
14 solidify soil (by mixing the soil with a reagent such as portland cement to create a soil-
15 cement like consistency) to depths of 45 feet below the bottom of the excavation.¹³ This
16 is approximately five to ten times greater excavation than was needed. In doing so, Duke
17 failed to use more reasonable and cost-effective approaches available under Ohio EPA's
18 VAP. For example, by applying institutional controls and adopting commonly used risk
19 mitigation measures, soil remediation could have been accomplished much more cost-

¹¹ For example, an Environmental Covenant limiting land use to commercial applications and prohibiting use of groundwater.

¹² Ohio VAP Risk Mitigation Plan Template and VAP Rule 3745-300-11 (Remediation).

¹³ OCC-POD-01-001(s) Attachment East End, attached as Attachment JRC-8.

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1 effectively (*i.e.*, without significant excavation) by construction of soil covers.¹⁴ Soil
2 covers (*i.e.*, two feet of soil with grass cover) will reasonably prevent human exposure to
3 contaminated soil.

4
5 For example, for the East End MGP Middle Parcel, Duke concluded “that soils
6 present at the Site do not exceed VAP standards for construction workers, and do not
7 pose an unacceptable risk to current and future on-site construction workers.”¹⁵ Duke,
8 nonetheless, proceeded to conduct unnecessary and imprudent soil remediation at a cost
9 of \$15 to \$20 million.

10
11 ***Q15. DO OHIO EPA’S VAP RULES ALLOW RISK MITIGATION MEASURES TO BE***
12 ***USED FOR REMEDIATION IN LIEU OF EXCAVATION?***

13 ***A15.*** Yes. The VAP Rules allow risk mitigation measures (such as described below) to be
14 undertaken in lieu of excavation.¹⁶ One less expensive alternative to the more extensive
15 and expensive approach taken by Duke is to control direct contact exposure to
16 contaminated soils by constructing engineering controls such as soil covers or asphalt
17 paving. Institutional controls can then be established to limit future uses of the site to
18 those that are consistent with the engineering controls and future commercial/industrial
19 use assumptions.

¹⁴ VAP Rules 3745-300-07 (Phase II Property Assessments) and 3745-300-11 (Remediation).

¹⁵ OCC-POD-01-001(q) Attachment East End at 28, attached as Attachment JRC-7.

¹⁶ VAP Rule 3745-300-11 (Remediation).

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1 Institutional controls and Risk Mitigation Plans can also prohibit excavation of
2 contaminated soil without proper personnel protective equipment (“PPE”) and establish
3 soil handling controls to protect workers and the environment. Specification of PPE and
4 soil handling requirements can be accomplished through a Risk Mitigation Plan linked to
5 the institutional control. Risk Mitigation Plans are commonly accepted exposure control
6 mechanisms used in environmental remediation. Risk Mitigation Plans are accepted by
7 both industry and regulatory agencies, incorporated into the VAP and would have been a
8 more reasonable remediation measure for Duke at the MGP Sites.

9
10 ***Q16. WHAT CAN BE LEARNED FROM OHIO EPA’S VAP GUIDANCE DISCUSSED IN***
11 ***THE PREVIOUS ANSWER?***

12 ***A16.*** The preceding testimony shows the flexibility provided for in the VAP Rules for soil
13 remediation. It would have been prudent for Duke to have taken advantage of that
14 flexibility to implement a more reasonable remediation approach of using soil covers,
15 engineering controls and institutional controls. Duke’s approach of extensive soil
16 excavation was not necessary for protection from commercial and industrial use soil
17 exposure pathways, including construction and excavation exposures.¹⁷ The VAP rules
18 do not require the costly remedial approach employed by Duke. It is unreasonable for the
19 PUCO to simply pass along these excessive costs to customers.

¹⁷ VAP Rule 3745-300-11 (Remediation).

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1 ***Q17. DO THE VAP RULES ADDRESS SOIL REMEDIATION FOR PROTECTION OF***
2 ***GROUNDWATER?***

3 ***A17.*** Yes. The VAP Rules include the option of analyzing the potential for leaching of
4 chemical(s) of concern from soils to groundwater. However, Duke correctly concluded
5 that the leaching pathway is not applicable at the West End MGP Site.¹⁸ The Middle
6 Parcel of the East End MGP Site Phase 2 Report does not include an evaluation of
7 leaching from soil to groundwater.¹⁹ As such, Duke must not have considered leaching
8 potential to be important.

9
10 The VAP Rules also include groundwater protection “soil saturation” concentrations for
11 some contaminants.²⁰ Single compound soil saturation concentrations apply to
12 compounds that are liquids at ambient temperature. Soil saturation concentrations are
13 meant to be an indicator for when pure organic liquids (*e.g.*, a solvent such as acetone
14 (nail polish remover)) could be present and thus be a threat to groundwater quality.
15 Contamination at the MGP Sites is the result of releases of tar, which is a mixture of
16 multiple compounds (most of which are solids at ambient temperature). As such, single
17 compound saturation does not apply to the MGP Sites.

¹⁸ OCC-POD-01-001(j) Attachment West End at page 165 of 437, attached as Attachment JRC-9.

¹⁹ OCC-POD-01-001(q) Attachment East End at 26 and 27, attached as Attachment JRC-7.

²⁰ VAP Rule 3745-300-08 (Generic Numerical Standards).

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1 ***Q18. WHAT IS YOUR OPINION REGARDING THE NECESSITY AND SCOPE OF THE***
2 ***SOIL REMEDIATION EFFORTS EMPLOYED BY DUKE AT THE MGP SITES?***

3 ***A18.*** The scope of Duke's soil remediation efforts for the exposure pathways described above
4 was excessive and imprudent and resulted in Duke spending considerably more than was
5 necessary under the VAP Rules. Duke was not required to conduct soil excavation and
6 solidification at a cost of approximately \$38 million. Duke's choice of an overly
7 expensive remediation program should not fall on the shoulders of its customers.
8

9 ***Q19. DID DUKE APPLY THE APPROPRIATE POINT OF COMPLIANCE FOR***
10 ***GROUNDWATER REMEDIATION?***

11 ***A19.*** No. While Duke correctly concluded that potable use of groundwater at the MGP Sites is
12 not a complete exposure pathway (i.e., the water is not used for drinking and cooking),²¹
13 Duke appears to have inappropriately concluded that Unrestricted Potable Use Standards
14 (UPUS) apply to all groundwater beneath the MGP Sites. Duke consistently failed to use
15 more cost-effective approaches available under the VAP Rules. That failure to pursue
16 more cost-effective approaches should be borne by Duke's shareholders and not its
17 customers.

²¹ OCC-POD-01-001(q) Attachment East End at 27 and 28, attached as Attachment JRC-7, OCC-POD-01-001(d) Attachment West End at 4-1, attached as Attachment JRC-10.

Q20. WHAT DO OHIO EPA'S VAP RULES PROVIDE FOR REGARDING THE POINT OF COMPLIANCE FOR GROUNDWATER REMEDIATION?

A20. The VAP Rules provide for use of institutional controls, Urban Setting Designations (“USDs”) and variances to affect how and where groundwater standards are applied. For the hydrogeologic (*i.e.*, subsurface) conditions encountered at the MGP Sites, the VAP Rules define MGP Site groundwater as “critical resource groundwater.” For critical resource groundwater where the contaminant source areas are on the property (as they are for the MGP sites), the VAP Rules²² require implementation of institutional controls (*e.g.*, use restrictions) or engineering controls (*e.g.*, fences, soil covers) to prevent on-site exposure to contaminated groundwater. The VAP Rules²³ then require that groundwater emanating from the property must not exceed UPUS, except where groundwater discharges to surface water, in which case applicable surface water standards apply. If UPUS or surface water standards are not exceeded at the property boundary, no additional groundwater remedy (*i.e.*, in addition to institutional controls and engineering controls) is required. If an USD has been granted for the area around the property, then the same requirements apply except that the point of compliance is the USD area boundary (or a maximum of 0.5 miles from the property boundary). If UPUS are or will be exceeded at the property, surface water or USD area boundary, the VAP Rules²⁴ require that groundwater beyond the boundary be restored to UPUS or a reliable alternate water supply be provided to affected users. This means that the remedy needs to be

²² VAP Rule 3745-300-10 (Ground Water Classification and Potable Use Response Requirements).

²³ VAP Rule 3745-300-10 (Ground Water Classification and Potable Use Response Requirements).

²⁴ VAP Rule 3745-300-10 (Ground Water Classification and Potable Use Response Requirements).

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1 sufficient to prevent exceedance of UPUS at the property or USD area boundaries (or an
2 alternate water supply needs to be provided to any users in the affected area).

3
4 ***Q21. DOES THE GROUNDWATER EMANATING FROM THE MGP SITES***
5 ***CURRENTLY EXCEED APPLICABLE STANDARDS?***

6 ***A21.*** Groundwater at the MGP Sites basically flows south to the Ohio River. There is no
7 indication in the MGP Site environmental reports provided by Duke that groundwater
8 discharging from the southern site boundaries into the Ohio River has or will cause
9 surface water standards in the Ohio River to be exceeded. The northern property
10 boundaries are upgradient to the groundwater flow direction. Groundwater from the MGP
11 Sites cannot flow upgradient (groundwater does not flow uphill) across the northern
12 boundaries. There is no indication in the MGP Site environmental reports provided by
13 Duke that groundwater upgradient of the MGP Sites exceeds UPUS. The eastern and
14 western property boundaries of the MGP Sites are basically side gradient to the
15 groundwater flow direction. If there is, or could be, an exceedance at the eastern or
16 western boundaries, a USD could be used to expand the point of compliance beyond the
17 exceedance. However, Duke has not applied for a USD.²⁵

²⁵ Duke Response to OCC-INT-02-004, attached as Attachment JRC-11.

**Q22. UNDER WHAT CONDITIONS DO OHIO EPA'S VAP RULES ACCEPT AN URBAN
SETTING DESIGNATION FOR GROUNDWATER COMPLIANCE?**

A22. VAP Guidance provides additional explanation of how and where the USD can be applied. These conditions apply to the MGP Sites.

An urban setting designation involves a formal recognition by the Ohio EPA that ground water in qualifying urban areas is not currently used as a source of drinking water and is not expected to be needed to meet the demands for public water supplies in the foreseeable future. An approved urban setting designation provides exceptions to certain response requirements for Critical Resources or Class A ground water in the designated areas.

A USD may be requested for properties when there is no current or future use of ground water by local residents for the purpose of drinking, showering, bathing, or cooking. There are areas within Ohio where, because of the urban nature of land use and the reliance on alternative community water systems to supply residents with safe drinking water, ground water is not used as a potable water supply. Thus, ground water that contains chemicals from prior industrial activities poses no potable use risk to the community because it is not used and will not likely be used by humans. In these locations, *an approved USD would lower the cost of cleanup and*

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1 thereby promote economic redevelopment while still protecting public
2 health and safety. Voluntary actions within USD areas must protect
3 ecological receptors and humans from any exposures including exposures
4 to ground water not related to drinking, showering, bathing, or cooking.²⁶

5
6 USDs have been granted for dozens of Sites under the VAP, including for entire
7 cities (*e.g.*, Warren and Youngstown).²⁷ Duke should apply for a USD.

8
9 ***Q23. DO THE VAP RULES ADDRESS “FREE PRODUCT” IN THE GROUND?***

10 ***A23.*** Yes. The VAP Rules²⁸ define free product (*e.g.*, liquid, mobile tar) as “a separate liquid
11 hydrocarbon phase that has a measurable thickness of greater than one one-hundredth of
12 a foot.” Such measurements are collected in groundwater monitoring wells.

13
14 ***Q24. WAS FREE PRODUCT IDENTIFIED AT THE MIDDLE PARCEL OR WOW***
15 ***PARCEL OF THE EAST END MGP SITE OR PHASE 2A AREA OF THE WEST***
16 ***END SITE?***

17 ***A24.*** Free product (also referred to as DNAPL) was consistently identified in monitoring wells
18 TW-1S, MW-22D and MW-23D in the Middle Parcel but not in the monitoring well

²⁶ VAP Technical Guidance Compendium VA30010.09.006 (Urban Setting Designation Notification Letter: Purpose of USD and Standards) (emphasis added).

²⁷ <https://oepa.maps.arcgis.com/apps/webappviewer/index.html?id=ae884981d088410fab36cabfaa9cfdc5>

²⁸ VAP Rule 3745-300-01(Definitions).

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1 cluster located on the WOW Parcel of the East End Site.²⁹ Free product was consistently
2 identified at the MW-13 cluster in Phase 2A Area of the West End Site.³⁰
3

4 ***Q25. DOES THE EXISTENCE OF FREE PRODUCT REQUIRE REMEDIATION?***

5 ***A25.*** Yes, but the remedial approach can be limited. The requirement under the VAP Rules
6 applies only to the extent that groundwater beyond the property or USD area boundaries
7 may be affected. As mentioned earlier in my testimony, groundwater quality may not
8 exceed UPUS at the property boundaries and would not exceed UPUS at appropriate
9 USD boundaries. As such, under the VAP Rules, the presence of free product does not
10 require the extensive and imprudent soil remediation conducted by Duke. As a practical
11 matter, remediation of free product could be accomplished much more cost effectively
12 with DNAPL recovery wells.
13

14 ***Q26. DO OHIO EPA'S VAP RULES ALLOW FOR VARIANCES THAT LIMIT THE***
15 ***SCOPE OF REMEDIATION FOR FREE PRODUCT?***

16 ***A26.*** Yes. Even if free product affected groundwater quality at the property or USD
17 boundaries, Duke could have applied for a variance under the VAP Rules to limit the
18 scope of the remediation. The VAP Rules³¹ allow for a variance from established
19 standards, such as groundwater UPUS, based on: 1) technical infeasibility or if the cost
20 substantially exceeds the economic benefits; 2) if the proposed remediation method (e.g.,

²⁹ OCC-POD-02-004 (b) SUPP Attach, attached as Attachment JRC-12.

³⁰ OCC-POD-01-001 (cc) Attachment West End at 9, attached as Attachment JRC-13.

³¹ VAP Rule 3745-300-12 (Variances and Case-by-Case Determinations).

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1 institutional controls and engineering controls) of addressing the issue will ensure that
2 public health and safety will be protected; and 3) and if the proposed remediation method
3 is necessary to promote, protect, preserve or enhance employment opportunities or the
4 reuse of the affected property.

5
6 ***Q27. DO THE COSTS BEING CLAIMED FOR RECOVERY BY DUKE INCLUDE***
7 ***GROUNDWATER REMEDIATION COSTS?***

8 ***A27.*** No. The Phase 2 Property Assessment Report for the Middle Parcel of the East End Site
9 states the following with respect to groundwater remediation:

10
11 “Because site groundwater is impacted above UPUS, response requirements
12 (including institutional or engineering controls) are required to prevent on-site
13 human exposure to groundwater exceeding UPUS, in accordance with VAP rules
14 (OAC 3745-300-10 (E)(2)(a)). In addition, the extent of groundwater impacts has
15 not been determined. Therefore, further response requirements related to on-site
16 and off-site groundwater cannot currently be determined until the extent of
17 groundwater impacts have been defined.”³²

18
19 The Focused Remedial Alternatives Analysis for the East End Site includes the following
20 Remedial Action Objective:

³² OCC-POD-01-001(q) Attachment East End at iv, attached as Attachment JRC-7.

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1 “Evaluate the potential for Site groundwater to impact downgradient receptors
2 (this investigation/evaluation will be performed in the future and, therefore, is not
3 included in remedial alternatives identified in this report) (OAC 3745-300-08
4 (A)(l) and (H), and OAC 3745-300-09 (E)).”³³

5
6 The Phase 2 Property Assessment Report for the West End Site states the following with
7 respect to groundwater remediation:

8
9 “Prevention of potable and non-potable exposure to the on-site impacted
10 groundwater may be achieved using an institutional control. The only complete
11 pathway for the non-potable use standard considered for this Site is the on-site
12 groundwater to indoor air pathway which was evaluated in the HHRA.”³⁴

13
14 ***Q28. HAS DUKE ASKED ITS CERTIFIED PROFESSIONALS TO ISSUE A NO***
15 ***FURTHER ACTION LETTERS OR REQUEST A COVENANT NOT TO SUE***
16 ***FROM OHIO EPA FOR THE EAST END OR WEST END MGP SITES?***

17 ***A28.*** No. Duke has not asked its CPs to issue a No Further Action Letter or request a Covenant
18 Not to Sue for either of the MGP Site.³⁵ Both sites are years away from achieving those
19 ends points. Duke’s imprudent and excessive remediation approach has not materially

³³ OCC-POD-01-001(p) Attachment East End at 11, attached as Attachment JRC-14.

³⁴ OCC-POD-01-001(d) Attachment West End at 5-2, attached as Attachment JRC-10.

³⁵ Duke Response to OCC-INT-02-002, attached as Attachment JRC-15; Duke Response to OCC-INT-02-003, attached as Attachment JRC-16.

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1 shortened the time frame required to reach those end points. Applying an Urban Setting
2 Designation to the East and West End MGP Sites would do far more to shorten the time
3 frame to closure than spending tens of millions of dollars in imprudent and excessive
4 remediation, as Duke has done.

5 **IV. REVIEW OF RECOMMENDED RECOVERABLE INVESTIGATION AND**
6 **REMEDATION EXPENSES**

7 ***Q29. DID THE STAFF REPORT PROVIDE A RECOMMENDATION FOR EXCLUDING***
8 ***INVESTIGATION AND REMEDIATION EXPENSES FROM RECOVERY?***

9 ***A29.*** Yes. The Staff Report recommended exclusion of costs associated with investigation and
10 remediation of “the parcel of land adjacent to the East End site that the Commission
11 denied for recovery, known as the Area West of the West Parcel (“WOW”), and costs
12 associated with investigation or remediation of soil, water or any other tracts of land
13 located outside the original footprint” of the East End and West End sites.³⁶ In addition,
14 the Staff Report recommended exclusion of cost associated with “relocation of an electric
15 substation on the site to accommodate the Brent Spence Bridge replacement project” and
16 “relocation of nitrogen tanks for use in the electrical substation and construction of a new
17 metal staircase to access the building on the West End.”³⁷ As mentioned above, my
18 testimony does not take any position on these issues because they are utility regulatory

³⁶ Staff Report at 3-5 (September 28, 2018) and Staff Report at 5-6 (July 12, 2019).

³⁷ Staff Report at 5 (September 28, 2018) and Staff Report at 6 (July 12, 2019).

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1 issues, not VAP or engineering issues. OCC witness Adkins discusses OCC's position on
2 these topics. The Staff Report also provided a specific evaluation of recoverable costs.³⁸
3

4 ***Q30. HAVE YOU REVIEWED THE PUCO STAFF'S SPECIFIC EVALUATION?***

5 ***A30.*** Yes.
6

7 ***Q31. WHAT HAVE YOU DETERMINED?***

8 ***A31.*** The PUCO's evaluation of charges to customers should address not only the PUCO
9 Staff's recommendations identified above, but also an evaluation regarding the scope of
10 remediation and whether remediation was necessary. Such an evaluation is an essential
11 part of determining whether Duke's expenditures are reasonable and prudent, and
12 whether the expenditures may be charged to customers. Thus, a recommendation for
13 recoverable costs should include an analysis of remediation work performed by Duke
14 compared to an interpretation of the VAP Rules regarding necessity and scope of
15 remediation, as provided in my testimony.
16

17 ***Q32. DID THE STAFF RECOMMEND ELIMINATION OF ANY COSTS FOR THE***
18 ***WEST END MGP SITE?***

19 ***A32.*** Yes. The Staff Report recommended "adjustments to Duke's proposed recovery amounts
20 to remove costs associated with relocation of an electric substation on the site to
21 accommodate the Brent Spence Bridge replacement project and investigation and

³⁸ Staff Report at 3-5 (September 28, 2018) and Staff Report at 5-9 (July 12, 2019).

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1 remediation work that was performed outside of the West End site boundaries.”³⁹ The
2 Staff Report “made an adjustment to remove the offsite costs, specifically, costs that were
3 associated with investigation and remediation in the Ohio River” and “relocation of
4 nitrogen tanks for use in the electrical substation and construction of a new metal
5 staircase to access the building on the West End site.”⁴⁰ Staff recommended removing
6 \$2,639,599 from Duke’s cost claim for the West End Site.⁴¹

7
8 ***Q33. WHAT IS YOUR RECOMMENDATION FOR AN APPROPRIATE SOIL REMEDY***
9 ***FOR THE PHASE 2A AREA OF THE WEST END MGP SITE?***

10 ***A33.*** Although the PUCO Staff did significantly reduce the amount of cost from Duke’s
11 request in its Application, as previously mentioned, the amount of money for this limited
12 recovery should be adjusted further downward based on prudent remedial approaches
13 allowed under the VAP Rules, as discussed earlier. An appropriate soil remedy for the
14 Phase 2A Area of the West End MGP Site should be limited to:

- 15 1) Engineering controls in the form of maintaining the existing
16 perimeter fence to limit and control access to the Site and
17 construction of a two-foot soil cover for protection of workers
18 from direct contact with contaminated soils.
- 19 2) Institutional controls should be applied in the form of an
20 Environmental Covenant restricting future use of the property to

³⁹ Staff Report at 5 (September 28, 2018).

⁴⁰ Staff Report at 6 (July 12, 2019).

⁴¹ Staff Report at 9 (July 12, 2019).

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commercial/industrial uses, prohibiting use of groundwater, and
requiring mitigation measures in the form of a Risk Mitigation
Plan.

The Risk Mitigation Plan would provide procedures for any required future excavation. If
and when soil needed to be excavated, the work would be conducted in accordance with
the procedures outlined by Duke in the Risk Mitigation Plan. Such procedures would
protect human health and the environment by specifying how the excavation should be
completed, worker protection standards, requirements for management and disposal of
contaminated soils, backfilling and replacement of the soil cover. As Duke owns the
property and it is used for commercial/industrial purposes and has limited access, this
approach is imminently practical.

***Q34. DID THE STAFF RECOMMEND ELMINATATION OF RECOVERY OF ANY
COSTS FOR THE EAST END MGP SITE?***

A34. Yes. The Staff Report recommended removing 50% of costs incurred from 2013 through
2016 and 2018 and 70% of cost incurred in 2017 because the costs were associated with
the WOW parcel and cost associated with activities taking place in the Ohio River.⁴²
Staff recommended removing \$20,594,543 from Duke's cost claim for the East End
Site.⁴³

⁴² Staff Report at 4 (September 28, 2018) and Staff Report at 5-6 (July 12, 2019).

⁴³ Staff Report at 9 (July 12, 2019).

**Q35. WHAT IS YOUR RECOMMENDATION FOR AN APPROPRIATE SOIL REMEDY
FOR THE MIDDEL PARCEL OF THE EAST END MGP SITE?**

A35. Although the PUCO Staff did significantly reduce the level of recoverable costs from Duke's request in its Application, as previously mentioned, the amount of money for this limited recovery should be adjusted further downward based on prudent remedial approaches allowed under the VAP Rules, as discussed earlier. An appropriate soil remedy for the Middle Parcel of the East End MGP Site should be limited to:

- 1) Engineering controls in the form of maintaining the existing perimeter fence to limit and control access to the Site and construction of a two-foot soil cover for protection of workers from direct contact with contaminated soils.
- 2) Institutional controls should be applied in the form of an Environmental Covenant restricting future use of the property to commercial/industrial uses, prohibiting use of groundwater, and requiring mitigation measures in the form of a Risk Mitigation Plan.

The Risk Mitigation Plan would provide procedures for any required future excavation. If and when soil needed to be excavated, the work would be conducted in accordance with the procedures outlined by Duke in the Risk Mitigation Plan. Such procedures would protect human health and the environment by specifying how the excavation should be completed, worker protection standards, requirements for management and disposal of contaminated soils, backfilling and replacement of the soil cover. As Duke owns the

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property and it is used for commercial/industrial purposes and has limited access, this approach is eminently practical and reasonable, without overly burdening customers who are charged for such expenses.

Q36. WHAT IS YOUR RECOMMENDATION FOR THE AMOUNT THAT DUKE SHOULD BE ALLOWED TO CHARGE CUSTOMERS FOR INVESTIGATION AND SOIL REMEDIATION EXPENSES?

A36. Attachments JRC-2 and JRC-3 identify the maximum costs that Duke should be allowed to charge customers for 2013 to 2018 MGP investigation and remediation based on prudent remedial approaches allowed under the VAP Rules, as discussed earlier. The recommendation is based on the Staff review of Duke's claim as well as the remedial approach outlined in this testimony. I recommend charges of no more than \$3,876,102.

