

**AMENDED AND RESTATED
LANDFILL GAS RIGHTS, EASEMENT AND LEASE AGREEMENT**

by and between

Southeastern Public Service Authority of Virginia, as Owner

and

MAS Suffolk RNG, LLC, as Gasco

December 15, 2021

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**AMENDED AND RESTATED
LANDFILL GAS RIGHTS, EASEMENT AND LEASE AGREEMENT**

THIS AMENDED AND RESTATED LANDFILL GAS RIGHTS, EASEMENT AND LEASE AGREEMENT (this “Agreement”) is made as of this 15th day of December, 2021 (the “Effective Date”) by and between Southeastern Public Service Authority of Virginia, a public body politic and corporate of the Commonwealth of Virginia (“Owner”), and MAS Suffolk RNG, LLC (f/k/a Suffolk Energy Partners, LLC), a Delaware limited liability company (“Gasco”). Owner and Gasco are referred to herein individually as a “Party” and collectively as the “Parties.”

Background

A. Owner owns that certain property located in the Sleepy Hole Borough of the City of Suffolk, Virginia, on a portion of which property Owner owns and operates a solid waste disposal facility (the “Landfill”), as more particularly identified and described on Exhibit B-1 attached hereto.

B. As a result of decomposition of solid waste deposited in the Landfill, the Landfill emits Landfill Gas that is subject to extensive federal and state environmental regulation. Owner desires to (i) obtain services from Gasco in connection with compliance by Owner with all federal and state Laws applicable to Landfill Gas, and (ii) permit Gasco to recover and use Landfill Gas for beneficial use projects, all on the terms and conditions set forth in this Agreement.

C. Owner and Gasco previously entered into that certain Landfill Gas Rights, Easement and Lease Agreement dated as of January 21, 2011, as amended by the First Amendment to Landfill Gas Agreement dated as of August 7, 2014 (collectively, the “2011 Agreement”), pursuant to which, among other things, Owner supplied Landfill Gas to Gasco and Gasco owned and operated Project Facilities (as defined in the 2011 Agreement) to process and use the Landfill Gas to generate electric power and to sell Recovered Landfill Gas to third party purchasers.

D. Gasco now desires to (i) decommission and demolish certain Project Facilities (as defined in the 2011 Agreement) (as more particularly described herein, the “Legacy Power Facilities”), and (ii) finance, permit, construct, operate, and maintain a new beneficial use project, the RNG Facilities (as defined herein), to utilize the Recovered Landfill Gas for the production and sale of Renewable Natural Gas (as defined herein) and other Products, as more particularly described herein. This Agreement amends, restates and replaces in its entirety the 2011 Agreement.

Agreement

NOW, THEREFORE, for and in consideration of the premises, and of the mutual covenants and agreements hereinafter set forth, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged by the Parties, Owner and Gasco agree as follows:

ARTICLE I
DEFINITIONS

1.1 Defined Terms. Except as otherwise provided for in this Agreement, the terms defined in Exhibit A shall, for purposes of this Agreement, have the meanings therein specified.

1.2 Construction of Certain Terms and Phrases; U.S. Dollars. Unless the context of this Agreement otherwise requires: (a) words of either gender include the other gender; (b) words using the singular or plural also include the plural or singular, respectively; (c) the terms “hereof,” “herein,” “hereby,” “hereto” and similar words refer to this entire Agreement and not any particular Article, Section, Clause, Exhibit, Appendix or Schedule or any other subdivision of this Agreement; (d) references to “Article,” “Section,” “Clause,” “Exhibit,” “Appendix” or “Schedule” are to the Articles, Sections, Clauses, Exhibits, Appendices and Schedules, respectively, of this Agreement; (e) the words “include” or “including” shall be deemed to be followed by “without limitation” or “but not limited to” whether or not they are followed by such phrases or words of similar import; (f) references to “this Agreement” or any other agreement or document shall be construed as a reference to such agreement or document, including any Exhibits, Appendices, Attachments and Schedules hereto, as amended, modified or supplemented and in effect from time to time and shall include a reference to any document that amends, modifies or supplements it, or is entered into, made or given pursuant to or in accordance with its terms; (g) the word “or” shall not imply exclusivity; and (h) references to any Person shall include its successors, assigns and designees. Whenever this Agreement refers to a number of days, such number shall refer to calendar days unless Business Days are specified. All accounting terms used herein and not expressly defined herein shall have the meanings given to them under GAAP. References herein to a Party’s obligation to comply with any Laws shall be interpreted to be an obligation to act in accordance with such Laws, and vice versa. All monetary amounts expressed herein or reflected in statements or other documentation delivered hereunder, including in all financial statements, Periodic Statements and annual statements, shall be in United States dollars.

ARTICLE II
LANDFILL GAS RIGHTS, APPURTENANT RIGHTS, LEASE AND OPERATIONAL
RESPONSIBILITIES

2.1 Landfill Gas Rights, Lease, Liens, and Other Rights Granted to Gasco.

(a) Owner hereby conveys, transfers, and assigns exclusively to Gasco for the purpose of exercising its rights and obligations hereunder during the Term, free and clear of all liens, claims or any encumbrances whatsoever, all of the rights, title, and interest in and to all Landfill Gas from time to time located and recoverable at the Designated Landfill Cells, whether as personal property or real property, together with a non-exclusive easement in, upon, over, across, and under the Designated Landfill Cells (but above the liner to the Designated Landfill Cells), including ingress and egress, in order that Gasco may be able to capture, collect, analyze, monitor, process, treat, store, destroy, develop, flare, market, transact, convey, burn, transport or otherwise use or dispose of Landfill Gas in accordance with the provisions of this Agreement and otherwise in its sole discretion. Gasco shall have the exclusive right to all of the Landfill Gas available at the Designated Landfill Cells, and all Products produced therefrom, during the Term.

(b) Title and risk-of-loss to the Landfill Gas shall pass from Owner to Gasco at the Collection Point.

(c) In accordance with the Amended and Restated Easement Agreement, Owner hereby grants to Gasco such exclusive rights as may be necessary or convenient for Gasco, at its election, (i) to capture, collect, process, produce, measure, transport, market production, sell to third parties, and flare or otherwise reduce or destroy, all Landfill Gas from the Designated Landfill Cells, including the right to conduct exploratory tests; (ii) to drill, construct, maintain, expand, operate, and cease to operate the Collection System; (iii) for purposes of the collection, production, processing, destruction and transportation of Products within and from the Designated Landfill Cells and activities related thereto, to use roads; and (iv) subject to the provisions of Article VIII, to locate, install, construct, maintain, expand, operate, cease to operate, abandon and remove one or more Gasco Facilities on the Designated Landfill Cells, in each case, so that Recovered Landfill Gas can be used for commercial purposes or destroyed. Gasco shall have the right to flare or otherwise destroy, sell, transact, and convey Recovered Landfill Gas and Products to third-party purchasers as it so determines in its sole discretion. Gasco shall verbally notify Owner within twenty-four (24) hours (with written notice to Owner within seventy-two (72) hours), whenever it ceases to operate any of the Gasco Facilities if such suspension of operations could have an impact on the Landfill or Permits, compliance with such Permits or Gasco's performance of its obligations hereunder, including for downtime, and provide a description of the reason therefor and the expected duration.

(d) Owner hereby leases to Gasco for the purpose of exercising its rights and obligations hereunder, free and clear of all liens, claims or any encumbrances whatsoever (other than the Permitted Encumbrances), the Power Station Site and the RNG Facilities Site; provided, upon the Operative Date or earlier termination of this Agreement, the lease for the Power Station Site shall automatically terminate and be of no further force and effect. Subject to rights of any third parties pursuant to the Permitted Encumbrances, Gasco shall have the exclusive right to and possession of (i) the Power Station Site from the Effective Date until the Operative Date or earlier termination of this Agreement, and (ii) the RNG Facilities Site during the Term.

(e) At the request of Gasco, Owner shall, at its own expense, defend, or assist in the defense of, rights to the Designated Landfill Cells and title to the Landfill Gas.

(f) As security for the performance of Owner's obligations hereunder, now existing or hereafter arising, during the Term, Owner grants to Gasco a security interest and continuing lien on all of Owner's right, title and interest in and to all of the Landfill Gas, whether now existing or hereafter created, produced or existing. In addition, to the extent that the Landfill Gas at any time constitutes real property, Owner agrees that it will promptly upon request, at Gasco's cost and expense, take any and all actions reasonably requested by Gasco, including executing and recording deeds and instruments, to secure Gasco's interest in the Landfill Gas, whether by deed of trust, mortgage or otherwise.

2.2 Easements. Owner hereby grants to Gasco the non-exclusive rights of way and easements across the Landfill and over roadways on and through Owner's adjoining properties (if applicable) for ingress and egress at all times to and from the Landfill and the RNG Facilities Site as is necessary in the performance of its obligations and the exercise of its rights hereunder. Gasco

shall, at Gasco's expense, file and record the Amended and Restated Easement Agreement in the appropriate filing office and shall comply with its terms.

2.3 Access to Landfill. Subject to the provisions of Section 2.4 and Section 2.7, but without limitation of Section 2.1 or Section 2.2, Gasco and its employees, representatives, agents, invitees, whether express or by implication, and independent contractors shall have, and Owner hereby grants to Gasco and its employees, representatives, agents, invitees, whether express or by implication, and independent contractors, access to the Designated Landfill Cells and reasonable access to the other areas of the Landfill on a twenty-four (24) hour per day, seven (7) day per week basis, provided that such access is in connection with Gasco's operations permitted or required under this Agreement. In connection with the access granted hereby and subject to the other terms and conditions hereof, Gasco shall have the right to use access and facility roads on the Landfill and on Owner's adjoining properties.

2.4 Non-Interference.

(a) Gasco shall cooperate with Owner in coordinating its activities on the Landfill in order to not unreasonably interfere with Owner's management and operation of the Landfill and the solid waste disposal facility. Gasco shall schedule its activities on the Landfill with Owner as may be necessary (but without compromising the safe operation of the Gasco Facilities in accordance with applicable Laws and Permits) to prevent and avoid any unreasonable interference with Owner's activities on the Landfill.

(b) Owner shall cooperate with Gasco in coordinating its activities on the Landfill in order to not unreasonably interfere with Gasco's management and operation of the Project. Owner shall schedule its activities on the Landfill with Gasco as may be necessary (but without compromising the safe operation of the Landfill in accordance with applicable Laws and Permits) to prevent and avoid any unreasonable interference with Gasco's activities on the Landfill.

2.5 Owner Operations.

(a) Owner shall operate, maintain and administer the Landfill and the solid waste disposal facility in material compliance with all applicable Laws and all required Permits, including those duties and obligations allocated to Owner in Exhibits D and E and the Title V Permit, and in accordance with Good Industry Practices. Notwithstanding anything herein to the contrary, (i) Owner agrees that its failure to comply with its responsibilities and obligations set forth on Exhibit D or E shall be considered material for all purposes of this Agreement and (ii) Gasco's failure or inability to comply with its responsibilities and obligations set forth on Exhibit D, E or L shall not constitute a breach or violation by Owner. Owner may, without Gasco's approval, engage qualified contractors and subcontractors in the operation, maintenance or administration of the Landfill and/or the solid waste disposal facility.

(b) Owner has legal responsibility as the permittee under the Title V Permit for the control and containment of Landfill Gas at the Landfill, whether related to subsurface migration or surface emission, including the legal responsibility with respect to the control and containment

of Landfill Gas arising under all applicable Environmental Laws, including any monitoring or remediation obligations relating to Landfill Gas subsurface migration or surface emission.

(c) Owner shall, in all material respects maintain, in accordance with the all applicable Laws, Permits including the Title V Permit, and Good Industry Practices, the integrity of the Landfill, and shall, without limitation, promptly repair, at no cost to Gasco, any material cracks, fissures, erosion, physical changes or damages in, of or to the interim or final covers at the Landfill; provided that Gasco shall promptly reimburse Owner for the reasonable costs to repair any such material cracks, fissures, or damages in, of or to the interim or final covers at the Landfill caused by the acts or omissions of Gasco or any Gasco Person.

(d) Subject to Gasco's obligations under the Amended and Restated Easement Agreement, Owner shall maintain all Designated Landfill Cells access and facility roads and utilities on the Landfill in good condition sufficient for their current use.

(e) Owner shall have responsibility for, and shall bear all liability associated with the presence, collection and disposal of Leachate at the Landfill in material compliance with all applicable Laws, at no cost to Gasco.

2.6 Gasco Operations.

(a) Gasco shall obtain and maintain, at no cost to Owner, appropriate Permits required under applicable Laws relating to the Alteration, demolition, disposal, construction, maintenance, repair, restoration, and replacement of any Gasco Facilities under this Agreement.

(b) Gasco shall finance, construct, operate, maintain, repair, and replace the Collection System and the RNG Facilities, at no cost to Owner (other than as and to the extent provided herein) in material compliance with all applicable Laws and Permits, including the Gasco Title V Permit and the applicable provisions of the Title V Permit as set forth in Exhibits D and E, Good Industry Practices, and the Gas Collection and Control System Plan, and the Landfill Gas Management Plan; provided that Owner shall promptly reimburse Gasco for the reasonable out-of-pocket third-party costs to repair any damage to the Collection System and the other Gasco Facilities to the extent caused by the acts or omissions of Owner or any Owner Person, accompanied by reasonable supporting documentation of such costs. Notwithstanding anything herein to the contrary, Gasco agrees that its failure to comply with its responsibilities and obligations set forth on Exhibit D, E or L shall be considered material for all purposes of this Agreement. Gasco shall be responsible for, at Gasco's cost and expense, any expansion or improvement of the Collection System (including, without limitation, Cell VII, if applicable). Gasco may provide for such operation, maintenance, repair or replacement by third-party contractors.

(c) Gasco shall install, operate, and maintain all flow meters and measuring equipment necessary for accurately and continuously measuring the quantities of Recovered Landfill Gas and to test the composition of such Recovered Landfill Gas. Gasco shall periodically calibrate, verify and, if necessary, recalibrate the measuring equipment in accordance with regulatory requirements and Good Industry Practices. Gasco shall record the quantities of Recovered Landfill Gas collected from the Designated Landfill Cells and shall maintain such

records for not less than five (5) years. Gasco shall provide Owner with reasonable access during normal business hours to all records, test data and charts regarding the Recovered Landfill Gas, including an electronic data feed containing the same data and information accessible or made available to Gasco. Owner shall have the right to inspect the measuring equipment, upon reasonable prior written notice to Gasco during normal business hours; provided that, such inspection is conducted at Owner's sole cost and would not unreasonably interfere with Gasco's management or operation of the Collection System or the RNG Facilities Site.

(d) In connection with the operation, maintenance, and replacement of the Collection System and the RNG Facilities, Gasco shall provide to Owner copies of any drawings, plans, specifications, and manuals relating thereto that are reasonably available to Gasco, and shall provide to Owner copies of any drawings, plans, specifications, and manuals for any new Gasco Facilities, including Alterations, installed or constructed by Gasco after the date of this Agreement. Owner reserves the right to provide comments on any drawings, plans, or specifications relating to changes to the Collection System, and Gasco shall cooperate with Owner and consider in good faith any Owner comments.

(e) Gasco covenants and agrees that Gasco will not remove the Collection System from the Landfill. Owner agrees that it shall not require Gasco to remove the Collection System.

(f) Nothing herein shall be deemed or interpreted to prevent or limit Gasco's compliance with applicable Laws, and such compliance shall be deemed to be consistent with Gasco's obligations hereunder.

2.7 Precedence of Operations of Owner and Gasco. The management and operation of the Landfill and the solid waste disposal facility in material compliance with all applicable Permits and Laws shall take precedence over the interests conveyed to Gasco pursuant to this Agreement and over Owner's obligations to Gasco hereunder; provided that Owner shall not unnecessarily restrict Gasco's activities hereunder such that Gasco is unable to realize the benefit of the rights granted to it or unable to perform its obligations hereunder.

2.8 Condensate. The Parties acknowledge and agree that certain vapors condense during the normal collecting, transporting and processing of Recovered Landfill Gas, resulting in the production of Condensate. During the Term, all Condensate shall be treated and collected by Gasco, at no cost to Owner. Gasco shall have the right to return to Owner any such Condensate (other than to the extent that any Condensate contains a Hazardous Substance), at locations on the Landfill designated by Owner. Gasco shall be responsible for the proper handling, treatment, collection and disposal of Condensate in material compliance with all applicable Permits and Laws; provided, that, upon Gasco's delivery of Condensate to Owner pursuant to the previous sentence, Owner shall be responsible for the proper disposal thereof in material compliance with all applicable Permits and Laws. Gasco shall perform tests of Condensate at the Landfill during each year of the Term to determine whether Condensate contains a Hazardous Substance and will notify Owner in writing if at any time such tests determine that the Condensate contains a Hazardous Substance. In the event that the results of such tests confirm that Condensate contains a Hazardous Substance, Gasco shall not have the right to return to Owner any Condensate until

such time as Gasco can retest and confirm to Owner that the Condensate no longer contains a Hazardous Substance pursuant to subsequent testing.

2.9 Development of Landfill. The Parties acknowledge and agree that after the Effective Date, Owner may (but is not obligated to) develop new cells at or adjacent to the Landfill. In such event, the Parties agree that prior to Owner granting any third party the right to recover and use Landfill Gas available at any such new cell, the Parties shall meet to discuss in good faith granting such rights to Gasco on the terms of this Agreement or on other mutually agreeable terms and conditions.

2.10 Regulatory Reporting and Compliance.

(a) Gasco and Owner shall each comply with their respective obligations under the Title V Permit as set forth in Exhibit D, as amended from time to time pursuant to this Section 2.10 (the “Title V Obligations”), which, without limitation of Section 1.2, is made a part hereof and hereby incorporated herein by this reference. Gasco shall not receive any payment or additional consideration hereunder in connection with the services it provides in accordance with this Section 2.10 and Exhibit D. The services Gasco provides in accordance with this Section 2.10 and Exhibit D are integral to this Agreement and have been accounted for as part of any consideration provided between the Parties. Accordingly, Gasco shall not receive any additional payment or consideration for such services.

(b) Gasco acknowledges and agrees that the safe operation of the Collection System in compliance with applicable Laws and Permits is of primary importance and that the primary purpose of the Collection System is to collect and control Landfill Gas. Gasco shall (i) operate the Collection System in accordance with applicable Laws, Permits and Good Industry Practices so as to maximize, to the greatest extent possible (consistent with Good Industry Practices and safety, and in accordance with applicable Laws and Permits), the collection of Landfill Gas throughout the Designated Landfill Cells and minimize, to the greatest extent possible (consistent with Good Industry Practices and safety, and in accordance with applicable Laws and Permits), the amount of Landfill Gas surface emissions, subsurface migration, and Recovered Landfill Gas that is flared, and (ii) upon written notice from Owner that subsurface migration beyond the boundaries of waste has been detected (“Migration Notice”), assist with Owner’s efforts to collect Landfill Gas that may be migrating beyond the boundaries of waste or emitted from the Landfill. Without limiting the foregoing, following a Migration Notice, Gasco shall, at its cost, perform or take such action(s) as may be reasonably requested by Owner, including without limitation to adjust individual wells, adjust the vacuum available in certain areas of the Collection System, expand collection of Landfill Gas from manhole covers on leachate collection clean-outs and pump stations, expand the Collection System, and operate soil vapor extraction equipment to further mitigate subsurface migration of Landfill Gas from the Landfill; provided, however, if the subsurface migration of Landfill Gas beyond the boundaries of the waste is not the direct or indirect result of any action or inaction by Gasco, then Owner shall reimburse Gasco for any reasonable out-of-pocket third-party costs, accompanied by reasonable supporting documentation of such costs, incurred by Gasco in performing such action(s) requested by Owner. In the event of any dispute between Gasco and Owner concerning (x) the cause of and resolution to subsurface migration of Landfill Gas from the Landfill and such dispute is not resolved within thirty (30) days of the date of the Migration Notice or (y) the reasonableness of the costs incurred

by Gasco (in the event such costs are the responsibility of Owner), then in either case, either Party may refer such dispute to the Independent Engineer for resolution in accordance with Sections 2.10(d)(i) and (ii).

(c) Gasco shall undertake and comply with the reporting obligations specified in 40 C.F.R. 98 Subpart HH and Subpart C, as amended and as applicable, regarding the Recovered Landfill Gas, the Collection System and the Gasco Facilities (the “Reporting Obligations”), as such obligations are allocated to Gasco as specified on Exhibit E attached hereto. Exhibit E shall be amended from time to time as such regulations are amended or otherwise modified in accordance with Section 2.10(d). Calibration of monitoring equipment shall comply with the requirements of these Subparts. Exhibit D, as attached hereto and incorporated herein by reference, also sets forth certain other assigned responsibilities of the Parties consistent with this Agreement.

(d) Following any amendment, modification or replacement of the Title V Permit or the Reporting Obligations, the Parties shall promptly (and in any event within ten (10) days following such event) meet and discuss possible amendments to Exhibit D or E, as applicable, to reallocate or assign new or modified responsibilities or obligations based on the amended, modified or replacement Title V Permit or the Reporting Obligations, as applicable. Based on such meeting, if any amendments are proposed to Exhibit D or E which Owner determines, in its reasonable discretion, are acceptable to Owner, Owner shall prepare and deliver such proposed amendments to Gasco. Following receipt of such initial proposed amendments, Gasco shall, within twenty (20) Business Days (or such longer period as may be agreed in writing by the Parties) review and, if desired, comment in writing on such proposed amendments to Owner. If Gasco provides comments to Owner within such twenty (20) Business Day review period, Owner shall consider such comments and may deliver to Gasco a revised version of the proposed amendments to Exhibit D or E, as applicable. Following the initial round of comments, Gasco shall have ten (10) Business Days to review and, if desired, comment in writing on such revised proposed amendments to Owner. The procedures described in this Section 2.10(d) shall be repeated as necessary until the Parties have mutually accepted the proposed amendments to Exhibit D or E, whereupon the existing Exhibit D or E, as applicable, shall be amended and replaced with the final, mutually agreed Exhibit D or E, as applicable. If Gasco does not respond to Owner within (i) the initial twenty (20) Business Day review period, or (ii) any subsequent ten (10) Business Day review period, if applicable, then in either case, Owner’s proposed amendments to Exhibit D or E, as applicable, shall be, without further action of either Party, automatically deemed to be agreed upon by the Parties and Exhibit D or E, as applicable, shall be automatically amended and replaced with such applicable amended Exhibit D or E. In the event of any dispute between Gasco and Owner concerning any proposed amendments to Exhibit D or E is not resolved within fifteen (15) Business Days following written notice from one Party to the other Party of such dispute, either Party may refer such dispute to the Independent Engineer for resolution in accordance with Sections 2.10(d)(i) and (ii).

(i) Selection of Independent Engineer. If either Party refers a dispute pursuant to Section 2.10(b) or (d) for resolution by the Independent Engineer, the Parties shall attempt to mutually agree upon an Independent Engineer to resolve the dispute. If Owner and Gasco cannot mutually agree on an Independent Engineer, then Owner and Gasco shall each nominate an Independent Engineer within five (5) Business Days of written notice of either Party

requesting the nomination of each Party's Independent Engineer. The two Independent Engineers shall jointly select, within ten (10) Business Days after their selection, a third Independent Engineer, who shall resolve the dispute in accordance with Section 2.10(d)(ii). The selected Independent Engineer shall be given written notice of such selection by the Parties and the Parties shall secure its agreement to serve as the Independent Engineer for such matter. If the selected Independent Engineer does not agree to serve in such capacity, the Parties shall repeat such selection procedure until an Independent Engineer agrees to serve in such capacity. The selected Independent Engineer's costs and expenses to perform the work described in this Section 2.10 shall be shared equally by the Parties.