A comparison of my recommendations to the Company and Staff is shown in Table 1 below:

**TABLE 1
SUMMARY OF INVESTIGATION AND SOIL REMEDIATION
COSTS FOR STAFF DEFINED PORTIONS OF THE TWO MGP SITES**

MGP	Duke	Staff	OCC
East End MGP	\$33,022,327	\$12,428,054	\$2,387,342
West End MGP	<u>\$12,823,445</u>	<u>\$10,183,847</u>	<u>\$1,488,760</u>
Total	\$45,845,772	\$22,611,901	\$3,876,102

V. APPLICATION OF RECOMMENDED REMEDIAL APPROACH TO THE ENTIRETY OF BOTH MGP SITES

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**Q37. IF THE PUCO ALLOWS DUKE TO CHARGE CUSTOMERS FOR PRUDENT
REMEDiation OF THE PURCHASED PARCEL/WEST OF THE WEST PARCEL,
THE OHIO RIVER, AND OTHER AREAS OUTSIDE THE BOUNDARIES OF THE
MGP SITES, WHAT WOULD YOUR RECOMMENDATION BE?**

A37. For the East End MGP, the soil remedy recommended in A35 would be applied to both the WOW and Middle Parcels. As presented in Attachment JRC-4, the maximum amount Duke should be allowed to charge customers for the East End Site should be \$5,914,033 based on prudent remedial approaches allowed under the VAP Rules, as discussed earlier.

For the West End MGP, the soil remedy recommend in A33 would be applied and as presented in Attachment JRC-5, the maximum amount Duke should be allowed to charge customers for the West End Site should be \$4,145,280 based on prudent remedial approaches allowed under the VAP Rules, as discussed earlier.

**Q38. HOW DO THE RECOMMENDED COSTS COMPARE WITH THE COSTS
CLAIMED BY DUKE?**

A38. A comparison of my recommendations to Duke's Claim is shown in Table 2 below:

**TABLE 2
SUMMARY OF INVESTIGATION AND SOIL REMEDIATION
COSTS FOR THE TWO MGP SITES IN THEIR ENTIRETY**

MGP	Duke	OCC
East End MGP	\$33,022,327	\$5,914,033
West End MGP	\$12,823,445	\$4,145,280
Total	\$45,845,772	\$10,059,313

VI. CONCLUSION

Q39. WHAT IS YOUR RECOMMENDATION?

A39. For the portions of the property within the MGP Sites that Staff determined to be appropriate for recovery, based on prudent remedial approaches allowed under the VAP Rules, as discussed. I recommend that Duke be allowed to charge customers no more than \$3,876,102 for MGP investigation and remediation from 2013 to 2018. This compares to Staff's recommendation for cost recovery for the two MGP-Sites of \$22,611,901.

Alternatively, if the PUCO determines that the investigation and soil remediation activities implemented by Duke for the entire East and West End MGP Sites are to be reviewed for collection from customers, then I recommend charges to customers of no more than \$5,914,033 for the East End MGP and \$4,145,280 for the West End MGP (total amount for the East End and West End MGP Sites of \$10,059,313). This compares to the Utility's total requested amount for investigation and soil remediation costs to be collected from customers of \$45.8 million.

Q40. DOES THIS CONCLUDE YOUR TESTIMONY AT THIS TIME?

A40. Yes. However, I reserve the right to incorporate new information that may subsequently become available through outstanding discovery or otherwise. I also reserve the right to

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1 supplement my testimony if the PUCO changes any of the recommendations and
2 conclusions in the Staff Report.

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing *Direct Testimony of James R. Campbell Ph.D* was served on the persons listed below via electronic service this 7th day of November 2019.

/s/ Christopher Healey
Christopher Healey
Assistant Consumers' Counsel

The PUCO's e-filing system will electronically serve notice of the filing of this document on the following parties:

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Attachment JRC – 1
Resume of Dr. James R. Campbell

JAMES R. CAMPBELL, Ph.D., P.E.

EDUCATION

Ph.D. Civil and Environmental Engineering, Carnegie-Mellon University
M.S. Civil and Environmental Engineering, Carnegie-Mellon University
B.E. Civil Engineering, Youngstown State University

REGISTRATION

Professional Engineer – Pennsylvania
Certified Professional – Ohio Voluntary Action Program

EXPERIENCE

Engineering Management, Inc. - 1992 - present

Principal - Owner of firm that specializes in management and negotiation services associated with construction and environmental liabilities as well as expert services for environmental and construction related dispute resolution. Management activities include coordination and oversight of investigation, design, construction, emergency response and operation and maintenance work. Negotiation services include development of management strategies and negotiation support for technology applications and remedy selection, construction claims and other disputes. Expert services include analysis, expert reports and testimony regarding industrial operations, environmental conditions, NCP consistency, allocation and construction claims.

Carnegie Mellon University - 2002 - 2010

Adjunct Professor – Team taught senior level engineering design course for the Department of Civil and Environmental Engineering. Prepared project assignments, presented lectures and worked with students in a studio setting regarding various design projects.

Beazer Environmental Services, Inc. - 1991 to 1992

Director of Remedial Design - Responsible for management of the remedial design phase for all internal and external projects. This included in-house development of conceptual designs as well as oversight of detailed design activities by subsidiary companies. The annual program budget for design activities was approximately \$5 million. Also provided management oversight for Beazer's technology joint venture company.

McLaren/Hart Environmental Engineering Corporation - 1990 to 1991

Principal Engineer - Responsible for client development and management of major projects with an emphasis on RCRA and CERCLA remedial actions. Client development activities included identification of sales leads, presentations, and preparation of proposals and qualification statements. Project activities included expert testimony, negotiation support, project direction, etc. Served as Trustee for a multi-million dollar PRP-led CERCLA remedial action.

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Keystone Environmental Resources, Inc./Koppers Company, Inc. - 1984 to 1990

Division Manager - 1988 to 1990 - Managed Keystone's Environmental Science and Engineering Division that was comprised of approximately 55 professionals and technicians. The Division generated approximately \$5.5 million in annual net revenue through consulting services such as audits, site investigations, risk assessments, and feasibility studies. The Division's engineering services included treatability studies and conceptual designs for treatment of process wastewater, contaminated groundwater and soil. Development of proprietary treatment technologies was also handled within the Division. Accomplished goal of stabilizing the Division and returning it to profitability following the sale of Keystone.

Assistant Manager, Corporate Environmental Programs – 1988 - Responsible for managing Koppers' corporate environmental programs including RCRA, CERCLA, CWA, CAA, environmental auditing and training. Other responsibilities included acquisition/divestiture due diligence and management of environmental reserves.

Manager, Previously Operated Properties - 1986 to 1988 - Responsible for management of over 50 formerly owned/operated chemical plant sites and disposal sites having an annual program budget of approximately \$10 million. Environmental management responsibilities included oversight of investigatory and remedial activities, as well as negotiation of government orders and private party agreements. Other responsibilities included acquisition/divestiture due diligence, management of environmental reserves, negotiation of real estate transactions and coordination with counsel on environmental litigation and toxic tort actions.

Project Manager - 1984 to 1986 - Served as project manager for Superfund emergency response actions, RI/FS projects, and RCRA Part B permitting activities. Responsibilities included project budget and schedule considerations, negotiation of technical issues in government orders, work plans, and reports. Served as Koppers' representative in multi-PRP Superfund sites.

NUS Corporation - 1983 to 1984

Project Engineer - As a part of EPA Superfund contract work, responsibilities included process engineering, chemistry, and risk assessment portions of RI/FS projects. General duties included planning and scheduling of project activities as well as preparation of proposals and reports.

EXPERT ANALYSIS, REPORTS AND TESTIMONY

- Construction Claim, MB&R Piping Contractors, Inc. v. Borough of East Brady v. Gibson-Thomas Engineering Co. Inc., Expert Affidavit and Trail Testimony, Court of Common Pleas, Clarion County, Pennsylvania, Civil Division No. 1066-2012, 2015.
- Tort Claim, Onder Reality, Inc. et al. v. Keyspan Corp. et al., Expert Affidavit, Supreme Court of the State of New York, County of Suffolk, Index No. 10-837, 2014.
- Expert Testimony in the Matter of the Application of Duke Energy Ohio, Inc. for an Increase in Gas Rates before the Public Utilities Commission Of Ohio Case No.12-1685-GA-AIR, 2012 and 2013.
- Cost Recovery at Former Oil Recycling Site, Expert Analysis, United States of America v. AK Steel Corporation et al., United States District Court for the Western District of Pennsylvania, Civil Action No. 97-1863, 2010 and 2012.
- Cost Recovery at Former Railcar Manufacturing and Repair Site, Expert Report and Deposition Testimony, Trinity Industries, Inc. v. Honeywell International, Inc., United States District Court for the Western District of Pennsylvania, Pittsburgh Division, Civil Action No. 2:08-cv-00211-DSC, 2009.
- Cost Recovery at Former Coke Plant and Tar Distillation Sites, Analysis of Coke Plant Operations, Declaration in Support of Motion to Intervene, United States of America v. ExxonMobil Corporation, U.S. District Court for the Northern District of West Virginia, Case No. 1:08-CV-124, 2009.
- Allocation Mediation at Former Manufactured Gas Plant/Tar Distillation Facility, Analysis of Tar Plant Operations, Expert Report, Mediation discussion support, 2009 (confidential).
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- Cost Recovery at Chemical Manufacturing Plant Site, Analysis of Necessity of Activities and Appropriateness of Response Cost, Expert Report and Deposition Testimony, Wacker Chemical Corporation vs. Bayer Cropscience, Inc., U.S. District Court for the Eastern District of Michigan, Southern Division, Case No. 2:05-CV-72207, 2006-2007.
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- Cost Recovery at Industrial Park, Analysis of Plant Operations, Muniz et al. v. Rexnord et al. (Defendants) and Rexnord et al. (Third-Party Plaintiffs) v. Arrow et al. (Third-Party Defendants), in the United States District Court, Northern District of Illinois, Eastern Division, Civil Action No. 1:04-cv-02405, 2006.

- Cost Recovery at Former Coke Plant Site, Analysis of Plant Operations and Response Costs, Maxus Energy Corp., et al. v. Ace Lakefront Properties, Inc. et al., in the United States District Court, Northern District of Ohio, Civil Action No. 1:00CV972, 2005.
- Property Takings Claim, Trial Testimony, John R Sand and Gravel Company v. United States of America, United States Court of Federal Claims, Case No. 02-509L, 2004.
- Cost Recovery at Former Oil Refinery Site, Analysis of Facts and Events, USA v. Sprague Energy Corp., et al. v. ARCADIS Geraghty & Miller, Inc. et al., in the United States District Court, Eastern District of North Carolina, Southern Division, Civil Action No. 7:01CV-14-F(1), 2004.
- Cost Recovery at Former Manufactured Gas Plant/Tar Plant Site, Analysis of Plant Operations, Beazer East, Inc. v. KeySpan Energy Services, Inc. and KeySpan Corporation v. Beazer East, Inc. and Honeywell International, Inc. in the United States District Court, Eastern District of New York, Case No. 02-CV-3728, 2004.
- Cost Recovery at Former Manufacturing Site, Evaluation of Response Cost, Coordination of Experts, Expert Report and Mediation Presentation, Signature at Durant LLC v. General Motors Corporation, Case No. CO2-0938.SBA, United States District Court, Northern District of California, 2002.
- Cost Recovery at Former Manufactured Gas Plant Site, Analysis of Plant Operations, Expert Report and Deposition Testimony, New Jersey Natural Gas Company v. St. Paul Fire & Marine Insurance Company, et al., Docket No. OCN-L-859-95, Superior Court New Jersey, Law Division: Ocean County, 2002.
- Cost Recovery at Former Manufactured Gas Plant Site, Analysis of Plant Operations, Expert Report and Deposition Testimony, Niagara Mohawk Power Corporation v. Consolidated Rail Corporation et al., Case No. 98-CV-1039, United States District Court, Northern District of New York, 2001.
- Cost Recovery at Oil Recycling Facility, NCP Consistency and Cost Analysis, Expert Report and Deposition Testimony, Centerior Service Company and General Electric Company v. Acme Scrap Iron & Metal Corp et al., Case No. 1A:94-CV-1588 and consolidated cases, United States District Court, Northern District Of Ohio, Eastern Division, 2000.
- Cost Recovery at Oil Recycling Facility, NCP Consistency and Remedy Driver Analysis, Expert Report and Deposition Testimony, United States of America (Plaintiff) v. Alvin F. Laskin et al. (Defendant) v. General Motors, et al. (Defendants and Third-Party Plaintiffs) v. Abex Corporation et al. (Third-Party Defendants), Civil Action C84-2035Y, United States District Court, Northern District Of Ohio, Eastern Division, 2000.
- Allocation Mediation at Former Wood Treating and Manufactured Gas/Coke Plant Facility, Analysis of Wood Treating and Gas/Coke Plant Operations, Expert Report, Coordination of Experts and Presentation of Allocation Position to Participants and Mediator, 2000 (confidential).

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- Cost Recovery at Glass Manufacturing Facility, NCP Consistency Expert Report, Cargill, Incorporated v. Libbey-Owens-Ford Co. and Kuhlman Corporation, Case Number 3:93CV7486, United States District Court, Northern District of Ohio, Western Division, 1995.
- Cost Recovery at Manufactured Gas Plant Site, NCP Consistency, Deposition Testimony, The Upjohn Company v. Consumers Power Company, Civil Action No. K88-227-CA 4, United States District Court, Western District of Michigan, Southern Division, 1990.
- Fact witness deposition testimony in six different cases.

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Ohio Environmental Protection Agency

Division of Environmental Response & Revitalization
Voluntary Action Program

Under the authority of Ohio Revised Code Section 3746.04 (B)(5) and Ohio Administrative Code Rule 3745-300-05

Recognizes

James R. Campbell

as a

Certified Professional

(Number CP 355)

FEB 05 2019

Issuance Date Certificate

A handwritten signature in black ink, appearing to read "Jamie A. Sturges".

Director, Ohio Environmental Protection Agency

FEB 05 2020

Date of Expiration

A handwritten signature in black ink, appearing to read "Lisa Shock".

Manager, Voluntary Action Program

SCOPE, LIMITATION, OBLIGATIONS AND RESPONSIBILITIES OF CERTIFICATION ON REVERSE SIDE

Attachment JRC – 2

Estimate of Prudent Investigation and Soil Remediation Costs

Middle Parcel of the East End MGP Site

Attachment JRC-2
Estimate of Prudent Investigation and Soil Remediation Costs
Middle Parcel of the East End MGP Site

<u>Item</u>	<u>Price</u>	<u>Unit</u>	<u>Quantity</u>	<u>Cost</u>	
Investigation	--	--	--	\$1,220,853	¹
Design	--	--	--	\$200,000	²
Construction Management					
Admin	\$14,266	Month	2	\$28,532	³
Temp Facilities	\$1,200	Month	2	\$2,400	³
Field Oversight	\$4,100	Day	44	\$180,400	⁴
Air Monitoring	\$36,234	Month	1	\$36,234	⁵
Soil Cover					
Mob	\$93,800	L.S.	--	\$93,800	⁶
Demob & Record Documents	\$72,850	L.S.	--	\$72,850	⁶
Insurance Rider	\$3,500	L.S.	--	\$3,500	⁶
Grubbing & Erosion Control	\$1.58	S.Y.	14,900	\$23,542	^{6,7,9}
Soil Cover	\$15.42	S.Y.	14,900	\$229,758	^{6,8,9}
Hydroseeding	\$3,900	Acre	3.1	\$12,090	^{6,9}
Institutional Controls	\$25,000	L.S.	--	\$25,000	²
Duke Internal Charges	\$3,972	Month	2	\$7,944	¹⁰
Inflation Adjustment	--	--	--	\$106,216	¹¹
Carrying Charges	--	--	--	<u>\$144,223</u>	¹²
Total				\$2,387,342	

Notes:

1 - From Duke cost claim as adjusted by PUCO Staff.

2 - Based on previous experience with similar work.

3 - Based on monthly average Haley & Aldrich cost during 2010 and 2011 (\$14,266/month for admin and \$1,200 for facilities). Cost taken from Haley & Aldrich invoice dated December 17, 2011 (Attachment 6).

4 - Based on daily Haley & Aldrich cost during 2010 and 2011 (\$2,900). Cost taken from Haley & Aldrich invoice dated December 17, 2011 (Attachment 6).

response to Staff Data Requests 70-006 and 109-001, Case Nos. 12-1685-GA-AIR, 12-1686-GA-ATA, 12-1687-GA-ALT and 12-1688-GA-AAM.

6 - RW Collins cost taken from Haley & Aldrich invoice dated December 17, 2011 (Attachment 6).

7 - Based on sq. yd. cost for West Parcel from RW Collins (\$24,750) and total square yardage for West (15,711 sq. yd.) as measured in Adobe Acrobat from DEO-MGP 011370, Case Nos. 12-1685-GA-AIR, 12-1686-GA-ATA, 12-1687-GA-ALT and 12-1688-GA-AAM.

8 - Based on sq. yd. cost for West Parcel soil cover and erosion control from RW Collins (\$15.42=\$242,200 (item 32)/15,711) (Attachment 6) as measured in Adobe Acrobat from DEO-MGP 011370, Case Nos. 12-1685-GA-AIR, 12-1686-GA-ATA, 12-1687-GA-ALT and 12-1688-GA-AAM.

9 - Middle Parcel area as measured in Adobe Acrobat from drawing C-102 in OCC-POD-01-001(s) CONF Attachment East End in Case No. 19-1085-GA-AAM.

10 - Based on monthly average Duke internal cost during 2017 and 2018 for the East End MGP.

Attachment JRC-2
Estimate of Prudent Investigation and Soil Remediation Costs
Middle Parcel of the East End MGP Site

- 11 - Adjust unit costs from 2010 to 2017 at 2% inflation per year.
- 12 - Calculated from Attachment JRC-4 based on Staff reductions.
- L.S. = lump sum
- S.Y. = square yard
- C.Y. = cubic yard

Attachment JRC – 3
Estimate of Prudent Investigation and Soil Remediation Costs
Phase 2A Area of the West End MGP Site

Attachment JRC-3
Estimate of Prudent Investigation and Soil Remediation Costs
Phase 2A Area of the West End MGP Site

<u>Item</u>	<u>Price</u>	<u>Unit</u>	<u>Quantity</u>	<u>Cost</u>	
Investigation	--	--	--	\$763,702	¹
Design	--	--	--	\$200,000	²
Construction Management					
Admin	\$14,266	Month	1	\$14,266	³
Temp Facilities	\$1,200	Month	1	\$1,200	³
Field Oversight	\$4,100	Day	22	\$90,200	⁴
Air Monitoring	\$36,234	Month	1	\$36,234	⁵
Soil Cover					
Mob	\$93,800	L.S.	--	\$93,800	⁶
Demob & Record Documents	\$72,850	L.S.	--	\$72,850	⁶
Insurance Rider	\$3,500	L.S.	--	\$3,500	⁶
Grubbing & Erosion Control	\$1.58	S.Y.	1,350	\$2,133	^{6,7,9}
Soil Cover	\$15.42	S.Y.	1,350	\$20,817	^{6,8,9}
Hydroseeding	\$3,900	Acre	0.3	\$1,170	^{6,9}
Institutional Controls	\$25,000	L.S.	--	\$25,000	²
Duke Internal Charges	\$31,360	Month	1	\$31,360	¹⁰
Inflation Adjustment	--	--	--	\$21,670	¹¹
Carrying Charges	--	--	--	<u>\$110,858</u>	¹²
Total				\$1,488,760	

Notes:

- 1 - From Duke cost claim as adjusted by PUCO Staff.
- 2 - Based on previous experience with similar work.
- 3 - Based on monthly average Haley & Aldrich cost during 2010 and 2011 (\$14,266/month for admin and \$1,200 for facilities). Cost taken from Haley & Aldrich invoice dated December 17, 2011 (Attachment 6).
- 4 - Based on daily Haley & Aldrich cost during 2010 and 2011 (\$2,900). Cost taken from Haley & Aldrich invoice dated December 17, 2011 (Attachment 6).
- 5 - Based on monthly average cost for AECOM and Columbia analytical for 2010 and 2011 from Duke's response to Staff Data Requests 70-006 and 109-001, Case Nos. 12-1685-GA-AIR, 12-1686-GA-ATA, 12-1687-GA-ALT and 12-1688-GA-AAM.
- 6 - RW Collins cost taken from Haley & Aldrich invoice dated December 17, 2011 (Attachment 6).
- 7 - Based on sq. yd. cost for West Parcel from RW Collins (\$24,750) and total square yardage for West (15,711 sq. yd.) as measured in Adobe Acrobat from DEO-MGP 011370, Case Nos. 12-1685-GA-AIR, 12-1686-GA-ATA, 12-1687-GA-ALT and 12-1688-GA-AAM.
- 8 - Based on sq. yd. cost for West Parcel soil cover and erosion control from RW Collins (\$15.42=\$242,200 (item 32)/15,711) (Attachment 6) as measured in Adobe Acrobat from DEO-MGP 011370, Case Nos. 12-1685-GA-AIR, 12-1686-GA-ATA, 12-1687-GA-ALT and 12-1688-GA-AAM.
- 9 - Phase 2A area as measured in Adobe Acrobat from Figure 2.1 in OCC-POD-01-014(d) CONF Attachment in Case No. 18-283-GA-RDR

Attachment JRC-3
Estimate of Prudent Investigation and Soil Remediation Costs
Phase 2A Area of the West End MGP Site

10 - Based on monthly average Duke internal cost during 2017 and 2018 for the East End MGP.

11 - Adjust unit costs from 2010 to 2013 at 2% inflation per year.

12 - Calculated from Attachment JRC-5 based on Staff reductions.

L.S. = lump sum

S.Y. = square yard

C.Y. = cubic yard

Attachment JRC – 4

Estimate of Prudent Investigation and Soil Remediation Costs

West of West Parcel and Middle Parcel of the East End MGP Site

Attachment JRC-4
Estimate of Prudent Investigation and Soil Remediation Costs
West of West Parcel and Middle Parcel of the East End MGP Site

<u>Item</u>	<u>Price</u>	<u>Unit</u>	<u>Quantity</u>	<u>Cost</u>	
Investigation	--	--	--	\$4,339,659	¹
Design	--	--	--	\$200,000	²
Construction Management					
Admin	\$14,266	Month	2	\$28,532	³
Temp Facilities	\$1,200	Month	2	\$2,400	³
Field Oversight	\$4,100	Day	44	\$180,400	⁴
Air Monitoring	\$36,234	Month	1	\$36,234	⁵
Soil Cover					
Mob	\$93,800	L.S.	--	\$93,800	⁶
Demob & Record Documents	\$72,850	L.S.	--	\$72,850	⁶
Insurance Rider	\$3,500	L.S.	--	\$3,500	⁶
Grubbing & Erosion Control	\$1.58	S.Y.	16,700	\$26,386	^{6,7,9}
Soil Cover	\$15.42	S.Y.	16,700	\$257,514	^{6,8,9}
Hydroseeding	\$3,900	Acre	3.4	\$13,260	^{6,9}
Institutional Controls	\$25,000	L.S.	--	\$25,000	²
Duke Internal Charges	\$3,972	Month	2	\$7,944	¹⁰
Inflation Adjustment	--	--	--	\$110,981	¹¹
Carrying Charges	--	--	--	<u>\$515,573</u>	¹²
Total				\$5,914,033	

Notes:

1 - From Duke cost claim.

2 - Based on previous experience with similar work.

3 - Based on monthly average Haley & Aldrich cost during 2010 and 2011 (\$14,266/month for admin and \$1,200 for facilities). Cost taken from Haley & Aldrich invoice dated December 17, 2011 (Attachment 6).

4 - Based on daily Haley & Aldrich cost during 2010 and 2011 (\$2,900). Cost taken from Haley & Aldrich invoice dated December 17, 2011 (Attachment 6).

5 - Based on monthly average cost for AECOM and Columbia analytical for 2010 and 2011 from Duke's response to Staff Data Requests 70-006 and 109-001, Case Nos. 12-1685-GA-AIR, 12-1686-GA-ATA, 12-1687-GA-ALT and 12-1688-GA-AAM.

6 - RW Collins cost taken from Haley & Aldrich invoice dated December 17, 2011 (Attachment 6).

7 - Based on sq. yd. cost for West Parcel from RW Collins (\$24,750) and total square yardage for West (15,711 sq. yd.) as measured in Adobe Acrobat from DEO-MGP 011370, Case Nos. 12-1685-GA-AIR, 12-1686-GA-ATA, 12-1687-GA-ALT and 12-1688-GA-AAM.

8 - Based on sq. yd. cost for West Parcel soil cover and erosion control from RW Collins (\$15.42=\$242,200 (item 32)/15,711) (Attachment 6) as measured in Adobe Acrobat from DEO-MGP 011370, Case Nos. 12-1685-GA-AIR, 12-1686-GA-ATA, 12-1687-GA-ALT and 12-1688-GA-AAM.

9 - Middle Parcel and WOW areas as measured in Adobe Acrobat from drawing C-102 in OCC-POD-01-001(s) CONF Attachment East End in Case No. 19-1085-GA-AAM.

Attachment JRC-4
Estimate of Prudent Investigation and Soil Remediation Costs
West of West Parcel and Middle Parcel of the East End MGP Site

10 - Based on monthly average claimed Duke internal cost during 2017 and 2018 for the East End MGP.

11 - Adjust unit costs from 2010 to 2017 at 2% inflation per year.

12 - Calculated based on assumption that recommended remedial work would have been conducted in June and July 2017, with design from January-May 2017.