(ii) Independent Engineer Referral and Decision. Within ten (10) Business Days after the selection of the Independent Engineer in accordance with Section 2.10(d)(i), the Parties shall each provide to the Independent Engineer (with a copy to the other Party) a written statement stating in detail the contested matter and such Party's basis for its position. The Independent Engineer may, in its discretion, request that the Parties meet with the Independent Engineer to explain their position. Within ten (10) Business Days after receipt of the written statement(s) of the Parties to be provided pursuant to this Section 2.10(d)(ii) or such meeting or as soon thereafter as possible, the Independent Engineer shall decide the dispute and issue a written memorandum decision to the Parties. The Parties agree that (A) the decision of the Independent Engineer is final and binding on the Parties and (B) Exhibit D or E, as applicable, incorporating the final decision of the Independent Engineer, shall be automatically amended and replaced and attached hereto.

(e) Gasco shall promptly provide Owner copies of all Permits obtained in connection with the construction, operations and maintenance of the RNG Facilities, and copies of any amendments thereto. If Gasco receives notice of a violation of a Permit or applicable Laws, Gasco shall promptly deliver a copy of such notice to Owner. Without limiting the generality of Section 11.1, Gasco shall indemnify, defend, and hold Owner harmless from and against all Losses incurred by Owner resulting from any violation or alleged violation of the Gasco Title V Permit, the Title V Permit or applicable Laws that arise from or relate to Gasco's performance or nonperformance of its obligations, responsibilities and duties under this Section 2.10.

2.11 Independent Consultant.

(a) Within thirty (30) days following the Effective Date, Gasco shall select and engage an Independent Consultant. Following such selection and during the remainder of the Term, Gasco shall engage and maintain, at its sole cost and expense, a contract with the Independent Consultant (subject to Gasco replacing the same, from time to time, in its discretion) to perform the work described in Section 2.11(b). Gasco shall (i) provide Owner with the name and contact information for the Independent Consultant following initial engagement and promptly following Gasco's replacement of the same, (ii) permit and direct the Independent Consultant to discuss with Owner any matter concerning its work without restriction, and (iii) permit and authorize the Independent Consultant to disclose and provide any data or information to Owner upon request of Owner. The Independent Consultant shall be a subcontractor to Gasco for all purposes of this Agreement, and Gasco shall be solely responsible and liable for all work performed, or to be performed, by the Independent Consultant, including but not limited to, the Title V Obligations and Reporting Obligations and any consequences resulting therefrom (e.g.,

breaches or defaults hereunder or any Permit violations, penalties or fines). Gasco's contract with the Independent Consultant shall include, at a minimum, the Collection System monitoring and other requirements set forth in Exhibit L, and Gasco shall cause the Independent Consultant to perform and comply with such requirements.

(b) The Independent Consultant shall (i) monitor each active wellhead monthly and perform such other activities and work on behalf of Gasco contemplated by this Section 2.11(b), (ii) record, verify, assemble and deliver the data and information required pursuant to, and in accordance with, Exhibits D, E and L to Owner and its consulting engineer (as designated from time to time by Owner), and (iii) prepare and review the Reporting Obligations on behalf of Gasco. Gasco shall, or cause the Independent Consultant to, prepare and submit the data and information required pursuant to Exhibits D, E and L to Owner and its consulting engineer(s) in accordance with the timeframes specified in such exhibit(s). From time to time, Owner may request, and Gasco shall arrange or direct, that the Independent Consultant attend in person (or virtually, if appropriate given the circumstances) and, if requested, make a presentation at Owner's Board or other Owner meeting concerning the work being performed by the Independent Consultant and its findings or conclusions.

(c) Notwithstanding anything herein to the contrary, Owner and/or its consulting engineer(s) may, from time to time in Owner's discretion, independently monitor and/or test all or any aspect of the Collection System. Gasco acknowledges and agrees that by Owner conducting such activities, Owner shall not, and does not, assume any of Gasco's responsibilities, obligations or liabilities hereunder. Gasco shall, and shall direct its Independent Consultant and other contractors and subcontractors to, reasonably cooperate with Owner regarding Owner's monitoring and/or testing activities.

ARTICLE III

REPRESENTATIONS AND WARRANTIES

3.1 Gasco Representations and Warranties. Except as otherwise disclosed to Owner as set forth in Gasco's Disclosure set forth in Exhibit G-1, Gasco represents and warrants to Owner as follows as of the Effective Date:

(a) Gasco is a limited liability company duly organized and validly existing under the laws of the State of Delaware and authorized to do business in the State, with full legal right, power and authority to enter into and to perform its obligations hereunder.

(b) Gasco has duly authorized, executed and delivered this Agreement and this Agreement constitutes a legal, valid and binding obligation, enforceable against Gasco in accordance with its terms, except as enforceability may be limited by bankruptcy, insolvency, reorganization, moratorium or other similar laws affecting creditors' rights generally, by general equitable principles or by principles of good faith and fair dealing.

(c) Neither the execution nor delivery by Gasco of this Agreement, nor the performance by Gasco of its obligations hereunder conflicts with, violates or results in a breach of any constitution, law or governmental regulation applicable to it, or materially conflicts with, violates or results in a breach of any term or condition of any order, judgment or decree or any

agreement or instrument to which Gasco is a party or by which Gasco or any of its properties or assets are bound, or constitutes a default thereunder.

(d) No approval, authorization, order, consent, declaration, registration or filing with any Governmental Authority is required for the valid execution and delivery of this Agreement by Gasco, except such as have been duly obtained or made.

(e) Gasco has all the rights required to enter into this Agreement and perform its obligations hereunder without the consent of any third party that has not been obtained and is in effect as of the date hereof.

(f) Gasco has no knowledge of any action, suit or proceeding, at law or in equity, before or by any Governmental Authority, pending against Gasco, in which an unfavorable decision, ruling or finding would materially adversely affect the performance by Gasco of its obligations hereunder, or that, in any way, would materially adversely affect the validity or enforceability of this Agreement.

(g) Gasco makes no representation or warranty, whether express or implied, of any kind or nature, as to the presence, quality or quantity of Landfill Gas on the Landfill.

(h) All activities and operations of Gasco in connection with the Landfill are in compliance in all material respects with the requirements of all applicable Environmental Laws. Gasco has obtained all licenses and Permits under Environmental Laws necessary for its operations in connection with the Landfill; all such licenses and Permits are in good standing; and Gasco is in compliance in all material respects with all terms and conditions of such licenses and Permits. Gasco is not involved in any suit, action or proceeding with, and has not received any notice, complaint or other request for information from, any Governmental Authority or other Person, with respect to any actual or alleged Environmental Claims that, if adversely determined, would be reasonably likely, individually or in the aggregate, to have a material adverse effect on Gasco or Owner or on the ability of Gasco to construct or operate the Project, and, to the knowledge of Gasco, there are no threatened actions, suits, proceedings or investigations with respect to any such Environmental Claims, nor any basis therefor.

(i) Neither Gasco nor any of its Affiliates has, directly or indirectly, offered or given any gratuities (in the form of entertainment, gifts or otherwise) to any Owner Board member or Owner employee with a view towards securing this Agreement or securing favorable treatment with respect to any determinations concerning the performance of this Agreement.

3.2 Owner Representations and Warranties. Except as otherwise disclosed to Gasco as set forth in Owner's Disclosure set forth in Exhibit G-2, as of the Effective Date, Owner represents and warrants to Gasco as follows:

(a) Owner is a public body politic and corporate of the State, with full legal right, power and authority to enter into and to perform its obligations hereunder.

(b) Owner has duly authorized, executed and delivered this Agreement and this Agreement constitutes a legal, valid and binding obligation of Owner, enforceable against Owner in accordance with its terms, except as enforceability may be limited by bankruptcy, insolvency,

reorganization, moratorium or other similar laws affecting creditors' rights generally, by general equitable principles or by principles of good faith and fair dealing.

(c) Neither the execution nor the delivery by Owner of this Agreement, nor the performance by Owner of its obligations hereunder conflicts with, violates or results in a breach of any constitution, law or governmental regulation applicable to it, or materially conflicts with, violates or results in a breach of any term or condition of any order, judgment or decree, or any agreement or instrument to which Owner is a party or by which Owner or any of its properties or assets are bound, or constitutes a default thereunder.

(d) No approval, authorization, order, consent, declaration, registration or filing with any Governmental Authority is required for the valid execution, delivery and performance by Owner of this Agreement.

(e) Owner has all the rights required to enter into this Agreement and perform its obligations hereunder without the consent of any third party.

(f) There is no action, suit or proceeding, at law or in equity, before or by any Governmental Authority, pending against Owner, in which an unfavorable decision, ruling or finding would materially adversely affect the performance by Owner of its obligations hereunder, or that, in any way, would materially affect the validity or enforceability of this Agreement.

(g) Owner owns good and marketable title to the Landfill and to the Landfill Gas, free and clear of any Lien (other than the Permitted Encumbrances).

(h) Owner is operating the Landfill as a municipal solid waste disposal landfill in material compliance with applicable Laws. Owner has not used, stored, released, disposed of or otherwise treated, and has not knowingly permitted any other Person to use, store, release, dispose of or otherwise treat, Hazardous Substances in, on, or under any portion of the Landfill in violation of applicable Laws. Since August 7, 2014, Owner has not received any notice of violation from any Governmental Authority concerning or relating to Hazardous Substances at the Landfill in violation of any applicable Law.

(i) All activities and operations of Owner in connection with the Landfill are in compliance in all material respects with the requirements of all applicable Environmental Laws. Owner has obtained all licenses and Permits under Environmental Laws or other applicable Laws necessary for its operations at or in connection with the Landfill; all such licenses and Permits are in good standing; and Owner is in compliance in all material respects with all terms and conditions of such licenses and Permits. Owner is not involved in any suit, action or proceeding with, and has not received any notice, complaint or other request for information from, any Governmental Authority or other Person, with respect to any actual or alleged Environmental Claims that, if adversely determined, would be reasonably likely, individually or in the aggregate, to have a material adverse effect on Owner or Gasco or on the ability of Gasco to construct or operate the Project, and, to the knowledge of Owner, there are no threatened actions, suits, proceedings or investigations with respect to any such Environmental Claims, nor any basis therefor.

(j) Owner makes no representation or warranty, whether express or implied, of any kind or nature, as to the presence, quality or quantity of Landfill Gas.

(k) Owner has not granted or conveyed, and has not agreed and is not bound to grant or convey in any event, and there does not exist any lien, mortgage, security interest or other encumbrance in, on, or over the Landfill Gas other than as set forth herein. There are no pending or threatened claims of any Person in or to any interest in the Landfill Gas.

(l) Upon the filing of all UCC financing statements and other filings in respect of Gasco's security interest in the Landfill Gas, the security interests granted to Gasco hereunder will constitute valid and perfected security interest in the Landfill Gas to the extent that a security interest in the Landfill Gas can be perfected by such filings under applicable Law.

(m) Owner's chief executive office is, and has been for the four month period preceding the date hereof, located at the place indicated in Section 18.1 (as amended or supplemented from time to time).

(n) The full legal name of Owner is as set forth in the Preamble hereto, and it has not in the last five (5) years and does not do business under any other name.

3.3 Owner Covenants.

(a) Owner hereby covenants and agrees that it shall not change its name, identity, organizational structure, chief executive office or jurisdiction of organization, or establish any trade names unless it shall have (a) notified Gasco in writing, at least thirty (30) days prior to any such change or establishment, identifying such new proposed name, identity, organizational structure, sole place of business, chief executive office, jurisdiction of organization or trade name and providing such other information in connection therewith as Gasco may reasonably request and (b) taken all actions necessary or advisable to maintain the continuous validity, perfection and the same or better priority of Gasco's security interest in the Landfill Gas intended to be granted and agreed to hereunder.

(b) Owner hereby covenants and agrees that it will not grant, convey or suffer to exist any Lien on or over the Landfill Gas. In the event that any Person claims any interest in the Landfill Gas that is inconsistent with the foregoing sentence, Owner shall promptly discharge any such interest and remove any such encumbrance.

ARTICLE IV **ENVIRONMENTAL ATTRIBUTES; TAX BENEFITS**

4.1 Ownership.

(a) Gasco shall have and retain exclusive title to, and all rights, interests and benefits of any and all Environmental Attributes produced in connection with the Project or any Gasco Facilities during the Term. Gasco shall have the sole and exclusive right to use, sell, trade, assign, convey or otherwise transact such Environmental Attributes in its sole discretion and, other than as expressly provided in Article VII, to receive and retain all Revenues generated from the sale or trade of such Environmental Attributes.

(b) Owner hereby grants, makes and conveys to Gasco an absolute and irrevocable assignment of any and all right, title or interest that it may now or at any time own in

respect of any Environmental Attributes produced or otherwise available during the Term in connection with or attributable to the Recovered Landfill Gas, the Project or any Gasco Facilities.

(c) Gasco shall at all times own and have all of the exclusive rights in and to, and the benefit of, all Tax Benefits.

4.2 Cooperation. Owner shall reasonably cooperate with Gasco in any action that Gasco reasonably determines is necessary or advisable with respect to the identification, creation, validation, verification, acquisition, sale and/or transfer of any Product; provided that Gasco shall reimburse Owner for any reasonable third-party out-of-pocket costs incurred by Owner in connection with such cooperation.

ARTICLE V

OTHER OBLIGATIONS

5.1 Survey and Easements; Real Property Agreements. Gasco agrees to promptly provide Owner with certified copies of any survey obtained by Gasco and all related easements upon request. In each Real Property Agreement executed by Gasco or its Affiliates, such Real Property Agreement shall include a provision to the effect that such Real Property Agreement may be transferred and assigned to Owner without such counterparty's consent or approval. Upon execution of any Real Property Agreements (including any amendments), Gasco shall promptly deliver to Owner true and complete copies of such Real Property Agreements. Notwithstanding the foregoing, Gasco shall have no obligation to amend existing Real Property Agreements.

5.2 Recordation. Gasco may, but is not obligated to, at its own expense file and record this Agreement or a memorandum of lease with respect to the RNG Facilities Site in any filing office in respect of the rights granted hereunder. In addition, at such time as Gasco determines that the conveyance of rights to the Landfill Gas as provided herein may be characterized as a real property interest of any type, Gasco may, but is not obligated to, at its own expense, file and record a memorandum in the appropriate filing office in respect of its rights to the Landfill Gas hereunder. Owner shall cooperate with Gasco in good faith promptly upon Gasco's request to make any modifications to this Agreement (including by amendment) to reflect and properly state such real property interest in the Landfill Gas, including by characterizing Gasco's rights to the Landfill Gas as an exclusive lease of the Landfill Gas. Owner shall have the right to review and approve the form of any such memoranda before it is recorded, which approval shall not be unreasonably withheld and shall be given or denied (with a written explanation for such denial) within ten (10) Business Days of receipt of the proposed form.

5.3 Estoppel and Non-Disturbance. In the event that any or all of the Landfill is or becomes subject during the Term to a lease, security interest, lien, mortgage, deed of trust or similar encumbrance, Owner, upon the written request of Gasco, shall use commercially reasonable efforts to cause the lessor or mortgagee within thirty (30) days to enter into an agreement with Gasco or to provide an estoppel reasonably acceptable to Gasco acknowledging and recognizing Gasco's rights under this Agreement and acknowledging that the Gasco Facilities are the personal property of Gasco severable from the land and the Landfill (subject to the provisions of Section 2.6(e) and the applicable provisions of Article XV) and that such lessor or mortgagee shall have no right or interest in or to such property, except as expressly provided

herein. Gasco may in its discretion make filings in the public records in its discretion to notice Gasco's personal property interest in the Gasco Facilities.

5.4 No Encumbrance by Gasco. Gasco acknowledges and agrees that the primary use of the Landfill is for the operation of the solid waste disposal facility. Gasco agrees that its leasehold interest hereunder is only for the uses expressly stated herein and for no other use. Other than in the exercise of its remedies hereunder, Gasco shall not do any act which shall in any way encumber the title of Owner in and to the Landfill (other than the Gasco Facilities, excluding the Collection System), nor shall any interest or estate of Owner in the Landfill or Gasco in the Collection System be in any way subject to any claim by way of Lien, whether by operation of law or by virtue of any express or implied contract by Gasco or any of its contractors or subcontractors, and any claim or Lien upon the Landfill or the Collection System arising from any act or omission of Gasco or its contractors or subcontractors shall accrue only against Gasco. Gasco shall indemnify, defend, and hold Owner harmless from and against all Losses resulting from any Liens filed against Owner, Owner's property or the Collection System as a result of Gasco's breach of its obligations under this Section 5.4.

5.5 Possession. Gasco shall peaceably and quietly hold and enjoy possession of the RNG Facilities Site during the Term without hindrance or interruption by Owner or any other person lawfully or equitably claiming by, through or under Owner, other than as provided herein.

5.6 Successor Owner; Lease. In no event and under no circumstances whatsoever shall Owner sell, convey, transfer, or assign the Landfill (or any portion thereof) to any Person unless such Person shall have assumed and agreed in writing with Gasco (in form reasonably satisfactory to Gasco) to be bound by Owner's obligations under this Agreement. Owner may, in its sole discretion, lease the Landfill (or any portion thereof) at any time or from time to time so long as the lease rights granted thereunder do not materially interfere with Gasco's operations. Owner shall give Gasco not less than thirty (30) days prior written notice of any such event.

5.7 Emergency. Upon the occurrence of an Emergency Condition, and in the event that employees or representatives of Gasco are not present at the Landfill or if Gasco is otherwise unable to timely cure the Emergency Condition in accordance with Good Industry Practices, Gasco hereby authorizes Owner or agents or representatives authorized by Owner to have access to the Collection System and to enter the RNG Facilities Site in order to implement actions to immediately mitigate the extent of such Emergency Condition and to prevent or mitigate any danger to the safety of individuals or damage to the Collection System, any RNG Facilities, the Landfill or any of Owner's property, all in accordance with Good Industry Practices. Notwithstanding the foregoing, Owner, when practicable, shall notify Gasco prior to taking any action pursuant to this Section 5.7 and Owner shall, in all cases, act in good faith and use commercially reasonable efforts to take the least intrusive action practicable and to consider Gasco's input, if or as available. Owner shall promptly notify Gasco of such Emergency Condition by telephone, electronic mail or in person, with confirmation in writing to be provided within five (5) Business Days, describing in reasonable detail the nature and extent of the Emergency Condition, the steps taken by Owner or its authorized agents or representatives in response to such Emergency Condition and the anticipated duration of such Emergency Condition. Gasco shall reimburse Owner for all reasonable out-of-pocket third-party costs incurred in connection with responding to such Emergency Condition.

ARTICLE VI

TERM

6.1 Initial Term. This Agreement shall take effect as of the Effective Date and shall remain in full force and effect for an initial term ending twenty (20) years from the Operative Date (the “Initial Term”), unless earlier terminated as provided herein.

6.2 Renewal Term. Provided Gasco is not then in default hereunder, Gasco may elect, in its sole discretion, to extend the Initial Term for two successive five (5) year periods (each a “Renewal Term” which, together with the Initial Term, constitutes the “Term”), by providing Owner with prior written notice of such election. Gasco shall provide notice of its election to extend the Initial Term not less than one hundred and eighty (180) days prior to the end of the Initial Term. If applicable, Gasco shall provide notice of its election to extend the first Renewal Term for an additional five (5) years not less than one hundred and eighty (180) days prior to the end of the first Renewal Term. The terms and conditions of this Agreement during any Renewal Term shall be the same as those in effect at the time of extension, unless otherwise agreed in writing by the Parties. At the expiration of the Term, this Agreement shall terminate (except for those provisions which expressly or impliedly survive termination or expiration), unless renewed for an additional period by mutual agreement of the Parties. Upon such termination, and except for any payments owing as of the date of such termination and for any provisions of this Agreement which expressly or impliedly survive termination or expiration, including indemnities provided hereunder, Gasco and Owner shall be relieved of all obligations under this Agreement.

6.3 Termination for Convenience. At any time after the Effective Date, Gasco may terminate this Agreement upon not less than one hundred and eighty (180) days prior written notice to Owner, if Gasco determines in its sole discretion that the Project is not economically viable or profitable for any reason, including the following: (a) the Landfill can no longer produce sufficient quantities of Landfill Gas, (b) any Permits required for the operation of the Collection System or any Gasco Facilities have not or cannot be obtained, despite Gasco’s good faith effort, (c) due to a Material Change in Law that cannot be addressed in accordance with Article IX, or (d) the Condensate is found to contain any Hazardous Substance. For purposes of this Section 6.3, the Landfill will be considered to not be producing sufficient quantities of Landfill Gas if the average monthly MMBtu content of the Recovered Landfill Gas falls below 450 Btu per cubic foot or the total annual Recovered Landfill Gas at the Designated Landfill Cells falls below 200,000 MMBtu.

ARTICLE VII

PAYMENTS

7.1 Payments.

(a) Payments. In consideration of the rights granted to Gasco pursuant to this Agreement, Gasco agrees to pay to Owner the following amounts (collectively, the “Payments”):

(i) An amount equal to thirty percent (30%) of Revenues during each month from sales of Recovered Landfill Gas that does not require processing beyond cooling and dehydration; and

(ii) An amount equal to twenty percent (20%) of Revenues during each month from sales of electricity and associated Environmental Attributes (e.g., RECs) produced or resulting from Recovered Landfill Gas; and

(iii) An amount equal to \$0.25 for each MMBtu of Recovered Landfill Gas that is flared on and following the Decommissioning Date and continuing until the Operative Date; provided, for the period commencing on the day immediately following the first anniversary of the Decommissioning Date and continuing until the Operative Date, such amount shall automatically increase to \$0.50 for each MMBtu of Recovered Landfill Gas that is flared; and

(iv) On and after the Operative Date, an amount equal to eight percent (8%) of Revenues during each month from sales of (A) RNG and associated Environmental Attributes (e.g., RINs) and (B) other Products (not otherwise payable pursuant to Sections 7.1(a)(i) or (ii)).

(b) Post-Term Payments. Any amounts accrued and payable pursuant to Sections 7.1 but not paid as of the termination or expiration of this Agreement shall remain payable, and shall be paid by Gasco to Owner, following termination or expiration of this Agreement in accordance with the terms hereof.

7.2 Periodic Statements. Gasco shall provide a statement in substantially the form attached hereto as Exhibit H (a “Periodic Statement”) to Owner not later than five (5) Business Days after the end of each month (each such period being a “Billing Period”) during the Term, containing, for the preceding Billing Period, the following information (at a minimum):

(a) The quantity of Recovered Landfill Gas (in MMBtu) collected from the Landfill and flared or sold during the Billing Period;

(b) Revenues received during the Billing Period for the Recovered Landfill Gas (including electricity produced from Recovered Landfill Gas), RNG, Environmental Attributes and other Products (together with supporting calculations, showing gross receipts for sales of Landfill Gas, RNG, Environmental Attributes (including RINs) and other Products, and any applicable sales taxes or other taxes required to be paid to third parties);

(c) Payments due to Owner based on the Revenues received or the Recovered Landfill Gas flared during the Billing Period, in accordance with Section 7.1;

(d) RIN credits and other Environmental Attributes generated, accrued, reserved and sold during the Billing Period (together with supporting documentation (including any reporting submitted to Governmental Authorities or other reporting services) and calculations, showing gross receipts for RINs and other Environmental Attributes sold and cash received during the Billing Period);

(e) Any taxes or duties that Gasco is obliged to charge on the Payments due to Owner for the Billing Period;

(f) The performance metrics specified on the Periodic Statement; and

- (g) Such other documentation or information as Owner may reasonably request.

For the avoidance of doubt, Gasco shall prepare and send Owner a Periodic Statement prepared in accordance with this Section 7.2, whether or not any Payments have accrued and are due to Owner with respect to such Billing Period. Gasco shall permit Owner and/or its representatives to audit all records, documents and data used in preparing its Periodic Statement on reasonable prior written notice during normal business hours. From time to time upon request, Gasco shall promptly (and in any event, within ten (10) Business Days) deliver to Owner true and complete copies of any agreements, bills of sale, purchase orders, invoices, checks, or other documentation, including any amendments thereto, requested by Owner relating to the sales by Gasco or its Affiliates of any Products, including Recovered Landfill Gas, electricity produced from Recovered Landfill Gas, and Environmental Attributes. The Parties may, by mutual written agreement, revise the form and content of the Periodic Statement in Exhibit H.

7.3 Annual Statements. In addition to the Periodic Statements, Gasco shall provide an annual statement to Owner not later than ninety (90) days after the end of each calendar year during the Term, in a form and substance substantially similar to the Periodic Statements, providing such information for the previous calendar year, including any applicable adjustments to Payments made in the prior year.

7.4 Payment. On the last Business Day of each month, Gasco shall pay to Owner the Payments for the immediately preceding month. Any such amounts that are not paid by such date shall accrue interest at ten percent (10%) per annum until paid. Payments shall be paid in lawful money of the United States to Owner at such place or pursuant to wire payment instructions as Owner shall from time to time direct Gasco by prior written notice.

7.5 GASCO CONTROL OF SALES. GASCO SHALL IN NO WAY AND IN NO EVENT BE LIABLE TO OWNER OR ANY OWNER PERSON (WHETHER IN CONTRACT, TORT OR BASED ON ANY OTHER LEGAL THEORY) FOR ANY CLAIM, LOSSES OR DAMAGES ARISING IN CONNECTION WITH THE PRICE, TIMING, PAYMENTS RECEIVED FROM THIRD PARTIES OR TERMS OF ANY SALE OF RECOVERED LANDFILL GAS, ENVIRONMENTAL ATTRIBUTES, RENEWABLE ENERGY CREDITS OR OTHER PRODUCTS, PROVIDED SUCH SALES ARE TO THIRD PARTIES AND ON AN ARMS-LENGTH BASIS, AND OWNER HEREBY ACKNOWLEDGES AND AGREES THAT GASCO MAY MAKE SUCH SALES AT SUCH PRICE, SUCH TIMES AND ON ANY AND ALL SUCH OTHER TERMS AS IT DETERMINES IN ITS SOLE DISCRETION. Gasco covenants and agrees that all Products will be sold to third parties (either directly or indirectly through an Affiliate).

7.6 Records and Financial Statements.

(a) Records. Gasco shall at all times during the Term and for a period of five (5) years after the expiration or termination of this Agreement, keep or cause to be kept true and complete books, records, periodic statements and accounts, together with applicable supporting data, information, and documentation, of all sales of Products. Owner shall have the right through an independent certified public accounting firm to examine and audit said books, records and accounts (i) once during each year of the Term and (ii) following expiration or termination of the

Term, within ninety (90) days following any Payment to Owner, in each case, upon ten (10) days prior written notice to Gasco, during normal business hours.

(b) Discrepancies. The full cost of any audit conducted under Section 7.6(a) shall be borne by Gasco if the audit reveals either: (i) a discrepancy in the amount of payments due Owner of greater than five percent (5%), or (ii) Gasco has failed to maintain true and complete books, records, accounts and supporting documentation as required by Section 7.6(a); and in all other cases, Owner shall bear the full cost of the audit and any reasonable out-of-pocket third-party expenses, accompanied by reasonable supporting documentation, incurred by Gasco in connection therewith.

(c) Financial Statements. Within ninety (90) days of the end of each fiscal quarter of Gasco, Gasco shall furnish to Owner quarterly unaudited financial statements for Gasco. Within one hundred eighty (180) days of the end of each fiscal year of Gasco, Gasco shall furnish to Owner audited financial statements (the "Audited Financials") for Gasco. All financial statements furnished to Owner shall include an income statement, balance sheet and statement of cash flows, and must be prepared in accordance with GAAP, consistently applied over all relevant reporting periods. The Audited Financials shall be accompanied by a letter from the independent accountant of Gasco (i) confirming, for the applicable fiscal year, (x) the revenues generated from Gasco's facilities during such fiscal year, and (y) the accuracy of the calculation of the Payments owed to Owner in respect of such fiscal year; and (ii) confirming that the annual statement delivered pursuant to Section 7.3 was used in preparing Gasco's annual financial statements and preparing the Audited Financials delivered hereunder. This Section 7.6(c) shall survive termination or expiration of this Agreement for a period of six (6) months following when all Payments are made hereunder.

(d) Confidentiality. Subject to applicable Law, including without limitation, the Virginia Freedom of Information Act (Virginia Code § 2.2-3700 *et seq.*), all such books, records and financial statements required to be disclosed in accordance with this Section 7.6 shall be treated as confidential information and the Party receiving such information will maintain its confidentiality (other than disclosure to its representatives, consultants or advisors, or in the case of Owner, to Owner's Board) using such care and diligence as it uses to protect its own confidential information, but in no event less than reasonable care. For purposes of this Agreement, the term "confidential information" does not include information that: (i) was publicly known and made generally available in the public domain prior to the time of disclosure by the disclosing Party; (ii) becomes publicly known and made generally available after disclosure by the disclosing Party to the receiving Party through no action or inaction of the receiving Party; (iii) is disclosed to the receiving Party on a non-confidential basis from another source which is not bound by a confidentiality agreement with the disclosing Party; or (iv) is independently developed by the receiving Party without use of, or reference to, the confidential information.

7.7 Payment Reserve. As security for the performance of Gasco's payment and other obligations hereunder, Gasco shall, within ten (10) Business Days of the Effective Date, fund an escrow reserve account (the "Escrow Reserve") with the Escrow Agent in an amount equal to \$150,000, to be held and distributed in accordance with the terms of this Agreement and the Amended and Restated Escrow Agreement. On the Operative Date, the amount of the Escrow Reserve may be reduced to \$100,000, provided Gasco is not then in default hereunder. Owner

shall be entitled to make a full or partial draw upon the Escrow Reserve upon the occurrence of a default by Gasco or as otherwise provided herein. If, at any time during the Term, the Escrow Reserve is less than the amount required to be held in such Escrow Reserve pursuant to this Section 7.7, Gasco shall, within five (5) Business Days after receipt of notice from Owner, replenish the Escrow Reserve to the full amount. Gasco shall be solely responsible for any escrow fees or costs, if any, charged by the Escrow Agent.

ARTICLE VIII
DECOMMISSIONING OF LEGACY POWER FACILITIES; CONSTRUCTION AND
OPERATION OF RNG FACILITIES

8.1 Decommissioning of Legacy Power Facilities. Gasco shall, at its sole cost, decommission and demolish the Legacy Power Facilities and remove and dispose of all debris from the Landfill, all in accordance with applicable Laws and Permits, and the terms of this Agreement. Gasco shall provide at least thirty (30) days prior written notice to Owner of the date when Gasco intends to decommission and demolish any of the Legacy Power Facilities. Gasco shall consult in good faith with Owner in relation to the proposed work plan for the proposed decommissioning and demolition of the Legacy Power Facilities in advance of commencement of such work and shall take into account Owner's operations and minimize the disruption or impact thereof. Owner shall have the right to review and comment on such proposed work plans for up to ten (10) days thereafter. Gasco shall keep Owner informed as to the progress of the work.

8.2 Construction of RNG Facilities.

(a) Owner hereby consents to and approves of Gasco's construction, at Gasco's sole cost, of the RNG Facilities on the RNG Facilities Site.

(b) Gasco shall provide Owner with copies of the drawings and specifications for the RNG Facilities and a copy of the application for any Permit required for the construction or installation thereof. Before commencing the construction or installation of the RNG Facilities, Gasco shall procure, at its cost and expense, all Permits required therefor. Gasco may engage qualified contractors and subcontractors in the construction or installation of the RNG Facilities.

(c) Before commencing the construction or installation of the RNG Facilities, Gasco shall provide performance security in an amount equal to \$250,000.00 (the "Performance Security"), which Performance Security shall be satisfied by depositing cash, in immediately available funds, in such amount into the Escrow Reserve, to satisfy the requirements of Va. Code Section 2.2-4337 and in accordance with the requirements of Va. Code Section 2.2-4338. The Performance Security shall be held and distributed in accordance with the terms of this Agreement and the Amended and Restated Escrow Agreement. Owner shall be entitled to make a full or partial draw upon the Performance Security upon the occurrence of a default by Gasco or as otherwise provided herein. For the avoidance of doubt, the amount of the Performance Security shall be in addition to the amount of the payment reserve to be held in the Escrow Reserve pursuant to Section 7.7. Gasco shall provide Owner copies of all payment and performance bonds, including those delivered by Gasco's contractors and subcontractors, and shall list Owner as an additional beneficiary on all such bonds. In addition to the insurance policies and coverages to be maintained by Gasco, as set forth in Exhibit F, before commencing the construction or installation of any

Gasco Facilities, Gasco shall purchase and maintain builder's risk insurance or other similar coverages appropriate to such construction or installation activities. Owner agrees that its rights, as beneficiary, under any Gasco contractor or subcontractor payment and performance bonds may be subordinated to any project lender financing construction of the RNG Facilities. Gasco shall cause its contractors and subcontractors to maintain insurance policies and coverages as set forth on Exhibit F-2. Owner shall be listed as an additional insured on all insurance policies required under Exhibits F-1 and F-2, including those required from Gasco's contractors and subcontractors.

(d) Gasco and Owner shall jointly agree to a staging area for all materials and equipment used by Gasco for construction or installation of the RNG Facilities. All applicable erosion and sedimentation controls will be properly constructed by Gasco at its cost and expense prior to using the staging area. Proper erosion and sedimentation controls may include silt fence, ditches, sedimentation traps or ponds, stabilization and revegetation of disturbed areas. Gasco agrees (i) to repair and restore the staging area, if applicable, to the condition immediately prior to its use or otherwise satisfactory to Owner and (ii) repair, replace or reestablish any current site erosion and sedimentation controls that are impacted by the construction or installation of the RNG Facilities.

(e) Gasco shall, at its cost and expense, properly remove, transport and dispose at a landfill or other disposal facility (other than the Landfill) all material, debris or waste as a result of the demolition, construction and installation of the Gasco Facilities, all in accordance with Applicable Law.

(f) The Gasco Facilities and related equipment owned by Gasco at the Designated Landfill Cells shall at all times remain the personal property of Gasco or its designee, notwithstanding the method or mode of installation or attachment thereof to real property, severable from the land and the Landfill (other than as provided in Section 2.6(e) and the applicable provisions of Article XV), and Owner acknowledges that it has no interest in any Gasco Facilities other than as expressly provided herein. Within ten (10) days after written request by Gasco, Owner shall provide a waiver or estoppel certificate, in a form reasonably satisfactory to Gasco, acknowledging that the Gasco Facilities and related equipment on the Designated Landfill Cells are the personal property of Gasco or its designee. Ownership and disposition of the Collection System and the other Gasco Facilities at the expiration of the Term or the earlier termination of this Agreement are subject to the provisions set forth in Article XV.

(g) Gasco shall comply with all applicable Laws relating to the construction, installation Alteration, maintenance, repair, restoration and replacement of any Gasco Facilities and shall obtain, at no cost to Owner, appropriate Permits for such activities. Gasco shall provide copies of any Permits required for the demolition, disposal, construction or Alteration of any Gasco Facilities to Owner, as reasonably requested by Owner from time to time. Owner shall reasonably cooperate with and assist Gasco in obtaining any Permit; provided that Gasco shall reimburse Owner for any reasonable out-of-pocket costs incurred by Owner in connection with such assistance and the inability or failure of Owner to provide such assistance shall not constitute a breach or default hereunder.

(h) Gasco shall not permit the Landfill to become subject to any mechanics', laborers' or materialmen's liens on account of labor or materials furnished to Gasco or claimed to

have been furnished to Gasco in connection with work of any character performed or claimed to have been performed on the Landfill by or at the direction of Gasco. If any such liens are filed against the Landfill or Owner, then Gasco shall cause same to be promptly discharged of record or post a bond in respect of such lien. If Gasco shall fail to so discharge any lien, then Owner may do so, and all amounts paid by Owner, including, all costs, expenses and attorneys' fees, shall be paid by Gasco to Owner upon Owner's written notice to Gasco accompanied by reasonable supporting documentation of such costs and expenses.

(i) Without limiting Gasco's indemnity obligations pursuant to Section 11.1, in connection with the demolition, removal, construction, installation, Alteration, maintenance, repair, restoration and replacement of any Gasco Facilities, Gasco shall use commercially reasonable care and Good Industry Practices to avoid causing any damage to the liner to the Landfill or any property of Owner, or creating any condition that could compromise or lead to the compromise of the liner to the Landfill.

8.3 Alterations. Gasco may, from time to time, make or cause to be made, at no cost to Owner, repairs, improvements, additions, expansions, alterations or changes in or to the Collection System or any Gasco Facilities within the Designated Landfill Cells or RNG Facilities Site, as applicable (collectively, "Alterations"), in each case to the extent that Gasco deems such Alterations necessary or desirable to carry on any activity permitted under this Agreement; provided that, any such Alteration shall not unreasonably interfere with Owner's operations or use of or access to or from the Landfill. In the event that Gasco determines an Alteration is necessary or desirable, it shall provide Owner with any plans or specifications relating thereto and any requisite Permits prior to making such Alteration. Owner shall have the right to review and comment on such plans and specifications for up to ten (10) days thereafter. Gasco shall provide a final copy of such plans and specifications to Owner.

8.4 Owner Construction. Owner shall provide notice to Gasco whenever Owner plans to construct or erect any building or structure within two hundred (200) feet of the Collection System or within one hundred (100) feet of any other RNG Facilities. Subject to Section 5.7, Owner shall not improve, repair, alter, modify or change the Collection System, without Gasco's prior written consent, which consent shall not be unreasonably withheld, conditioned or delayed.

ARTICLE IX

MATERIAL CHANGE IN LAW

In the event of a Material Change in Law, the Parties shall, to the extent necessary and possible, cooperate in good faith to reform this Agreement to ensure compliance and conformity with such Material Change in Law and to restore or retain the Parties' original respective intended benefits and burdens under this Agreement.

ARTICLE X

COORDINATION; OPERATIONS AND DEVELOPMENT; MEETINGS

10.1 Coordination. Each of Gasco and Owner shall appoint a representative to facilitate the Parties' coordination of their respective operations on the Landfill with the other Party. The

Parties' representatives shall meet not less than once quarterly to discuss and coordinate the Parties' ongoing day-to-day activities on the Landfill.

10.2 Operations and Development; Meetings. The Parties' representatives shall meet annually to review the Parties' respective operations and activities on the Landfill and to and discuss development opportunities for the Landfill. Owner and Gasco agree to exchange information for planning and coordination of any such development opportunities in order to promote the safe and orderly development and operation of the Landfill. Once each calendar quarter or on a more frequent basis as may be requested by Owner, a Gasco senior representative (including, in the case of a Permit violation, Gasco's chairman or chief executive officer (or similar position) of Gasco's parent company) shall attend in person (or virtually, if appropriate given the circumstances) and, if requested, make a presentation at Owner's Board meeting concerning Gasco, the Gasco Facilities or its operations, including but not limited to, the status of financing the RNG Facilities, decommissioning and demolition of the Legacy Power Facilities, construction and operations of the Gasco Facilities, the reason(s) for the Permit violations and any fines or payments therefor, and Gasco's performance of the work hereunder.

ARTICLE XI **INDEMNIFICATION**

11.1 Indemnification by Gasco. Gasco shall indemnify, hold harmless and, subject to Sections 11.3 and 11.4 defend Owner and its Affiliates, the Member Communities and their respective officers, directors (including the Board), employees, agents, invitees and independent contractors, and their respective successors and assigns ("Owner Persons"), from and against any and all costs, claims, liabilities, penalties, fines, damages, expenses, causes of action, suits, or judgments, including, reasonable attorneys' fees and all court costs and experts' fees (collectively, "Losses"), actually incurred or paid by an Owner Person in connection with or relating to (a) the performance or nonperformance of any duties, covenants, or obligations of Gasco hereunder, including without limitation, those services or work performed or to be performed by Gasco's contractors and subcontractors (including, for the avoidance of doubt, the Independent Consultant) on behalf of Gasco, or of Gasco or its Affiliates hereunder or pursuant to the Amended and Restated Easement Agreement, (b) any damage to property or person of Owner, (c) the claims of third parties for injury to persons or damage to property, or (d) any investigation, violation or alleged violation, or proceeding by a Governmental Authority (to the extent not actually recovered from insurance proceeds available from insurance coverage carried by such Owner Person), in each of the foregoing cases, that arise from or relate to (i) any breach or default by Gasco of any of its duties, covenants or obligations hereunder (including, without limitation, Exhibits D, E and L) or in the Amended and Restated Easement Agreement, (ii) Gasco's or its contractors' or subcontractors' use, occupancy, conduct, operation, construction, demolition, removal, disposal, Alteration, maintenance, repair, replacement, or management of the Collection System or any Gasco Facilities in violation of applicable Permits, including the Gasco Title V Permit, the Title V Permit, or applicable Laws, or (iii) any willful misconduct or negligent or grossly negligent act or omission of a Gasco Person.

11.2 Indemnification by Owner. To the extent permitted by applicable Laws and without waiving its sovereign immunity, Owner shall indemnify, hold harmless and, subject to Sections 11.3 and 11.4 defend Gasco and its Affiliates and their respective officers, employees, agents,

invitees, independent contractors, and their respective successors and assigns (“Gasco Persons”), from any and all Losses actually incurred or paid by a Gasco Person in connection with the claims of third parties or any proceeding by a Governmental Authority (to the extent not actually recovered from insurance proceeds available from insurance coverage carried by such Gasco Person) that arise from or relate to (i) any breach by Owner in the performance of the duties, and obligations of Owner as set forth in Exhibit D, (ii) Owner’s use, occupancy, conduct, operation or management of the Landfill or the solid waste disposal facility, including (A) any violation of applicable Permits including the Title V Permit or applicable Laws by Owner or any Owner Person, and (B) any willful misconduct or negligent or grossly negligent act or omission of an Owner Person, or (iii) any contamination or other environmental condition at the Landfill, whether now known or hereafter discovered other than any such contamination or environmental condition solely caused by Gasco or any Gasco Person.

11.3 Notice and Defense of Claims.

(a) Whenever a claim shall arise for indemnification hereunder or upon learning of facts which a Party believes may give rise to a claim for indemnification, the Party seeking indemnification (the “Indemnified Party”) shall give prompt written notice to the Party from whom indemnification is sought (the “Indemnifying Party”) of the claim for indemnification and the facts, in reasonable detail, constituting the basis for such claim; provided that failure of an Indemnified Party to give prompt written notice of any claim shall not release, waive or otherwise affect an Indemnifying Party’s obligations with respect thereto except to the extent that the Indemnifying Party is materially adversely affected in its ability to defend against such claim or is otherwise materially prejudiced thereby.

(b) The obligations and liabilities of an Indemnifying Party to an Indemnified Party under this Article XI with respect to claims resulting from the assertion of liability by those not parties to this Agreement (including claims of Governmental Authorities for penalties, fines and assessments) shall be subject to the following conditions:

(i) The Indemnified Party shall give prompt written notice to the Indemnifying Party of the nature of the assertion of Losses by a third party and the amount thereof to the extent known; provided that failure of an Indemnified Party to give prompt written notice of any claim shall not release, waive or otherwise affect an Indemnifying Party’s obligations with respect thereto except to the extent that the Indemnifying Party is materially adversely affected in its ability to defend against such claim or is otherwise materially prejudiced thereby.

(ii) The Indemnifying Party shall be entitled to participate in or, at its option, assume the defense, appeal or settlement of such claim. Such defense, appeal or settlement shall be conducted through counsel selected by the Indemnifying Party. The Indemnifying Party shall not be entitled to assume control of such defense and shall pay the reasonable fees and expenses of counsel retained by the Indemnified Party if (A) the claim for indemnification relates to or arises in connection with any criminal proceeding, action, indictment, allegation or investigation; (B) the Indemnified Party reasonably believes an adverse determination with respect to the claim or giving rise to such claim for indemnification would be detrimental to or injure the Indemnified Party’s reputation or future business prospects; (C) the claim seeks an injunction or equitable relief against the Indemnified Party; or (D) upon petition by the Indemnified Party, the

appropriate court rules that the Indemnifying Party failed or is failing to vigorously prosecute or defend such claim.

(iii) In any claim initiated by a third party and defended by the Indemnifying Party (A) the Indemnified Party shall have the right to be represented by advisory counsel and accountants at its own expense, (B) the Indemnifying Party shall keep the Indemnified Party fully informed as to the status of such claim at all stages thereof, whether or not the Indemnified Party is represented by its own counsel, (C) the Indemnifying Party shall make available to the Indemnified Party, and its attorneys, accountants and other representatives, all books and records of the Indemnifying Party relating to such claim and (D) the Parties shall render to each other such assistance as may be reasonably required in order to ensure the proper and adequate defense of such claim.

(iv) No third party claim may be compromised or settled by the Indemnifying Party without the written consent of the Indemnified Party (which consent shall not be unreasonably withheld, conditioned or delayed) unless (A) there is no finding or admission of any violation of Law by the Indemnified Party, and no effect on any other claims that may be raised by the Indemnified Party, and (B) the sole relief provided is monetary damages that are paid in full by the Indemnifying Party. Similarly, no third party claim may be settled by the Indemnified Party without the written consent of the Indemnifying Party, which consent shall not be unreasonably withheld, conditioned or delayed.

11.4 LIMITATION OF LIABILITY. NO PARTY SHALL BE LIABLE TO ANY OTHER PARTY FOR ANY SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, OR PUNITIVE DAMAGES OF ANY CHARACTER, INCLUDING BUT NOT LIMITED TO LOST PROFITS, LOSS OF BUSINESS, LOSS OF USE, OR LOST OR REDUCTION IN TAX BENEFITS OR ENVIRONMENTAL ATTRIBUTES, RESULTING FROM, ARISING OUT OF, IN CONNECTION WITH OR IN ANY WAY INCIDENT TO ANY ACT OR OMISSION OF A PARTY RELATED TO THE PROVISIONS OF THIS AGREEMENT, IRRESPECTIVE OF WHETHER CLAIMS OR ACTIONS FOR SUCH LOSSES ARE BASED UPON CONTRACT, WARRANTY, NEGLIGENCE, STRICT LIABILITY OR ANY OTHER THEORY AT LAW OR EQUITY.