L.S. = lump sum

S.Y. = square yard

C.Y. = cubic yard

**East End MGP
Adjusted MGP Carrying Cost Calculations**

	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13
Monthly MGP Costs	\$129,247.00	\$41,905.00	\$30,348.00	\$9,570.00	\$1,709.00	\$4,464.00	\$82,596.00
Cumulative MGP Costs	\$129,247.00	\$171,152.00	\$201,500.00	\$211,070.00	\$212,779.00	\$217,243.00	\$299,839.00
Cost of Debt Rate	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
Monthly Carrying Costs ¹	\$0.00	\$665.88	\$826.05	\$914.53	\$939.53	\$953.22	\$1,146.20
Cumulative Carrying Costs	\$0.00	\$665.88	\$1,491.93	\$2,406.46	\$3,345.99	\$4,299.21	\$5,445.41

¹ Modified to reflect Half-Month Convention

Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14
\$14,438.00	\$52,251.00	\$54,286.00	\$25,685.00	\$7,488.00	\$1,538.10	\$16,345.41	\$3,065.28	\$8,161.41
\$314,277.00	\$366,528.00	\$420,814.00	\$446,499.00	\$453,987.00	\$455,525.10	\$471,870.51	\$474,935.79	\$483,097.20
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$1,361.29	\$1,509.12	\$1,745.27	\$1,922.54	\$1,996.08	\$2,016.09	\$2,055.73	\$2,098.75	\$2,123.64
\$6,806.70	\$8,315.81	\$10,061.09	\$11,983.63	\$13,979.71	\$15,995.79	\$18,051.52	\$20,150.28	\$22,273.92

May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15
\$4,227.87	\$20,266.09	\$111,942.54	\$2,155.44	\$22,492.68	\$22,966.07	\$13,829.57	\$13,819.18	\$24,488.23
\$487,325.07	\$507,591.16	\$619,533.70	\$621,689.14	\$644,181.82	\$667,147.89	\$680,977.46	\$694,796.64	\$719,284.87
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$2,151.10	\$2,205.40	\$2,498.46	\$2,751.38	\$2,806.01	\$2,906.78	\$2,988.34	\$3,049.63	\$3,134.55
\$24,425.02	\$26,630.42	\$29,128.88	\$31,880.25	\$34,686.27	\$37,593.05	\$40,581.39	\$43,631.03	\$46,765.57

Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15
\$15,489.87	\$8,768.39	\$11,634.05	\$14,322.71	\$2,629.54	\$4,918.10	\$6,223.57	\$8,569.37	\$10,360.28
\$734,774.74	\$743,543.13	\$755,177.18	\$769,499.89	\$772,129.43	\$777,047.53	\$783,271.10	\$791,840.47	\$802,200.75
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$3,223.17	\$3,276.94	\$3,322.16	\$3,379.70	\$3,417.28	\$3,434.01	\$3,458.71	\$3,491.50	\$3,533.46
\$49,988.74	\$53,265.68	\$56,587.84	\$59,967.54	\$63,384.82	\$66,818.83	\$70,277.53	\$73,769.03	\$77,302.49

Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16
\$67,684.23	\$154,903.94	\$17,703.57	\$59,212.45	\$32,838.92	\$66,052.14	\$75,841.93	\$18,220.16	\$9,887.36
\$869,884.98	\$1,024,788.92	\$1,042,492.49	\$1,101,704.94	\$1,134,543.86	\$1,200,596.00	\$1,276,437.93	\$1,294,658.09	\$1,304,545.45
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$3,706.46	\$4,199.86	\$4,582.47	\$4,752.97	\$4,957.02	\$5,176.23	\$5,490.76	\$5,699.26	\$5,761.57
\$81,008.95	\$85,208.81	\$89,791.28	\$94,544.25	\$99,501.27	\$104,677.50	\$110,168.25	\$115,867.52	\$121,629.09

Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17
\$67,592.42	\$30,436.85	\$48,395.10	\$528,155.95	\$125,006.22	\$40,000.00	\$40,713.27	\$55,856.28	\$49,957.18
\$1,372,137.87	\$1,402,574.72	\$1,450,969.82	\$1,979,125.77	\$2,104,131.99	\$2,144,131.99	\$2,184,845.26	\$2,240,701.54	\$2,290,658.72
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$5,933.31	\$6,150.61	\$6,325.36	\$7,603.38	\$9,051.22	\$9,416.99	\$9,595.90	\$9,809.96	\$10,044.52
\$127,562.40	\$133,713.01	\$140,038.37	\$147,641.75	\$156,692.97	\$166,109.95	\$175,705.85	\$185,515.82	\$195,560.33

May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18
\$36,289.53	\$432,533.52	\$430,640.50	\$0.00	\$10,113.00	\$0.00	\$7,272.75	\$61,543.22	\$80,878.24
\$2,326,948.25	\$2,759,481.77	\$3,190,122.27	\$3,190,122.27	\$3,200,235.27	\$3,200,235.27	\$3,207,508.02	\$3,269,051.24	\$3,349,929.48
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$10,235.70	\$11,274.92	\$13,188.29	\$14,142.88	\$14,165.29	\$14,187.71	\$14,203.83	\$14,356.37	\$14,672.07
\$205,796.03	\$217,070.95	\$230,259.24	\$244,402.11	\$258,567.40	\$272,755.11	\$286,958.94	\$301,315.32	\$315,987.39

Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18
\$8,776.25	\$230,526.02	\$244,620.54	\$8,750.52	\$48,977.45	\$267,735.84	\$108,841.21	\$23,371.77	\$393,717.25
\$3,358,705.73	\$3,589,231.75	\$3,833,852.29	\$3,842,602.81	\$3,891,580.26	\$4,159,316.10	\$4,268,157.31	\$4,291,529.08	\$4,685,246.33
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$14,870.81	\$15,401.26	\$16,454.50	\$17,016.14	\$17,144.11	\$17,846.15	\$18,680.90	\$18,973.97	\$19,898.52
\$330,858.20	\$346,259.46	\$362,713.96	\$379,730.11	\$396,874.21	\$414,720.37	\$433,401.27	\$452,375.24	\$472,273.76

Nov-18	Dec-18
\$39,572.75	\$673,643.36
\$4,724,819.08	\$5,398,462.44
5.32%	5.32%
\$20,858.98	\$22,439.94
\$493,132.73	\$515,572.67

Attachment JRC – 5
Estimate of Prudent Investigation and Soil Remediation Costs
Phase 2A Area of the West End MGP Site

Attachment JRC-5
Estimate of Prudent Investigation and Soil Remediation Costs
Phase 2A Area of the West End MGP Site

<u>Item</u>	<u>Price</u>	<u>Unit</u>	<u>Quantity</u>	<u>Cost</u>	
Investigation	--	--	--	\$3,083,485	¹
Design	--	--	--	\$200,000	²
Construction Management					
Admin	\$14,266	Month	1	\$14,266	³
Temp Facilities	\$1,200	Month	1	\$1,200	³
Field Oversight	\$4,100	Day	22	\$90,200	⁴
Air Monitoring	\$36,234	Month	1	\$36,234	⁵
Soil Cover					
Mob	\$93,800	L.S.	--	\$93,800	⁶
Demob & Record Documents	\$72,850	L.S.	--	\$72,850	⁶
Insurance Rider	\$3,500	L.S.	--	\$3,500	⁶
Grubbing & Erosion Control	\$1.58	S.Y.	1,350	\$2,133	^{6,7,9}
Soil Cover	\$15.42	S.Y.	1,350	\$20,817	^{6,8,9}
Hydroseeding	\$3,900	Acre	0.3	\$1,170	^{6,9}
Institutional Controls	\$25,000	L.S.	--	\$25,000	²
Duke Internal Charges	\$31,360	Month	1	\$31,360	¹⁰
Inflation Adjustment	--	--	--	\$21,670	¹¹
Carrying Charges	--	--	--	<u>\$447,595</u>	¹²
Total				\$4,145,280	

Notes:

- 1 - From Duke cost claim.
- 2 - Based on previous experience with similar work.
- 3 - Based on monthly average Haley & Aldrich cost during 2010 and 2011 (\$14,266/month for admin and \$1,200 for facilities). Cost taken from Haley & Aldrich invoice dated December 17, 2011 (Attachment 6).
- 4 - Based on daily Haley & Aldrich cost during 2010 and 2011 (\$2,900). Cost taken from Haley & Aldrich invoice dated December 17, 2011 (Attachment 6).
- 5 - Based on monthly average cost for AECOM and Columbia analytical for 2010 and 2011 from Duke's response to Staff Data Requests 70-006 and 109-001, Case Nos. 12-1685-GA-AIR, 12-1686-GA-ATA, 12-1687-GA-ALT and 12-1688-GA-AAM.
- 6 - RW Collins cost taken from Haley & Aldrich invoice dated December 17, 2011 (Attachment 6).
- 7 - Based on sq. yd. cost for West Parcel from RW Collins (\$24,750) and total square yardage for West (15,711 sq. yd.) as measured in Adobe Acrobat from DEO-MGP 011370, Case Nos. 12-1685-GA-AIR, 12-1686-GA-ATA, 12-1687-GA-ALT and 12-1688-GA-AAM.
- 8 - Based on sq. yd. cost for West Parcel soil cover and erosion control from RW Collins (\$15.42=\$242,200 (item 32)/15,711) (Attachment 6) as measured in Adobe Acrobat from DEO-MGP 011370, Case Nos. 12-1685-GA-AIR, 12-1686-GA-ATA, 12-1687-GA-ALT and 12-1688-GA-AAM.
- 9 - Phase 2A area as measured in Adobe Acrobat from Figure 2.1 in OCC-POD-01-014(d) CONF Attachment in Case No. 18-283-GA-RDR

Attachment JRC-5
Estimate of Prudent Investigation and Soil Remediation Costs
Phase 2A Area of the West End MGP Site

- 10 - Based on monthly average Duke internal cost during 2017 and 2018 for the East End MGP.
 - 11 - Adjust unit costs from 2010 to 2013 at 2% inflation per year.
 - 12 - Calculated based on assumption that recommended remedial work would have been conducted in June 2013, with design from January-May 2013.
- L.S. = lump sum
S.Y. = square yard
C.Y. = cubic yard

**West End MGP
Adjusted MGP Carrying Cost Calculations**

	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13
Monthly MGP Costs	\$40,000.00	\$40,000.00	\$40,000.00	\$40,000.00	\$40,000.00	\$415,438.00	\$24,553.00	\$7,974.00
Cumulative MGP Costs	\$40,000.00	\$80,000.00	\$120,000.00	\$160,000.00	\$200,000.00	\$615,438.00	\$639,991.00	\$647,965.00
Cost of Debt Rate	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
Monthly Carrying Costs ¹	\$0.00	\$266.00	\$443.33	\$620.67	\$798.00	\$1,807.55	\$2,782.87	\$2,854.97
Cumulative Carrying Costs	\$0.00	\$266.00	\$709.33	\$1,330.00	\$2,128.00	\$3,935.55	\$6,718.42	\$9,573.39

¹ Modified to reflect Half-Month Convention

Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
\$29,219.00	\$2,840.00	\$89,045.00	\$0.00	\$130,531.15	\$25,550.85	\$10,818.90	\$24,341.18	\$13,825.29	\$13,733.60
\$677,184.00	\$680,024.00	\$769,069.00	\$769,069.00	\$899,600.15	\$925,151.00	\$935,969.90	\$960,311.08	\$974,136.37	\$987,869.97
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$2,937.41	\$3,008.48	\$3,212.16	\$3,409.54	\$3,698.88	\$4,044.87	\$4,125.48	\$4,203.42	\$4,288.03	\$4,349.11
\$12,510.80	\$15,519.28	\$18,731.44	\$22,140.98	\$25,839.86	\$29,884.73	\$34,010.21	\$38,213.63	\$42,501.66	\$46,850.77

Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15
\$11,683.53	\$2,108.74	\$4,044.78	\$18,775.77	\$1,257.35	\$6,057.40	\$7,385.30	\$35,357.80	\$23,798.53	\$5,014.00
\$999,553.50	\$1,001,662.24	\$1,005,707.02	\$1,024,482.79	\$1,025,740.14	\$1,031,797.54	\$1,039,182.84	\$1,074,540.64	\$1,098,339.17	\$1,103,353.17
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$4,405.46	\$4,436.03	\$4,449.67	\$4,500.25	\$4,544.66	\$4,560.88	\$4,590.67	\$4,685.42	\$4,816.55	\$4,880.42
\$51,256.23	\$55,692.26	\$60,141.92	\$64,642.18	\$69,186.84	\$73,747.71	\$78,338.39	\$83,023.81	\$87,840.36	\$92,720.78

May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16
\$5,437.50	\$0.00	\$26,395.37	\$500.00	\$0.00	\$0.00	\$24,858.34	\$0.00	\$50,229.08	\$20,555.46
\$1,108,790.67	\$1,108,790.67	\$1,135,186.04	\$1,135,686.04	\$1,135,686.04	\$1,135,686.04	\$1,160,544.38	\$1,160,544.38	\$1,210,773.46	\$1,231,328.92
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$4,903.59	\$4,915.64	\$4,974.15	\$5,033.77	\$5,034.87	\$5,034.87	\$5,089.98	\$5,145.08	\$5,256.42	\$5,413.33
\$97,624.36	\$102,540.00	\$107,514.15	\$112,547.92	\$117,582.79	\$122,617.67	\$127,707.64	\$132,852.72	\$138,109.14	\$143,522.47

Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16
\$18,687.31	-\$1,434.52	\$11,294.35	\$5,936.93	\$26,120.40	\$13,278.99	\$9,650.62	\$5,326.03	\$12,080.54	\$4,032.83
\$1,250,016.23	\$1,248,581.71	\$1,259,876.06	\$1,265,812.99	\$1,291,933.39	\$1,305,212.38	\$1,314,863.00	\$1,320,189.03	\$1,332,269.57	\$1,336,302.40
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$5,500.32	\$5,538.56	\$5,560.41	\$5,598.61	\$5,669.67	\$5,757.01	\$5,807.83	\$5,841.03	\$5,879.62	\$5,915.33
\$149,022.79	\$154,561.34	\$160,121.76	\$165,720.37	\$171,390.04	\$177,147.05	\$182,954.88	\$188,795.91	\$194,675.53	\$200,590.86

Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17
\$4,791.59	\$4,005.40	\$7,249.14	\$48,192.62	\$107,394.03	\$175,116.71	\$9,336.21	\$13,865.66	\$65,355.56	\$3,945.96
\$1,341,093.99	\$1,345,099.39	\$1,352,348.53	\$1,400,541.15	\$1,507,935.18	\$1,683,051.89	\$1,692,388.10	\$1,706,253.76	\$1,771,609.32	\$1,775,555.28
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$5,934.90	\$5,954.40	\$5,979.34	\$6,102.24	\$6,447.12	\$7,073.35	\$7,482.23	\$7,533.66	\$7,709.26	\$7,862.88
\$206,525.76	\$212,480.16	\$218,459.50	\$224,561.74	\$231,008.86	\$238,082.21	\$245,564.44	\$253,098.10	\$260,807.36	\$268,670.24

Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18
\$60,990.76	\$302,237.09	\$474,167.80	\$24,649.21	\$191,701.46	\$80,658.84	\$94,151.97	\$23,844.83	\$60,656.28	\$148,388.02
\$1,836,546.04	\$2,138,783.13	\$2,612,950.93	\$2,637,600.14	\$2,829,301.59	\$2,909,960.43	\$3,004,112.40	\$3,027,957.22	\$3,088,613.50	\$3,237,001.51
5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%	5.32%
\$8,006.82	\$8,811.98	\$10,533.01	\$11,638.72	\$12,118.30	\$12,722.03	\$13,109.53	\$13,371.09	\$13,558.40	\$14,021.78
\$276,677.07	\$285,489.04	\$296,022.06	\$307,660.78	\$319,779.08	\$332,501.11	\$345,610.63	\$358,981.72	\$372,540.12	\$386,561.90

Sep-18	Oct-18	Nov-18	Dec-18
\$125,311.53	\$23,628.73	\$114,829.73	\$297,887.69
\$3,362,313.04	\$3,385,941.77	\$3,500,771.49	\$3,798,659.18
5.32%	5.32%	5.32%	5.32%
\$14,628.48	\$14,958.63	\$15,265.55	\$16,180.40
\$401,190.38	\$416,149.01	\$431,414.56	\$447,594.96

Attachment JRC – 6

Relevant Pages from Haley & Aldrich Invoice dated December 17, 2011

Haley & Aldrich, Inc.
75 Washington Avenue
Suite 203
Portland, ME 04101-2617

Tel: 207.482.4600
Fax: 207.775.7666
HaleyAldrich.com



17 December 2011
File No. 36604-700

Duke Energy Business Services, LLC
526 South Church Street
Mail Code 13K
Charlotte, North Carolina 28202

Attention : Ms. Jessica L. Bednarcik, P.E.

Subject: Monthly Invoice and Progress Report
November 2011
East End Gas Works Site Remediation – Design-Build Services

Dear Ms. Bednarcik,

Enclosed please find Haley & Aldrich, Inc's (Haley & Aldrich) invoice number 194148 for professional services rendered on the East End Gas Works Site Remediation Design-Build project under Duke Contract 13626. Services provided on the project for the referenced period include the following:

Middle Parcel VAP Phase II Work Plan

- Base plan preparation, task kick-off call with Duke, site data/plans assembly for use in planning investigation locations.

Construction Services (See attached table for cost breakdown)

- RW Collins submittals and pay requisition review;
- Envirocon submittals and pay requisition coordination and review;
- Excavation volume calculations;
- Coordination of gravel road construction materials and details for East and West Parcels;
- Construction Manager's field trailer rental and utility fees;
- Field construction management and oversight;
- City Special Inspections Report submittal;
- Subcontractor invoices for remedial construction (RW Collins, Envirocon, United Wastewater, TMI Electric, and Timely Engineering Soil Tests); and
- Coordination of field activities, client coordination, and project management.
- Note that two United Waste Water invoices for dewatering water disposal include charges for on-site time related to frac tank cleaning (invoice numbers 232424 and 232387). These costs are associated with RW Collins frac tank demobilization. These fees have been credited by RW Collins on their monthly invoice (line A25), therefore, there is no net cost to Duke for this item in this invoice.

Ms. Jessica Bednarcik
17 December 2011
Page 2

Pittsburgh Street Investigation

- Finalize Pittsburgh Street investigation data package submittal.

Upcoming Project Activities

The following project activities are anticipated for the December 2011 reporting period:

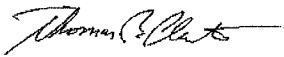
- Completion of West Parcel construction in early December. Dormant seeding scheduled for early January once ground freezes.
- Completion of East Parcel construction to 95% due to inability to work around gas mains during the heating season.
- On-site construction management;
- Planning/design of Pittsburgh Street remediation; and
- Client coordination and project management.

Scope Modifications

- Pittsburgh Street remedial planning initiated. Scope and budget have been submitted for approval by Duke.

We appreciate the opportunity to work with Duke on this important project. Please call if you have any questions.

Sincerely,
HALEY & ALDRICH, INC.



Thomas R. Plante, P.E.
Project Manager

Enclosure

K:\Accounting\Invoices\35000-39999\36604\November 2011 Invoice Ltr.docx

INVOICE

HALEY &
ALDRICH

December 17, 2011

File No. 36604

Contract No.: 13626

Haley & Aldrich, Inc.
465 Medford Street
Suite 2200
Boston, MA 02129-1400
Phone: 617.886.7400
Fax: 617.886.7600

Duke Energy
PO Box 37935
Charlotte, NC 28237

Invoice #194149

Attn: Accounts Payable

Contract No.: 13626

East End Gas Works Site Remediation - Design/Build Services
Cincinnati, OH
Project Cost Summary
For Services through December 3, 2011

Invoice Summary
See Attached Detail

Project Task No.	Task Description	Purchase Order Contract Ceiling ⁽¹⁾	Period Cost	Prior Invoices	Cost To-date	Remarks
100	Pre-Design Services	\$160,929	\$0.00	\$144,583.45	\$144,583.45	
200	Design Services	\$145,563	\$0.00	\$107,255.85	\$107,255.85	
300	Permitting Services	\$80,405	\$0.00	\$74,965.02	\$74,965.02	
400	Bidding Services	\$34,552	\$0.00	\$29,518.10	\$29,518.10	
500	Construction Drilling	\$183,990	\$0.00	\$69,376.42	\$69,376.42	
600	Construction Complete Reports	\$34,898.00	\$0.00	\$741.60	\$741.60	
610	VAP Phase I Property Assessment R	\$5,500.00	\$0.00	\$5,247.97	\$5,247.97	
620	VAP Phase II Workplan	\$7,500.00	\$1,402.37	\$0.00	\$1,402.37	
621	Middle Parcel Geophysics	\$12,200.00	\$0.00	\$12,198.21	\$12,198.21	
700	Construction Services	\$16,747,462	\$1,391,983.73	\$13,296,531.78	\$14,688,515.51	
TOTALS		\$17,400,799	\$1,393,386.10	\$13,740,418.40	\$15,133,804.50	

NOTES/REMARKS: (1) Budgets current as of Amendment #2 dated 05 April 2011.

CURRENT INVOICE AMOUNT: \$1,393,386.10

TOTAL FIELD LABOR HOURS THIS PERIOD: 5,709.00

TOTAL LABOR DISCOUNT APPLIED THIS PERIOD: \$0.00

Certification by Contractor that the Monthly Payment Invoice represents the amount to which Contractor is entitled pursuant to the terms of this Agreement and shall also certify as follows: There are no Liens or claims of Liens of Subcontractors in connection with the Work outstanding at the date of this Invoice (except those liens disputed by Contractor which Contractor has discretion either bonded off and provided Duke Energy written confirmation of such bond or for which Duke Energy is withholding an amount equal to the amount of the lien), all amounts which are due and payable to any third party (including Subcontractors) with respect to the Work commenced or completed as of the date of this invoice have been paid or are included in the amount requested in the current application, and, except for those bills not paid but so included and amounts disputed between Duke Energy and Contractor, there is no known basis for the filing of any Liens on the property comprising the Site, except in respect to payments to Subcontractors withheld for proper reasons. Contractor hereby waives and releases, to the extent of the receipt of payment requested in this Monthly Payment Invoice, any right to any lien.

cc: Duke Energy Business Svcs. LLC
526 South Church St.
Charlotte, NC 28202
Attn: Jessica Bednarcik

Construction Management Services Cost Tracking
East End Gas Works Site Remediation - Design/Build Services

Invoice Period	700 - Construction Administration	701 - Temporary Facilities \$1200/month	702 - Construction Manager \$1450/day*	703 - Field Engineer \$1450/day*	704- Subcontractors	720 - Pittsburgh St. Investigations	721 - Pittsburgh St. Investigations Additional Evaluation & Permitting Work	Monthly Totals
			Days	Cost	Days	Cost		
January-10	\$ 403.21							\$ 403.21
February-10	\$ 2,790.97							\$ 2,790.97
March-10	\$ 10,310.61				10	\$ 14,500.00		\$ 24,810.61
April-10	\$ 2,752.39	\$ 1,200.00			20	\$ 29,000.00	\$ 81,771.89	\$ 114,724.28
May-10	\$ 16,312.53	\$ 1,200.00	3	\$ 4,350.00	7	\$ 10,150.00		\$ 32,012.53
June-10	\$ 28,817.95	\$ 1,200.00	19	\$ 27,550.00	10	\$ 14,500.00	\$ 469,303.12	\$ 541,371.07
July-10	\$ 17,776.45	\$ 1,200.00	15	\$ 21,750.00	5	\$ 7,250.00	\$ 843,801.42	\$ 891,777.87
August-10	\$ 19,837.50	\$ 1,200.00	23	\$ 33,350.00	9	\$ 13,050.00	\$ 1,493,680.16	\$ 1,561,117.66
September-10	\$ 18,023.14	\$ 1,200.00	19	\$ 27,550.00	4	\$ 5,800.00	\$ 611,247.29	\$ 663,820.43
October-10	\$ 16,861.31	\$ 1,200.00	17	\$ 24,650.00	10	\$ 14,500.00	\$ 1,163,199.94	\$ 1,220,411.25
November-10	\$ 13,298.62	\$ 1,200.00	16	\$ 23,200.00	7	\$ 10,150.00	\$ 634,467.33	\$ 682,315.95
December-10	\$ 13,256.45	\$ 1,200.00	14	\$ 20,300.00	0	\$ -	\$ 296,943.74	\$ 331,700.19
January-11	\$ 14,905.81	\$ 1,200.00	20	\$ 29,000.00	0	\$ -	\$ 573,319.76	\$ 618,425.57
February-11	\$ 13,787.54	\$ 1,200.00	18	\$ 26,100.00	3	\$ 4,350.00	\$ 334,237.61	\$ 379,675.15
March-11	\$ 17,036.11	\$ 1,200.00	19	\$ 27,550.00	0	\$ -	\$ 452,963.14	\$ 498,749.25
April/May-11	\$ 33,467.92	\$ 2,400.00	41	\$ 56,990.00	0	\$ -	\$ 462,305.03	\$ 556,162.95
June-11	\$ 22,007.13	\$ 1,200.00	16	\$ 22,240.00	14	\$ 19,460.00	\$ 407,570.71	\$ 472,477.84
July-11	\$ 21,470.23	\$ 1,200.00	22	\$ 30,580.00	27	\$ 37,530.00	\$ 628,535.65	\$ 731,484.48
August-11	\$ 15,363.97	\$ 1,200.00	21	\$ 29,190.00	20	\$ 27,800.00	\$ 818,177.23	\$ 952,129.41
September-11	\$ 9,348.96	\$ 1,200.00	18	\$ 25,020.00	27	\$ 37,530.00	\$ 1,608,772.22	\$ 1,695,586.57
October-11	\$ 12,489.72	\$ 1,200.00	21	\$ 29,190.00	0	\$ -	\$ 1,279,858.43	\$ 1,325,584.54
November-11	\$ 7,808.59	\$ 1,200.00	21	\$ 29,190.00	0	\$ -	\$ 1,353,134.61	\$ 1,391,983.73
Task Totals	\$ 328,127.11	\$ 24,000.00	343	\$ 487,750.00	173	\$ 245,570.00	\$ 13,513,289.28	\$ 14,688,515.51

*Field day rates reduced by 5% to \$1,390 per day per Contract Amendment #2

RW COLLINS CO.