11.5 Survival. All provisions of this Article XI shall survive the expiration, surrender or termination of this Agreement.

ARTICLE XII **INSURANCE**

Each Party shall, at its own cost and expense, obtain, maintain and keep in force throughout the Term (and in the case of Gasco, until its removal and restoration obligations described in Section 15.3 are fully performed), insurance of the types and in amounts as set forth in Exhibit F-1 attached hereto. In addition, each of Gasco's contractors and subcontractors, including without limitation, the Independent Consultant, shall, at its own cost and expense, obtain, maintain and keep in force, during the time in which such contractor or subcontractor performs services or work on behalf of Gasco hereunder, its own insurance of the types and in the amounts as set forth in Exhibit F-2 attached hereto (i.e., the same as those insurance types and in the amounts applicable

to Gasco). All policies of insurance shall be in a form and with insurers licensed in the State and recognized as adequate by prudent business persons and shall name the other Party as an additional insured. Each Party shall deliver to the other Party certificates of insurance evidencing the coverages required by Exhibits F-1 and F-2 within thirty (30) days of the Effective Date and periodically thereafter promptly upon request of the other Party. The certificate of insurance shall further provide that the insurer will notify the certificate holder and each additional insured thereunder at least thirty (30) days before any cancellation or material modification of the policy.

ARTICLE XIII **TAXES**

13.1 Gasco Taxes and Utilities. Gasco shall, during the Term of this Agreement, pay all costs, charges, taxes, assessments, water and sewer charges, charges for public utilities, and other charges and fees that may be properly levied upon or assessed against any Gasco Facilities or Recovered Landfill Gas, and all other equipment and improvements constructed or installed by Gasco in or on the Designated Landfill Cells, the Power Station Site, the RNG Facilities Site or otherwise in or on the Landfill.

13.2 Owner Taxes and Utilities. Owner shall, during the Term of this Agreement, pay or arrange for the payment of all costs, charges, taxes, assessments, water and sewer charges, charges for public utilities, and other charges and fees that may be properly levied upon or assessed against the property, land, facilities, equipment and improvements owned, constructed, located or installed by Owner in, on, or adjacent to the Landfill, including the solid waste disposal facility, but excluding the Gasco Facilities. Owner shall pay all other costs, charges, taxes, assessments, water and sewer charges, charges for public utilities, and other charges and fees assessed against the Landfill, but excluding the Gasco Facilities.

13.3 Failure to Pay Taxes. If Gasco or Owner shall fail to pay any amounts required to be paid in accordance with Section 13.1 or 13.2, respectively, then at any time after furnishing the non-performing Party five (5) days prior written notice, without waiving or releasing the non-performing Party from any of its obligations or waiving or releasing any rights hereunder, the other Party may pay such amount or perform such act, and all amounts paid, including all costs, expenses and attorneys' fees, shall be payable by the non-performing Party to the other Party promptly upon written notice to non-performing Party, such notice to be accompanied by reasonable supporting documentation of such costs and expenses.

ARTICLE XIV **FORCE MAJEURE**

Except as otherwise provided in this Article XIV, a Party shall be excused from performance under this Agreement, and shall not be considered to be in default hereunder for failure to perform obligations under this Agreement, to the extent that such Party is unable to, or otherwise fails to, perform due to a Force Majeure Event. No Party shall be relieved of any obligation for the payment of money as a result of a Force Majeure Event.

If either Party's ability to perform its obligations under this Agreement is affected by a Force Majeure Event, such Party shall: (i) promptly notify the other Party in writing of such event

and its cause; and (ii) promptly supply such other available information about the Force Majeure Event and its cause as may be reasonably requested by the other Party.

The suspension of performance by a Party due to a Force Majeure Event hereunder shall be of no greater scope and no longer duration than to the extent necessary by reason of the Force Majeure Event. The affected Party shall use commercially reasonable efforts to promptly mitigate or remedy its inability to perform its obligations under this Agreement. A Force Majeure Event shall not excuse compliance with any Law or Permit, except to the extent provided under the applicable Law or Permit.

ARTICLE XV **SURRENDER**

15.1 Collection System.

(a) At the expiration of the Term or the earlier termination of this Agreement for any reason, all of Gasco's right, title, and interest in and to the Collection System shall immediately vest in Owner, and Gasco, upon the request of Owner, shall execute and deliver to Owner, within ten (10) Business Days, an appropriate instrument or instruments to evidence the transfer of the Collection System to Owner, together with all related plans, specifications, operating manuals and third party warranties (if any) in Gasco's possession. The transfer of ownership of the Collection System by Gasco to Owner hereunder shall be AS-IS, WHERE-IS, free and clear of all Liens, and without warranty of any kind, whether express or implied, other than a warranty of title. Upon such transfer, Gasco shall be relieved of any liability or obligation in respect of the Collection System arising upon or after such transfer.

(b) The transfer of the Collection System to Owner pursuant to Section 15.1(a) shall be at no cost to Owner; provided, however, if this Agreement is terminated by Gasco as a result of a default by Owner as provided in Section 17.3, Owner shall pay to Gasco the Fair Market Value of the Collection System, as determined by mutual written agreement of the Parties, or if the Parties fail to reach agreement on such Fair Market Value, the Fair Market Value shall be determined by an independent appraiser appointed by the Parties. If applicable, Owner shall pay Gasco the agreed purchase price for the Collection System within sixty (60) days of the date the Fair Market Value is determined in accordance with this Section 15.1(b).

15.2 Option to Purchase Gasco Facilities.

(a) End of Term. Gasco grants to Owner an irrevocable option to purchase the Gasco Facilities owned by Gasco at the expiration of the Term (the "Term Option") on the terms and conditions in this Section 15.2; provided, that there is not any uncured default by Owner hereunder. Owner shall notify Gasco in writing whether Owner intends to elect to exercise the Term Option at any time within one hundred fifty (150) days prior to, but not later than thirty (30) days prior to, the scheduled expiration of this Agreement (assuming Gasco has not exercised its rights to a Renewal Term pursuant to Section 6.2). If Owner fails to timely deliver such notice, Owner shall be deemed to have elected not to exercise the Term Option, and Gasco shall have no obligation to sell or convey the Gasco Facilities to Owner.

(b) Gasco Default. Gasco grants to Owner an irrevocable option to purchase

the Gasco Facilities owned by Gasco upon and following an Event of Default by Gasco under this Agreement (the “Default Option” and together with the Term Option, collectively, the “Option”) on the terms and conditions in this Section 15.2; provided, that there is not any uncured default by Owner hereunder and Owner has exercised its right to terminate this Agreement. Owner shall notify Gasco in writing whether Owner intends (but, for the avoidance of doubt, Owner is not obligated to purchase the Gasco Facilities (excluding the Collection System) except upon delivery of notice in accordance with Section 15.2(d)) to elect to exercise the Default Option together with its notice to exercise its right to terminate this Agreement. If Owner fails to deliver such notice, Owner shall be deemed to have elected not to exercise the Default Option, and Gasco shall have no obligation to sell or convey the Gasco Facilities to Owner other than pursuant to Section 15.2(a) above. For the avoidance of doubt, the Parties acknowledge that, if Gasco makes a Financing Assignment and such Financing Assignment is in effect, the lender thereunder may exercise its rights under such Financing Assignment to attempt to cure a Gasco default hereunder within the time permitted to Gasco to cure such default provided herein.

(c) Purchase Price. If Owner delivers notice to Gasco indicating its intent to exercise its Option, the purchase price for the Gasco Facilities shall be the Fair Market Value of the Gasco Facilities, as determined by mutual written agreement of the Parties. If the Parties fail to reach agreement on such Fair Market Value within thirty (30) days following Owner’s notice of intent to exercise the Option, the Fair Market Value (as a going concern) shall be determined by an independent appraiser appointed by the Parties. Any such sale and transfer shall be on an AS-IS, WHERE-IS basis, free and clear of all Liens, and without warranty of any kind, whether express or implied, other than warranty as to Gasco’s title to the purchased Gasco Facilities. For the avoidance of doubt, the Option shall not apply to any Gasco Facilities, or portions thereof, not owned by Gasco as of the date of termination or expiration of this Agreement.

(d) Option Election; Closing. Following (i) the Parties’ mutual agreement as to the Fair Market Value of the Gasco Facilities or (ii) determination of the Fair Market Value of the Gasco Facilities by the independent appraiser in accordance with Section 15.2(c), as applicable, Owner shall have sixty (60) days in which to exercise the Option by delivering written notice to Gasco. If Owner fails to deliver such notice within such sixty (60) day period, Owner shall be deemed to have elected not to exercise the Option, and Gasco shall have no obligation to sell or convey the Gasco Facilities to Owner. If Owner delivers notice exercising its Option pursuant to this Section 15.2(d), the closing of the purchase of the Gasco Facilities shall occur within ten (10) Business Days of such notice. At the closing, (1) Owner shall pay the agreed purchase price to Gasco in immediately available U.S. Dollars; (2) Gasco shall execute and deliver to Owner an appropriate instrument or instruments to (A) transfer the Gasco Facilities, together with all related plans, specifications, operating manuals and third party warranties (if any) in Gasco’s possession, to Owner AS-IS, WHERE-IS, free and clear of all Liens and without warranty of any kind, whether express or implied, other than warranty as to Gasco’s title to the purchased Gasco Facilities, and (B) assign and transfer to Owner, at no cost or expense, all interest in real estate, easements, rights to access, rights-of-way and other real property interests which are owned, or are leased, used or held for use by Gasco or its Affiliates in connection with or relating to the Gasco Facilities (collectively, the “Real Property Agreements”), free and clear of all Liens; and (3) Gasco shall be released from any liability or obligation with respect to the Gasco Facilities arising upon or after such transfer, except for any payments owing as of the date of such termination and for any

provisions of this Agreement which expressly or impliedly survive termination or expiration, including indemnities provided hereunder.

(e) Collection System. For purposes of Section 15.2 only, the term “Gasco Facilities” shall not include the Collection System, the transfer of which shall be governed by the provisions of Section 15.1.

15.3 Removal and Restoration Obligations. In the event that the Gasco Facilities are not purchased by Owner pursuant to Section 15.2, then following the termination of this Agreement, and at no cost to Owner, Gasco shall provide for the removal of the Gasco Facilities (other than the Collection System) from the RNG Facilities Site. Gasco’s obligation shall not include any removal or restoration with respect to any buildings or improvements erected on the RNG Facilities Site except as may be required under this Section 15.3. Upon request of Owner made in writing prior to the end of the Term, within one (1) year of the end of the Term, Gasco shall remove any building located on the RNG Facilities Site and restore the RNG Facilities Site to a condition similar to the property adjacent to the RNG Facilities Site. In addition, Gasco shall remove all of its personal property on the RNG Facilities Site (other than the Collection System) not otherwise used in the operation, maintenance, repair or replacement of the Gasco Facilities. Gasco shall leave any building and improvement erected on the RNG Facilities Site clean of debris and other materials resulting from Gasco’s removal of personal property, and shall repair any damage to the Landfill caused by its removal pursuant to this Section 15.3. Notwithstanding the foregoing, if this Agreement is terminated as a result of a default by Owner, then the reasonable out-of-pocket third-party costs of removal and restoration as provided in this Section 15.3, accompanied by reasonable supporting documentation of such costs, shall be for the account of Owner.

ARTICLE XVI **CASUALTY AND CONDEMNATION**

16.1 Casualty. Gasco shall give prompt written notice to Owner of any material casualty to any Gasco Facilities. Owner shall give prompt written notice to Gasco of any casualty to the Landfill, the solid waste disposal facility or any portion thereof. Gasco shall provide Owner with its plans for the restoration of the Project as soon as reasonably practical following such casualty.

16.2 Condemnation. If, at any time during the Term, the Landfill, the Landfill Gas, the Gasco Facilities, or any part thereof or interest therein, shall be taken or damaged by reason of any public improvement or condemnation proceeding, or in any other manner, or should Gasco or Owner receive any notice or other information regarding such proceeding, the Party receiving such notice or other information shall give prompt written notice thereof to the other Party. Each of Gasco and Owner shall be entitled to all condemnation proceeds relating to property owned by it, and shall be entitled at its option to commence, appear in and prosecute in its own name any action or proceedings.

ARTICLE XVII **DEFAULT**

17.1 Gasco’s Default.

(a) Generally. Gasco shall be in default hereunder if it:

- (i) Fails to make payments to Owner as and when required hereunder;
- (ii) Fails to maintain or replenish the Escrow Reserve in accordance with Section 7.7;
- (iii) Fails to maintain bonds and insurance as required hereunder;
- (iv) Files a voluntary petition in bankruptcy, assignment for benefit of creditors or other insolvency proceeding;
- (v) Is the subject of an involuntary bankruptcy or insolvency proceeding and fails to have the same dismissed within ninety (90) days of the initiation of such proceedings;
- (vi) Abandons or ceases to operate (other than temporarily due to a Force Majeure Event) any of the Gasco Facilities;
- (vii) Fails to perform any of its obligations in accordance with Exhibits D or E;
- (viii) Fails to decommission the Legacy Power Facilities and commence construction of the RNG Facilities on the RNG Facilities Site within one hundred eighty (180) days following the Effective Date;
- (ix) Any representation or warranty made by Gasco hereunder is inaccurate in any material respect; or
- (x) Otherwise fails to perform or observe any of its material obligations under this Agreement.

(b) Gasco shall have thirty (30) days after receipt of notice of default from Owner within which to cure such default; provided, however, with respect to a breach or default pursuant to Section 17.1(a)(vii), Gasco shall have the relevant cure period specified on Exhibit D or E, as the case may be, or if not specified, then thirty (30) days after receipt of notice of default from Owner. Following the cure period specified in the preceding sentence, each such uncured event shall be an event of default by Gasco hereunder (an “Event of Default”), and Owner shall have the right to immediately terminate this Agreement upon written notice to Gasco in respect of such default; provided that, with respect to any failure (other than a failure to make any payment when due or with respect to a breach or default pursuant to Section 17.1(a)(vii) as to Title V Obligations or Reporting Obligations) for which compliance within the period provided for herein is not reasonably possible, Gasco shall have an additional period as reasonably required in which to cure such default prior to a termination by Owner, but only if such default is able to be cured and Gasco has commenced and is diligently pursuing such cure.

17.2 Achievement of the Operative Date.

(a) Operative Date. If (i) the Operative Date does not occur within eighteen (18) months after the Decommissioning Date, as such date may be extended pursuant to Section 17.2(b), or (ii) the Operative Date does not occur by the Drop Dead Date, then Owner shall have

the right to immediately terminate this Agreement upon written notice to Gasco. For the avoidance of doubt, neither a Force Majeure Event nor any other event shall, in any circumstance, extend the Drop Dead Date.

(b) Extension of Operative Date. The eighteen (18) month period referenced in Section 17.2(a)(i) shall be extended on a day-for-day basis (i) for each day that a Force Majeure Event is present and Gasco is unable to perform its obligations hereunder, (ii) for each day of delay caused by third parties that are outside of Gasco's control, including, but not limited to, delays related to the issuance of Permits, interconnection delays, and delivery delays provided that Gasco has made commercially reasonable efforts to resolve third party delays outside of Gasco's control and that any third party delays are not a direct result of Gasco's actions or inactions, and (iii) for each day that Gasco is unable to perform its obligations hereunder due to Owner's failure to act or failure to cooperate with Gasco in Gasco's performance of its obligations hereunder. Gasco shall provide written notice to Owner promptly following either event described in this Section 17.2(b)(i), (ii) or (iii), including a description of the event(s) and the number of days of delay.

17.3 Owner's Default. Gasco shall notify Owner in writing in the event that Owner at any time fails to perform or observe any of its material obligations under this Agreement or in the event that any representation or warranty made by Owner hereunder is inaccurate in any material respect. Owner shall have thirty (30) days after receipt of such notice in which to cure such failure or inaccuracy, except with respect to a breach of the provisions of Section 5.6, for which there will be no cure period. Following the cure periods specified in the preceding sentence, each such uncured event shall be a default by Owner hereunder, and Gasco shall have the right to terminate this Agreement upon written notice to Owner in respect of such default; provided that with respect to any failure (other than a failure to make any payment when due), for which compliance within the period provided for herein is not reasonably possible, Owner shall have an additional period as reasonably required in which to cure such default prior to a termination by Gasco, but only if such default is able to be cured and Owner has commenced and is diligently pursuing such cure.

17.4 Remedies. In the event of a breach of or default under this Agreement, whether or not such breach or default results in a termination of this Agreement, and without limitation of the non-defaulting Party's right to terminate this Agreement as provided in this Article XVII, the Parties shall have the right to exercise all of their respective rights and remedies available at law or equity in respect of such breach, default, or termination. Without limitation of the foregoing, Owner acknowledges that in the event of a breach or default or potential breach or default by Owner of this Agreement, Gasco may be irreparably harmed and that monetary damages hereunder may be an insufficient remedy for such harm, and in such event, Gasco may seek any and all available equitable remedies, including injunctive relief and specific performance, in respect of such breach or potential breach.

ARTICLE XVIII **MISCELLANEOUS**

18.1 Notices. All notices, demands and other communications under this Agreement shall be in writing and shall be effective on the date of delivery by registered United States mail, return receipt requested or by overnight courier, to the Party to whom it is intended at the address of such Party set forth below:

To Owner: Southeastern Public Service Authority of Virginia
723 Woodlake Drive
Chesapeake, Virginia 23320
Attn: Executive Director

With a copy to (which shall not constitute notice): Willcox & Savage, P.C.
440 Monticello Avenue
Suite 2200
Norfolk, Virginia 23510
Attn: Brett A. Spain

With a copy to (which shall not constitute notice): Williams Mullen
8350 Broad Street
Suite 1600
Tysons, Virginia 22102
Attn: Bradley J. Nowak

To Gasco: MAS Suffolk RNG, LLC
c/o MAS Energy, LLC
3340 Peachtree Road NE, Suite 170
Atlanta, Georgia 30326
Attn: Michael Hall

With a copy to: Milam Howard Nicandri & Gillam, P.A.
14 East Bay Street
Jacksonville, Florida 32202
Attn: G. Alan Howard

Each Party to this Agreement may change its address for notices hereunder by specifying such change in accordance with the foregoing.

18.2 Severability. If any provision of this Agreement is invalid, illegal or incapable of being enforced by any rule of law or public policy, all other terms and provisions of this Agreement will nevertheless remain in full force and effect so long as, and only so long as, the economic or legal substance of the transactions contemplated hereby is not affected in any manner materially adverse to any Party hereto. Upon any determination that any provision is invalid, illegal or incapable of being enforced and does not adversely affect the substance of these transactions in a material way, the Parties hereto will negotiate in good faith to modify this Agreement so as to effect the original intent of the Parties to the end that the transactions contemplated hereby are consummated to the extent practicable.

18.3 Governing Law. This Agreement and the transactions contemplated herein, and all disputes between the Parties under or related to this Agreement or the facts and circumstances leading to its execution and performance, whether in contract, tort or otherwise, shall be governed by and construed in accordance with the laws of the Commonwealth of Virginia, without regard to the conflict of laws rules thereof.

18.4 Jurisdiction; Service of Process. The Parties hereby irrevocably submit to the exclusive jurisdiction of the federal courts sitting in U.S. District Court for the Eastern District of Virginia (Norfolk Division), in respect of any proceeding arising out of or relating to this Agreement or any of the transactions contemplated by this Agreement, or in the event that such court does not recognize jurisdiction in any such matter, the state courts of Virginia sitting in Chesapeake, Virginia, and each of the Parties waives any objection it may now or hereafter have to venue or to convenience of forum, agrees that all claims in respect of such proceeding shall be heard and determined only in such court and agrees not to bring any proceeding arising out of or relating to this Agreement or the transactions contemplated by this Agreement in any other court. The Parties agree that either or both of them may file a copy of this paragraph with any court as written evidence of the knowing, voluntary and bargained agreement between the Parties to waive irrevocably any objections to venue or to convenience of forum. Process in any proceeding referred to in the first sentence of this Section 18.4 may be served on any Party anywhere in the world.

18.5 WAIVER OF JURY TRIAL. OWNER AND GASCO ACKNOWLEDGE AND AGREE THAT ANY CONTROVERSY WHICH MAY ARISE HEREUNDER IS LIKELY TO INVOLVE COMPLICATED AND DIFFICULT ISSUES AND HEREBY WAIVE ANY RIGHT TO A TRIAL BY JURY IN ANY ACTION TO ENFORCE OR DEFEND ANY RIGHT UNDER ANY DOCUMENT, INSTRUMENT, OR AGREEMENT DELIVERED OR TO BE DELIVERED IN CONNECTION WITH THIS AGREEMENT AND AGREE THAT ANY ACTION WILL BE TRIED BEFORE A COURT AND NOT BEFORE A JURY.

18.6 Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed original, and all of which together shall constitute one and the same instrument.

18.7 Amendment. This Agreement may be amended or modified only by a written instrument signed by each Party hereto.

18.8 Construction; No Partnership. The headings appearing in this Agreement are intended for convenience and reference only and are not to be considered in construing this Agreement. Nothing herein contained shall create a joint venture, agency, trust, partnership, or impose a trust or partnership, duty, obligation or liability or an agency relationship on, or with regard to, either Party. Neither Party shall have the right to bind or obligate the other in any way or manner unless otherwise provided for herein.

18.9 Successors. All rights, duties, and liabilities herein benefit and bind Owner and Gasco and their heirs, successors and assigns.

18.10 Assignment, Change of Control or Subletting.

(a) Neither Party shall (i) sell, assign, pledge, sublet, delegate or otherwise transfer (collectively, an "Assignment") this Agreement or any of its rights or obligations hereunder or (ii) consummate or attempt to consummate any Change of Control, in either case, without the prior written consent of the other Party, which consent shall not be unreasonably withheld, conditioned or delayed; provided, however, notwithstanding anything herein to the contrary, Owner may, without the prior written consent of Gasco, make an Assignment of this

Agreement to a successor by merger or consolidation, a purchaser or transferee, or a validly constituted agency or authority of Virginia, a duly created municipal corporation or authority or similar entity created by Owner or by Virginia legislation, in each case, to which all or substantially all of Owner's Landfill assets (including this Agreement) are transferred or assigned. Notwithstanding the foregoing, Gasco may, without the need for consent from Owner, (i) make an Assignment of all or a portion of this Agreement or any of its rights or obligations hereunder to an Affiliate of Gasco and (ii) beginning on and after the second (2nd) anniversary of the Operative Date, consummate or attempt to consummate a Change of Control with a Qualified Purchaser, provided (A) Gasco is not in default or breach hereunder, (B) Gasco gives Owner written notice of the name and provides the qualifications of the Qualified Purchaser at least ninety (90) days prior to the closing date of the transaction, and (C) prior to the closing or consummation of a Change of Control with a Qualified Purchaser, Gasco delivers, or causes to be delivered, to Owner a bring-down certificate issued to Owner and dated as of the closing date of such transaction, executed by an authorized officer of each of the Qualified Purchaser and Gasco and certifying that the proposed transferee satisfies all qualifications specified in the definition of "Qualified Purchaser." Either Party may, without the need for consent from the other Party, make an Assignment of all or a portion of this Agreement or any of its rights or obligations or for collateral security purposes to a Lender providing financing, directly or indirectly, in connection with the construction, operation or ownership of that Party's assets (a "Financing Assignment"). Any assignee (other than a collateral assignee) of all or any portion of a Party's interest hereunder shall assume and agree in writing to perform all of the obligations of its assignor arising hereunder after the effective date of such Assignment. Any Party making an Assignment (the "Assignor") in accordance with this Section 18.10 shall promptly notify the other Party thereof and furnish such Party a copy of such Assignment.

(b) In the event that either Party makes a Financing Assignment as contemplated by this Section 18.10, the other Party shall, upon the reasonable request of the Assignor, cooperate with the Assignor in order to deliver such customary additional documentation as the Lender may reasonably request in order to effect the financing transaction. Such additional documentation may include the following: (i) an acknowledgment by the non-assigning Party of the Financing Assignment, (ii) an estoppel certificate confirming the absence of (or identifying existing) breaches of this Agreement by either of the Parties, and (iii) an agreement under which the non-assigning Party will provide the Lender with (A) all notices of default and/or termination of this Agreement, (B) upon default by the Assignor under this Agreement, rights of the Lender to cure such defaults and otherwise perform the obligations of the Assignor under this Agreement, (C) upon default by the Assignor with respect to the financing transaction, foreclosure or "step-in" rights of the Lender (or an assignee of that Lender) (a "Lender Assignee") to assume the rights and obligations of the Assignor under this Agreement without the consent of the non-assigning Party, and (D) the right of the Lender to receive direct payments of any amounts due to the Assignor. Neither the Lender nor a Lender Assignee shall be deemed to have assumed the obligations of Assignor under this Agreement until the Lender or such Lender Assignee acquires the rights of Assignor under this Agreement by virtue of the exercise by Lender of its foreclosure or "step-in" rights.

(c) An Assignment by an Assignor as contemplated by this Section 18.10 shall not be construed to relieve the Assignor of any of its obligations under this Agreement, nor shall any such Assignment be deemed to modify or otherwise affect any of the rights of the non-

assigning Party hereunder, in each case without the written consent of the other Party, which consent shall not be unreasonably withheld, conditioned or delayed.

18.11 Waiver. A waiver of any of the provisions of this Agreement shall only be effective if made in writing. Failure on the part of Owner or Gasco to complain of any action or non-action on the part of Owner or Gasco shall not be deemed to be a waiver of any rights hereunder. No waiver at any time of any of the provisions hereof by Owner or Gasco shall be construed as a waiver at any subsequent time of the same provisions. The consent or approval of Owner or Gasco to or of any action or non-action by Owner or Gasco requiring Owner's or Gasco's consent or approval, shall not be deemed to waive or render unnecessary Owner's or Gasco's consent or approval to or of any subsequent similar action or non-action by Owner or Gasco.

18.12 Entire Contract. The entire agreement between Owner and Gasco with respect to the subject matter hereof is embodied herein and in the exhibits attached hereto, and supersedes all prior oral or written agreements and understandings between the Parties or their respective Affiliates relating to the subject matter hereof. No oral warranties, representations, or promises have been made or relied upon by either party as an inducement to or modification of this Agreement.

18.13 Survival. Any term, condition, covenant or obligation that requires performance by a Party subsequent to termination or expiration of this Agreement shall remain enforceable against such Party for a period of five (5) years subsequent to such termination or expiration, or the applicable statute of limitations, whichever is greater.

18.14 No Third Party Beneficiaries. Except as specifically provided in Article XI with respect to Owner Persons and Gasco Persons, nothing contained herein is intended, or shall be deemed, to create or confer any rights upon any third person not a Party hereto, whether as a third-party beneficiary or otherwise.

18.15 Liability of Board, Officers and Employees. No member of Owner's Board nor any manager, director, officer, agent, consultant, representative or employee of either Party shall be charged personally by the other or held contractually liable thereto under any term or provision of this Agreement; provided, however, that all Persons remain responsible for any of their own criminal actions.

18.16 Time of Essence. Time is of the essence of this Agreement.

18.17 Anti-Discrimination.

(a) During the performance of this Agreement, Gasco agrees as follows:

(i) Gasco shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability, or other basis prohibited by State law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of Gasco. Gasco shall post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

(ii) Gasco, in all solicitation or advertisements for employees placed by or on behalf of Gasco, will state that such contractor is an equal opportunity employer.

(iii) Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose meeting the requirements of this Section 18.17.

(b) Gasco shall include the provisions of Section 18.17(a)(i), (ii) and (iii) in every subcontract or purchase order of over Ten Thousand Dollars (\$10,000), so that the provisions will be binding upon each contractor, subcontractor or vendor.

18.18 Compliance with Federal, State and Local Laws and Federal Immigration Law. Gasco represents and warrants to Owner that it does not, and Gasco covenants that it shall not, during the performance of the Agreement, knowingly employ an unauthorized alien as defined in the federal Immigration Reform and Control Act of 1986.

18.19 Authorization to Transact Business in the State. At all times during the Term, Gasco shall be authorized to transact business in the State as a domestic or foreign business entity if so required by Title 13.1 or Title 50 of the Code of Virginia, as amended, or as otherwise required by law. Gasco shall not allow its existence to lapse or its certificate of authority or registration to transact business in the State, if so required under Title 13.1 or Title 50 of the Code of Virginia, as amended, to be revoked or cancelled at any time during the Term.

18.20 Drug-Free Workplace. During the performance of this Agreement, Gasco agrees (a) to provide a drug-free workplace for Gasco's employees; (b) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in Gasco's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (c) state in all solicitations or advertisements for employees placed by or on behalf of Gasco that Gasco maintains a drug-free workplace; and (d) include the provisions of the foregoing clauses in every subcontract or purchase order of over Ten Thousand Dollars (\$10,000), so that the provisions will be binding upon each contractor, subcontractor or vendor. For purposes of this Section 18.20, "drug-free workplace" means a site for the performance of work done in connection with a specific contract awarded to a contractor, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract.

18.21 Further Assurances. In addition to the agreements herein provided, each of the Parties shall, from time to time upon the reasonable request of the other party, execute and deliver such additional certificates, notices and documents and shall take such other action as may reasonably be required to more effectively carry out the terms of this Agreement.

[SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, the Parties hereto have caused the execution of this Amended and Restated Landfill Gas Rights, Easement and Lease Agreement by the duly authorized officers whose names appear below as of the date first written above.

OWNER:

**SOUTHEASTERN PUBLIC SERVICE
AUTHORITY OF VIRGINIA,**
a political subdivision of the Commonwealth of
Virginia

By: 
Name: Liesl R. DeVary
Title: Executive Director

GASCO:

MAS SUFFOLK RNG, LLC,
a Delaware limited liability company

By: _____
Name: Michael Hall
Title: Manager

IN WITNESS WHEREOF, the Parties hereto have caused the execution of this Amended and Restated Landfill Gas Rights, Easement and Lease Agreement by the duly authorized officers whose names appear below as of the date first written above.

OWNER:

**SOUTHEASTERN PUBLIC SERVICE
AUTHORITY OF VIRGINIA,**
a political subdivision of the Commonwealth of
Virginia

By: _____
Name: _____
Title: _____

GASCO:

MAS SUFFOLK RNG, LLC,
a Delaware limited liability company

By: Michael Hall
Name: Michael Hall
Title: Manager

Exhibits

EXHIBIT A	Definitions
EXHIBIT B-1	Depiction of Landfill
EXHIBIT B-2	Depiction of Cells
EXHIBIT B-3	Depiction of Power Station Site
EXHIBIT B-4	Depiction of RNG Facilities Site
EXHIBIT B-5	Depiction of Delivery Point
EXHIBIT B-6	Amended and Restated Easement Agreement
EXHIBIT C-1	Owner's Title V Permit
EXHIBIT C-2	Gasco's Title V Permit
EXHIBIT D	Title V Permit Responsibility Allocation Matrix
EXHIBIT E	Reporting Obligations: 40 C.F.R. 98 Subpart HH
EXHIBIT F-1	Gasco Insurance Requirements
EXHIBIT F-2	Contractor Insurance Requirements
EXHIBIT G-1	Gasco Disclosure
EXHIBIT G-2	Owner Disclosure
EXHIBIT H	Form of Periodic Statement
EXHIBIT I	Legacy Power Facilities
EXHIBIT J	RNG Facilities
EXHIBIT K	Amended and Restated Escrow Agreement
EXHIBIT L	Collection System Monitoring Requirements

EXHIBIT A DEFINITIONS

For purposes of this Agreement, the following terms and variations thereof have the meanings specified or referred to in this Exhibit A:

“2011 Agreement” has the meaning set forth in the Recitals.

“Affiliate” of a Person means an entity that directly or indirectly has ownership of, or controls, is controlled by or is under common control with that Person. For purposes of the foregoing, “ownership” or “control” of a Person means that an entity possesses, directly or indirectly, the power to direct or cause the direction of management and policies of such Person, whether by law or regulation, through ownership of voting securities, by contract, or otherwise.

“Agreement” has the meaning set forth in the Preamble.

“Alterations” or “Altered” has the meaning set forth in Section 8.3.

“Amended and Restated Easement Agreement” means that certain Amended and Restated Easement Agreement dated as of the Effective Date, attached hereto as Exhibit B-6, as the same may be amended, modified or supplemented from time to time by the Parties.

“Amended and Restated Escrow Agreement” means that certain Amended and Restated Escrow Agreement dated as of the Effective Date, attached hereto as Exhibit K, as the same may be amended, modified or supplemented from time to time by the Parties and the Escrow Agent.

“Assignment” has the meaning set forth in Section 18.10(a).

“Assignor” has the meaning set forth in Section 18.10(a).

“Audited Financials” has the meaning set forth in Section 7.6(c).

“Billing Period” has the meaning set forth in Section 7.2.

“Board” means Owner’s Board of Directors.

“Business Day” means any calendar day, other than any day that commercial banks are authorized to be closed by the Federal Reserve.

“Change of Control” means: (a) any individual, partnership, firm, corporation, limited liability company, association, trust, unincorporated organization or other entity or Person, or any syndicate or group becomes the beneficial owner, directly or indirectly, of securities of Gasco representing fifty percent (50%) or more of the combined voting power of Gasco’s then outstanding securities entitled to vote; (b) there occurs a transaction with respect to which the stockholders, managers, members, partners or owners of Gasco immediately prior to such transaction do not, immediately after the transaction, own or control more than fifty percent (50%) of the combined voting power of Gasco then outstanding securities entitled to vote; or (c) all or substantially all of the assets of Gasco are sold, liquidated or distributed; provided, however, that,

for purposes of clauses (a) and (b), a Change of Control shall not be deemed to have occurred with respect to Gasco solely by virtue of transfers of direct or indirect interests in Gasco among Affiliates of Gasco that are subject to the control of the same Person (or an Affiliate of such Person) that controls Gasco as of the Effective Date.

“Collection Point” means the point(s) between the Landfill and the Collection System at which the Landfill Gas first passes into the recovery wells of the Collection System.

“Collection System” means (i) the network of recovery wells and interconnecting below-grade pipes and (ii) the candlestick flare skid, that in each case are from time to time located on the Designated Landfill Cells for the purpose of extracting, recovering and destroying Landfill Gas, as the same may be Altered or otherwise modified from time to time.

“Condensate” means the liquid formed from the condensation of Recovered Landfill Gas vapors.

“Decommissioning Date” means the date the Legacy Power Facilities cease to generate electric power.

“Default Option” has the meaning set forth in Section 15.2(b).

“Delivery Point” means the point at which the RNG Facilities owned and operated by Gasco connect to and transfer RNG and/or other Products to facilities owned by the pipeline operator, the RNG or Products’ buyer or natural gas utility, as the case may be, as more particularly shown on Exhibit B-5 attached hereto.

“Designated Landfill Cells” means the parcels of property located at the Landfill and designated as Cell I, Cell II, Cell III, Cell IV, Cell V, Cell VI and, if and only if or when Cell VII is developed and when it becomes operational, Cell VII, all as shown and as more particularly described in Exhibit B-2.

“Drop Dead Date” shall mean thirty (30) months following the Effective Date.

“Effective Date” has the meaning set forth in the Preamble.

“Emergency Condition” means (i) the occurrence or significant risk of imminent occurrence of an event adversely affecting the safety of any Person or endangering any Gasco Facility or the property located at or adjacent to any Gasco Facility, including without limitation the Landfill or any Owner property, or (ii) the failure, delay or refusal of Gasco to operate the Collection System in accordance with the terms of this Agreement.

“Environmental Attribute” means any and all existing and future legal and beneficial rights that are capable of being measured, verified, calculated or commoditized, arising from a reduction in emissions of Greenhouse Gases or other gases, whether generated, created or issued under a voluntary program or under a legislative, regulatory or governmental program or scheme of any kind, including any right, interest, credit, entitlement, benefit, allowance, certificate or registrable right, voluntary or compulsory that may be issued, generated or created at any time during the Term, related to, arising from or in connection with the Landfill Gas. An Environmental Attribute

may include one or more of the following: avoided, reduced or offset NO_x, SO_x or Greenhouse Gas emissions, or as otherwise defined under an applicable program or Law, or as agreed between the Parties. Environmental Attributes include RINs, RECs and tradable emission allowances or other entitlements or credits to produce emissions issued by a Governmental or quasi-Governmental Authority, but do not include other third-party subsidies for the use of renewable energy, the generation of electricity, the reduction of emissions or any Tax Benefits.

“Environmental Claim” means any claim, action, suit, proceeding, demand, assessment, fine, penalty or investigation by any person or entity arising under any Environmental Law; and shall also include any claim or action at common law, equity, or any other action of whatever form or denomination (including nuisance, trespass, negligence, or strict liability) that alleges harm to natural resources, property damages, personal injuries, or other similar harms from the presence, release, spillage, transportation, treatment, storage, disposal or other handling or management of any Hazardous Substances.

“Environmental Laws” means any statute, law, act, ordinance, rule, regulation, standard, requirement, order, decree, permit, guidance, policy, authorization or ruling of any federal, state and/or local government, or administrative regulatory body, agency, board, or commission or a judicial body, relating to the protection of human health and/or the environment or otherwise regulating and/or restricting the management, use, storage, disposal, treatment, handling, release, threatened release and/or transportation of a Hazardous Substance, which are applicable to the Landfill, including, the Comprehensive Environmental Response, Compensation and Liability Act (“CERCLA”), the Resource Conservation and Recovery Act (“RCRA”), the National Environmental Policy Act, the Federal Water Pollution Control Act, the Safe Drinking Water Act, the Endangered Species Act, the Federal Insecticide, Fungicide and Rodenticide Act, the Atomic Energy Act, the Occupational Safety and Health Act, the Clean Air Act, the Hazardous Materials Transportation Act, the Toxic Substances Control Act, and the Emergency Planning and Community Right To Know Act, as each of the same is amended or supplemented from time to time.

“Escrow Agent” means TD Bank, a National banking association, or such other financial institution mutually agreed upon by the Parties.

“Escrow Reserve” has the meaning set forth in Section 7.7.

“Event of Default” has the meaning set forth in Section 17.1(b).

“Fair Market Value” means the amount that would be paid in an arm’s length, free market transaction, for cash, between an informed, willing seller and an informed willing buyer, neither of whom is under compulsion to complete the transaction.

“Financing Assignment” has the meaning set forth in Section 18.10(a).

“Force Majeure Event” means any act or condition to the extent (a) beyond the reasonable control of the affected Party and (b) the effects of which are incapable of being prevented, overcome or mitigated by the reasonable efforts of the affected Party, including but not limited to natural or accidental occurrences or casualties (including fire, earthquake, explosion, flood, hurricane, pandemic, epidemic or any other casualty or accident), war, terrorism, sabotage, labor

strikes, and civil strife or other violence; provided, with respect to the asserting Party, that such act or condition is not the result of such Party's failure to perform its obligations hereunder in accordance with the terms and conditions of this Agreement.

Without limitation, a Force Majeure Event shall not include (i) general market or economic changes, (ii) financial or economic hardship, economic infeasibility, general economic conditions, interest or inflation rates or currency fluctuations, (iii) changes in, reductions or cessation of waste volumes deposited at the Landfill or the closure of any Landfill cells, (iv) the inability, failure or delay of Owner to expand or construct new cells (including Cell VII) of the Landfill, (v) the failure, inability or delay of Gasco or its Affiliates to obtain financing for all or any portion of the Project, (vi) changes in the financial condition of Owner, any Owner member community, Gasco, Gasco's Affiliates, or any of its or their contractors, subcontractors, or suppliers affecting the affected Party's ability to perform its obligations under this Agreement, (vii) changes in or the presence, quality, characteristics, variability, quantity, volume, or contamination, or any one or more of the foregoing, of the Landfill Gas, (viii) increases in the costs associated with the demolition, disposal, construction or operation of the Gasco Facilities, (ix) pricing, economic or other market fluctuations related in any respect to the marketing or selling of any of the Products, including prices or rates received for the sale of such Products and/or the costs involved in marketing, selling or transporting such Products, (x) equipment failures, except due to acts or conditions specifically enumerated herein as a Force Majeure Event, or (xi) failures of Gasco's contractors, subcontractors or suppliers, unless such failures are caused by an event that would constitute a Force Majeure Event if experienced directly by Gasco.

"GAAP" means generally accepted accounting principles in the United States.

"Gas Collection and Control System Plan" means the approved gas collection and control system design plan that is a part of Owner's Title V Permit.

"Gasco" has the meaning set forth in the Preamble.

"Gasco Facilities" means, collectively, the Legacy Power Facilities and the RNG Facilities.

"Gasco Persons" has the meaning set forth in Section 11.2.

"Gasco Title V Permit" means the Stationary Source Permit to Construct and Operate approved on January 26, 2021, issued to Gasco by the Virginia Department of Environmental Quality, a copy of which is attached hereto as Exhibit C-2, and as the same may be amended, modified or replaced.

"Good Industry Practices" means those practices, methods, acts and standards for safety and performance, that in the exercise of reasonable judgment in light of the facts known at the time the decision was made, would have been expected to accomplish the desired result in a manner consistent with reliability, safety and all applicable Laws, and that are generally accepted, prudent and in use by owners or operators of facilities similar to the Landfill and the Gasco Facilities, as applicable.

"Governmental Authority" means the United States of America, any state, locality, county, or municipality, any federal, state, local, county, municipal or other governmental authority of any

nature (other than Owner), including any governmental agency, branch, department, official or entity and any court having jurisdiction over the Parties, this Agreement or ownership or operation of the Landfill, the solid waste disposal facility, or any Gasco Facilities.

“Greenhouse Gases” means carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride or any other gas that an applicable voluntary, legislative or regulatory program, scheme or system defines to be a “greenhouse gas.”

“Hazardous Substance” means any substance that is at any time defined or listed in, or otherwise classified, designated, or regulated pursuant to any Environmental Law as a hazardous substance, hazardous material, extremely hazardous substance, Hazardous Waste, hazardous chemical, infectious waste, toxic substance, toxic pollutant, pollutant, contaminant, or solid waste, or any other legislative or regulatory formulation intended to define, list, or classify substances by reason of properties potentially deleterious to human or public health or the environment such as ignitability, corrosivity, reactivity, carcinogenicity, or toxicity.

“Hazardous Waste” has the meaning set forth in 40 C.F.R. § 261.3, and under applicable Virginia law, as each of the same is amended or supplemented from time to time.

“Indemnified Party” has the meaning set forth in Section 11.3.

“Indemnifying Party” has the meaning set forth in Section 11.3.

“Independent Consultant” means a nationally recognized professional engineering or consulting firm with experience in Title V and 40 C.F.R. 98 Subpart HH reporting requirements.

“Independent Engineer” means a nationally recognized professional engineer or engineering firm licensed in the State with experience in operation of landfill gas processing facilities, Title V permitting and landfill and RNG facility operations.

“Initial Term” has the meaning set forth in Section 6.1.

“Landfill” has the meaning set forth in the Recitals.

“Landfill Gas” means all of the gases and their constituents, including methane, carbon dioxide and other gases produced by the decomposition of matter available within the Designated Landfill Cells.

“Landfill Gas Management Plan” means a gas management plan developed by Owner (as amended, modified or supplemented from time to time by Owner), as required pursuant to 9 VAC 20-81-200, as amended.

“Law” or “Laws” means statutes, laws, acts, ordinances, rules, regulations, standards, requirements, orders, decrees, permits, guidance, policies, authorizations or rulings of any federal, state and/or local government, or any administrative regulatory body, agency, board, or commission or a judicial body.

“Leachate” means the liquid that forms in the Landfill other than Condensate.

“Legacy Power Facilities” means the facilities and equipment set forth on Exhibit I attached hereto.

“Lender” means a bank, financial institution, insurance company, investor, or any other Person providing capital to either Party, or a trustee or agent for any such entity.

“Lender Assignee” has the meaning set forth in Section 18.10(b).

“Liens” mean all mortgages, liens, pledges, security interests, charges and encumbrances of any kind or nature whatsoever.

“Losses” has the meaning set forth in Section 11.1.

“Material Change in Law” means a change of any applicable Law or in the conditions of any Permit after the Effective Date that renders the implementation of or the realization of the benefits to be derived from this Agreement illegal or impossible.

“Member Communities” means the localities party to an Agreement for Use and Support of a Solid Waste Disposal System with Owner as of the Effective Date, which include the following: Cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk and Virginia Beach, and the Counties of Isle of Wight and Southampton.

“Migration Notice” has the meaning set forth in Section 2.10(b).

“MMBtu” means one million British thermal units.

“Operative Date” means the initial date of commercial operation of the RNG Facilities, to include when RNG is produced in commercial quantities for sale derived from Recovered Landfill Gas. For the avoidance of doubt, start-up, commissioning and/or testing of the RNG Facilities shall not constitute the Operative Date for purposes of this Agreement.

“Option” has the meaning set forth in Section 15.2(b).

“Owner” has the meaning set forth in the Preamble.

“Owner Persons” has the meaning set forth in Section 11.1.

“Party” or “Parties” has the meaning set forth in the preamble.

“Payments” has the meaning set forth in Section 7.1.

“Performance Security” has the meaning set forth in Section 8.2(c).

“Periodic Statements” has the meaning set forth in Section 7.2.

“Permits” means all approvals, consents, licenses, and/or permits that must be obtained and/or observed by a Party in order to perform its duties and obligations under this Agreement, whether required by applicable Laws or necessary in accordance with Good Industry Practices.

“Permitted Encumbrances” means any easements, rights-of-way, restrictions, and other similar charges or encumbrances affecting the Landfill.

“Person” means any individual, trustee, firm, corporation, limited liability company, limited partnership, Governmental Authority or other entity, whether acting in an individual, fiduciary or any other capacity.

“Power Station Site” means the area shown and designated as such on Exhibit B-3 attached hereto.

“Products” means the Recovered Landfill Gas, RNG, electricity, heat, steam, and any and all other byproducts produced from the Recovered Landfill Gas, including Environmental Attributes.

“Project” means all activities associated with the capturing, collecting, processing, producing, measuring, transportation, marketing, sale, flaring, reducing, destroying or any other use of Recovered Landfill Gas, Environmental Attributes, Renewable Energy Credits, and other Products pursuant to this Agreement, the construction, operation and maintenance of any Gasco Facilities, and the services provided by Gasco as set forth in Exhibit D.