Chicagoland's Premier Environmental Excavation Contractor since 1946

7225 W. 66th Street, Chicago, IL 60638
Phone: 708.458.6868 Fax: 708.458.6870
www.rwcollins.com

INVOICE No.

2736

INVOICE DATE

12/2/2011

BILL TO Haley & Aldrich, Inc.
465 Medford Street, Ste. 2200
Boston, MA 02129
Attn: Tom Plante

JOB NAME Cincinnati, OH-2801 Riverside Dr

PO NUMBER	JOB NUMBER	REP	TERMS	DATE DUE
	10H0148	TC	Net 30	1/1/2012

DESCRIPTION	QUANTITY	UNIT PRICE	AMOUNT
-------------	----------	------------	--------

Project Manager: Tom Plante

Project #: H0148

10/1/2011 - 10/28/2011

Backup included:

Item 8 - Clean Sand Borrow (Watson Gravel tickets): 28,292.06 tons;

Item 21 - Rumpke LF (manifests): 15,422.34 tons;

Item A22 - Wood (manifest): 1 load.

Per Attached Schedule of Values

1 796356.51 796,356.51

36604-705 - \$195,317.60 + 5%

36604-706 - \$601,038.91 + 7%

TOTAL AMOUNT:

\$796,356.51

NOTE: A FINANCE CHARGE OF 1.5% PER MONTH (18% ANNUALLY) WILL
BE CHARGED ON BALANCES NOT PAID WITHIN 30 DAYS OF THE INVOICE DATE.

CONTINUATION SHEET

AIA Document G702, APPLICATION AND CERTIFICATE FOR PAYMENT.

containing Contractor's signed Certification, is attached.

In Tabulations below, amounts are stated to the nearest dollar. Use Column 1 on Contracts where variable earnings apply.

Use Column I on Contracts where variable retainage for line items may apply.

AIA DOCUMENT G703

PAGE 2 OF 2 PAGES

APPLICATION NO.: 17

APPLICATION DATE: 11/3/2011

PERIOD TO: 10/1/11-10/28/11

CONTRACTOR'S PROJECT NO.: 10HO148

Bid Item	Item Description	Unit of Measure	Price	Original Estimated Quantity	Approved Change Order	Q from Previous Bids		I This Period		Total Contract to Date		Estimate as Complete		Variance to Contract		Percent Complete to Contract	
						Units	Value	Units	Value	Total	Value	Units	Value	Units	Value		Units	Value
1	Mob & Temp Facilities Setup	LS	\$93,800.00	1.00		1.00	\$93,800.00	#	\$ -	1.00	\$93,800.00	1.00	\$93,800.00	0.00	\$ -	-	
2	Well & Utility Structure Markers	per loc	\$550.00	1.00		7.00	\$3,850.00	#	\$ -	7.00	\$3,850.00	19.00	\$10,450.00	0.00	\$ -	37%	
3	Cushioning & Erosion Controls Inst	LS	\$24,750.00	1.00		0.96	\$24,255.00	#	0.02	\$495.00	1.00	\$24,750.00	1.00	\$24,750.00	0.00	\$ -	100%
4	West Parcel Final Cover Erection	LY	\$18,000.00	1.00		0.00	\$ -	#	\$ -	0.00	\$ -	1.00	\$18,000.00	0.00	\$ -	0%	
5	CHF Processing	CY	\$7.45	41000.00		38525.00	\$284,977.40	#	\$ -	38525.00	\$284,977.40	41000.00	\$305,450.00	0.00	\$ -	93%	
6	East Parcel Test Pits	per Loc	\$850.00	4.00		4.00	\$3,400.00	#	\$ -	4.00	\$3,400.00	4.00	\$3,400.00	0.00	\$ -	100%	
7	CHF Transport, Place, Compact	CY	\$10.75	41000.00		37002.00	\$397,771.50	#	\$13,337.50	38282.00	\$412,209.00	41000.00	\$440,750.00	0.00	\$ -	93%	
8	Clear Sand Borrow	Tons	\$14.25	41281.48		36989.98	\$526,978.97	#	\$26,292.06	\$403,161.86	\$553,140.82	41281.48	\$594,432.30	\$23,291.48	\$341,879.73	100%	
9	Low Permeability BF (east each wall)	SF	\$11.15	18000.00		6336.50	\$70,625.25	#	\$225.00	\$33,795.30	\$71,050.55	18000.00	\$200,000.00	0.00	\$ -	87%	
10	Panels of Segregated Soil Gm Fill	CY	\$10.75	10000.00		1000.00	\$10,750.00	#	\$ -	1.00	\$10,750.00	1.00	\$10,750.00	0.00	\$ -	0%	
11	Demo W Parcel Surf Slabs & Fill Voids	LS	\$24,000.00	1.00		1.00	\$24,000.00	#	\$ -	1.00	\$24,000.00	1.00	\$24,000.00	0.00	\$ -	0%	
12	Demolish Solid Dike Walls	CF	\$3.85	12700.00		18700.00	\$33,495.00	#	\$ -	\$770.00	\$34,265.00	12700.00	\$24,000.00	0.00	\$ -	99%	
13	N Area Work Pad Prep & Fence Ravel	LS	\$37,450.00	1.00		1.00	\$37,450.00	#	\$ -	1.00	\$37,450.00	1.00	\$37,450.00	0.00	\$ -	100%	
14	Temp Mid Parcel Gate Inst & Ravel	LS	\$1,500.00	1.00		0.80	\$1,200.00	#	\$ -	0.80	\$1,200.00	1.00	\$1,500.00	0.00	\$ -	80%	
15	Cut & Cap embankment utilities	each	\$2,800.00	10.00		11.00	\$30,800.00	#	\$ -	11.00	\$30,800.00	10.00	\$28,000.00	1.00	\$2,800.00	110%	
16	Solidifier Pile Inst - Phase 1	LS	\$868,535.00	1.00		1.00	\$868,535.00	#	\$ -	1.00	\$868,535.00	2.00	\$1,737,070.00	0.00	\$ -	100%	
16L	Phase 1 Logging	LS	\$812,200.00	1.00		1.00	\$812,200.00	#	\$ -	1.00	\$812,200.00	1.00	\$812,200.00	0.00	\$ -	100%	
17	Bracing & Tieback Inst-Phase 1	LS	\$812,215.00	1.00		1.00	\$812,215.00	#	\$ -	1.00	\$812,215.00	1.00	\$812,215.00	0.00	\$ -	100%	
A2	Solidifier Pile Inst-Phase 2-Option 2	LS	\$450,690.00	1.00		1.00	\$450,690.00	#	\$ -	1.00	\$450,690.00	1.00	\$450,690.00	0.00	\$ -	100%	
A2L	Phase 2 Logging	LS	\$532,315.00	1.00		1.00	\$532,315.00	#	\$ -	1.00	\$532,315.00	1.00	\$532,315.00	0.00	\$ -	100%	
A3	Bracing Inst-Phase 2-Option 2	LS	\$532,315.00	1.00		1.00	\$532,315.00	#	\$ -	1.00	\$532,315.00	1.00	\$532,315.00	0.00	\$ -	100%	
20	Borrow & Blend Cont'd Soil	CY	\$12.50	85500.00		80199.74	\$1,002,496.75	#	\$300.26	\$85500.00	\$1,068,750.00	85500.00	\$1,068,750.00	0.00	\$ -	100%	
21	Mob & Temp Facilities Reuse LP	Tons	\$12.65	82800.00		128468.45	\$1,625,125.89	#	\$1542.34	\$195,992.60	\$1,821,118.49	143890.79	\$1,821,118.49	\$			

Attachment JRC – 7
OCC-POD-01-001(q) Attachment East End
(relevant pages)

**PHASE II PROPERTY ASSESSMENT REPORT
DUKE ENERGY OHIO, INC.
EAST END GAS WORKS
MIDDLE PARCEL
2801 RIVERSIDE DRIVE
CINCINNATI, OHIO**

for

**Duke Energy Ohio, Inc.
Cincinnati, Ohio**

by

**Haley & Aldrich, Inc.
Cleveland, Ohio**

**File No. 40674
May 2014**

- Oil-like material and TLM are mobile constituents within the soil column that have migrated from source areas and may continue to migrate, both horizontally and vertically. Further, OLM and TLM represent continuing sources of dissolved constituents in groundwater above applicable standards. The VAP requires that current and future on-site and off-site receptors be protected. As such, where mobile OLM and TLM are present, VAP standards are not met. Remediation of OLM and TLM impacts is required in order to meet applicable VAP standards.
- The Ohio Environmental Protection Agency defines “free product” as “a separate liquid hydrocarbon phase that has a measurable thickness of greater than one one-hundredth of a foot.” Dense non-aqueous phase liquid was observed in two of the deep monitoring wells (MW-22D and MW-23D). Dense non-aqueous phase liquid thickness ranged from 3.1 to 3.2 feet in well MW-22D and from 4.03 to 5.40 feet in well MW-23D during the 30 October 2012 and 14 January 2013 monitoring events. Voluntary Action Program rules state that properties with NAPL exceed applicable UPUS for groundwater (OAC 3745-300-08(B)(2)(c)). Further, the VAP generally requires that NAPL be removed, or mitigated to the extent practicable, prior to issuance of an No Further Action (OAC 1301:7-9-13(G)(3)(a)). As such, DNAPL remediation is required.
- Site shallow groundwater is classified as a Class B; however, the deeper groundwater is classified as a Critical Resource. Because site groundwater is impacted above UPUS, response requirements (including institutional or engineering controls) are required to prevent on-site human exposure to groundwater exceeding UPUS, in accordance with VAP rules (OAC 3745-300-10 (E)(2)(a)). In addition, the extent of groundwater impacts has not been determined. Therefore, further response requirements related to on-site and off-site groundwater cannot currently be determined until the extent of groundwater impacts have been defined.

If a continual source of residual material is present, the horizontal migration of the residual materials in the subsurface is expected to continue along the zones of increased porosity and/or permeability and downward through vertical conduits. Removal or containment of the source(s) enables both vertical and lateral migration to reach equilibrium, as determined by the surface tension, density and viscosity of the material, porosity and permeability of the subsurface soils and presence/absence of a continual source of the material.

6.5.1 Fate and Transport

The four stratigraphic layers at the Site consist of fill materials, clay layer, outwash layer and bedrock. In general, the extents of MGP residuals in the fill material and clay layers extend across the majority of the Site, except the southeastern corner and along Riverside Drive (Figure 9). Manufactured gas plant residuals extend to the outwash layer and to the bedrock interface (Figures 11 and 12). These impacts generally extend from the middle of the Site to the southernmost portion of the Site. Dissolved constituents are present in shallow and deeper groundwater. The Ohio River borders the Site to the south (downgradient) and the downgradient extent of these impacts is unknown.

6.5.2 Transport Mechanisms

This section details transport mechanisms that are receiving or may receive MGP residuals. The evaluation of transport mechanisms considers the site setting (e.g., topography, geology, hydrogeology and potential conduits for transport), as related to exposure pathways and receptors. The potential constituent migration routes retained for the Site include the following:

On-Site Surface Soil

- Volatilization of constituents from surface soil to outdoor air and transported via wind.
- Emission of particulates (dust) with sorbed constituents released from surface soil to outdoor air and transported via wind.
- Leaching of constituents from surface soil to subsurface soil and ultimately to groundwater.

On-Site Subsurface Soil

- Volatilization of constituents from subsurface soil (exposed during excavation activities) to outdoor air and transported via wind.
- Emission of particulates (dust) with sorbed constituents released from subsurface soil during excavation activities to outdoor air and transported via wind.
- Volatilization of constituents to soil vapor and, ultimately, to indoor air, impacting on-site commercial/industrial buildings.
- Leaching of constituents from subsurface soil to groundwater.

On-Site Groundwater

- Volatilization of constituents from site groundwater to soil vapor and, ultimately, to indoor air, impacting potential on-site commercial/industrial buildings.

- Migration of dissolved and separate phase liquids constituents in site groundwater to surface water (neither of which have been assessed).

Surface Water

- Migration of dissolved and separate phase liquid constituents from site groundwater into surface water (this has not been assessed).

6.6 Potential Exposure Pathways and Receptors

Potential receptors have been identified to aid in understanding potential exposure pathways and exposure scenarios and to focus future remediation efforts. These potential pathways and receptors are discussed below and are summarized in Table 9.

Potential exposure pathways include ingestion, inhalation (particulates and/or vapors) and dermal contact. Potential receptors are identified based on the current and anticipated future property use and current and future anticipated uses of the abutting properties located within the site area (commercial/industrial use).

Currently, the Site is used for industrial purposes, including as a synthetic natural gas peaking plant in which propane, air and natural gas are mixed to make synthetic natural gas, as a city gate gas station and as a district headquarters for field operations. Although it is assumed that foreseeable future site use will remain the same (e.g., industrial), it may be appropriate to consider implementation of land use restrictions prohibiting future commercial and residential land use, prohibiting groundwater use, prohibiting habitable subsurface structures, etc. as part of an overall remedy of the Site. However, based on the current and likely future use, on-site potential human receptors at the Site are as follows:

- Current and Future On-Site Commercial/Industrial Worker
- Current and Future On-Site Construction Worker
- Site Visitors/Trespassers

While the upland portion of the Site has been investigated and it has been determined that ecological receptors do not exist, the area between the Site top of the bank and the river have not been investigated thoroughly. It is undetermined as to whether or not ecological receptors exist in these areas. Therefore, ecological receptors have been evaluated as part of this pathway analysis.

Descriptions of these receptors are provided below along with exposure pathways that potentially exist. Exposure pathways were evaluated based on the potential sources of COCs, migration potential of COCs and the activities of the receptor.

Current and Future On-Site Commercial/Industrial Worker – Complete exposure pathways for future on-site commercial or industrial workers may include: incidental ingestion and dermal contact with soil; inhalation of fugitive dust in ambient air generated due to wind erosion of non-vegetated portions of the Site; and inhalation of VOCs emanating from soil or groundwater into ambient air. Evaluation of site sampling data, and associated MCA evaluation (Section 5.2.3), indicates that soils in unpaved areas of the Site exceed VAP standards and pose an unacceptable risk to current and future on-site commercial and industrial workers for these exposure pathways. Soils in paved areas of the Site do not exceed VAP standards for these exposure pathways and do not pose an unacceptable risk to current and future on-site commercial and industrial workers.

In addition, exposure to ambient air concentrations may not be restricted to areas outside the buildings, as ambient air concentrations may also enter the buildings. However, in approximately 2010, Duke performed indoor air sampling of the site buildings. Results of these sampling and analysis activities indicated that no unacceptable indoor air concentrations of COCs were encountered. Therefore, the soil and groundwater vapor to indoor air are not considered complete pathways under current conditions.

Current and Future On-Site Construction Worker– It is assumed that construction workers may work on buried gas lines and other utilities at the Site. The worker would have direct contact with soil during work activities. Thus, it is assumed that the potentially complete exposure pathways for the construction worker include direct contact with soil (accidental ingestion of soil, dermal contact with soil, inhalation of fugitive dust and VOCs emanating from soil into ambient air). It is assumed that groundwater would not be encountered in construction activities.

Evaluation of site sampling data, and associated MCA evaluation (Section 5.2.3), indicates that soils present at the Site do not exceed VAP standards for construction workers, and do not pose an unacceptable risk to current and future on-site construction workers. However, the presence of OLM and/or TLM in the site soils pose a risk to construction workers that may excavate and come into contact with these materials, if encountered.

On-site Visitors/Trespassers – Visitors or trespassers may enter the subject site. Complete exposure pathways for on-site visitors may include: incidental ingestion and dermal contact with soil; inhalation of fugitive dust in ambient air generated due to wind erosion of non-vegetated portions of the Site; and inhalation of VOCs emanating from soil into ambient air. Based on evaluation of site sampling data, and associated MCA activities (Section 5.2.3), it is assumed that visitors and trespassers would remain on paved areas/on-site areas for much less time than site workers. Therefore, soils present at the Site do not exceed VAP standards for visitors/trespassers.

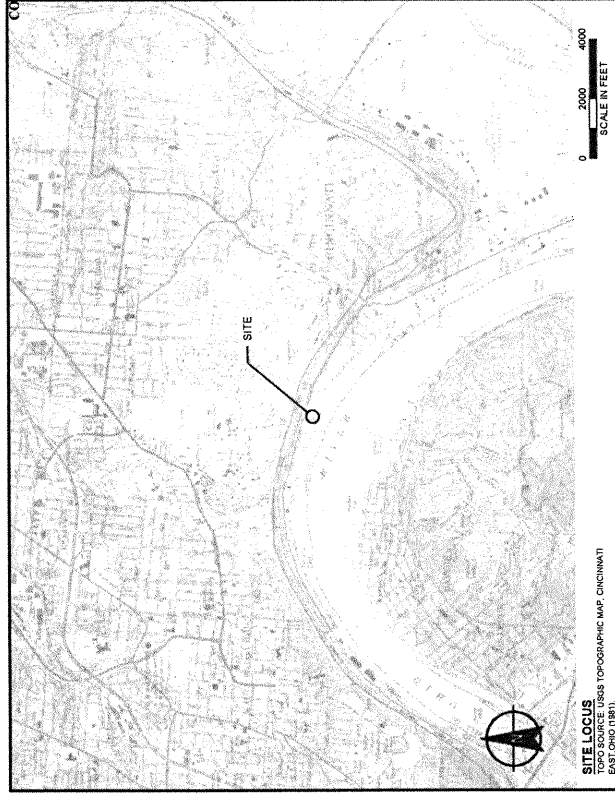
Ecological Receptors – Complete exposure pathways for possible ecological receptors may include: incidental ingestion and direct contact with soil, groundwater and/or sediment and surface water in the area from between the Site top of the bank and the river. The potential for impacts to ecological receptors is undetermined because insufficient data have been collected between the Site top of bank and the river. Therefore, it is currently unknown as to whether or not risks to ecological receptors exceed VAP standards.

6.7 VAP Applicable Standards and Remediation Considerations

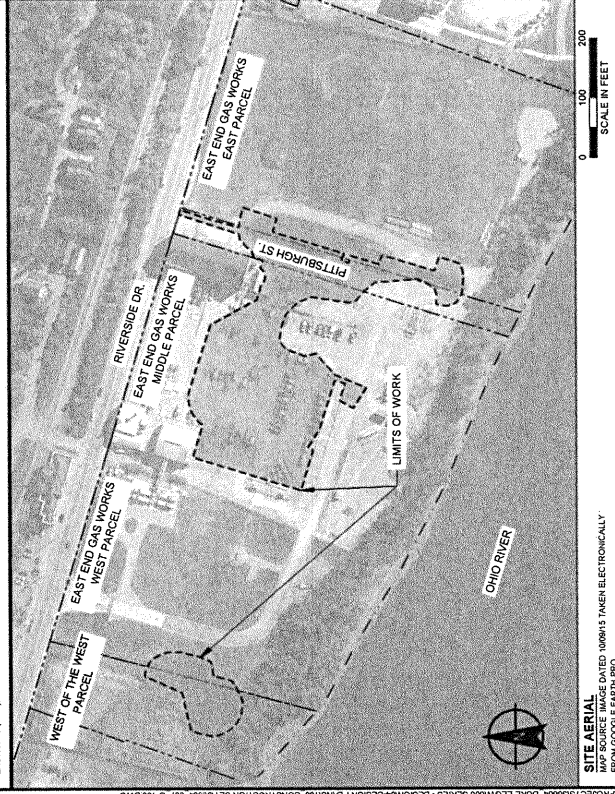
As previously indicated, the Middle Parcel has been investigated following the Ohio EPA VAP. A Phase I and Phase II Work Plan have been prepared for the Site and site investigation activities have been completed consistent with these documents and with VAP rules documented in OAC Rule 3745-300, as well as in a number of other Ohio EPA publications, including the TGC. Based on the findings discussed in this section and in Section 5, remediation will be required to meet all applicable standards under the VAP. A summary of applicable VAP standards and remedial considerations is provided in Table 10. It should be noted that under the VAP, remediation can include active remediation (e.g., source removal or containment) and/or passive remediation (institutional or engineering controls) designed to meet all applicable standards and to mitigate risks to current/future site users and offsite receptors. Remedial activities that may be required at the Site include:

Attachment JRC – 8
OCC-POD-01-001(s) Attachment East End
(relevant pages)

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SITE LOCUS
MAP SOURCE: 10000 TOPOGRAPHIC MAP CINCINNATI
EAST, OHIO (1:80,000)



SITE AERIAL
MAP SOURCE: IMAGE DATED 10/06/15 TAKEN ELECTRONICALLY
FROM GOOGLE EARTH PRO

DUKE ENERGY OHIO, INC. EAST END GAS WORKS MIDDLE & WEST OF WEST PARCEL REMEDIAL CONSTRUCTION 2801 RIVERSIDE DRIVE CINCINNATI, OHIO ISSUED FOR CONSTRUCTION

HALEY ALDRICH
HALEY ALDRICH, INC.
780514 High Street, Suite 100
Cincinnati, OH 45225-5402
Tel: 513.251.2500
Fax: 513.251.2549
www.haleyaldrich.com

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DRAWING.
INFORMATION WILL
BE LOST IF
REPRODUCED IN
BLACK AND WHITE.