“Qualified Purchaser” means a Person of (i) equal or greater tangible net worth of Gasco and (ii) with demonstrated experience owning, operating and managing landfill gas collection and control systems similar to the Collection System and renewable natural gas systems similar to the RNG Facilities for at least five (5) years.

“Real Property Agreements” has the meaning set forth in Section 15.2(d).

“Recovered Landfill Gas” means Landfill Gas that has entered the Collection System.

“Renewable Energy Credit” or “REC” means any and all existing and future legal and beneficial rights associated with the green or environmental attributes related to the production of electricity from a qualifying renewable resource, whether generated under a voluntary program or under a legislative, regulatory or governmental program or scheme of any kind created or recognized by a local, state, federal, international or foreign government authority, or certified or verified by a third party non-governmental or quasi-governmental entity that certifies or verifies RECs. For the purposes of this Agreement, a REC may be bundled with or unbundled from the associated electricity. A REC shall not be construed to include other Environmental Attributes except that a REC shall include Environmental Attributes to the extent a Governmental Authority, quasi-Governmental Authority or private certifying program mandates Environmental Attributes to be included in order to satisfy its requirements for a REC.

“Renewal Term” has the meaning set forth in Section 6.2.

“Reporting Obligations” has the meaning set forth in Section 2.10(c).

“Revenues” means the gross cash revenues received by Gasco or its Affiliates and derived from the sale or transacting of Recovered Landfill Gas, RNG, Environmental Attributes, Renewable Energy Credits, RINs, or any other Products, as applicable, and in each case derived

from, pertaining to or otherwise resulting from the Landfill Gas or operation of the Gasco Facilities. Revenues shall not include (i) sales taxes or other similar taxes (e.g., value added tax, if applicable) collected by Gasco and required to be remitted by Gasco to governmental tax authorities in respect of such sales, but excluding, for the avoidance of doubt, Gasco's or its Affiliates' income taxes, or (ii) any value or benefits derived from Tax Benefits.

“RIN” or “Renewable Identification Number” will mean marketable fuel credits created and regulated under the US EPA Renewable Fuels Standard.

“RNG” or “Renewable Natural Gas” means natural gas that has been produced at the RNG Facilities by processing Recovered Landfill Gas from the Landfill, and which meets the applicable pipeline quality standards of third-party purchasers and/or accepted by third-party purchasers.

“RNG Facilities” means all machinery, equipment, fixtures, buildings and improvements owned by Gasco (including the Collection System), necessary or incidental to the gathering, processing, compression, transmission, consumption, use, monitoring, measuring, testing, marketing or storage of Landfill Gas for any purpose, including production and transmission of RNG, the transportation or delivery of Recovered Landfill Gas or other Products (including all pipelines, equipment and other improvements up to and including the Delivery Point), and Condensate collection and return, as more particularly described on Exhibit J attached hereto.

“RNG Facilities Site” means the location where the portion of the RNG Facilities that processes Recovered Landfill Gas will be constructed, as shown and as more particularly described on Exhibit B-4.

“scfm” means standard cubic feet per minute.

“State” means the Commonwealth of Virginia.

“Tax Benefits” means renewable energy related tax credits established under Section 48 or Section 45 of the Internal Revenue Code, as amended, or any similar or successor provision of the Internal Revenue Code (as well as grants that are obtained by Gasco that are in lieu of, or were otherwise designed to replicate the benefits of, such tax credits) and any other tax benefit associated with the Project or any Gasco Facilities.

“Term” means the Initial Term and any Renewal Term pursuant to Section 6.1 and Section 6.2.

“Term Option” has the meaning set forth in Section 15.2(a).

“Title V Obligations” has the meaning set forth in Section 2.10(a).

“Title V Permit” means the Federal Operating Permit effective as of December 3, 2012, as amended, issued to Owner by the Commonwealth of Virginia under Title V of the Clean Air Act, a copy of which is attached hereto as Exhibit C-1, and as the same may be amended, modified or replaced.

**EXHIBIT B-1
DEPICTION OF LANDFILL**

[Attached]



**EXHIBIT B-2
DEPICTION OF CELLS**

[Attached]

SPSA Property Boundary

Stormwater Features



Leachate and Gas Management Area
(16.3 Acres)

Estimated Closed Cells I-IV
(106 Acres)

Estimated Existing Cell VI
(41.3 Acres)

Estimated Existing Cell V
(43.8 Acres)

Estimated Proposed Cell VII*
(73 Acres)
(56.1 Acre Waste Boundary)

Wetland Preservation Area
(50 Acres)

Wetland Enhancement Area
(36 Acres)

Wetland Restoration Area
(12 Acres)

Suffolk Transfer Station

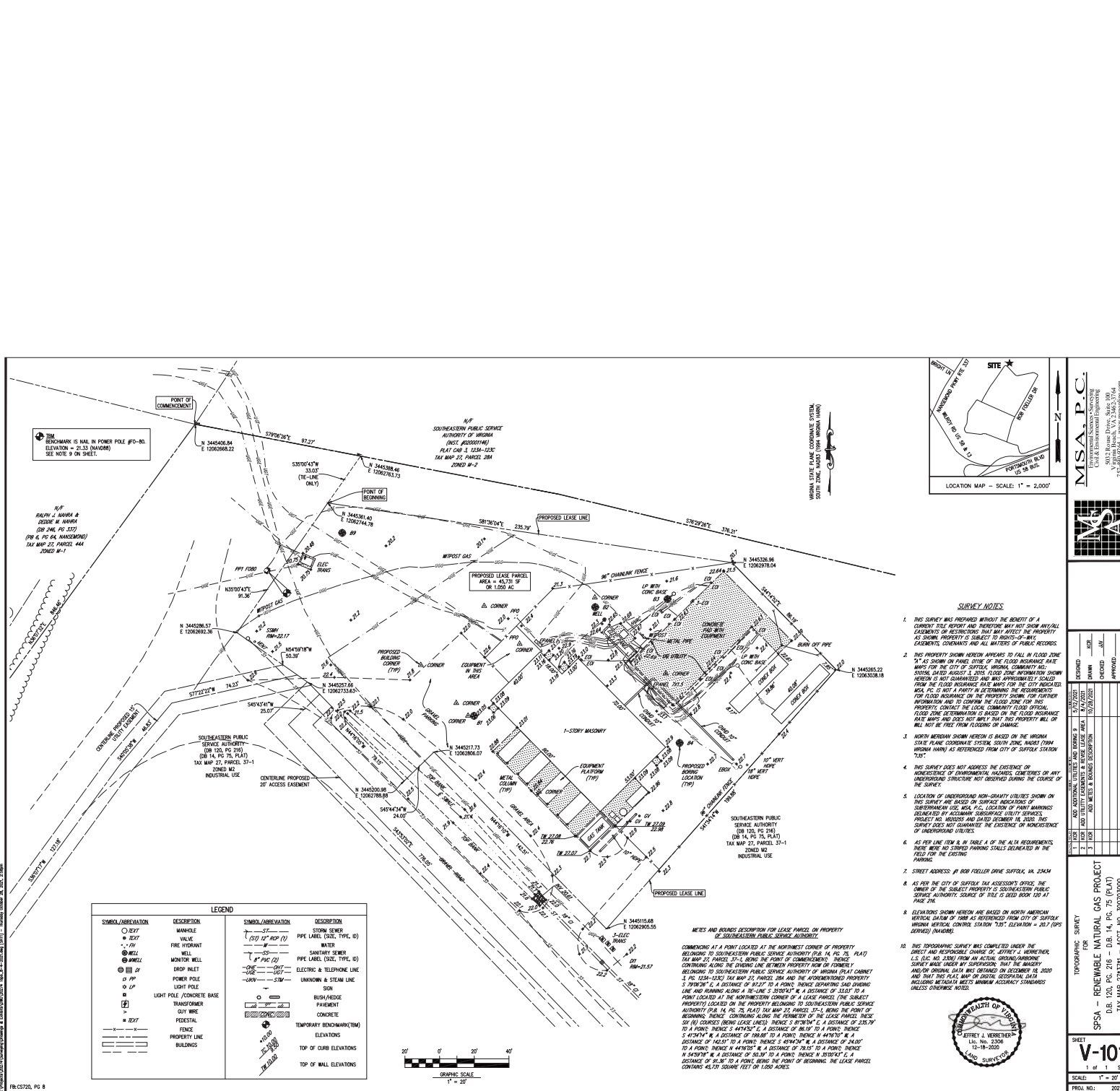
Portsmouth BLVD

4,000 ft

*No guarantee of waste in Cell VII

EXHIBIT B-4
DEPICTION OF RNG FACILITIES SITE

[Attached]



SURVEY NOTES

1. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT AND THEREFORE MAY NOT SHOW ANY/all EASEMENTS OR RESTRICTIONS THAT MAY AFFECT THE PROPERTY. AS SHOWN, PROPERTY IS SUBJECT TO RIGHTS-OF-WAY, EASEMENTS, EASEMENTS AND ALL MATTERS OF PUBLIC RECORD.
2. THE PROPERTY SHOWN HEREON APPEARS TO FALL IN FLOOD ZONE "X" AS SHOWN ON PANEL ONE OF THE FLOOD INSURANCE RATE MAPS FOR THE CITY OF SUFFOLK, VIRGINIA. COMMENTS: FLOOD ZONE "X" IS A FLOOD HAZARD AREA APPROXIMATELY 100 FEET FROM THE FLOOD INSURANCE RATE MAPS FOR THE CITY OF SUFFOLK, VIRGINIA. CONTACT THE LOCAL COMMUNITY FLOOD OFFICIAL FOR FLOOD INSURANCE TO THE PROPERTY SHOWN FOR FURTHER INFORMATION AND TO OBTAIN THE FLOOD ZONE MAP FOR THE PROPERTY. CONTACT THE LOCAL COMMUNITY FLOOD OFFICIAL FOR FLOOD INSURANCE TO THE PROPERTY SHOWN FOR FURTHER INFORMATION AND TO OBTAIN THE FLOOD ZONE MAP FOR THE PROPERTY.
3. NORTH MERIDIAN SHOWN HEREON IS BASED ON THE VIRGINIA STATE PLANE COORDINATE SYSTEM SOUTH ZONE, NAD83 (1984 VIRGINIA HARN) AS REFERENCED FROM CITY OF SUFFOLK STATION "151".
4. THIS SURVEY DOES NOT ADDRESS THE EXISTENCE OF NON-EXISTENCE OF ENVIRONMENTAL HAZARDOUS WASTES OR ANY UNDERGROUND STRUCTURE NOT IDENTIFIED DURING THE COURSE OF THE SURVEY.
5. LOCATION OF UNDERGROUND NON-QUALITY UTILITIES SHOWN ON THIS SURVEY ARE BASED ON SURFACE RECORDS, SUBMERGED AND UNLOCATED UTILITIES. LOCATION OF FUTURE UTILITIES INDICATED BY ACCURATE SURFACE UTILITY SERVICES. PROJECT NO. 1000000000 AND DATED DECEMBER 10, 2020. THIS SURVEY DOES NOT GUARANTEE THE EXISTENCE OR NON-EXISTENCE OF UNDERGROUND UTILITIES.
6. AS PER LINE VIEW 8 IN PAGE 4 OF THE ALTA RECORDS/MENTS THERE WERE NO STREET PARKING STALLS DELINEATED IN THE FIELD FOR THE EXISTING PARKING.
7. STREET ADDRESS OF 1000 FILLER DRIVE, SUFFOLK, VA 23064.
8. AS PER THE CITY OF SUFFOLK TAX ASSESSOR'S OFFICE, THE OWNER OF THE SUBJECT PROPERTY IS SOUTHEASTERN PUBLIC SERVICE AUTHORITY (DB 100 PLS 216) (DB 14, PLS 75, PLAT 1).
9. ELEVATIONS SHOWN HEREON ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 AS REFERENCED FROM CITY OF SUFFOLK VIRGINIA VERTICAL CONTROL STATION "151". ELEVATION = 201.7 (GPS CORRECTED) (METERS).
10. THIS TOPOGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF: ETHELL L. WERNEITER, L.S. (LIC. NO. 2300) FROM AN ACTUAL SURVEY/RECORDING SURVEY MADE UNDER HIS SUPERVISION. THAT THE MAPPING AND/OR ORIGINAL DATA WAS OBTAINED ON DECEMBER 10, 2020 AND THAT THIS FILE MAP OR DIGITAL RECORDING DATA INCLUDING METADATA MEETS VIRGINIA ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

NOTES AND BOUNDS DESCRIPTION FOR LEASE PARCEL ON PROPERTY OF SOUTHEASTERN PUBLIC SERVICE AUTHORITY.

COMMENCING AT A POINT LOCATED AT THE NORTHWEST CORNER OF PROPERTY BELONGING TO SOUTHEASTERN PUBLIC SERVICE AUTHORITY (DB 14, PLS 75, PLAT 1) TAX MAP 27, PARCEL 37-1, BEING THE POINT OF COMMENCEMENT, THENCE CONTINUING ALONG THE DIVING LINE BETWEEN PROPERTY NOW FORMERLY BELONGING TO SOUTHEASTERN PUBLIC SERVICE AUTHORITY (PLAT CABINET 1) TO A POINT BEING THE POINT OF COMMENCEMENT OF THE PROPERTY 5' 00" 00" 00" N 89° 00' 00" W A DISTANCE OF 84.27' TO A POINT, THENCE BEARING S 89° 00' 00" W ALONG A TIE-LINE TO A POINT, THENCE S 89° 00' 00" W TO A POINT LOCATED AT THE NORTHWEST CORNER OF A LEASE PARCEL (THE SUBJECT PROPERTY) LOCATED ON THE PROPERTY BELONGING TO SOUTHEASTERN PUBLIC SERVICE AUTHORITY (DB 14, PLS 75, PLAT 1) TAX MAP 27, PARCEL 37-1, BEING THE POINT OF BEGINNING, THENCE CONTINUING ALONG THE PERIMETER OF THE LEASE PARCEL, THENCE S 89° 00' 00" W BEING LEASE LINES, THENCE S 89° 00' 00" W A DISTANCE OF 25.00' TO A POINT, THENCE S 89° 00' 00" W A DISTANCE OF 142.00' TO A POINT, THENCE S 89° 00' 00" W A DISTANCE OF 142.00' TO A POINT, THENCE S 89° 00' 00" W A DISTANCE OF 142.00' TO A POINT, THENCE S 89° 00' 00" W A DISTANCE OF 142.00' TO A POINT, THENCE S 89° 00' 00" W A DISTANCE OF 142.00' TO A POINT, BEING THE POINT OF BEGINNING, THE LEASE PARCEL CONTAINS 45,731 SQUARE FEET OF 1.000 ACRES.



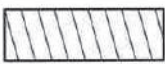
MSA P.C.
 MSA PROFESSIONAL CORPORATION
 Civil & Environmental Engineers
 5013 Pioneer Drive, Suite 100
 Suffolk, VA 23080
 757-490-2244 | www.msapc.com

PROJECT NO.	2377371
DATE	12/10/2020
SCALE	1" = 20'
PROJECT NAME	RENEWABLE NATURAL GAS PROJECT
PROJECT ADDRESS	1000 FILLER DRIVE, SUFFOLK, VA 23064
PROJECT OWNER	SOUTHEASTERN PUBLIC SERVICE AUTHORITY
PROJECT SURVEYOR	ETHELL L. WERNEITER
PROJECT DATE	12/10/2020

SHEET V-101
 1 of 1 Sheets
 SCALE: 1" = 20'
 PROJ. NO.: 2377371

EXHIBIT B-5
DEPICTION OF DELIVERY POINT

RNG sales gas will be delivered through a buried high-pressure pipe into the Columbia Interstate Natural Gas Pipeline via an underground connection point located inside the pipeline's current easement across Owner's property. The pipeline connection point will also include an aboveground tap station to be located in the existing laydown area and consisting of a pipeline specified and fenced valving and metering station approximately 67' x 80' in size as depicted on the diagram below (final tap station configuration to be coordinated with, and as approved by, Owner). The high-pressure RNG pipe and tap station along with the existing low pressure LFG pipe and any new required utilities (natural gas, water and data services lines) will be routed to the RNG facility via a utility corridor running parallel to the existing haul road and governed by the terms and conditions of the Amended & Restated Easement Agreement (all underground utility work being coordinated with Owner taking care to avoid any existing underground utilities.) The previously existing low-pressure landfill gas pipeline along with the easements required for its maintenance will remain (see easement agreement for details).



DENOTES PROPOSED
15FT UTILITY EASEMENT
AREA=42,691 SF
OR 0.980 AC



DENOTES PROPOSED
67FT x 80FT UTILITY
EASEMENT
AREA=5,360 SF
OR 0.123 AC

EASEMENT NO.	DESCRIPTION
A	VARIABLE WIDTH PERMANENT UTILITY EASEMENT
B	70' COMMONWEALTH GAS EASEMENT

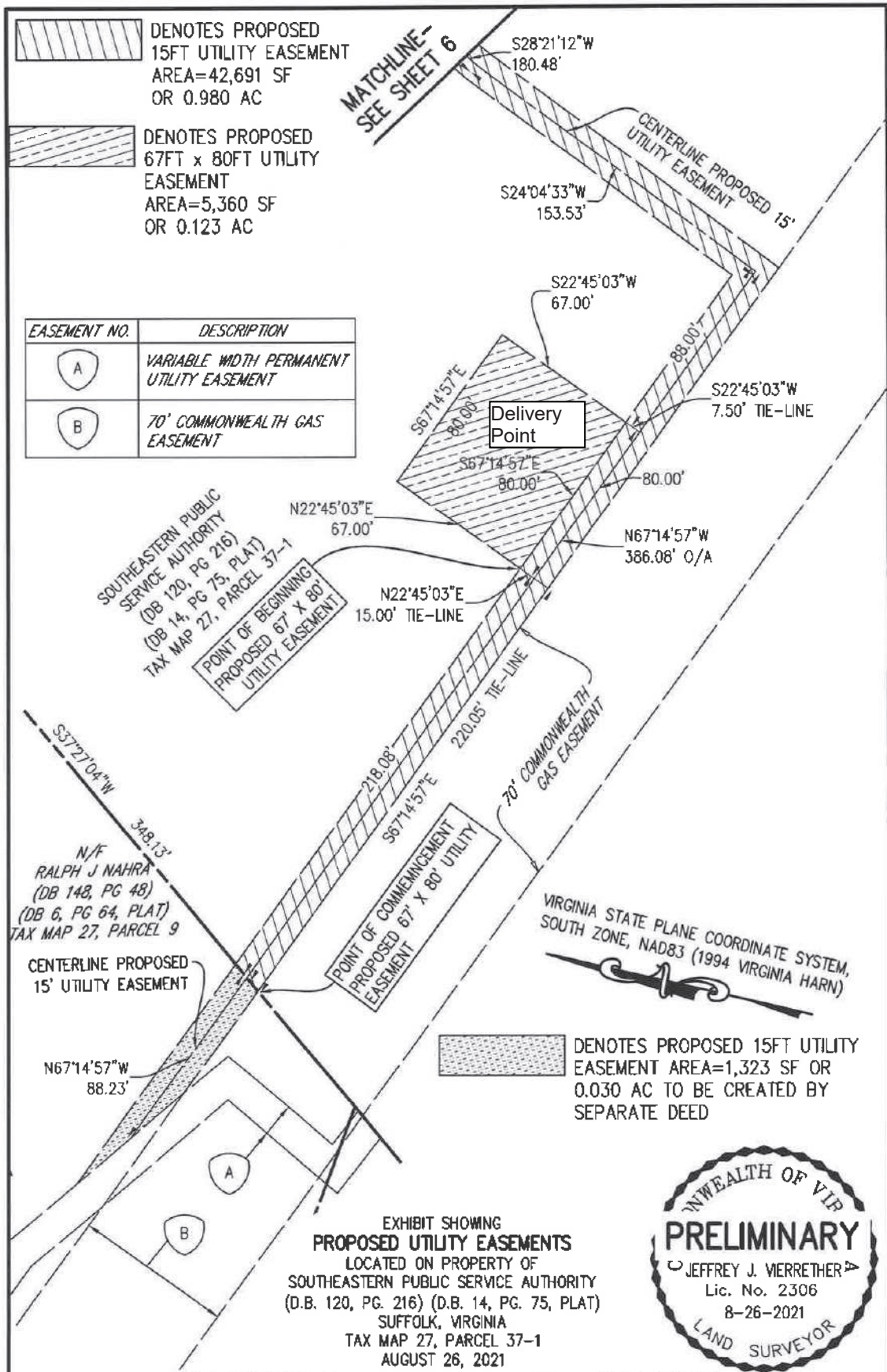


EXHIBIT SHOWING
PROPOSED UTILITY EASEMENTS
LOCATED ON PROPERTY OF
SOUTHEASTERN PUBLIC SERVICE AUTHORITY
(D.B. 120, PG. 216) (D.B. 14, PG. 75, PLAT)
SUFFOLK, VIRGINIA
TAX MAP 27, PARCEL 37-1
AUGUST 26, 2021



MSA, P.C.
Environmental Sciences • Surveying
Civil & Environmental Engineering
5032 Rouse Drive, Suite 200
Virginia Beach, VA 23462-3764
757-490-9264 | www.msaonline.com



DWN BY: KCR
FB: CS720, PG. 8

SHEET 7 OF 7
JOB# 20274
SCALE: 1" = 50'

EXHIBIT B-6
AMENDED AND RESTATED EASEMENT AGREEMENT

[Attached]

G. Alan Howard, Esq.
Milam Howard Nicandri & Gillam, P.A.
14 E. Bay Street
Jacksonville, Florida 32202

Space above this line for Recorder's Use

AMENDED AND RESTATED EASEMENT AGREEMENT

THIS AMENDED AND RESTATED EASEMENT AGREEMENT (this "Agreement") is made and entered into as of December 15, 2021 ("Effective Date"), by and between **SOUTHEASTERN PUBLIC SERVICE AUTHORITY OF VIRGINIA**, a public body politic and corporate of the Commonwealth of Virginia ("Grantor"), and **MAS SUFFOLK RNG, LLC**, a Delaware limited liability company ("Grantee"). Grantor and Grantee are referred to herein individually as a "Party" and collectively as the "Parties."