**ISSUED
FOR
CONSTRUCTION**

Project No. 19-1085-GA-AAM
Scale: AS SHOWN
Date: 12/28/18
Designed By: JAC
Checked By: JAC
Stamp: JAC



HALEY ALDRICH, INC.
DUKE ENERGY OHIO, INC.
EAST END GAS WORKS
MIDDLE & WEST OF WEST PARCEL
REMEDIAL CONSTRUCTION
2801 RIVERSIDE DRIVE
CINCINNATI, OHIO
ISSUED FOR CONSTRUCTION

Page 2 of 3
Sheet 1 of 28

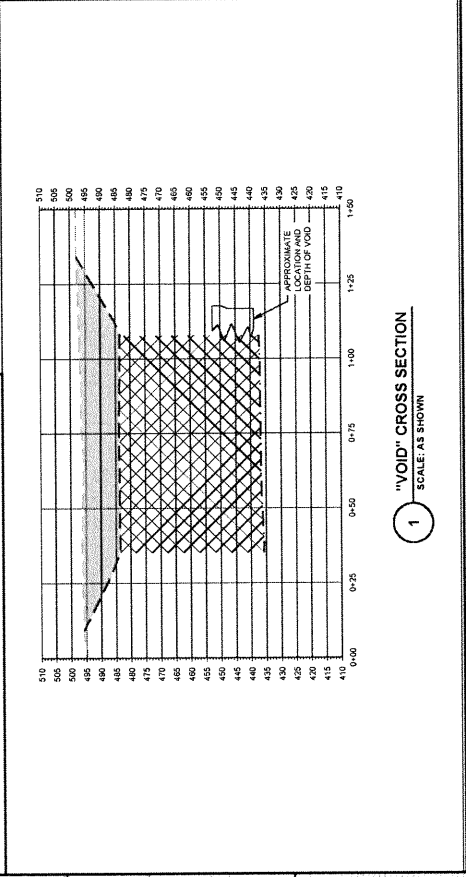
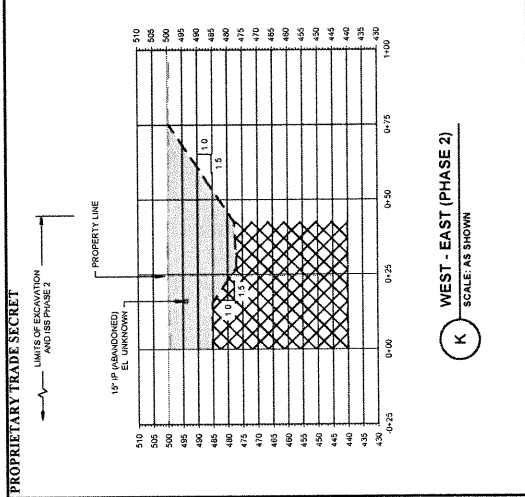
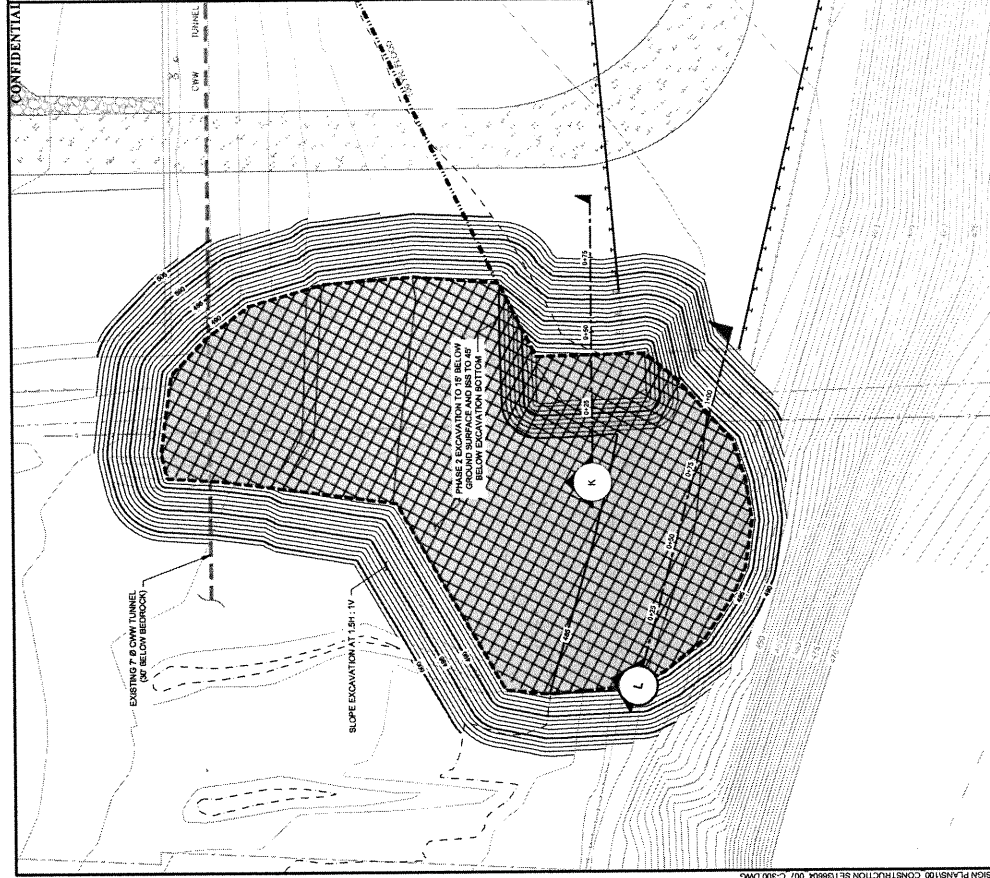
G-100

DRAWING INDEX

SHEET NO.	SHEET TITLE	SHEET DESCRIPTION
1	G-100	TITLE AND INDEX SHEET
2	G-101	NOTES AND LEGEND
3	C-100	EXISTING CONDITIONS PLAN
4	C-101	LIMITS OF OLM AND OLMTLM
5	C-102	CONSTRUCTION PHASING PLAN
6	C-103	CONSTRUCTION SCHEDULE (SHEET 1 OF 2)
7	C-104	CONSTRUCTION SCHEDULE (SHEET 2 OF 2)
8	C-105	EROSION AND SEDIMENT CONTROL AND SITE PREPARATION PLAN
9	C-200	PHASE 1 SITE PREPARATION AND DEMOLITION PLAN
10	C-201	PHASE 2 WEST AND WEST OF THE WEST PARCEL SITE PREPARATION AND DEMOLITION PLAN
11	C-202	PHASE 3 SITE PREPARATION AND DEMOLITION PLAN
12	C-203	PHASE 4 SITE PREPARATION AND DEMOLITION PLAN
13	C-204	PHASE 5 SITE PREPARATION AND DEMOLITION PLAN
14	C-300	PHASE 1 EXCAVATION PLAN
15	C-301	PHASE 2 WEST AND WEST OF THE WEST PARCEL EXCAVATION AND SOLIDIFICATION PLAN
16	C-302	PHASE 3 EXCAVATION AND SOLIDIFICATION PLAN
17	C-303	PHASE 4 EXCAVATION AND SOLIDIFICATION PLAN
18	C-304	PHASE 5 EXCAVATION AND SOLIDIFICATION PLAN
19	C-400	CROSS SECTION LOCATION PLAN
20	C-401	GEOLOGIC AND EXCAVATION / ISS CROSS SECTION A
21	C-402	GEOLOGIC AND EXCAVATION / ISS CROSS SECTION B
22	C-403	GEOLOGIC AND EXCAVATION / ISS CROSS SECTION C
23	C-404	GEOLOGIC AND EXCAVATION / ISS CROSS SECTION D
24	C-405	GEOLOGIC AND EXCAVATION / ISS CROSS SECTION E
25	C-406	GEOLOGIC AND EXCAVATION / ISS CROSS SECTION F
26	C-407	GEOLOGIC AND EXCAVATION / ISS CROSS SECTION G
27	C-500	RESTORATION PLAN
28	C-600	CONSTRUCTION / RESTORATION DETAILS
29	C-601	EROSION AND SEDIMENT CONTROL DETAILS

FIGURE 15 OF 23
HAILEY ALDRICH
HAILEY & ALDRICH, INC.
7905 H. High Street, Suite 150
Columbus, OH 43235-5402
Tel: 614.444.2549
Fax: 614.444.2548
www.haileyaldrich.com

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CONSTRUCTION SEQUENCE AND GENERAL NOTES
1. PHASE 2 EXCAVATION, ISS, AND BACKFILLING WILL TAKE PLACE NOVEMBER 2016 THROUGH FEBRUARY 2017.

GENERAL NOTES
1. WORK SHALL BE CONDUCTED IN THE GENERAL PHASED APPROACH DESCRIBED ON SHEET C-102.

LEGEND:
EXCAVATION AREA
ISS AREA

THIS IS A COLOR DRAWING. INFORMATION WILL BE REPRODUCED IN BLACK AND WHITE.

ISSUED FOR CONSTRUCTION
Project No. 19002-007
AS SHOWN
Scale: 1"=20'-0"
Drawn By: JES
Designed By: JES
Checked By: JES
Approved By: VITALP
Stamp



NO.	DESCRIPTION	DATE
1	ISSUED FOR CONSTRUCTION	10/10/16

DUNE ENERGY CORP. INC.
EAST END GAS WORKS
MIDLAND TOWNSHIP, OHIO
2801 RIVERSIDE DRIVE
MIDLAND, OHIO 44860
ISSUED FOR CONSTRUCTION

PHASE 2 WEST AND WEST PARCELS EXCAVATION AND SOLIDIFICATION PLAN

C-3010

Sheet 15 of 25

PUCO Case No. 19-1085-GA-AA
OCC-P03-01-001(s) CONF Attachment East End

HALEX
10000 N. Agency Ave., Suite 100
Columbus, OH 43235-4402
Tel: 614.844.2400
Fax: 614.844.2400
www.halexinc.com

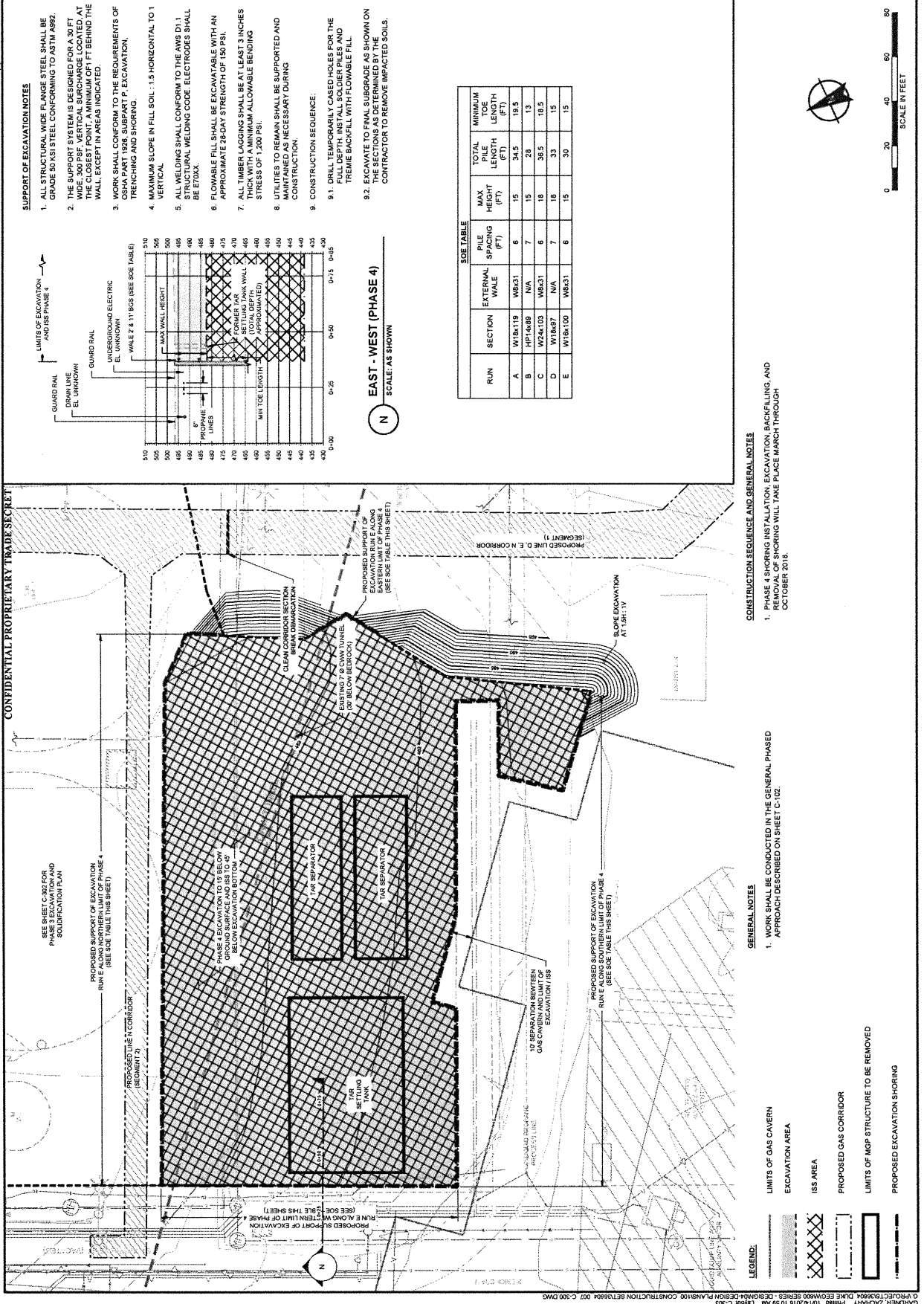
THIS IS A COLOR
DRAWING.
INFORMATION WILL
BE LOST IF
REPRODUCED IN
BLACK AND WHITE.

ISSUED
FOR
CONSTRUCTION

PROJECT NO. 19-1085-GA-AA
SCALE: AS SHOWN
DATE: 12-07-2018
DRAWN BY: JAC
CHECKED BY: WH
APPROVED BY: WH
SHEET NO. 17 of 29

PHASE 4
EXCAVATION AND
SOLIDIFICATION
PLAN

C-303



LEGEND:

- LIMITS OF GAS CAVERN EXCAVATION AREA
- ISS AREA
- PROPOSED GAS CORRIDOR
- LIMITS OF MGP STRUCTURE TO BE REMOVED
- PROPOSED EXCAVATION SHORING

GENERAL NOTES

- WORK SHALL BE CONDUCTED IN THE GENERAL PHASE APPROACH DESCRIBED ON SHEET C-302.

CONSTRUCTION SEQUENCE AND GENERAL NOTES

- PHASE 4 SHORING INSTALLATION, EXCAVATION, BACKFILLING, AND REMOVAL OF SHORING WILL TAKE PLACE MARCH THROUGH OCTOBER 2018.

- SUPPORT OF EXCAVATION NOTES**
- ALL STRUCTURAL WIDE FLANGE STEEL SHALL BE GRADE 50 A53 STEEL CONFORMING TO ASTM A582.
 - THE SUPPORT SYSTEM IS DESIGNED FOR A 30 FT WIDE, 300 PSF VERTICAL SURCHARGE LOCATED AT THE EXCAVATION FACE, 10 FT BEHIND THE WALL EXCEPT IN AREAS INDICATED.
 - WORK SHALL CONFORM TO THE REQUIREMENTS OF THE OHIO DEPARTMENT OF TRANSPORTATION TRENCHING AND SHORING.
 - MAXIMUM SLOPE IN FILL SOIL: 1:1.5 HORIZONTAL TO 1 VERTICAL.
 - ALL WELDING SHALL CONFORM TO THE AWS D1.1 STRUCTURAL WELDING CODE. ELECTRODES SHALL BE E70XX.
 - FLOWABLE FILL SHALL BE EXCAVATABLE WITH AN APPROXIMATE 28-DAY STRENGTH OF 150 PSI.
 - ALL TIMBER LAGGING SHALL BE AT LEAST 3 INCHES THICK WITH A MINIMUM ALLOWABLE BENDING STRESS OF 1,200 PSI.
 - ALL UTILITIES TO REMAIN SHALL BE SUPPORTED AND MAINTAINED AS NECESSARY DURING CONSTRUCTION.
 - CONSTRUCTION SEQUENCE:
 1. DRILL TEMPORARILY SIZED HOLES FOR THE FULL DEPTH INSTALL SOLDER PILES AND FRAME BACKFILL WITH FLOWABLE FILL.
 2. EXCAVATE TO FINAL SUBGRADE AS SHOWN ON THE SECTIONS AS DETERMINED BY THE CONTRACTOR TO REMOVE IMPACTED SOILS.

SOE TABLE

RUN	SECTION	EXTERNAL WALE (FT)	PILE SPACING (FT)	MAX HEIGHT (FT)	TOTAL PILE LENGTH (FT)	MINIMUM TOE LENGTH (FT)
A	W18x119	NR031	8	15	34.5	19.5
B	HP14x49	N/A	7	15	28	13
C	W24x103	NR031	6	18	38.5	16.5
D	W18x37	N/A	7	18	33	15
E	W18x100	NR031	6	15	30	15

EAST - WEST (PHASE 4)

N

SCALE: AS SHOWN

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SEE SHEET C-302 FOR PHASE 4 SOLIDIFICATION PLAN

PROPOSED SUPPORT OF EXCAVATION RUN E ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN F ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN G ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN H ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN I ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN J ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN K ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN L ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN M ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN N ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN O ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN P ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN Q ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN R ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN S ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN T ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN U ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN V ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

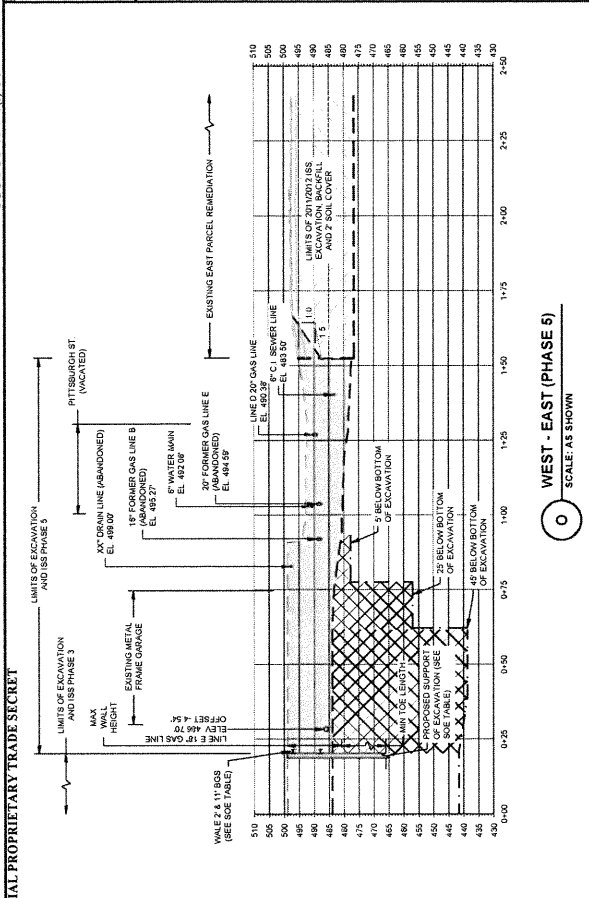
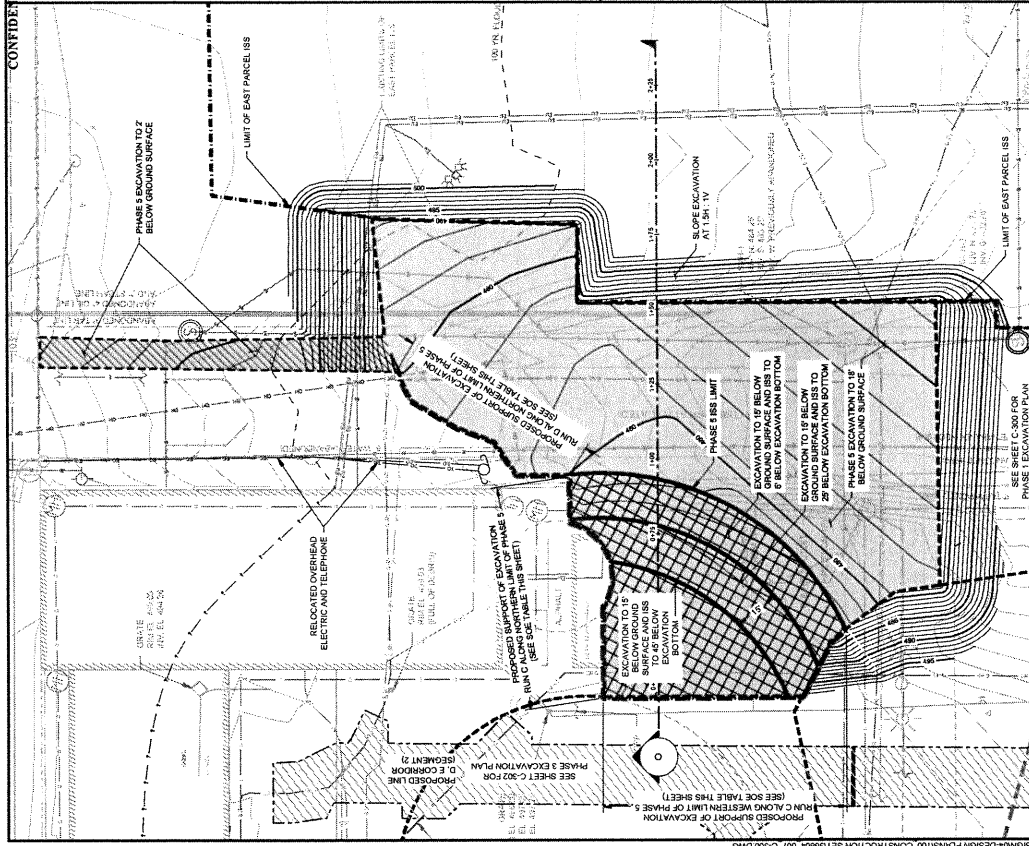
PROPOSED SUPPORT OF EXCAVATION RUN W ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN X ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN Y ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

PROPOSED SUPPORT OF EXCAVATION RUN Z ALONG WESTERN LIMIT OF PHASE 4 (SEE SIDE TABLE THIS SHEET)

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- SUPPORT OF EXCAVATION NOTES**
1. ALL STRUCTURAL WIDE FLANGE STEEL SHALL BE GRADE 50 KSI STEEL CONFORMING TO ASTM A582.
 2. THE SUPPORT SYSTEM IS DESIGNED FOR A 30 FT WIDE 300 PSF VERTICAL SURCHARGE LOCATED AT THE CLOSEST POINT, A MINIMUM 0 FT BEHIND THE WALL EXCEPT IN AREAS INDICATED.
 3. WORK SHALL CONFORM TO THE REQUIREMENTS OF OSHA PART 1926, SUBPART P, EXCAVATION, TRENCHING AND SHORING.
 4. MAXIMUM SLOPE IN FILL SOIL: 1:5 HORIZONTAL TO 1 VERTICAL.
 5. ALL WELDING SHALL CONFORM TO THE AWS D1.1 STRUCTURAL WELDING CODE. ELECTRODES SHALL BE E70XX.
 6. FLOWABLE FILL SHALL BE EXCAVATABLE WITH AN APPROXIMATE 28-DAY STRENGTH OF 150 PSI.
 7. ALL TIMBER LAGGING SHALL BE AT LEAST 3 INCHES THICK WITH A MINIMUM ALLOWABLE BENDING STRESS OF 1,200 PSI.
 8. UTILITIES TO REMAIN SHALL BE SUPPORTED AND MAINTAINED AS NECESSARY DURING CONSTRUCTION.
 9. CONSTRUCTION SEQUENCE:
 - 9.1. DRILL TEMPORARILY CAGED HOLES FOR THE FULL DEPTH. INSTALL SOLDIER PILES AND TREMIE BACKFILL WITH FLOWABLE FILL.
 - 9.2. EXCAVATE TO FINAL SUBGRADE AS SHOWN ON THE SECTIONS AS DETERMINED BY THE CONTRACTOR TO REMOVE IMPACTED SOILS.

- GENERAL NOTES**
1. WORK SHALL BE CONDUCTED IN THE GENERAL PHASED APPROACH DESCRIBED ON SHEET C-102.

- LEGEND:**
- EXCAVATION AREA
 - ISS AREA
 - PROPOSED GAS LINE CORRIDOR
 - PROPOSED EXCAVATION SHORING

- CONSTRUCTION SEQUENCE AND GENERAL NOTES**
1. PHASE 5 SHORING INSTALLATION, EXCAVATION, BACKFILLING, AND REMOVAL OF SHORING WILL TAKE PLACE MARCH THROUGH OCTOBER 2019.

SOE TABLE				SOE TABLE			
RUN	SECTION	EXTERNAL WALE	PILE SPACING (FT)	MAX HEIGHT (FT)	TOTAL LENGTH (FT)	MINIMUM LENGTH (FT)	
A	W18x119	W8x31	6	15	34.5	18.5	
B	W18x89	N/A	7	15	28	13	
C	W24x103	W8x31	6	18	36.5	18.5	
D	W18x97	N/A	7	18	33	15	
E	W18x100	W8x31	6	15	30	15	

THIS IS A COLOR DRAWING. INFORMATION WILL BE LOST IF REPRODUCED IN BLACK AND WHITE.

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PROJECT NO. 19-1085-GA-AAM
DATE 12-07-2019
DRAWN BY JES
CHECKED BY WH
APPROVED BY JWH



NO.	DESCRIPTION	DATE	BY
1	ISSUED FOR CONSTRUCTION	12-07-2019	JES

PHASE 5 EXCAVATION AND SOLIDIFICATION PLAN
C-304 of 13
Sheet 18 of 28

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CONSTRUCTION

Project No.	36604-007
Scale	AS SHOWN
Date	14-OCT-2016
Drawn By	ZGG
Designed By	
Checked By	WJH
Approved By	WRFINLP
Stamp	



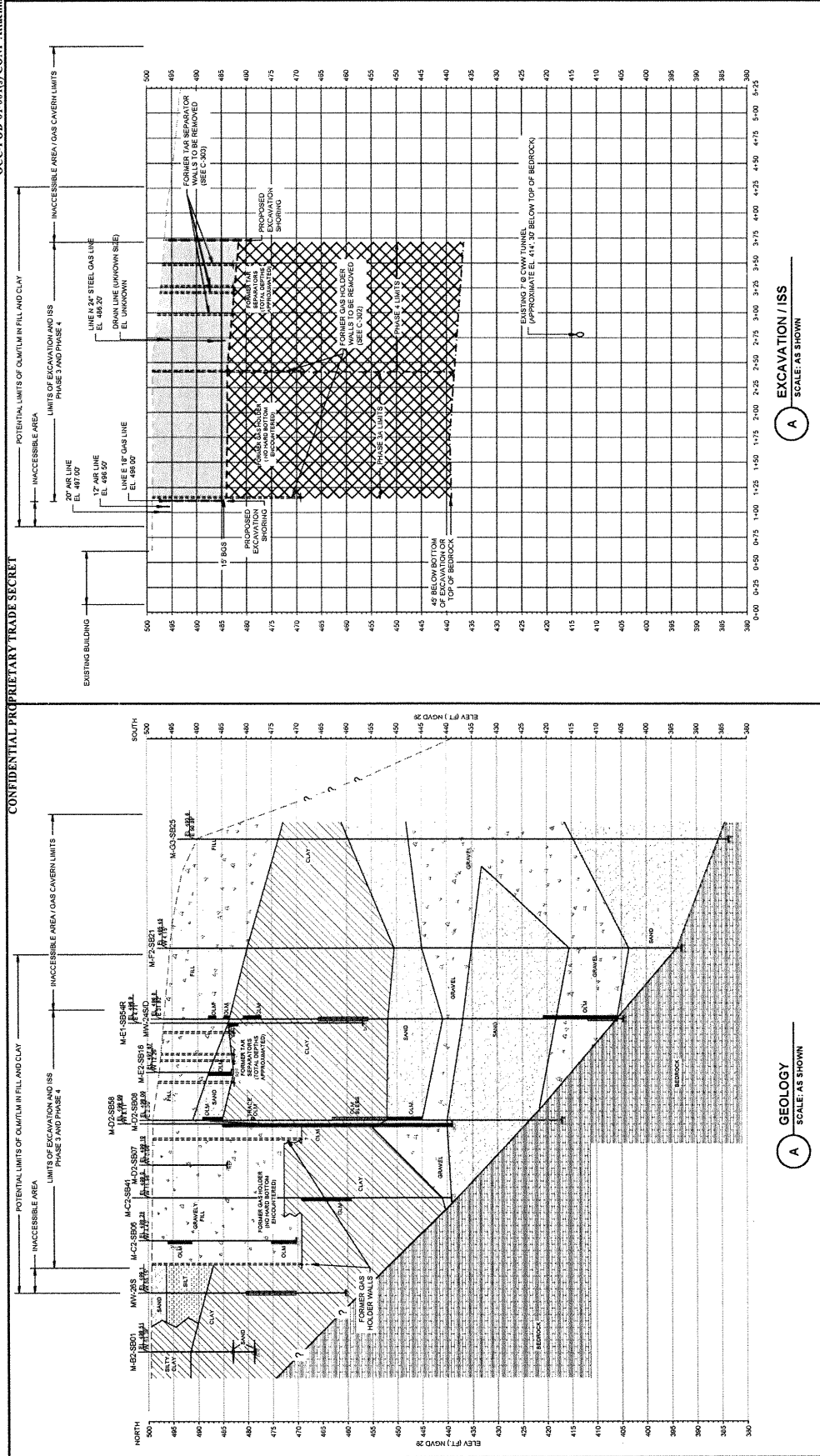
0	ISSUED FOR CONS.	H&A	18/1/17
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DUKE ENERGY OHIO, INC.
EAST END GAS WORKS
MIDDLE & WEST OF WEST PARCEL
REMEDIAL CONSTRUCTION
2801 RIVERSIDE DRIVE
CINCINNATI, OHIO
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Page

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Sheet: 20 of 29



LEGEND:
 1" = 100' (Horizontal)
 1" = 10' (Vertical)

EXISTING GROUND SURFACE

EXCAVATION AREA

ISS AREA

LEGEND:

EXPLORATION LEGEND

MW-26S	—	EXPLORATION DESIGNATION
AIR-1	—	CROSS SECTION LOCATION
_____	—	OFFSET FROM CROSS SECTION CUT LINE
_____	—	EASTING GROUND SURFACE
_____	—	POINT OF STRATIGRAPHIC CHANGE
_____	—	OIL-LINE MATERIAL
_____	—	TRACE CLM BLEBBY OR SHEENS
_____	—	NON-AQUEOUS PHASE LIQUID (NAPL) OBSERVED IN MONITORING WELL DURING JANUARY 14, 2013 GAUGING EVENT
_____	—	GROUNDWATER ELEVATION MEASURED DURING JANUARY 14, 2013 GAUGING EVENT
_____	—	GROUNDWATER MONITORING WELL SCREENED INTERVAL
_____	—	BOTTOM EXCAVATION/REFUSAL

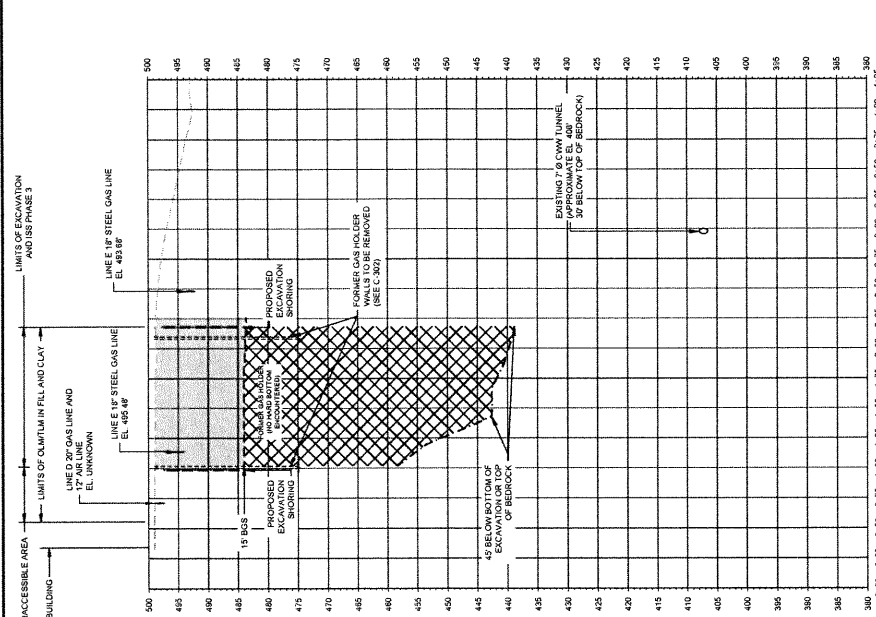
A **GEOLOGY**
SCALE: AS SHOWN

EXCAVATION / ISS
SCALE: AS SHOWN

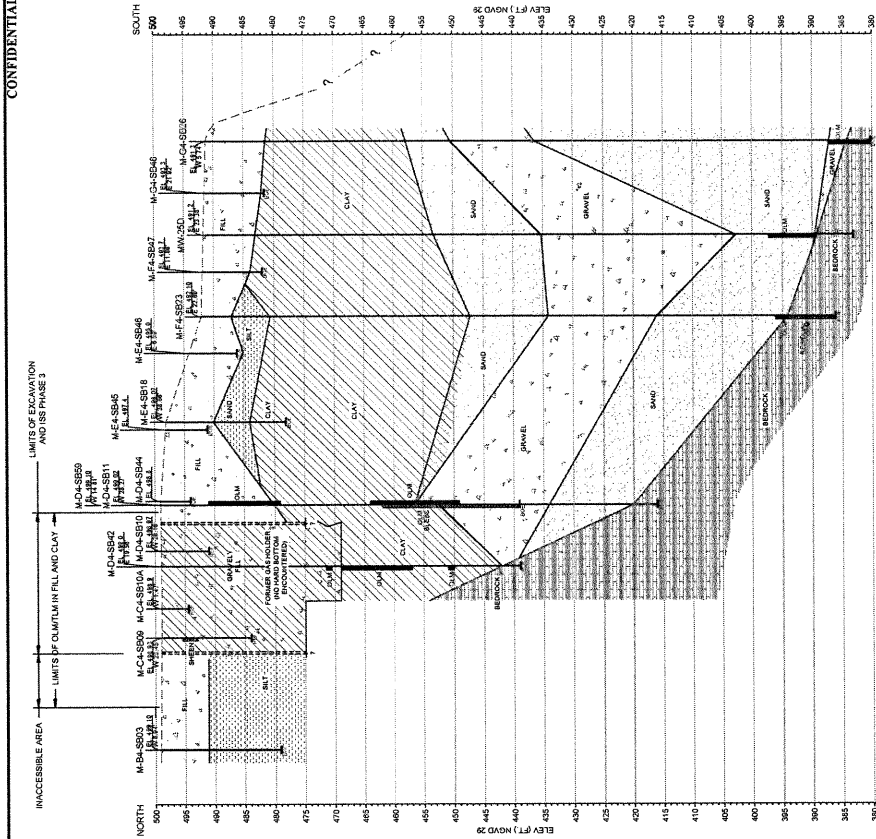


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INACCESSIBLE AREA
LIMITS OF EXCAVATION AND ISS PHASE 3
LIMITS OF CLAY/FILL IN FILL AND CLAY
LIMITS OF 20" GAS LINE AND 12" AIR LINE EL. UNKNOWN
LINE E 10" STEEL GAS LINE EL. 405.48'
LINE E 10" STEEL GAS LINE EL. 405.48'



B EXCAVATION / ISS
SCALE: AS SHOWN



B GEOLOGY
SCALE: AS SHOWN

- EXPLORATION LEGEND**
- MW-265 — EXPLORATION DESIGNATION
 - 100' — CORRELATION OF EXISTING DESIGN
 - 100' — OFFSET FROM CROSS SECTION CUT LINE
 - EXISTING GROUND SURFACE
 - POINT OF STRATIGRAPHIC CHANGE
 - OIL-LINE MATERIAL
 - TRACE OIL-BLEBS, OR SHEENS
 - NON-AQUEOUS PHASE LIQUID (NAPL) OBSERVED IN MONITORING WELL DURING JANUARY 14, 2013 GAUGING EVENT
 - GROUNDWATER ELEVATION MEASURED DURING JANUARY 14, 2013 GAUGING EVENT
 - GROUNDWATER MONITORING WELL SCREENED INTERVAL
 - BOTTOM EXCAVATION/REFUSAL
- LEGEND**
- EXISTING GROUND SURFACE
 - EXCAVATION AREA
 - ISS AREA

Page 27 of 29
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Nalley & Aldrich, Inc.
7965 N. High Street, Suite 150
Columbus, OH 43235-5402
Fax: 614 646 2549
www.nalleyaldrich.com

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Project No. 3000-007
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Drawn By: J. Z. 12/15/18
Designed By: J. Z. 12/15/18
Checked By: J. Z. 12/15/18
Approved By: J. Z. 12/15/18
Stamp



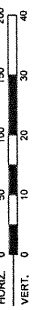
NO.	REVISION	DATE	BY	CHKD.
1	ISSUED FOR CONSTRUCTION	12/15/18	J. Z.	J. Z.

PALEY ENERGY OHIO, INC.
EAST END GAS WORKS
MIDDLE & WEST END PANEL
7800 INVERNESS DRIVE
COLUMBUS, OH 43235-5402
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GEOLOGIC AND
EXCAVATION / ISS
CROSS SECTION

C-402

Sheet 21 of 28



JRC-8
3

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Page 22 of 29

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	Scale	AS SHOWN
	Date	14-OCT-2016
	Drawn By	ZGG
	Designed By	
	Checked By	WJH
	Approved By	WVF/PLP
Stamp		



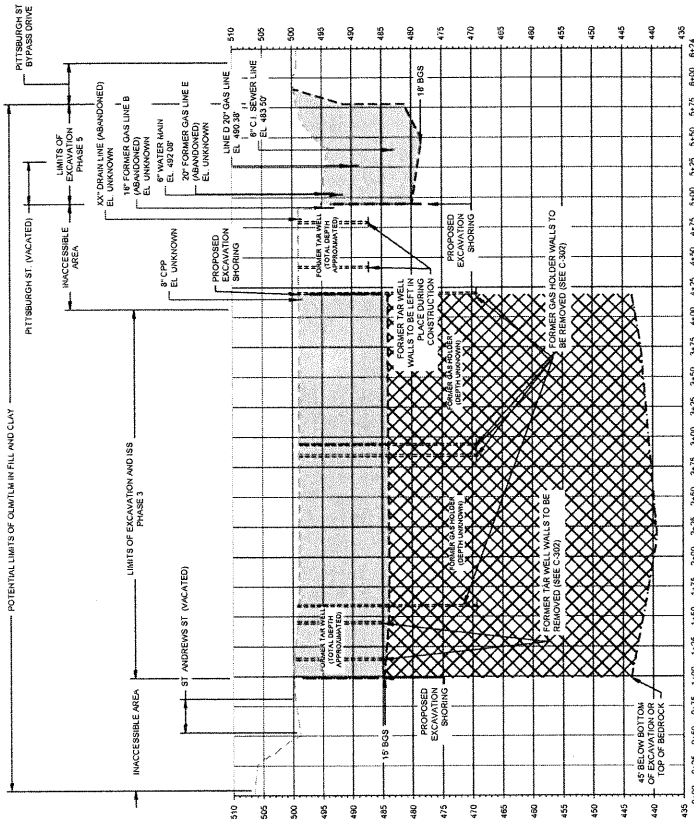
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DUKE ENERGY OHIO, INC.
EAST END GAS WORKS
MIDDLE & WEST OF WEST PARCEL
REMEDIAL CONSTRUCTION
2601 RIVERSIDE DRIVE
CINCINNATI, OHIO

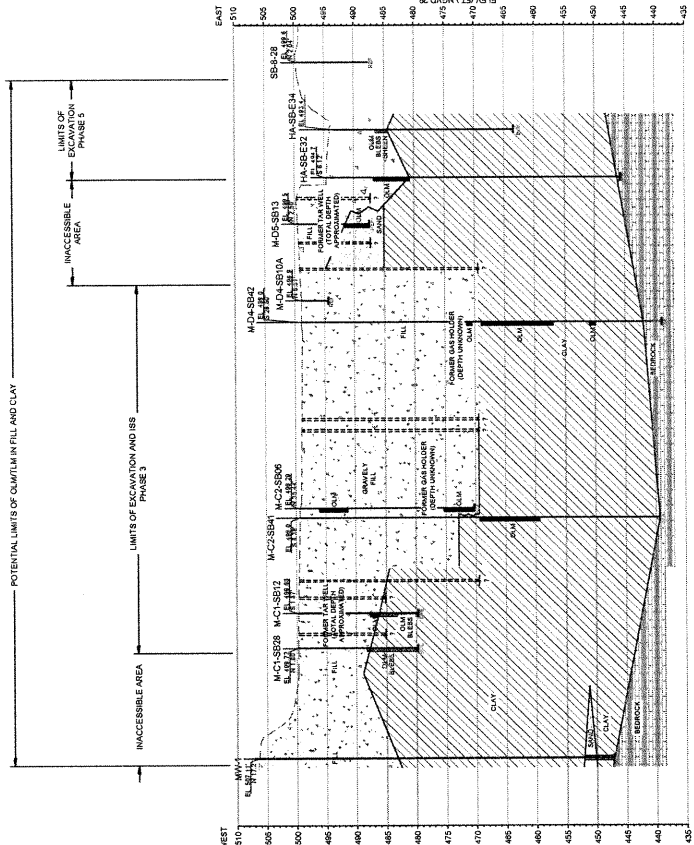
**GEOLOGIC AND
EXCAVATION / TEST
CROSS SECTION**

C-4030

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EXCAVATION / ISS
SCALE: AS SHOWN



C **GEOLOGY**
SCALE: AS SHOWN

LEGEND:

EXISTING GROUND SURFACE

EXCAVATION AREA

1000

W-285	EXPLORATION DESIGNATION
11-11	GROUND SURFACE ELEVATION
	OFFSET FROM CROSS-SECTION CUT LINE
	EXISTING GROUND SURFACE
	POINT OF STRATIGRAPHIC CHANGE
	OIL-LIKE MATERIAL
	TRACE O.I.M. BLEBS; OR SHEENS
	NON-AQUEOUS PHASE LIQUID (NAPL) OBS.
	GROUNDWATER ELEVATION MEASURED
	GROUNDWATER MONITORING WELL SCREEN
	BOTTOM EXCAVATION (FEET) (SA)

**ISSUED
FOR
CONSTRUCTION**



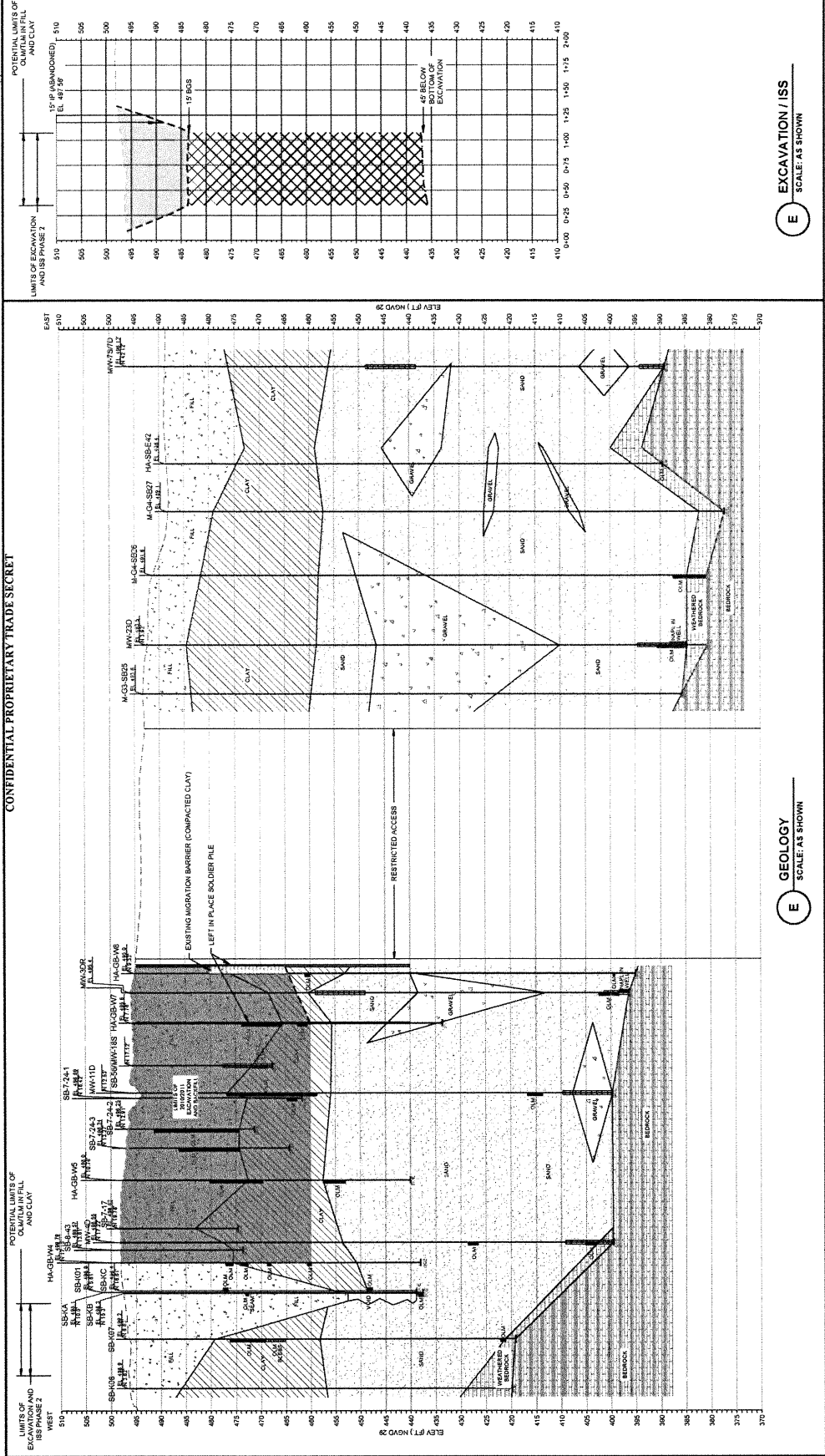
Rev	Description	By	Date
0	ISSUED FOR CON'S.	MLA	10/11/16

DUKE ENERGY OHIO, INC.
EAST END GAS WORKS
MIDDLE & WEST OF WEST PARCEL
REMEDIAL CONSTRUCTION
2801 RIVERSIDE DRIVE
CINCINNATI, OHIO
ISSUED FOR CONSTRUCTION

Page
GEOLOGIC AND
EXCAVATION /
CROSS SECTION E

C-4050

Sheet: 24 of 29



NOTE:

1. UTILITIES ARE NOT DEPICTED ON THE EAST SIDE OF CROSS SECTION E.
2. VOID DEPTHS:
 - 2.1. SB-X01 DESCRIBES VOID AT 45-60 FT BGS
 - 2.2. SB-X02 DESCRIBES VOID AT 44.5-48 FT BGS
 - 2.3. SB-X03 DESCRIBES VOID AT 44.5-50.5 FT BGS
 - 2.4. SB-XC DESCRIBES NO VOID

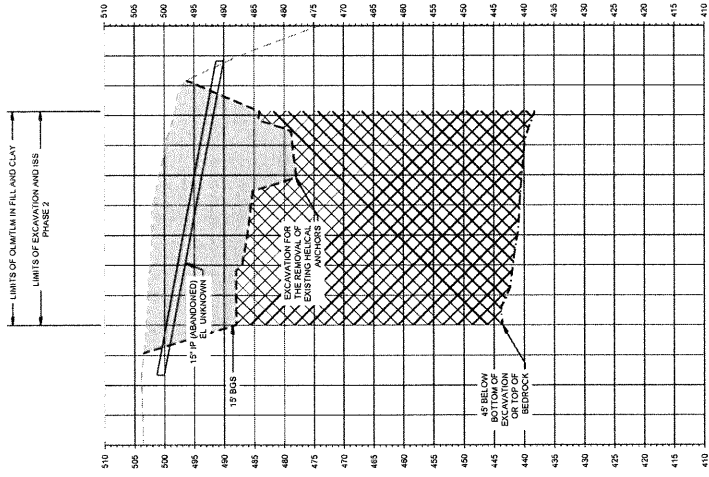
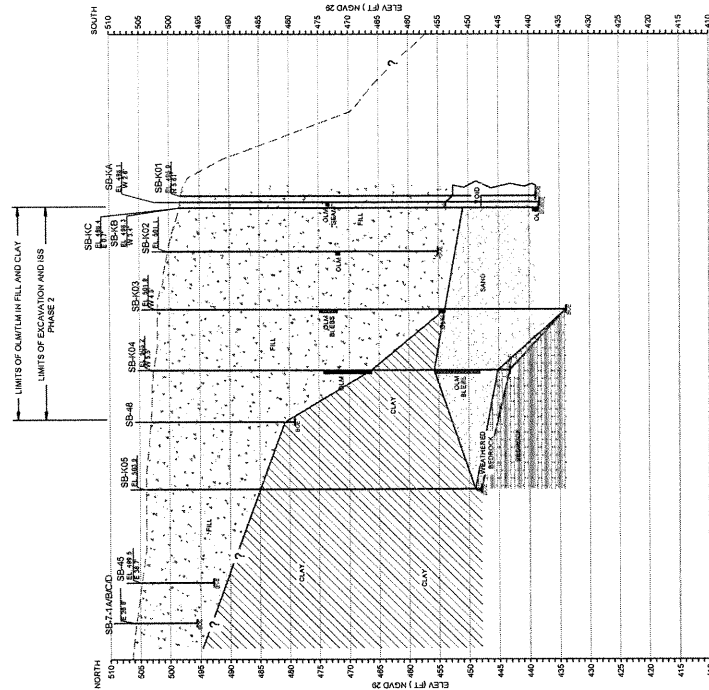
LEGEND:

	EXISTING GROUND SURFACE
	EXCAVATION AREA
	ISS AREA

EXPLORATION LEGEND

MW-24S	EXPLORATION DESIGNATION
11.8632	GROUND SURFACE ELEVATION
11.8632	GROUNDWATER MONITORING WELL CUT LINE
_____	EXISTING GROUND SURFACE
_____	POINT OF STRATIGRAPHIC CHANGE
_____	OIL-LIKE MATERIAL
_____	TRACE OIL, BLEBS, OR SHEENS
_____	NON-AQUEOUS PHASE LIQUID (NAPL)
_____	GROUNDWATER ELEVATION MEASURED DURING JANUARY 14, 2013 GAUGING EVENT
_____	GROUNDWATER MONITORING WELL SCREENED INTERVAL
_____	BOTTOM EXCAVATION/REFUSAL

0.00m



F **GEOLOGY**
SCALE: AS SHOWN

EXCAVATION / ISS
SCALE: AS SHOWN

EXPLORATION LEGEND

- EXPLANATION**
- | | |
|--------|--|
| MW-285 | EXPLORATION DESIGNATION |
| — | GROUND SURFACE ELEVATION |
| — | OFFSET FROM CROSS-SECTION CUT LINE |
| — | EXISTING GROUND SURFACE |
| — | POINT OF STRATIGRAPHIC CHANGE |
| — | OIL-LINE MATERIAL |
| — | TRACE OIL; BLEBS; OR SHEENS |
| — | NON-AQUEOUS PHASE LIQUID (NAPL) OBSERVED |
| — | GROUNDWATER ELEVATION MEASURED DURING |
| — | GROUNDWATER MONITORING WELL SCREEN |
| — | BOTTOM EXCAVATION/REFUSAL |

LEGEND:

- EXISTING GROUND SURFACE
- EXCAVATION AREA
- ISS AREA



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GEOLOGIC AND
EXCAVATION / ISOLATION
CROSS SECTION

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Sheet 25 of 29

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HALEY ALDRICH

Haley & Aldrich, Inc.
7985 N. High Street, Suite 160
Columbus, OH 43235-9402
Tel 614 987-2800
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	Scale	AS SHOWN
	Date	14-OCT-2016
	Drawn By	ZGG
	Designed By	
	Checked By	WJH
	Approved By	WRT/NLP
	Stamp	

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DUKE ENERGY OHIO, INC.
EAST END GAS WORKS
MIDDLE & WEST OF WEST PARCEL
REMEDIAL CONSTRUCTION
2801 RIVERSIDE DRIVE
CINCINNATI, OHIO
ISSUED FOR CONSTRUCTION

CONFIDENTIAL PROPRIETARY TRADE SECRET

HALEY ALDRICH
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7905 N. High Street, Suite 100
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Fax. 614.446.2549
www.haleyaldrich.com

ISSUED FOR CONSTRUCTION
PROJECT NO. 3882-207
SHEET NO. AS SHOWN
DATE 12/02/2018
CHECKED BY WJM
DESIGNED BY JCS
DRAWN BY JCS
Stamp



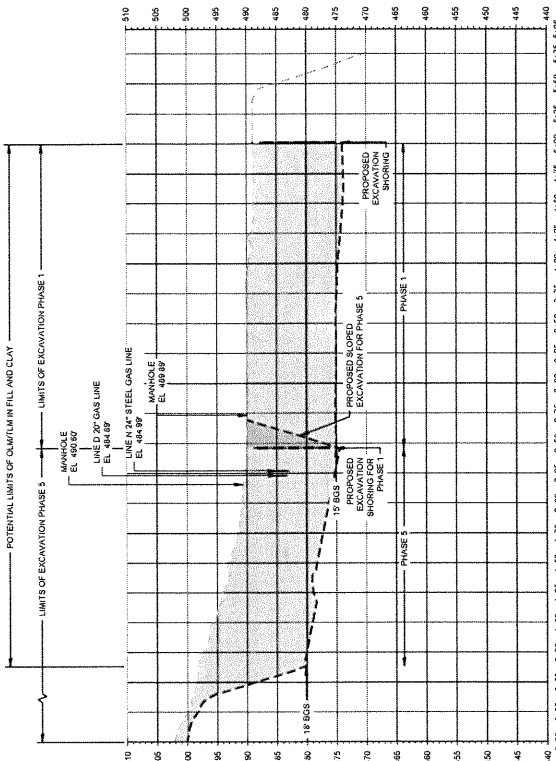
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2	PROPOSED EXCAVATION	1:1	10:1
3	PROPOSED EXCAVATION	1:1	10:1
4	PROPOSED EXCAVATION	1:1	10:1
5	PROPOSED EXCAVATION	1:1	10:1
6	PROPOSED EXCAVATION	1:1	10:1
7	PROPOSED EXCAVATION	1:1	10:1
8	PROPOSED EXCAVATION	1:1	10:1
9	PROPOSED EXCAVATION	1:1	10:1
10	PROPOSED EXCAVATION	1:1	10:1

HALEY & ALDRICH, INC.
MIDDLE & WEST OF WEST PARCEL
10000 N. High Street, Suite 100
COLUMBUS, OHIO 43229-5402
ISSUED FOR CONSTRUCTION

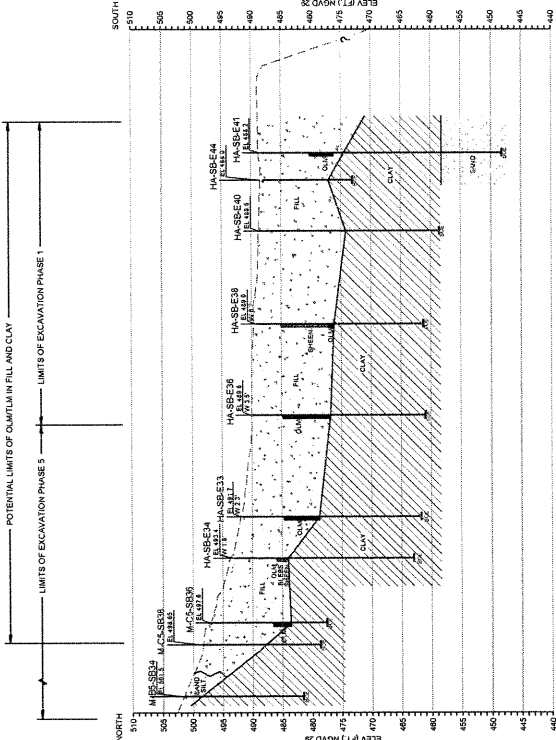
Page 26 of 29
GEOLOGIC AND EXCAVATION CROSS SECTION

C-407
Sheet 26 of 29

HORIZ. 0 50 100 150 200
VERT. 0 10 20 30 40



G EXCAVATION
SCALE: AS SHOWN



G GEOLOGY
SCALE: AS SHOWN

LEGEND:
--- EXISTING GROUND SURFACE
--- EXCAVATION AREA

EXPLORATION LEGEND
MW-28S --- EXPLORATION DESIGNATION
--- GROUND SURFACE ELEVATION
--- EXISTING GROUND SURFACE
--- POINT OF STRATIGRAPHIC CHANGE
--- OIL-LINE MATERIAL
--- TRACE OIL BLEBS; OR SHEENS
--- NON-AQUEOUS PHASE LIQUID (NAPL) OBSERVED IN MONITORING WELL DURING JANUARY 14, 2013 GAUGING EVENT
--- GROUNDWATER ELEVATION MEASURED DURING JANUARY 14, 2013 GAUGING EVENT
--- GROUNDWATER MONITORING WELL SCREENED INTERVAL
--- BOTTOM EXCAVATION/REFUSAL

Attachment JRC – 9
OCC-POD-01-001(j) Attachment West End
(relevant pages)

Appendix I

Data Validation Reports



Environment

CONFIDENTIAL PROPRIETARY TRADE SECRET

Submitted by:
Duke Energy Ohio, Inc.
Charlotte, North Carolina

PUCO Case No. 19-1085-GA-AAM
OCC-POD-01-001(j) CONF Attachment West End

Submitted by:
AECOM
Westford, MA
60144183
December 2010

JRC-9

Page 3 of 4

Human Health Risk Assessment

Duke Energy West End Site
646 Mehring Way
Cincinnati, Ohio

Prepared By: Kelly A.S. Vosnakis, Human Health Risk Assessor

Prepared By: Julie A.F. Kabel, Human Health Risk Assessor

Reviewed By: Lisa J.N. Bradley, PhD., D.A.B.T., Senior Toxicologist, VP

Reviewed By: Mark S. Westray, Senior Project Manager

6.3.4 Leaching Evaluation

The comparison of EPCs in soil to leach-based soil values is presented in Table 6-6. Concentrations of the following constituents exceed leach-based soil values:

Front and Rose Parcel

- Arsenic
- Benzene
- Lead
- Naphthalene

West End Parcel

- Arsenic
- Benzene
- Ethylbenzene
- Lead
- Naphthalene
- Selenium
- Thallium

The leach-based soil values were derived assuming groundwater is used as a drinking water source; however, the groundwater at the Site is not used for potable purposes (drinking water is supplied by the City of Cincinnati) and a City ordinance prohibits use of groundwater for potable purposes where public water is available. While some of the constituents listed above are detected in groundwater above potable use standards, they are below the calculated GNS for the future on-Site construction/excavation worker. Constituents present in soil at the Site have been in place for over 100 years and any leaching from soils to groundwater is likely to have already occurred. Furthermore, planned remedial actions will significantly reduce the mass of constituents in soil and will reduce their potential to impact groundwater. Therefore, due the above-listed reasons, no further evaluation of the leaching pathway is recommended.

6.3.5 Risk Characterization Summary

Potential risks greater than 10^{-5} and potential HIs greater than one were identified for both the future on-Site commercial/industrial worker and the future on-Site construction/excavation worker. Based on the results of this HHRA, the following COI, indicated by an "X" below, have been identified:

Attachment JRC – 10
OCC-POD-01-001(d) Attachment West End
(relevant pages)



Environment

CONFIDENTIAL PROPRIETARY TRADE SECRET

Prepared for:
Duke Energy Ohio, Inc.
Charlotte, North Carolina

PUCO Case No. 19-1085-GA-AAM
OCC-POD-01-001(d) CONF Attachment Work Item
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Prepared by:
AECOM
Raleigh, North Carolina
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December 2010

Ohio Voluntary Action Program (VAP) Phase II Property Assessment Report

Duke Energy West End Site
646 Mehring Way
Cincinnati, Ohio

4.0 Human Health Risk Assessment

4.1 Risk Assessment Summary

A human health risk assessment (HHRA) was conducted for the Duke Energy West End Site in accordance with the VAP requirements, OAC (3745-300-09) to assess potential risks associated with on-site exposure pathways. The HHRA was conducted assuming that future use of the Site remains non-residential and that groundwater is not used as a source of drinking water. The complete HHRA is included with this report as Appendix J. A summary of the risk assessment is provided below, followed by the conclusions.

COCs were selected in accordance with OAC [3745-300-09(D)(3)(a)]; generally all detected constituents were included as COCs. Dibenzofuran was excluded as a COC per OEPA VAP guidance, VA30009.09.003 (OEPA, 1997). Total chromium data were not included because both trivalent and hexavalent data were available. Total cyanide data were conservatively used in the HHRA rather than available cyanide, with the exception of one groundwater well in which available cyanide was detected and total cyanide was not; in that case, the available cyanide data were used.

Exposure Point Concentrations (EPCs) were calculated for soil COCs following EPA guidance (USEPA, 2002a; USEPA, 2010a). Groundwater was evaluated on a well-by-well basis, using the higher of the March and June 2010 results as the EPC. The September 2010 data were not included in the quantitative risk assessment because they were undergoing validation as the HHRA was being prepared; however, the reported analytical results from the September event do not differ significantly from previous events and, therefore, it is unlikely that the September data will affect the analyses and conclusions derived from the HHRA..

Dose-response values for this HHRA were obtained from the Chemical Information Database and Applicable Regulatory Standards (CIDARS) where available and were selected according to the hierarchy defined in OAC 3745-300-09(D)(3)(c)(i) for COCs not included in CIDARS.

Information regarding current and potential future uses of the Site was evaluated to develop a conceptual site model (CSM) that identifies primary and secondary sources, potential migration pathways of constituents from source areas to environmental media where exposure can occur, and potential human receptors. The CSM is summarized graphically in Figure 4-1.

Under the current use of the Site, there are no exposures to surface soils on the Front and Rose parcel, which is paved, nor on the West End parcel, which is gravel-covered. Drinking water is currently supplied to the Site by the City of Cincinnati, and groundwater is not used for any process at the Site. Therefore, there are no current exposures to groundwater. There is one small building on the Front and Rose parcel and one large building on the West End parcel; these buildings are currently only occasionally occupied for limited time intervals, therefore, the vapor intrusion scenario was not evaluated. There is no on-going construction or excavation work at the Site, so there is no current exposure to the subsurface. Therefore, under the current scenario, there are no exposures to surface soil, subsurface soil, groundwater, or indoor air, and all potential exposures are considered incomplete.

the VAP, the GUPUS based on maximum contaminant level (MCLs) and risk-derived GUPUS from OAC 3745-300-08(C)(3)(b)(Tables VI and VII) were used for applicable standards (even though the groundwater will not be consumed). The POC is the upper saturated zone within the Site boundary.

- Soil direct-contact by commercial/industrial worker – The applicable standard used is the OEPA VAP generic direct-contact standards for commercial and industrial land use categories from OAC 3745-300-08(B)(3)(c)(Table III). The POC is the upper four feet from the ground surface at the Site. Multiple chemical adjustments were not needed since it was assumed that the applicable direct contact standard was exceeded in unsaturated soil.
- Groundwater potable use - The applicable standard used is the GUPUS based on MCLs from OAC 3745-300-08(C)(3)(b)(Table VI). The POC is the upper saturated zone at the Site.
- Groundwater vapor intrusion to indoor air - The VAP does not provide generic standards for soil or groundwater for the vapor intrusion pathway. Applicable standards were determined by Site-specific risk assessment.

Under current uses of the Site, there are no exposures to COCs in surface soil, subsurface soil, groundwater, or indoor air. Under potential future commercial/industrial and construction/excavation exposure scenarios, potential carcinogenic risks greater than 10^{-5} and non-carcinogenic risk with HI values greater than 1 were identified. These potential risks may be mitigated through institutional controls, engineering controls, and/or remediation.

5.3 Groundwater Response Requirements

In accordance with the VAP, OAC 3745-300-10 (F), minimum response requirements must be met for any class of groundwater impacted with COCs above GUPUS. As previously noted in Section 3.2.3 of this report, groundwater at the Site is likely categorized as Critical Resource Groundwater. The Critical Resource Groundwater exhibits COC concentrations above GUPUS and the source of COCs is assumed to be attributable to on-Site origins resulting in the following response requirements:

- Human exposure from on-site potable use to the impacted groundwater must be prevented;
- Groundwater must meet non-potable-use standards on and off the Site, if applicable.
- Prevention of potable and non-potable exposure to the on-site impacted groundwater may be achieved using an institutional control. The only complete pathway for the non-potable use standard considered for this Site is the on-site groundwater to indoor air pathway which was evaluated in the HHRA.

If the uppermost groundwater zone underlying the property exceeds GUPUS, then the Volunteer must provide documentation showing that no groundwater zone is present or contains COCs above GUPUS beneath the uppermost impacted groundwater zone pursuant to OAC 3745-300-07(F)(2). For the West End Site, it has been shown through sampling that the groundwater in the deep portion of the unconsolidated aquifer zone currently meets GUPUS. Consequently, it is inferred that the lower bedrock aquifer has not been impacted and, therefore, also meets GUPUS.

5.4 Applicable Standards Compliance

As described previously, surface and subsurface soils currently exceed applicable standards for the relevant onsite potential exposure pathways. However, under current Site conditions, there are no

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Duke's Response to OCC INT-02-004

Duke Energy Ohio
Case No. 19-0174-GA-RDR
OCC's Second Set of Interrogatories
Date Received: May 2, 2019

OCC-INT-02-004

REQUEST:

Has Duke asked its Certified Professional(s) to issue an Urban Use Designation for the East End or West End MGP Sites?

RESPONSE:

Objection. This question is vague, ambiguous, calls for speculation and otherwise misstates facts. Without waiving said objection and to the extent discoverable, the Company presumes this question is referring to an "Urban Setting Designation" under the Ohio VAP. Only the Ohio EPA can issue Urban Setting Designations. Duke's CP has not requested that Ohio EPA issue an Urban Setting Designation at this time.

PERSON RESPONSIBLE: As to objection – Legal
As to response – Todd Bachand

Attachment JRC – 12
OCC-POD-02-004(b) SUPP Attach
(relevant pages)

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**TABLE 1 - PRELIMINARY
GROUNDWATER ELEVATION AND NAPL THICKNESS SUMMARY 2011-2019
EAST END GAS WORKS SITE
CINCINNATI, OHIO**

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Well ID	Top PVC Elevation (ft. NGVD 29) (Note 1)	Date	Groundwater Elevation (ft. NGVD 29)	Water Depth (ft)	Depth to DNAPL (ft)	DNAPL Thickness (ft)	DNAPL Removed (gal) (Note 2)
West of the West Parcel							
MW-K09S	503.72	8/23/2011	455.90	47.82	-	-	-
		10/30/2012	456.02	47.70	-	-	-
		1/14/2013	465.46	38.26	-	-	-
		2/10/2014	461.75	41.97	-	-	-
		5/12/2014	459.47	44.25	-	-	-
		8/11/2014	456.40	47.32	-	-	-
		11/17/2014	456.32	47.40	-	-	-
		11/13/2015	457.86	45.86	-	-	-
		2/8/2016	467.69	36.03	-	-	-
		5/31/2016	454.45	49.27	-	-	-
		8/9/2016	455.97	47.75	-	-	-
		11/7/2016	456.19	47.53	-	-	-
		4/3/2017	Not measured due to access restriction due to remedial construction.				
		5/24/2017	458.42	45.30	-	-	-
		9/13/2017	456.51	47.21	-	-	-
		12/12/2017	455.75	47.97	-	-	-
		2/6/2018	460.02	43.70	-	-	-
		5/8/2018	467.55	36.17	-	-	-
		8/14/2018	455.84	47.88	-	-	-
		10/23/2018	457.31	46.41	-	-	-
		4/2/2019	461.89	41.83	-	-	-
		5/22/2019	460.25	43.47	-	-	-
		7/29/2019	456.35	47.37	-	-	-
MW-K09D	503.16	8/23/2011	455.71	47.45	-	-	-
		10/30/2012	456.06	47.10	-	-	-
		1/14/2013	465.52	37.64	-	-	-
		2/10/2014	461.75	41.41	-	-	-
		5/12/2014	459.46	43.70	-	-	-
		8/11/2014	456.36	46.80	-	-	-
		11/17/2014	456.31	46.85	-	-	-
		11/13/2015	457.83	45.33	-	-	-
		2/8/2016	467.65	35.51	-	-	-
		5/31/2016	456.24	46.92	-	-	-
		8/9/2016	455.28	47.88	-	-	-
		11/7/2016	456.15	47.01	-	-	-
		4/3/2017	Not measured due to access restriction due to remedial construction.				
		5/24/2017	454.49	48.67	-	-	-
		9/13/2017	456.43	46.73	-	-	-
		12/12/2017	456.19	46.97	-	-	-
		2/6/2018	460.04	43.12	-	-	-
		5/8/2018	467.57	35.59	-	-	-
		8/14/2018	455.82	47.34	-	-	-
		10/23/2018	456.18	46.98	-	-	-
		4/2/2019	461.90	41.26	-	-	-
		5/22/2019	460.25	42.91	-	-	-
		7/29/2019	456.35	46.81	-	-	-
West Parcel							
MW-19S	508.82	10/30/2012	456.12	52.70	-	-	-
		1/14/2013	465.73	43.09	-	-	-
		2/10/2014	462.38	46.44	-	-	-
		5/12/2014	459.62	49.20	-	-	-
		8/11/2014	456.70	52.12	-	-	-
		11/17/2014	456.62	52.20	-	-	-
		11/13/2015	458.15	50.67	-	-	-
		2/8/2016	468.00	40.82	-	-	-

Haley Aldrich, Inc.

September 2019

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**TABLE 1 - PRELIMINARY
GROUNDWATER ELEVATION AND NAPL THICKNESS SUMMARY 2011-2019
EAST END GAS WORKS SITE
CINCINNATI, OHIO**

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Well ID	Top PVC Elevation (ft. NGVD 29) (Note 1)	Date	Groundwater Elevation (ft. NGVD 29)	Water Depth (ft)	Depth to DNAPL (ft)	DNAPL Thickness (ft)	DNAPL Removed (gal) (Note 2)
MW-19S	508.82	5/31/2016	457.87	50.95	-	-	-
		8/9/2016	456.41	52.41	-	-	-
		11/7/2016	456.67	52.15	-	-	-
		4/3/2017	473.70	35.12	-	-	-
		5/24/2017	458.90	49.92	-	-	-
		5/31/2017	462.44	46.38	-	-	-
		9/13/2017	456.86	51.96	-	-	-
		12/12/2017	456.72	52.10	-	-	-
		2/6/2018	460.43	48.39	-	-	-
		5/8/2018	467.58	41.24	-	-	-
		8/14/2018	456.36	52.46	-	-	-
		10/23/2018	457.55	51.27	-	-	-
		4/2/2019	462.12	46.70	-	-	-
		5/22/2019	460.87	47.95	-	-	-
		7/29/2019	457.03	51.79	-	-	-
MW-3D-R	497.95	10/30/2012	455.10	42.85	-	-	-
		1/14/2013	465.84	32.11	-	-	-
		2/10/2014	461.85	36.10	106.7	1.85	-
		5/12/2014	459.35	38.60	107	1.50	-
		8/11/2014	456.35	41.60	107.5	1.00	-
		11/17/2014	456.22	41.73	No DNAPL, sheen only		-
		11/13/2015	457.87	40.08	107	1.50	1
		2/8/2016	467.43	30.52	No DNAPL, sheen only		-
		5/31/2016	457.15	40.80	-	-	-
		8/9/2016	457.85	40.10	-	-	-
		11/7/2016	456.10	41.85	-	-	-
		4/3/2017	474.08	23.87	-	-	-
		5/24/2017	458.30	39.65	-	-	-
		6/1/2017	462.53	35.42	-	-	-
		9/13/2017	456.34	41.61	-	-	-
		12/12/2017	455.95	42.00	-	-	-
		2/6/2018	460.00	37.95	-	-	-
		5/8/2018	467.50	30.45	-	-	-
		8/14/2018	455.67	42.28	-	-	-
		10/23/2018	456.90	41.05	-	-	-
		4/2/2019	462.03	35.92	-	-	-
		5/22/2019	460.14	37.81	-	-	-
		7/29/2019	456.23	41.72	No DNAPL, sheen only		-
MW-4D-R	501.58	10/30/2012	456.03	45.55	-	-	-
		1/14/2013	465.78	35.80	-	-	-
		2/10/2014	461.68	39.90	-	-	-
		5/12/2014	459.28	42.30	-	-	-
		8/11/2014	456.25	45.33	-	-	-
		11/17/2014	456.18	45.40	-	-	-
		11/13/2015	457.72	43.86	-	-	-
		2/8/2016	467.52	34.06	-	-	-
		5/31/2016	457.08	44.50	-	-	-
		8/9/2016	455.41	46.17	-	-	-
		11/7/2016	456.01	45.57	-	-	-
(Note 3)	501.70	4/3/2017	474.09	27.61	-	-	-
		5/24/2017	458.15	43.55	-	-	-
		5/31/2017	461.89	39.81	-	-	-
		9/13/2017	456.23	45.47	-	-	-
		12/12/2017	455.93	45.77	-	-	-
		2/6/2018	459.82	41.88	-	-	-
		5/8/2018	467.45	34.25	-	-	-

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EAST END GAS WORKS SITE
CINCINNATI, OHIO**

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Well ID	Top PVC Elevation (ft. NGVD 29) (Note 1)	Date	Groundwater Elevation (ft. NGVD 29)	Water Depth (ft)	Depth to DNAPL (ft)	DNAPL Thickness (ft)	DNAPL Removed (gal) (Note 2)
MW-4D-R	501.70	8/14/2018	455.53	46.17	-	-	-
		10/23/2018	457.08	44.62	-	-	-
		4/2/2019	461.67	40.03	-	-	-
		5/22/2019	460.03	41.67	-	-	-
		7/29/2019	456.10	45.60	-	-	-
Middle Parcel							
MW-20S	497.53	10/30/2012	461.93	35.60	-	-	-
		1/14/2013	464.38	33.15	-	-	-
		2/10/2014	468.83	28.70	-	-	-
		5/12/2014	465.65	31.88	-	-	-
		8/11/2014	462.12	35.41	-	-	-
		11/17/2014	460.55	36.98	-	-	-
		11/13/2015	461.41	36.12	~3" DNAPL observed		-
		2/8/2016	468.75	28.78	~4" DNAPL observed		<0.5
		5/31/2016	459.65	37.88	-	-	-
		8/9/2016	461.58	35.95	-	-	-
		11/7/2016	461.26	36.27	-	-	-
		1/18/2017	Well decommissioned.				
MW-20D	497.53	10/30/2012	456.05	41.48	-	-	-
		1/14/2013	465.97	31.56	-	-	-
		2/10/2014	461.83	35.70	-	-	-
		5/12/2014	459.24	38.29	-	-	-
		8/11/2014	456.24	41.29	-	-	-
		11/17/2014	456.03	41.50	-	-	-
		11/13/2015	457.68	39.85	-	-	-
		2/8/2016	467.53	30.00	-	-	-
		5/31/2016	457.14	40.39	-	-	-
		8/9/2016	456.07	41.46	-	-	-
		11/7/2016	456.03	41.50	-	-	-
		1/18/2017	Well decommissioned.				
MW-21S	496.73	10/30/2012	462.78	33.95	-	-	-
		1/14/2013	464.13	32.60	-	-	-
		2/10/2014	464.93	31.80	-	-	-
		5/12/2014	461.30	35.43	-	-	-
		8/11/2014	458.45	38.28	-	-	-
		11/17/2014	458.38	38.35	-	-	-
		11/13/2015	459.38	37.35	-	-	-
		2/8/2016	471.51	25.22	-	-	-
		5/31/2016	460.13	36.60	-	-	-
		8/9/2016	457.73	39.00	-	-	-
		11/7/2016	Not measured due to access restriction due to remedial construction.				
		4/3/2017	473.38	23.35	-	-	-
		5/24/2017	461.46	35.27	-	-	-
		9/13/2017	458.54	38.19	-	-	-
		12/12/2017	458.76	37.97	-	-	-
		2/6/2018	460.66	36.07	-	-	-
		5/8/2018	463.49	33.24	-	-	-
		8/14/2018	458.63	38.10	-	-	-
		10/23/2018	462.07	34.66	-	-	-
		3/19/2019	Well decommissioned.				
MW-21D	496.78	10/30/2012	455.98	40.80	-	-	-
		1/14/2013	465.78	31.00	-	-	-
		2/10/2014	461.93	34.85	-	-	-
		5/12/2014	459.19	37.59	-	-	-
		8/11/2014	456.23	40.55	-	-	-
		11/17/2014	456.03	40.75	-	-	-

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Well ID	Top PVC Elevation (ft. NGVD 29) (Note 1)	Date	Groundwater Elevation (ft. NGVD 29)	Water Depth (ft)	Depth to DNAPL (ft)	DNAPL Thickness (ft)	DNAPL Removed (gal) (Note 2)
MW-21D	496.78	11/13/2015	457.62	39.16	-	-	-
		2/8/2016	467.69	29.09	-	-	-
		5/31/2016	457.20	39.58	-	-	-
		8/9/2016	455.78	41.00	-	-	-
		11/7/2016	Not measured due to access restriction due to remedial construction.				
		4/3/2017	473.89	22.89	-	-	-
		5/24/2017	458.24	38.54	-	-	-
		9/13/2017	456.25	40.53	-	-	-
		12/12/2017	456.03	40.75	-	-	-
		2/6/2018	459.85	36.93	-	-	-
		5/8/2018	467.19	29.59	-	-	-
		8/14/2018	455.64	41.14	-	-	-
		10/23/2018	455.83	40.95	-	-	-
		3/19/2019	Well decommissioned.				
MW-22S	496.30	10/30/2012	458.65	37.65	-	-	-
		1/14/2013	462.27	34.03	-	-	-
		2/10/2014	467.89	28.41	-	-	-
		5/12/2014	464.95	31.35	-	-	-
		8/11/2014	460.90	35.40	-	-	-
		11/17/2014	459.25	37.05	-	-	-
		11/13/2015	459.47	36.83	-	-	-
		2/8/2016	470.65	25.65	-	-	-
		5/31/2016	461.97	34.33	-	-	-
		8/9/2016	459.03	37.27	-	-	-
		11/7/2016	459.27	37.03	-	-	-
		1/18/2017	Well decommissioned.				
MW-22D	496.31	10/30/2012	456.13	40.18	84.10	3.20	-
		1/14/2013	466.30	30.01	84.20	3.10	-
		2/10/2014	460.06	36.25	84.00	3.20	-
		5/12/2014	459.31	37.00	84.70	2.50	-
		8/11/2014	456.28	40.03	85.10	2.00	-
		11/17/2014	456.11	40.20	86.20	1.00	-
		11/13/2015	457.76	38.55	85.70	1.50	3
		2/8/2016	467.43	28.88	86.60	0.60	1
		5/31/2016	457.14	39.17	-	-	-
		8/9/2016	455.79	40.52	-	-	-
		11/7/2016	456.08	40.23	-	-	-
		1/18/2017	Well decommissioned.				
MW-23D	493.11	10/30/2012	456.16	36.95	104.20	5.40	-
		1/14/2013	466.41	26.70	105.57	4.03	-
		2/10/2014	460.26	32.85	105.00	4.00	-
		5/12/2014	459.31	33.80	108.60	0.85	-
		8/11/2014	456.26	36.85	107.95	1.50	-
		11/17/2014	456.16	36.95	No DNAPL, sheen only		-
		11/13/2015	457.76	35.35	~1" DNAPL observed		-
		2/8/2016	467.40	25.71	-	-	-
		5/31/2016	457.14	35.97	106.00	3.50	2.5
		8/9/2016	455.76	37.35	105.7	3.9	4
		11/7/2016	Not measured due to access restriction due to remedial construction.				
		4/3/2017	473.97	19.14	104.72	4.88	2
		5/24/2017	458.45	34.66	NAPL levels not checked		
		9/13/2017	456.49	36.62	NAPL levels not checked		
		12/12/2017	455.99	37.12	106.44	3	2
		2/6/2018	459.86	33.25	107.85	1.75	~2
		5/8/2018	467.68	25.43	104.85	4.5	2.5
		8/14/2018	456.31	36.80	105.85	3.56	~2

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MW-23D	493.11	10/23/2018	457.96	35.15	-	-	~2.5
		4/2/2019	461.41	31.70	105.7	2.66	~1.5 to 2
		5/22/2019	462.31	30.80	106.25	1.05	< 1
		7/29/2019	456.36	36.75	-	-	< 1
MW-24S	496.36	10/30/2012	465.60	30.76	-	-	-
		1/14/2013	469.03	27.33	-	-	-
		2/10/2014	470.45	25.91	-	-	-
		5/12/2014	470.41	25.95	-	-	-
		8/11/2014	466.31	30.05	-	-	-
		11/17/2014	Not measured due to ponded water covering road box.				
		11/13/2015	467.96	28.40	-	-	-
		2/8/2016	469.33	27.03	-	-	-
		5/31/2016	469.55	26.81	-	-	-
		8/9/2016	466.11	30.25	-	-	-
		11/7/2016	466.91	29.45	-	-	-
		1/18/2017	Well decommissioned.				
MW-24D	496.40	10/30/2012	456.08	40.32	-	-	-
		1/14/2013	466.25	30.15	-	-	-
		2/10/2014	461.81	34.59	-	-	-
		5/12/2014	459.25	37.15	-	-	-
		8/11/2014	456.25	40.15	-	-	-
		11/17/2014	456.10	40.30	-	-	-
		11/13/2015	457.67	38.73	-	-	-
		2/8/2016	467.66	28.74	-	-	-
		5/31/2016	457.12	39.28	-	-	-
		8/9/2016	455.75	40.65	-	-	-
		11/7/2016	456.02	40.38	-	-	-
		1/18/2017	Well decommissioned.				
MW-25D	490.65	10/30/2012	455.02	35.63	-	-	-
		1/14/2013	466.05	24.60	-	-	-
		2/10/2014	461.85	28.80	-	-	-
		5/12/2014	459.20	31.45	101.20	1.30	-
		8/11/2014	456.20	34.45	100.95	1.40	-
		11/17/2014	456.10	34.55	101.75	0.50	-
		11/13/2015	457.67	32.98	101.60	0.75	2
		2/8/2016	467.39	23.26	~2" DNAPL observed		<0.25
		5/31/2016	457.17	33.48	-	-	-
		8/9/2016	455.70	34.95	-	-	-
		11/7/2016	Not measured due to access restriction due to remedial construction.				
		4/3/2017	473.91	16.74	Sheen on WL tape		-
		5/24/2017	458.19	32.46	-	-	-
		6/1/2017	462.37	28.28	-	-	-
		9/13/2017	456.30	34.35	-	-	-
		12/12/2017	455.85	34.80	-	-	-
		2/6/2018	459.85	30.80	-	-	-
		5/8/2018	467.53	23.12	-	-	-
		8/14/2018	455.58	35.07	-	-	-
		10/23/2018	457.10	33.55	-	-	-
		4/2/2019	461.82	28.83	-	-	-
		5/22/2019	460.10	30.55	-	-	-
		7/29/2019	456.17	34.48	-	-	-
MW-26S	498.69	10/30/2012	489.64	9.05	-	-	-
		1/14/2013	489.48	9.21	-	-	-
		2/10/2014	489.94	8.75	-	-	-
		5/12/2014	489.91	8.78	-	-	-
		8/11/2014	489.92	8.77	-	-	-

**TABLE 1 - PRELIMINARY
GROUNDWATER ELEVATION AND NAPL THICKNESS SUMMARY 2011-2019
EAST END GAS WORKS SITE
CINCINNATI, OHIO**

Well ID	Top PVC Elevation (ft. NGVD 29) (Note 1)	Date	Groundwater Elevation (ft. NGVD 29)	Water Depth (ft)	Depth to DNAPL (ft)	DNAPL Thickness (ft)	DNAPL Removed (gal) (Note 2)
MW-26S	498.69	11/17/2014	490.09	8.60	-	-	-
		11/13/2015	491.12	7.57	-	-	-
		2/8/2016	490.54	8.15	-	-	-
		5/31/2016	490.93	7.76	-	-	-
		8/9/2016	491.07	7.62	-	-	-
		11/7/2016	490.42	8.27	-	-	-
		4/3/2017	Not measured due to access restriction due to remedial construction.				
		5/24/2017	492.43	6.26	-	-	-
		9/13/2017	Not measured due to access restriction due to remedial construction.				
		12/12/2017	Not measured due to access restriction due to remedial construction.				
		2/6/2018	490.96	7.73	-	-	-
		5/8/2018	493.31	5.38	-	-	-
		8/14/2018	492.63	6.06	-	-	-
		10/23/2018	492.12	6.57	-	-	-
TW-1S	495.27	9/13/2017	456.32	38.95	-	-	-
		12/12/2017	456.11	39.16	-	-	-
		2/6/2018	459.96	35.31	-	-	-
		5/8/2018	467.76	27.51	~1" DNAPL observed		0
		8/14/2018	455.71	39.56	-	-	-
		10/23/2018	457.20	38.07	DNAPL globules on tape		0
		4/2/2019	Could not locate, buried under 3" of packed gravel.				
		5/22/2019	460.16	35.11	44.85	0.35	0
		7/29/2019	456.30	38.97	~6" DNAPL observed		-
TW-2I	494.29	9/13/2017	456.29	38.00	-	-	-
		12/12/2017	456.09	38.20	-	-	-
		2/6/2018	459.93	34.36	-	-	-
		5/8/2018	467.93	26.36	-	-	-
		8/14/2018	455.68	38.61	-	-	-
		10/23/2018	456.95	37.34	-	-	-
		4/2/2019	461.99	32.30	-	-	-
		5/22/2019	460.10	34.19	-	-	-
		7/29/2019	456.34	37.95	-	-	-
East Parcel							
MW-6	504.05	10/30/2012	486.05	18.00	-	-	-
		1/14/2013	487.67	16.38	-	-	-
		2/10/2014	488.15	15.90	-	-	-
		5/12/2014	487.64	16.41	-	-	-
		8/11/2014	486.05	18.00	-	-	-
		11/17/2014	485.33	18.72	-	-	-
		11/13/2015	487.14	16.91	-	-	-
		2/8/2016	488.27	15.78	-	-	-
		5/31/2016	487.24	16.81	-	-	-
		8/9/2016	487.25	16.80	-	-	-
		11/7/2016	485.80	18.25	-	-	-
		4/3/2017	488.54	15.51	-	-	-
		5/24/2017	487.91	16.14	-	-	-
		9/13/2017	485.69	18.36	-	-	-
		12/12/2017	487.08	16.97	-	-	-
		2/6/2018	487.53	16.52	-	-	-
		5/8/2018	488.32	15.73	-	-	-
		8/14/2018	487.61	16.44	-	-	-
		10/23/2018	487.18	16.87	-	-	-
		4/2/2019	488.40	15.65	-	-	-
		5/22/2019	488.36	15.69	-	-	-
		7/29/2019	487.99	16.06	-	-	-

**TABLE 1 - PRELIMINARY
GROUNDWATER ELEVATION AND NAPL THICKNESS SUMMARY 2011-2019
EAST END GAS WORKS SITE
CINCINNATI, OHIO**

Well ID	Top PVC Elevation (ft. NGVD 29) (Note 1)	Date	Groundwater Elevation (ft. NGVD 29)	Water Depth (ft)	Depth to DNAPL (ft)	DNAPL Thickness (ft)	DNAPL Removed (gal) (Note 2)
MW-7S	493.14	10/30/2012	456.01	37.13	-	-	-
		1/14/2013	465.49	27.65	-	-	-
		2/10/2014	462.09	31.05	-	-	-
		5/12/2014	459.29	33.85	-	-	-
		8/11/2014	456.29	36.85	-	-	-
		11/17/2014	456.18	36.96	-	-	-
		11/13/2015	457.71	35.43	-	-	-
		2/8/2016	467.86	25.28	-	-	-
		5/31/2016	457.33	35.81	-	-	-
		8/9/2016	455.86	37.28	-	-	-
		11/7/2016	Not measured due to access restriction due to remedial construction.				
		4/3/2017	473.99	19.15	-	-	-
		5/24/2017	458.34	34.80	-	-	-
		9/13/2017	456.34	36.80	-	-	-
		12/12/2017	456.11	37.03	-	-	-
		2/6/2018	459.95	33.19	-	-	-
		5/8/2018	467.25	25.89	-	-	-
		8/14/2018	455.73	37.41	-	-	-
		10/23/2018	457.29	35.85	-	-	-
		4/2/2019	461.85	31.29	-	-	-
		5/22/2019	460.23	32.91	-	-	-
		7/29/2019	455.27	37.87	-	-	-
MW-7D	493.08	10/30/2012	455.93	37.15	-	-	-
		1/14/2013	465.40	27.68	-	-	-
		2/10/2014	461.96	31.12	-	-	-
		5/12/2014	459.19	33.89	-	-	-
		8/11/2014	456.23	36.85	-	-	-
		11/17/2014	456.06	37.02	-	-	-
		11/13/2015	457.62	35.46	-	-	-
		2/8/2016	467.73	25.35	-	-	-
		5/31/2016	457.20	35.88	-	-	-
		8/9/2016	455.73	37.35	-	-	-
		11/7/2016	Not measured due to access restriction due to remedial construction.				
		4/3/2017	473.89	19.19	-	-	-
		5/24/2017	458.21	34.87	-	-	-
		9/13/2017	456.21	36.87	-	-	-
		12/12/2017	456.00	37.08	-	-	-
		2/6/2018	459.84	33.24	-	-	-
		5/8/2018	467.16	25.92	-	-	-
		8/14/2018	455.60	37.48	-	-	-
		10/23/2018	457.08	36.00	-	-	-
		4/2/2019	461.78	31.30	-	-	-
		5/22/2019	460.09	32.99	-	-	-
		7/29/2019	456.13	36.95	-	-	-
MW-8S	491.84	10/30/2012	456.26	35.58	-	-	-
		1/14/2013	465.79	26.05	-	-	-
		2/10/2014	462.34	29.50	-	-	-
		5/12/2014	459.56	32.28	-	-	-
		8/11/2014	456.59	35.25	-	-	-
		11/17/2014	456.44	35.40	-	-	-
		11/13/2015	457.96	33.88	-	-	-
		2/8/2016	468.11	23.73	-	-	-
		5/31/2016	457.59	34.25	-	-	-
		8/9/2016	456.10	35.74	-	-	-
		11/7/2016	456.37	35.47	-	-	-
		4/3/2017	474.23	17.61	-	-	-

CONFIDENTIAL PROPRIETARY TRADE SECRET

**TABLE 1 - PRELIMINARY
GROUNDWATER ELEVATION AND NAPL THICKNESS SUMMARY 2011-2019
EAST END GAS WORKS SITE
CINCINNATI, OHIO**

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Page 9 of 10

Well ID	Top PVC Elevation (ft. NGVD 29) (Note 1)	Date	Groundwater Elevation (ft. NGVD 29)	Water Depth (ft)	Depth to DNAPL (ft)	DNAPL Thickness (ft)	DNAPL Removed (gal) (Note 2)
MW-8S	491.84	5/24/2017	458.60	33.24	-	-	-
		9/13/2017	456.59	35.25	-	-	-
		12/12/2017	456.38	35.46	-	-	-
		2/6/2018	460.20	31.64	-	-	-
		5/8/2018	467.42	24.42	-	-	-
		8/14/2018	455.97	35.87	-	-	-
		10/23/2018	457.30	34.54	-	-	-
		4/2/2019	462.07	29.77	-	-	-
		5/22/2019	460.49	31.35	-	-	-
		7/29/2019	456.53	35.31	-	-	-
MW-8D	491.80	10/30/2012	456.25	35.55	-	-	-
		1/14/2013	465.79	26.01	-	-	-
		2/10/2014	462.30	29.50	-	-	-
		5/12/2014	459.50	32.30	-	-	-
		8/11/2014	456.53	35.27	-	-	-
		11/17/2014	456.38	35.42	-	-	-
		11/13/2015	457.93	33.87	-	-	-
		2/8/2016	467.02	24.78	-	-	-
		5/31/2016	457.50	34.30	-	-	-
		8/9/2016	456.03	35.77	-	-	-
		11/7/2016	456.30	35.50	-	-	-
		4/3/2017	474.17	17.63	-	-	-
		5/24/2017	458.52	33.28	-	-	-
		9/13/2017	456.52	35.28	-	-	-
		12/12/2017	456.30	35.50	-	-	-
		2/6/2018	460.14	31.66	-	-	-
		5/8/2018	467.38	24.42	-	-	-
		8/14/2018	455.90	35.90	-	-	-
		10/23/2018	457.41	34.39	-	-	-
		4/2/2019	462.05	29.75	-	-	-
		5/22/2019	460.40	31.40	-	-	-
		7/29/2019	456.48	35.32	-	-	-

**TABLE 1 - PRELIMINARY
GROUNDWATER ELEVATION AND NAPL THICKNESS SUMMARY 2011-2019
EAST END GAS WORKS SITE
CINCINNATI, OHIO**

Well ID	Top PVC Elevation (ft. NGVD 29) (Note 1)	Date	Groundwater Elevation (ft. NGVD 29)	Water Depth (ft)	Depth to DNAPL (ft)	DNAPL Thickness (ft)	DNAPL Removed (gal) (Note 2)
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River Gage - USGS 03255000 Ohio River at Cincinnati, Ohio

Datum of Gage	428.80 NGVD 29	Date	Gage Height (feet)	River Elevation
		11/13/2015	28.08	456.88
		2/8/2016	37.20	466.00
		5/31/2016	27.78	456.58
		8/9/2016	26.65	455.45
		11/7/2016	26.71	455.51
		4/3/2017	42.82	471.62
		5/24/2017	28.55	457.35
		9/13/2017	27.04	455.84
		12/12/2017	26.68	455.48
		2/6/2018	29.92	458.72
		5/8/2018	36.99	465.79
		8/14/2018	26.33	455.13
		10/23/2018	27.64	456.44
		4/2/2019	31.82	460.62
		5/22/2019	30.06	458.86
		7/22/2019	26.82	455.62

Notes:

1. Top of PVC elevation based on a 2012 survey.
 2. DNAPL removed was recorded after the November 2015 monitoring event.
 3. MW-4D-R top of PVC elevation revised 4/6/2017 after monitoring well repairs.
 4. Source of river gage data is USGS (data downloaded on 27 November 2018).
- Shaded cells are the most recent monitoring event.

Attachment JRC – 13
OCC-POD-01-001(cc) Attachment West End
(relevant pages)

VIA ELECTRONIC MAIL

May 22, 2019

Ms. Jessica Keener, PG
Senior Environmental Specialist
ES Remediation
Duke Energy
1000 East Main Street
Plainfield, Indiana 46168

Jessica.Keener@duke-energy.com

Re: AECOM Project No.: 60564634
2018 Groundwater Sampling Report
West End Former MGP Site
West Mehring Way
Cincinnati, Ohio

Dear Ms. Keener:

AECOM Technical Services, Inc. (AECOM) is pleased to provide this letter report to Duke Energy (Duke) summarizing the results of groundwater sampling conducted at the West End Former Manufactured Gas Plant (MGP) site (Site). These activities were conducted based on a request from Duke to implement a quarterly groundwater sampling program of the monitoring wells located throughout the West End Site for the last three quarters of 2018. The scope of work was presented in AECOM Change Order 1, dated May 24, 2018. The field activities and laboratory analyses were completed in accordance with Ohio Voluntary Action Program (VAP) Phase II rule, as specified in the Ohio Administrative Code (OAC) 3745-300-07, due to potential use of this program. The Site layout and monitoring wells are shown on **Figure 1**.

ENVIRONMENTAL ISSUES

The West End Site was the location of a MGP, which manufactured and distributed coal gas between 1843 and 1928, and subsequently distributed natural gas until sometime between 1960 and 1965. MGP related impacts to the subsurface have been historically identified at the Site including the presence of Tar-Like Material (TLM) and Oil-Like Material (OLM) in the soil and dissolved phase impacts to groundwater. The Site is divided into two parcels: the Front and Rose Parcel (north of West Mehring Way) and the West End Parcel (south of West Mehring Way). Remedial activities were previously conducted on the Front and Rose parcel in 2011, which included source area removal and in-situ soil solidification (ISS). During groundwater monitoring events in the years following remediation activities, MGP related constituents (i.e. benzene) were identified in groundwater samples collected from monitoring well locations located on the Front and Rose parcel.



Ms. Jessica Keener
Duke Energy
May 22, 2019
Page 9

- Styrene exceeded the Ohio VAP GUPUS of 100 µg/L in the groundwater samples collected from MW-13, MW-22S, the duplicate sample MW-01, and MW-24S.
- Toluene exceeded the Ohio VAP GUPUS of 1,000 µg/L in the groundwater sample collected from MW-13.
- 1,2,4-trimethylbenzene exceeded the Ohio VAP GUPUS of 140 µg/L in the groundwater samples collected from MW-13 and MW-22S, and the duplicate sample MW-01.

PAHs

- Benzo(a)pyrene exceeded the Ohio VAP GUPUS of 0.2 µg/L in the groundwater samples collected from MW-08D, MW-13, and MW-20S.
- Benzo(b)fluoranthene exceeded the Ohio VAP GUPUS of 0.46 µg/L in the groundwater sample collected from MW-08D.
- Naphthalene exceeded the Ohio VAP GUPUS of 67 µg/L in the groundwater samples collected from MW-13, MW-22S, the duplicate sample MW-01, MW-23S, and MW-24S.

PPL Metals (total)

- Arsenic exceeded the Ohio VAP GUPUS of 10 µg/L in the groundwater samples collected from MW-03R, MW-03DR, MW-11, MW-22S, the duplicate sample MW-01, MW-23S, and MW-24S.
- Lead exceeded the Ohio VAP GUPUS of 15 µg/L in the groundwater sample collected from MW-08D.
- Nickel exceeded the Ohio VAP GUPUS of 320 µg/L in the groundwater samples collected from MW-23S and MW-24S.

CONCLUSIONS

Based on the scope and results of this investigation, the following conclusions and environmental issues have been identified:

- Based on the measured groundwater elevations, the groundwater flow direction at the Site was calculated to be to the south, with a westerly direction on the West End Parcel during period of higher groundwater elevations as shown on **Figures 5 through 7**. A seasonally influenced groundwater elevation pattern is indicated by the elevation differences of 7 to 9 feet between June and December sampling events.
- DNAPL was present in the 13 monitoring well cluster during every sampling event. Benzene concentrations in exceedance of the Ohio VAP GUPUS appear to remain in the vicinity of the monitoring wells located on the northwest and central portions of the Front and Rose Parcel.
- VOCs were not identified in the groundwater sample collected from MW-25, indicating the absence of an upgradient source.
- PAH and Metal exceedances appear to be widespread across the area of the Site. A comparison of the Ohio VAP GUPUS exceedances for the three groundwater sampling events is presented in **Figure 8**.

Attachment JRC – 14
OCC-POD-01-001(p) Attachment East End
(relevant pages)

**HALEY &
ALDRICH**

REPORT ON

**FOCUSED REMEDIAL ALTERNATIVES ANALYSIS
EAST END GAS WORKS
CINCINNATI, OHIO**

BY

**Haley & Aldrich, Inc.
Portland, Maine**

FOR

Duke Energy Ohio, Inc.

**File No. 40674-005
7 August 2014**

2.2 Remedial Action Objectives

Remedial Action Objectives (RAOs) are overall protection of human health and the environment, including meeting all applicable VAP standards. For the areas of the Site considered in this Remedial Alternatives Analysis, the threshold criteria for achieving RAOs include the following (VAP applicable standards included in parentheses):

- Overall protection of human health and the environment;
- Mitigate exposure that exceeds applicable standards for Site workers, trespassers, and construction workers (OAC 3745-300-08 and OAC 3745-300-09);
- Mitigate the potential for future vapor intrusion risks if Site uses change (OAC 3745-300-07(I)(1)(a)(iii));
- Mitigate the potential for COCs in soil to leach into groundwater (OAC 3745-300-08, OAC 3745-300-09, and OAC 3745-300-10);
- Mitigate NAPL impacts to groundwater and the potential for migration of NAPL off-site (OAC 3745-300-08 and OAC 1301:7-9-13(G)(3)(a));
- Mitigate potential future exposure to impacted groundwater for potable and non-potable uses (OAC 3745-300-08, OAC 3745-300-09, and OAC 3745-300-10), and
- Evaluate the potential for Site groundwater to impact downgradient receptors (this investigation/evaluation will be performed in the future and, therefore, is not included in remedial alternatives identified in this report) (OAC 3745-300-08 (A)(1) and (H), and OAC 3745-300-09 (E)).

The above RAOs are then further evaluated and screened using the criteria in Section 4.1 of this report.

Attachment JRC – 15
Duke's Response to OCC INT-02-002

**Duke Energy Ohio
Case No. 19-0174-GA-RDR
OCC's Second Set of Interrogatories
Date Received: May 2, 2019**

OCC-INT-02-002

REQUEST:

Has Duke asked its Certified Professional(s) to issue a No Further Action Letter for the East End or West End MGP Sites?

RESPONSE:

No, as the East End and West End sites do not yet meet all applicable standards to qualify for a No Further Action Letter under the VAP at this time.

PERSON RESPONSIBLE: Todd Bachand

Attachment JRC – 16
Duke's Response to OCC INT-02-003

**Duke Energy Ohio
Case No. 19-0174-GA-RDR
OCC's Second Set of Interrogatories
Date Received: May 2, 2019**

OCC-INT-02-003

REQUEST:

Has Duke requested a Covenant Not to Sue from Ohio EPA for East End or West End MGP Sites?

RESPONSE:

No, as the East End and West End sites do not yet meet all applicable standards to support a Covenant Not to Sue under the VAP at this time.

PERSON RESPONSIBLE: Todd Bachand

This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

11/7/2019 4:22:08 PM

in

Case No(s). 14-0375-GA-RDR, 15-0452-GA-RDR, 16-0542-GA-RDR, 17-0596-GA-RDR, 18-0283-GA-RD

Summary: Testimony Revised Direct Testimony of James R. Campbell, Ph.D. on Behalf of The Office of The Ohio Consumers' Counsel electronically filed by Mrs. Tracy J Greene on behalf of Healey, Christopher