Background

WHEREAS, Grantor is the owner of the real property located in Sleepy Hole Borough, City of Suffolk, Virginia more particularly described in Exhibit A hereto (the "Property");

WHEREAS, Grantor and Suffolk Transmission Partners I, LLC, a Delaware limited liability company ("Suffolk Transmission"), previously entered into that certain Easement Agreement dated as of January 21, 2011 (the "2011 Easement Agreement") for the purpose of granting Suffolk Transmission an easement for construction and operation of a pipeline;

WHEREAS, by merger, Grantee has succeeded to the interests of Suffolk Transmission;

WHEREAS, Grantor and Grantee, have entered into that certain Amended and Restated Landfill Gas Rights, Easement and Lease Agreement, dated of even date herewith (as further amended, modified or supplemented from time to time, the "Landfill Gas Agreement");

WHEREAS, in connection with the execution of the Landfill Gas Agreement, Grantor and Grantee desire (a) to amend, restate and replace the 2011 Easement Agreement in its entirety and (b) vacate any and all easements granted pursuant to the 2011 Easement Agreement (the "Existing Easement Area"), and (c) grant the New Easement Area (as defined below) as more particularly described herein;

WHEREAS, Grantor desires to grant to Grantee non-exclusive easements described herein for ingress, egress, and purposes of (i) inspecting, operating, maintaining, replacing, repairing and removing an existing gas pipeline (the "Existing Landfill Gas Line"), (ii) constructing, installing, inspecting, operating, maintaining, replacing, repairing and removing a to-be-built landfill gas pipeline (the "New Landfill Gas Line"), natural gas, water supply, telecommunications and data cables, and appurtenances thereto (collectively with the New Landfill Gas Line, the "New Utilities"), and (iii) constructing, installing, inspecting, operating, maintaining, replacing,

repairing and removing a to-be-built building or facility containing the Delivery Point (the “Tapping Station”, and together with the New Utilities and the Existing Landfill Gas Line, collectively, the “Utilities”) upon a portion of the Property, as more particularly described herein; and

WHEREAS, capitalized terms used and not otherwise defined herein shall have the meanings assigned to them in the Landfill Gas Agreement.

NOW, THEREFORE, for and in consideration of the premises, and of the mutual covenants and agreements hereinafter set forth, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged by the Parties, Grantor and Grantee agree as follows:

1. Existing Easement; Grant of Easement.

(a) The Parties acknowledge and agree that the 2011 Easement Agreement is amended and restated in its entirety by this Agreement. Grantee hereby forever remises, quitclaims, releases, and conveys to Grantor, its successors and assigns, any and all of Grantee’s rights, title, and interest in and to the Existing Easement Area and any and all rights granted under the 2011 Easement Agreement.

(b) For and in consideration of Grantee’s payment of Ten and No/100 Dollars (\$10.00) and other good valuable consideration, the receipt and sufficiency of which is hereby acknowledged, during the Term, Grantor grants and conveys to Grantee, its successors and permitted assigns:

(i) a non-exclusive fifteen (15) foot wide easement across, under and over that portion of the Property starting at the point designated as the “Point of Beginning Centerline Proposed 15’ Utility Easement” and continuing as designated as the “Proposed 15’ Utility Easement” and ending at Grantor’s property line (the “Utility Corridor”), as shown on that certain plat entitled “Proposed Utility Easements” prepared by MSA, P.C. dated August 26, 2021 (the “Easement Plat”), said Easement Plat being attached hereto as Exhibit B, to which reference is made for a more particular description, for purposes of inspecting, operating, maintaining, replacing, repairing and removing the Utilities;

(ii) a non-exclusive fifteen (15) foot wide easement across, under and over that portion of the Property being designated as “A” – “Utility and access easement previously contracted for the transport of recovered landfill gas that will remain in effect until the operative date” (“Existing Corridor”), as shown on the Easement Plat, to which reference is made for a more particular description, for purposes of inspecting, operating, maintaining, replacing, repairing and removing that portion of the Existing Landfill Gas Line;

(iii) a non-exclusive easement for the sixty-seven (67) foot by eighty (80) foot area over that portion of the Property designated by such area on the Easement Plat (the “Tapping Station Easement Area”, and together with the Utility

Corridor and Existing Corridor, the “New Easement Area”), as shown on the Easement Plat, to which reference is made for a more particular description, for purposes of constructing, installing, inspecting, operating, maintaining, replacing, repairing and removing the Tapping Station; and

(iv) a non-exclusive easement of ingress and egress over the Property adjacent to the New Easement Area as is reasonably necessary to provide Grantee access to the New Easement Area.

(c) Upon the Operative Date, (i) the easement described in Section 1(b)(ii) for the Existing Corridor will automatically terminate, without further action of the Parties, and Grantee will be deemed to forever remise, quitclaim, release, and convey to Grantor, its successors and assigns, any and all of Grantee’s rights, title, and interest in and to Existing Corridor, (ii) Exhibit B attached hereto shall be automatically amended to remove the Existing Corridor, and (iii) the definition of “New Easement Area”, as defined in Section 1(b)(iii) shall be automatically amended, without further action of the Parties, to delete the term “Existing Corridor.” Within thirty (30) days following the Operative Date, Grantee shall, at its cost and expense, prepare and deliver to Grantor an amendment to this Agreement replacing Exhibit B to reflect that the easement for the Existing Corridor has terminated and, following the Parties execution thereof, record such amendment. Once recorded, Grantee shall provide a copy to Grantor.

(d) The easements granted hereunder shall run with and burden the Property. This conveyance is made subject to the rights of third parties under any Permitted Encumbrances and the rights of Grantor and Grantee pursuant to the terms of the Landfill Gas Agreement. Except as provided in Section 1(c), any change or variance from the New Easement Area described herein and as shown on the drawing attached hereto as Exhibit B shall require Grantor’s prior written approval and an amendment to this Agreement.

2. Term. This Agreement shall be for a term (the “Term”) beginning on the Effective Date and ending on the earliest to occur of (a) the date when the term of the Landfill Gas Agreement expires, or (b) the date when the Landfill Gas Agreement is terminated for any reason whatsoever. No delay or interruption by Grantee in the use or enjoyment of any right or easement hereby granted shall result in the loss, limitation or abandonment of any of the right, title, interest, easement or estate granted hereby. The easements granted hereunder shall automatically terminate upon the expiration or earlier termination of the Term without further action of the Parties.

3. Repairs and Maintenance; Restoration.

(a) Grantee shall, at its cost and expense, use commercially reasonable efforts to keep the Utilities in good order and repair, in accordance with all applicable Law.

(b) Within thirty (30) days following (i) the maintenance, operation, repair, or replacement of the Existing Landfill Gas Line or (ii) the construction, demolition, installation, maintenance, operation, repair, replacement or removal of the New Utilities and/or the Tapping Station, Grantee shall, at its sole cost and expense, repair or replace in good and workmanlike

manner and restore all portions of the Property and any improvements located thereon to substantially the same condition as existed prior to the occurrence of such activity and in a manner satisfactory to Grantor. To the extent any Grantee activity involves Grantor's haul road, including without limitation, repairing or replacing the Existing Landfill Gas Line and/or installing or constructing the New Utilities below or under the haul road, Grantee shall, at its cost and expense, repair or replace, in a good and workmanlike manner, the portion(s) of the haul road disturbed in accordance with the standards described in Exhibit C attached hereto and otherwise in a manner satisfactory to Grantor. At all times, including without limitation during construction, installation, repair or other activities, Grantee shall maintain and provide unobstructed and passable access for ingress and egress of vehicles over at least a twelve (12) foot wide section (i.e., one lane) of the haul road.

(c) If damage occurs in the New Easement Area, or to other portions of the Property as a result of the construction, demolition, installation, maintenance, operation, repair or replacement of the Utilities, Grantor shall provide written notice thereof to Grantee, and Grantee shall, at its cost and expense, within sixty (60) days after receipt of such notice, repair or replace, in a good and workmanlike manner, all damaged improvements and restore all portions of the Property and any improvements located thereon and the New Easement Area to substantially the same condition as existed prior to the occurrence of such damage and otherwise in a manner satisfactory to Grantor.

(d) Upon the expiration or termination of this Agreement, (i) at the written direction of Grantor, Grantee shall, at its cost and expense, remove all or any portion of the Utilities (as designated by Grantor) and restore the New Easement Area to substantially the same condition as the surrounding area and otherwise in a manner satisfactory to Grantor, ordinary wear and tear excepted, within one hundred twenty (120) days following expiration or termination of this Agreement, and (ii) the Parties shall cooperate to promptly execute and record a termination of this Agreement in the Clerk's Office of the Circuit Court of Suffolk, Virginia.

(e) If Grantee fails to repair, replace or restore the Property as required by this Section 3, Grantor may, at its election, undertake such repairs or replacements. Any amount Grantor shall expend for such purpose shall be paid by Grantee to Grantor, without contest, within fifteen (15) days after the date Grantor delivers its invoice(s) for same to Grantee.

4. Covenants Against Liens. In the event any mechanics', materialmen's, contractor's or subcontractor's lien is filed against the Property as a result of the services performed for, or work or materials furnished to, Grantee or its contractors or subcontractors, Grantee shall cause any such lien to be released and discharged of record, either by paying the indebtedness that gave rise to such lien or by posting bond or other security as shall be required by law to obtain such release and discharge, within thirty (30) days after notice to Grantee of the filing thereof. Grantee shall indemnify, defend, and hold Grantor harmless from and against all Losses resulting from any liens filed against Grantor or Grantor's property as a result of Grantee's breach of its obligations under this Section 4.

5. Grantor Reserved Rights. Grantor shall have the right to use the New Easement Area for any use or purpose that is not inconsistent with, and does not materially interfere with, the rights granted to Grantee hereunder.

6. Obstructions. Grantee may, from time to time, in coordination with, and upon the prior written approval of, the Grantor, such consent not to be unreasonably withheld, remove structures, trees, bushes, or other obstructions within the New Easement Area and may level and grade the New Easement Area to the extent reasonably necessary to carry out the purposes set forth herein; provided, however, that Grantee shall not remove or interfere with any improvements related to the construction, operation, maintenance and repair of facilities and improvements (the “Landfill Gas Improvements”) necessary for the fulfillment of the obligations of Grantor and Grantee under the terms of the Landfill Gas Agreement.

7. Title. Grantor warrants that it is the lawful owner of the Property and that it has the right and authority to execute and deliver this Agreement. Grantee acknowledges and agrees that all rights granted hereunder, including to the New Easement Area, are subject to any and all Permitted Encumbrances and the rights of third parties thereunder.

8. Nature of Obligations. Any obligations set forth in this Agreement shall be construed as covenants and not as conditions and a violation of any such obligations shall not result in a forfeiture or reversion of any easement granted hereby.

9. Indemnification. Grantee shall indemnify, defend and hold Grantor and its Affiliates, the Member Communities and their respective directors (including the Board), officers, employees, agents, invitees and independent contractors, and their respective successors and assigns (“Grantor Persons”) harmless from and against any and all costs, claims, liabilities, penalties, fines, damages, expenses, causes of action, suits, or judgments, including but not limited to, reasonable attorneys’ fees and all court costs and experts’ fees (collectively, “Losses”), incurred or paid by any Grantor Person in connection with or relating to (a) the performance or nonperformance of any duties, covenants, or obligations of Grantee hereunder, including services or work performed or to be performed by Grantee’s subcontractors on behalf of Grantee, or of Grantee or its Affiliates hereunder, (b) any damage to property of Grantor, (c) the claims of third parties for injury to persons or damage to property, or any investigation, violation or alleged violation, or proceeding by a Governmental Authority, in each of the foregoing cases, that arise from or relate to (i) any breach, violation or default by Grantee of any of its duties, covenants or obligations hereunder, (ii) Grantee’s or its subcontractors’ use, occupancy, conduct, operation, construction, demolition, removal, disposal, alteration, maintenance, repair, replacement, or management of the Utilities or pertaining to the New Easement Area and/or the Existing Corridor, or (iii) any willful misconduct, negligent or grossly negligent act or omission of Grantee or its employees, contractors, subcontractors, agents or assigns.

10. Attorney’s Fees and Costs. If either Party shall bring an action to enforce the terms of this Agreement, in any such action the prevailing Party shall be entitled to an award of its reasonable attorneys’ fees and reasonable costs. Said costs and attorneys’ fees shall include, without limitation, reasonable costs and attorneys’ fees incurred in any appeal or in any

proceedings under any present or future federal bankruptcy, forfeiture or state receivership or similar law.

11. Governing Law. This Agreement shall be governed by the laws of the Commonwealth of Virginia, without regard to its conflict of laws principles.

12. Jurisdiction; Service of Process. The Parties hereby irrevocably submit to the exclusive jurisdiction of the federal courts sitting in U.S. District Court for the Eastern District of Virginia (Norfolk Division), in respect of any proceeding arising out of or relating to this Agreement or any of the transactions contemplated by this Agreement, or in the event that such court does not recognize jurisdiction in any such matter, the state courts of Virginia sitting in Chesapeake, Virginia, and each of the Parties waives any objection it may now or hereafter have to venue or to convenience of forum, agrees that all claims in respect of such proceeding shall be heard and determined only in such court and agrees not to bring any proceeding arising out of or relating to this Agreement or the transactions contemplated by this Agreement in any other court. The Parties agree that either or both of them may file a copy of this paragraph with any court as written evidence of the knowing, voluntary and bargained agreement between the Parties to waive irrevocably any objections to venue or to convenience of forum. Process in any proceeding referred to in the first sentence of this Section 12 may be served on any Party anywhere in the world.

13. Severability. All provisions of this Agreement are severable and the invalidity or unenforceability of any provision shall not affect or impair the validity or enforceability of the remaining provisions.

14. Recordation. This Agreement shall be promptly recorded (and in any event, within thirty (30) days following the date first set forth above) by Grantee, at Grantee's sole cost and expense. Once recorded, Grantee shall provide a copy to Grantor.

15. Binding Effect; Successors and Assigns. The rights and obligations of the Parties shall inure to the benefit of and be binding upon their respective successors and assigns and shall be deemed to run with the land.

16. Headings. The headings used herein are for convenience only and are not to be used in interpreting this Agreement.

17. Entire Agreement; Amendment. This Agreement contains the entire agreement of the Parties and supersedes any prior written or oral agreements with respect to the matters described herein. This Agreement may be amended or modified only by written instrument, executed and acknowledged by the Parties or their successors or assigns, recorded in the land records of the City of Suffolk, Virginia.

18. Estoppel Certificates. Upon request of either Party in connection with the sale, long-term ground lease, financing or refinancing of its property, the other Party will, within fifteen (15) days, execute and deliver a certificate in favor of the requesting Party and the applicable purchaser, ground lessee or lender certifying (i) the amount, if any, of any payments or

reimbursements then due under this Agreement to the certifying party, and (ii) to the best of its knowledge, whether any default exists under this Agreement or whether any events have occurred or circumstances exist which, upon the giving of notice or the passage of time, or both, would constitute a default under this Agreement.

19. Assignment, Change of Control or Subletting.

(a) Grantee shall not (i) sell, assign, pledge, sublet, delegate or otherwise transfer (collectively, an “Assignment”) this Agreement or any of its rights or obligations hereunder or (ii) consummate or attempt to consummate any Change of Control, in either case, without the prior written consent of Grantor, which consent shall not be unreasonably withheld. Notwithstanding the foregoing, Grantee may, without the need for consent from Grantor, (i) make an Assignment of all or a portion of this Agreement or any of its rights or obligations hereunder to an Affiliate of Grantee and (ii) beginning on and after the two (2) year anniversary of the Operative Date, consummate or attempt to consummate a Change of Control with a Qualified Purchaser, provided (A) Grantee is not in default or breach hereunder or under the Landfill Gas Agreement, (B) Grantee gives Grantor written notice of the name and provides the qualifications of the Qualified Purchaser at least ninety (90) days prior to the closing date of the transaction and (C) prior to the closing or consummation of a Change of Control with a Qualified Purchaser, Grantee delivers, or causes to be delivered, to Grantor a bring-down certificate issued to Grantor and dated as of the closing date of such transaction, executed by an authorized officer of each of the Qualified Purchaser and Grantee and certifying that the proposed transferee satisfies all qualifications specified in the definition of “Qualified Purchaser.”

(b) An Assignment by Grantee as contemplated by this Section 19 shall not be construed to relieve Grantee of any of its obligations under this Agreement, nor shall any such Assignment be deemed to modify or otherwise affect any of the rights of Grantor hereunder, in each case without the written consent of Grantor, which consent shall not be unreasonably withheld.

20. Survival. Sections 3 (Repairs and Maintenance; Restoration), 4 (Covenants Against Liens), 9 (Indemnification), 10 (Attorney’s Fees and Costs), 11 (Governing Law), 12 (Jurisdiction; Service of Process), 13 (Severability), 15 (Billing Effect; Successors and Assigns), and 17 (Entire Agreement; Amendment) shall survive termination or expiration of this Agreement.

21. Counterparts. This Agreement may be executed in counterparts, each of which shall be deemed the original, but which together shall constitute one and the same instrument.

[Signatures on Following Page]

IN WITNESS WHEREOF, this instrument is executed under seal as of the date first written above.

GRANTOR:

Southeastern Public Service Authority of Virginia

By: Liesl R. DeVary
Liesl R. DeVary
Executive Director

COMMONWEALTH OF VIRGINIA

CITY OF CHESAPEAKE, to-wit

The foregoing instrument was acknowledged before me this aforesaid jurisdiction this 9th day of December, 2021, by Liesl R. DeVary, Executive Director of Southeastern Public Service Authority of Virginia, a public body politic and corporate of the Commonwealth of Virginia, on behalf of the Authority.

[SEAL]



Print Name: Adele C. Pelzel
Notary Public, State of Virginia
Commission No.: 316210
My Commission Expires: 08/31/2022

GRANTEE:

MAS SUFFOLK RNG, LLC

By: Michael Hall
Michael Hall
Manager

STATE OF Mississippi
CITY/COUNTY OF OKTIBBEHA to-wit

The foregoing instrument was acknowledged before me this aforesaid jurisdiction this ___ day of Dec 6, 2021, by Michael Hall, Manager of MAS Suffolk RNG, LLC, a Delaware limited liability company, on behalf of said company.

[SEAL]



Katherine Langston
Print Name: Katherine Langston
Notary Public, State of MS
Commission No.: 103374
My Commission Expires: 9/9/24

EXHIBIT A

Legal Description of Property

All that certain tract of land located in the City of Suffolk, Virginia, containing 308.6860 acres (13,466,363.277 Sq. Ft.) as shown on that certain plat of survey entitled "Plat Showing Survey of 'Sequoia Farm' for Southeastern Public Service Authority of Virginia, Sleepy Hole Borough, Suffolk, Virginia," dated February 17, 1983, prepared by Hassell & Folkes, P.C., Surveyors and Engineers, Portsmouth, Virginia, which said plat is marked "Exhibit B" and annexed to the hereinafter described Certificate of Taking recorded in Deed Book 120 at page 216, reference to which plat is hereby made for a more particular description.

IT BEING the same property acquired by the Southeastern Public Service Authority of Virginia by (i) Certificate of Taking recorded October 18, 1983 in the Clerk's Office of the Circuit Court of the City of Suffolk, Virginia in Deed Book 120 at page 216, (ii) Order entered May 3, 1984 and recorded in the Clerk's Office aforesaid in Deed Book 129 at page 341 and (iii) Amended Certificate of Taking recorded in the Clerk's Office aforesaid in Deed Book 129 at page 344.

EXHIBIT B

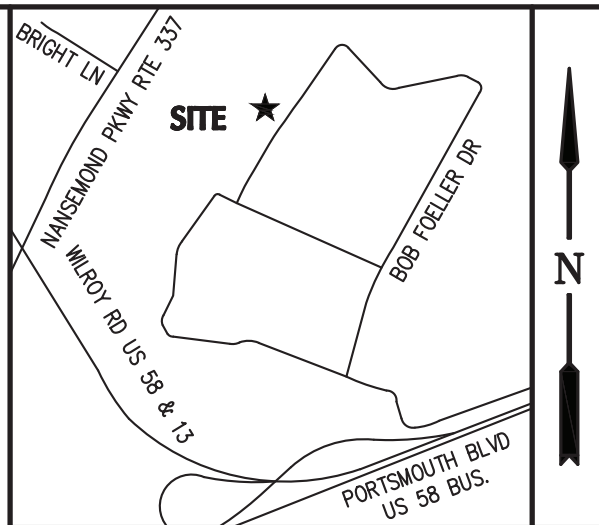
Easement Area

[Attached]

Metes and Bounds Description for Proposed 15ft Utility Easement

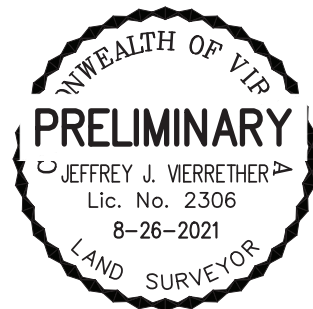
Commencing at a point located at the northwest corner of property belonging to Southeastern Public Service Authority (P.B. 14, PG. 75, Plat) Tax Map 27, Parcel 37-1, being the Point of Commencement; Thence continuing along the dividing line between property now or formerly belonging to Southeastern Public Service Authority of Virginia (Plat Cabinet 3, PG. 123A-123C) Tax Map 27, Parcel 28A and the aforementioned property S 79°06'26" E, a distance of 97.27' to a point; Thence departing said dividing line and running along a tie-line S 35°00'43" W, a distance of 33.03' to a point located at the northwestern corner of a Lease Parcel located on the property belonging to Southeastern Public Service Authority (P.B. 14, PG. 75, Plat) Tax Map 27, Parcel 37-1; Thence S 35°00'43" W, a distance of 91.36' to a point; Thence S 54°59'18" E, a distance of 42.54' to a point located at the intersection of the aforementioned Lease Parcel and the northeastern terminus of the centerline of the Proposed 15ft Utility Easement, being the Point of Beginning; Thence departing the southern edge of the Lease Parcel and continuing along the centerline of the aforementioned Easement these 13 courses: S 77°22'22" W, a distance of 74.23' to a point; S 40°05'38" W, a distance of 46.83' to a point; S 36°07'17" W, a distance of 127.18' to a point; S 36°59'28" W, a distance of 163.50' to a point; S 33°37'37" W, a distance of 591.44' to a point; S 33°52'32" W, a distance of 295.72' to a point; S 32°40'11" W, a distance of 390.59' to a point; S 29°23'52" W, a distance of 294.14' to a point; S 29°02'00" W, a distance of 187.36' to a point; S 28°21'12" W, a distance of 180.48' to a point; S 24°04'33" W, a distance of 153.53' to point; N 67°14'57" W, a distance of 386.08' to the western boundary of the property of Southeastern Public Service Authority (P.B. 14, PG. 75, Plat) Tax Map 27, Parcel 37-1 and the eastern boundary line of the property belonging to Ralph Nahra (D.B. 6, Pg. 64, plat) Tax Map 27, Parcel 44A, being the southern terminus of the Proposed 15ft Utility Easement. The Proposed 15ft Utility Easement contains 42,691 square feet or 0.980 acres.

1. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT AND THEREFORE MAY NOT SHOW ANY/ALL EASEMENTS OR RESTRICTIONS THAT MAY AFFECT THE PROPERTY AS SHOWN. PROPERTY IS SUBJECT TO RIGHTS-OF-WAY, EASEMENTS, COVENANTS AND ALL MATTERS OF PUBLIC RECORDS.
2. THIS PROPERTY SHOWN HEREON APPEARS TO FALL IN FLOOD ZONE "A" AS SHOWN ON PANEL 0119E OF THE FLOOD INSURANCE RATE MAPS FOR THE CITY OF SUFFOLK, VIRGINIA, COMMUNITY NO.: 510156, DATED AUGUST 3, 2015. FLOOD ZONE INFORMATION SHOWN HEREON IS NOT GUARANTEED AND WAS APPROXIMATELY SCALED FROM THE FLOOD INSURANCE RATE MAPS FOR THE CITY INDICATED. MSA, P.C. IS NOT A PARTY IN DETERMINING THE REQUIREMENTS FOR FLOOD INSURANCE ON THE PROPERTY SHOWN. FOR FURTHER INFORMATION AND TO CONFIRM THE FLOOD ZONE FOR THIS PROPERTY, CONTACT THE LOCAL COMMUNITY FLOOD OFFICIAL. FLOOD ZONE DETERMINATION IS BASED ON THE FLOOD INSURANCE RATE MAPS AND DOES NOT IMPLY THAT THIS PROPERTY WILL OR WILL NOT BE FREE FROM FLOODING OR DAMAGE.
3. NORTH MERIDIAN SHOWN HEREON IS BASED ON THE VIRGINIA STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NAD83 (1994 VIRGINIA HARN) AS REFERENCED FROM CITY OF SUFFOLK STATION "135".
4. THIS SURVEY DOES NOT ADDRESS THE EXISTENCE OR NONEXISTENCE OF ENVIRONMENTAL HAZARDS, CEMETERIES OR ANY UNDERGROUND STRUCTURE NOT OBSERVED DURING THE COURSE OF THE SURVEY.
5. STREET ADDRESS: #1 BOB FOELLER DRIVE SUFFOLK, VA. 23434
6. AS PER THE CITY OF SUFFOLK TAX ASSESSOR'S OFFICE, THE OWNER OF THE SUBJECT PROPERTY IS SOUTHEASTERN PUBLIC SERVICE AUTHORITY. SOURCE OF TITLE IS DEED BOOK 120 AT PAGE 216.
7. PROPERTY LINE INFORMATION IS BASED ON VARIOUS DEEDS AND PLATS OF RECORD.
8. THIS PLAT IS AN EXHIBIT TO ACCOMPANY THE DEED THAT WILL CREATE THE PROPOSED 15' UTILITY EASEMENT AND THE 67' X 80' UTILITY EASEMENT. THIS PLAT DOES NOT CONSTITUTE A BOUNDARY SURVEY.



LOCATION MAP - SCALE: 1" = 2,000'

EXHIBIT SHOWING
PROPOSED UTILITY EASEMENTS
 LOCATED ON PROPERTY OF
 SOUTHEASTERN PUBLIC SERVICE AUTHORITY
 (D.B. 120, PG. 216) (D.B. 14, PG. 75, PLAT)
 SUFFOLK, VIRGINIA
 TAX MAP 27, PARCEL 37-1
 AUGUST 26, 2021



MSA, P.C.

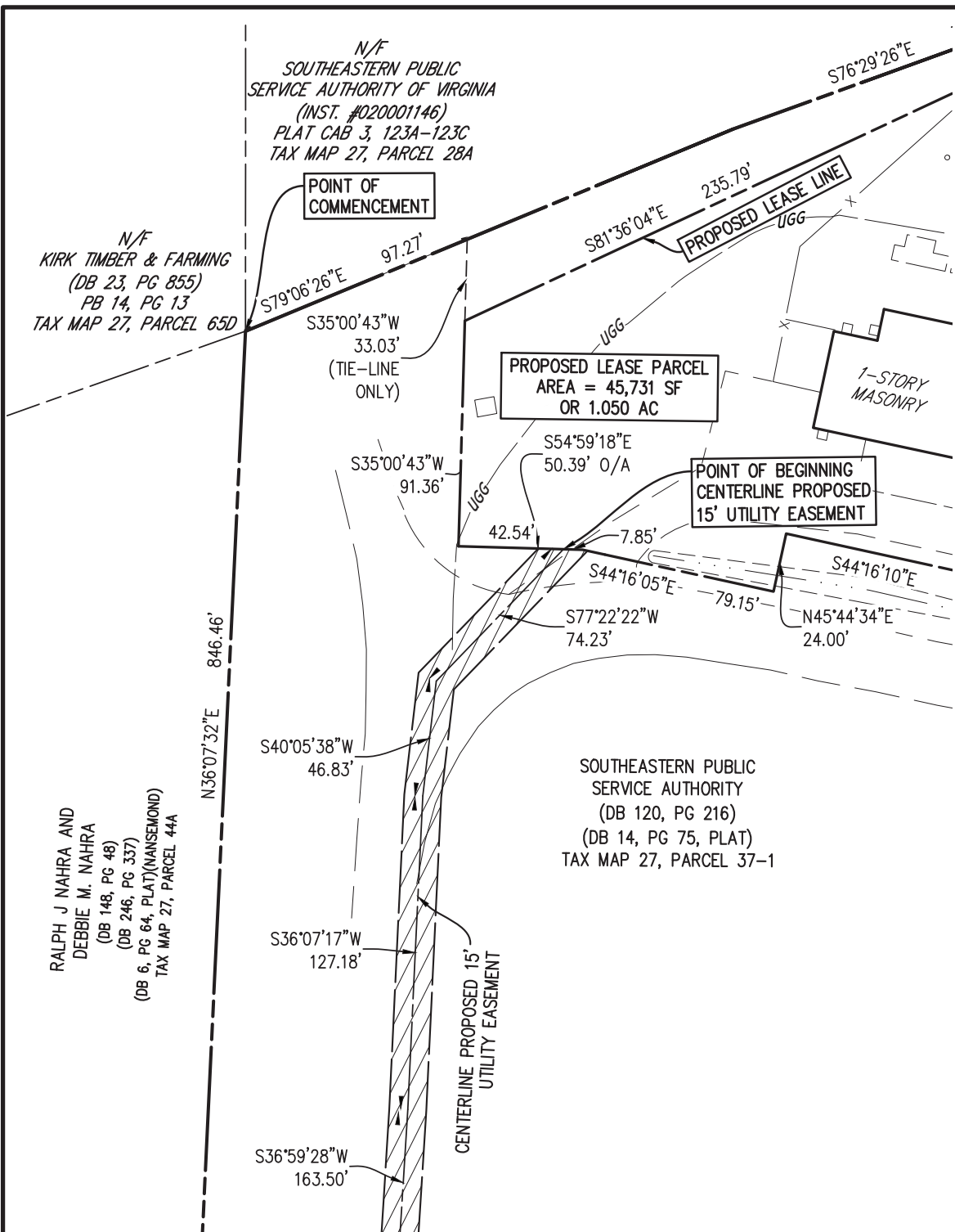
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 757-490-9264 | www.msaonline.com



DWN BY:KCR
 FB: CS720, PG. 8

SHEET 1 OF 7
 JOB# 20274
 SCALE: 1" = 50'

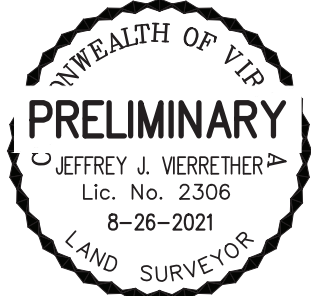


MATCHLINE—SEE SHEET 3



DENOTES PROPOSED
15FT UTILITY EASEMENT
AREA=42,691 SF
OR 0.980 AC

EXHIBIT SHOWING
PROPOSED UTILITY EASEMENTS
LOCATED ON PROPERTY OF
SOUTHEASTERN PUBLIC SERVICE AUTHORITY
(D.B. 120, PG. 216) (D.B. 14, PG. 75, PLAT)
SUFFOLK, VIRGINIA
TAX MAP 27, PARCEL 37-1
AUGUST 26, 2021



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FB: CS720, PG. 8

SHEET 2 OF 7
JOB# 20274
SCALE: 1" = 50'

MATCHLINE—SEE SHEET 2

S36°59'28"W
163.50'

VIRGINIA STATE PLANE COORDINATE SYSTEM,
SOUTH ZONE, NAD83 (1994 VIRGINIA HARN)


RALPH J NAHRA AND
DEBBIE M. NAHRA
(DB 148, PG 48)
(DB 246, PG 337)
(DB 6, PG 64, PLAT)(NANSEMOND)
TAX MAP 27, PARCEL 44A

S33°37'37"W
591.44'

SOUTHEASTERN PUBLIC
SERVICE AUTHORITY
(DB 120, PG 216)
(DB 14, PG 75, PLAT)
TAX MAP 27, PARCEL 37-1

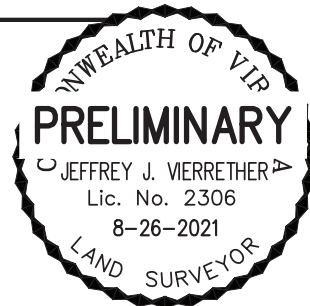
N36°07'32"E
846.46'

CENTERLINE PROPOSED 15'
UTILITY EASEMENT

 DENOTES PROPOSED
15FT UTILITY EASEMENT
AREA=42,691 SF
OR 0.980 AC

MATCHLINE—SEE SHEET 4

EXHIBIT SHOWING
PROPOSED UTILITY EASEMENTS
LOCATED ON PROPERTY OF
SOUTHEASTERN PUBLIC SERVICE AUTHORITY
(D.B. 120, PG. 216) (D.B. 14, PG. 75, PLAT)
SUFFOLK, VIRGINIA
TAX MAP 27, PARCEL 37-1
AUGUST 26, 2021



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FB: CS720, PG. 8

SHEET 3 OF 7
JOB# 20274
SCALE: 1" = 50'

MATCHLINE-SEE SHEET 3

S33°37'37"W
591.44'

VIRGINIA STATE PLANE COORDINATE SYSTEM,
SOUTH ZONE, NAD83 (1994 VIRGINIA HARN)

RALPH J NAHRA AND
DEBBIE M. NAHRA
(DB 148, PG 48)
(DB 246, PG 337)
(DB 6, PG 64, PLAT)(NANSEMOND)
TAX MAP 27, PARCEL 44A

N33°08'26"E
761.96'

SOUTHEASTERN PUBLIC
SERVICE AUTHORITY
(DB 120, PG 216)
(DB 14, PG 75, PLAT)
TAX MAP 27, PARCEL 37-1

S33°52'32"W
295.72'

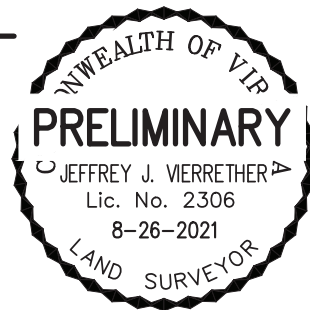
CENTERLINE PROPOSED 15'
UTILITY EASEMENT



DENOTES PROPOSED
15FT UTILITY EASEMENT
AREA=42,691 SF
OR 0.980 AC

MATCHLINE-SEE SHEET 5

EXHIBIT SHOWING
PROPOSED UTILITY EASEMENTS
LOCATED ON PROPERTY OF
SOUTHEASTERN PUBLIC SERVICE AUTHORITY
(D.B. 120, PG. 216) (D.B. 14, PG. 75, PLAT)
SUFFOLK, VIRGINIA
TAX MAP 27, PARCEL 37-1
AUGUST 26, 2021



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DWN BY:KCR
FB: CS720, PG. 8

SHEET 4 OF 7
JOB# 20274
SCALE: 1" = 50'

MATCHLINE-SEE SHEET 4

VIRGINIA STATE PLANE COORDINATE SYSTEM,
SOUTH ZONE, NAD83 (1994 VIRGINIA HARN)

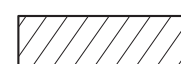
N33°08'26"E 761.96'
N32°12'04"E 134.00'
N30°34'04"E 206.35'

RALPH J NAHRA AND
DEBBIE M. NAHRA
(DB 148, PG 48)
(DB 246, PG 337)
(DB 6, PG 64, PLAT)(NANSEMOND)
TAX MAP 27, PARCEL 44A

S32°40'11"W
390.59'

SOUTHEASTERN PUBLIC
SERVICE AUTHORITY
(DB 120, PG 216)
(DB 14, PG 75, PLAT)
TAX MAP 27, PARCEL 37-1

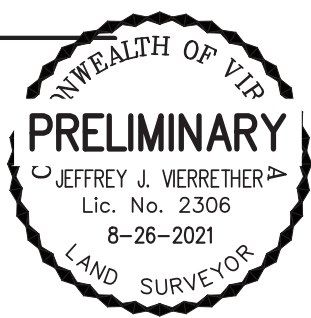
CENTERLINE PROPOSED 15'
UTILITY EASEMENT

 DENOTES PROPOSED
15FT UTILITY EASEMENT
AREA=42,691 SF
OR 0.980 AC

S29°23'52"W
249.14'

MATCHLINE-SEE SHEET 6

EXHIBIT SHOWING
PROPOSED UTILITY EASEMENTS
LOCATED ON PROPERTY OF
SOUTHEASTERN PUBLIC SERVICE AUTHORITY
(D.B. 120, PG. 216) (D.B. 14, PG. 75, PLAT)
SUFFOLK, VIRGINIA
TAX MAP 27, PARCEL 37-1
AUGUST 26, 2021



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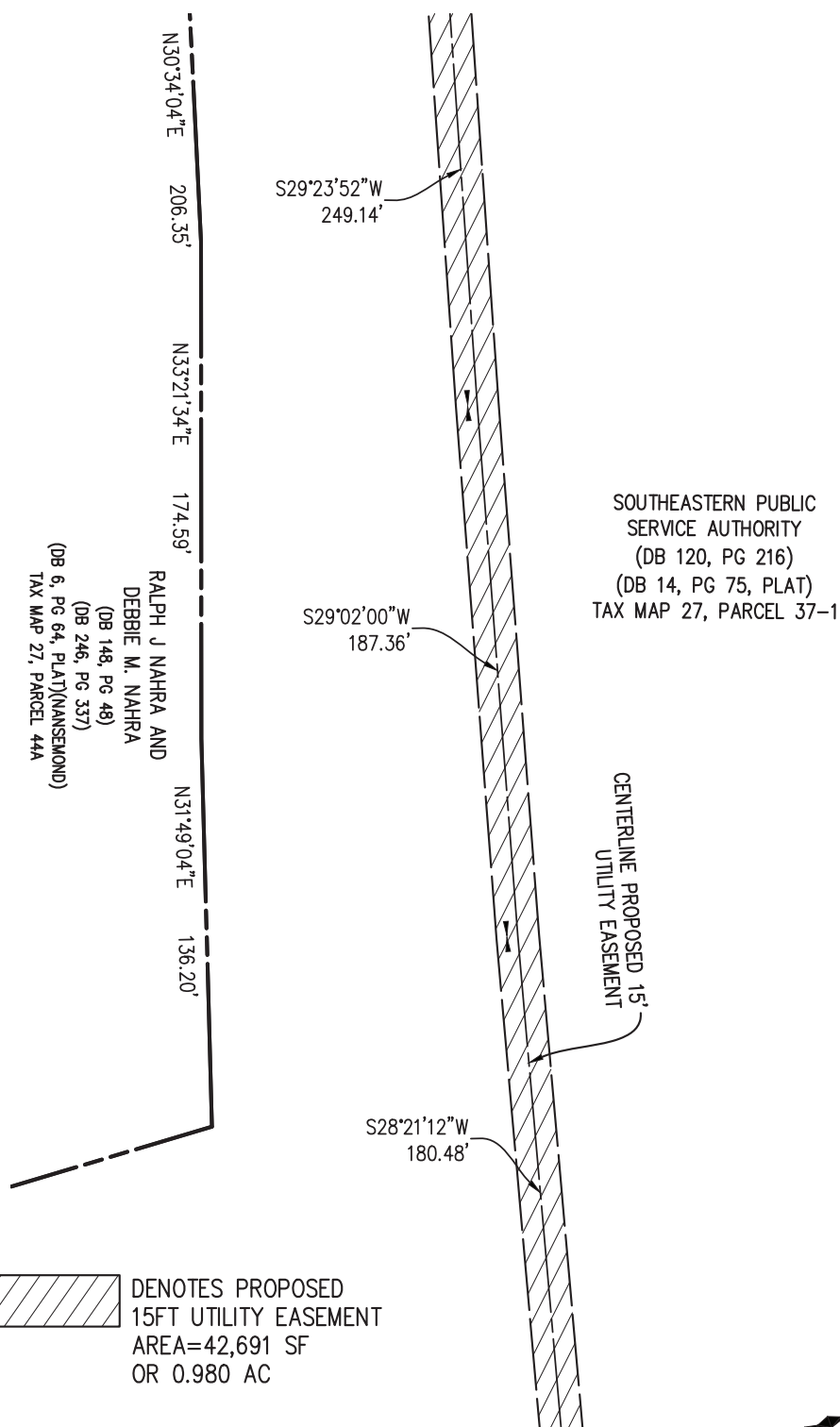
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FB: CS720, PG. 8


SHEET 5 OF 7
JOB# 20274
SCALE: 1" = 50'

MATCHLINE—SEE SHEET 5



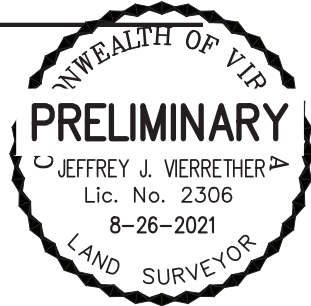
SOUTHEASTERN PUBLIC
SERVICE AUTHORITY
(DB 120, PG 216)
(DB 14, PG 75, PLAT)
TAX MAP 27, PARCEL 37-1

RALPH J NAHRA AND
DEBBIE M. NAHRA
(DB 148, PG 48)
(DB 246, PG 337)
(DB 6, PG 64, PLAT)(NANSEMOND)
TAX MAP 27, PARCEL 44A

 DENOTES PROPOSED
15FT UTILITY EASEMENT
AREA=42,691 SF
OR 0.980 AC

MATCHLINE—SEE SHEET 7

EXHIBIT SHOWING
PROPOSED UTILITY EASEMENTS
LOCATED ON PROPERTY OF
SOUTHEASTERN PUBLIC SERVICE AUTHORITY
(D.B. 120, PG. 216) (D.B. 14, PG. 75, PLAT)
SUFFOLK, VIRGINIA
TAX MAP 27, PARCEL 37-1
AUGUST 26, 2021



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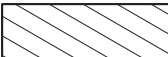



DWN BY:KCR
FB: CS720, PG. 8

SHEET 6 OF 7
JOB# 20274
SCALE: 1" = 50'

VIRGINIA STATE PLANE COORDINATE SYSTEM,
SOUTH ZONE, NAD83 (1994 VIRGINIA HARN)

EASEMENT NO.	DESCRIPTION
A	UTILITY AND ACCESS EASEMENT PREVIOUSLY CONTRACTED FOR THE TRANSPORT OF RECOVERED LANDFILL GAS THAT WILL REMAIN IN EFFECT UNTIL THE OPERATIVE DATE

 DENOTES PROPOSED 15FT UTILITY EASEMENT
AREA=42,691 SF
OR 0.980 AC

 DENOTES PROPOSED 67FT x 80FT UTILITY EASEMENT
AREA=5,360 SF
OR 0.123 AC

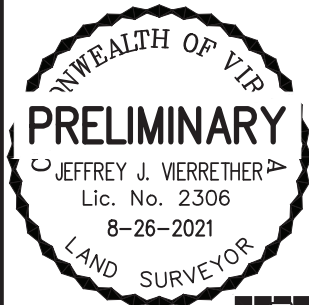


EXHIBIT SHOWING
PROPOSED UTILITY EASEMENTS
LOCATED ON PROPERTY OF
SOUTHEASTERN PUBLIC SERVICE AUTHORITY
(D.B. 120, PG. 216) (D.B. 14, PG. 75, PLAT)
SUFFOLK, VIRGINIA
TAX MAP 27, PARCEL 37-1
AUGUST 26, 2021

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FB: CS720, PG. 8



SHEET 7 OF 7
JOB# 20274
SCALE: 1" = 50'

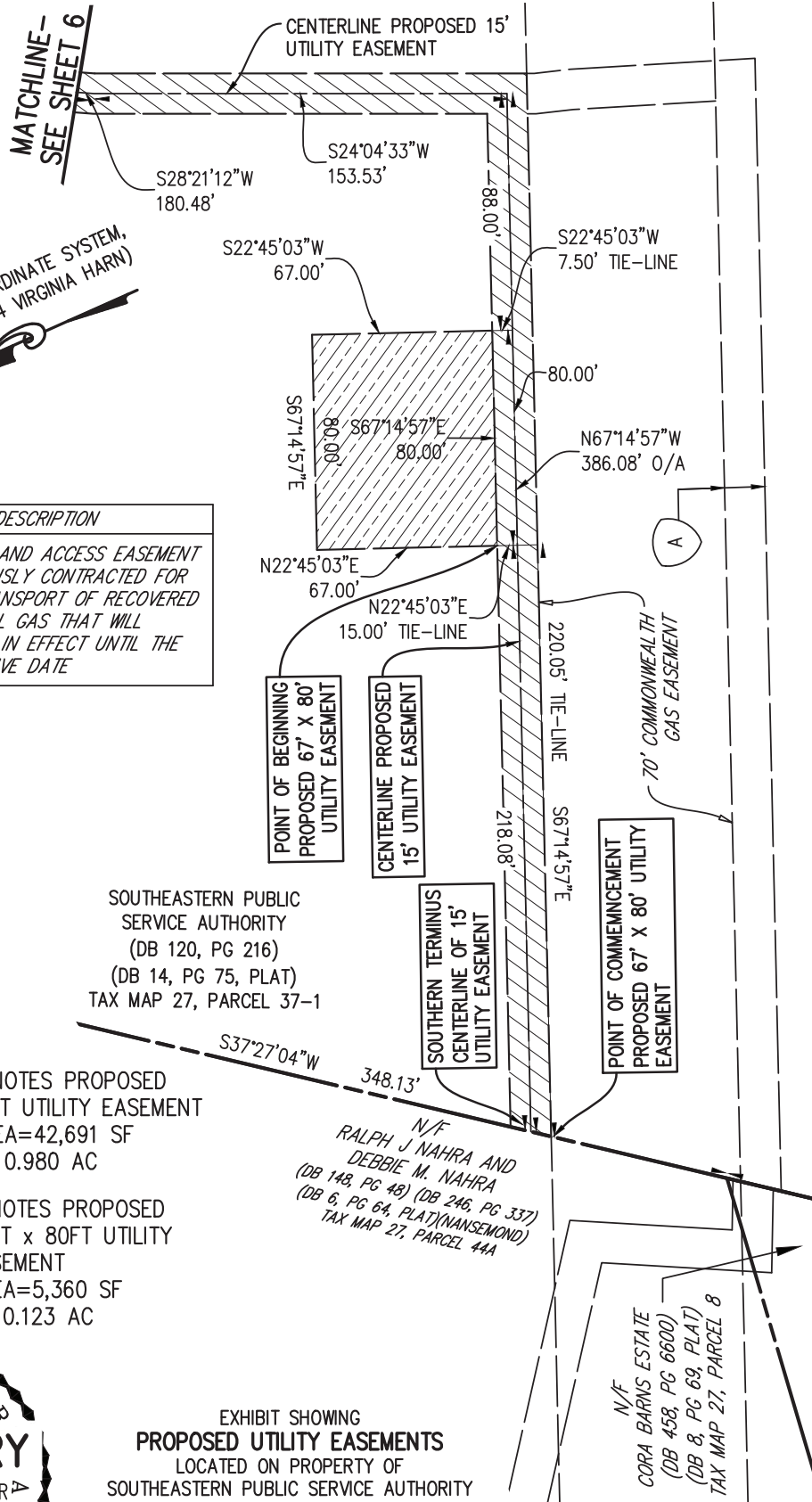
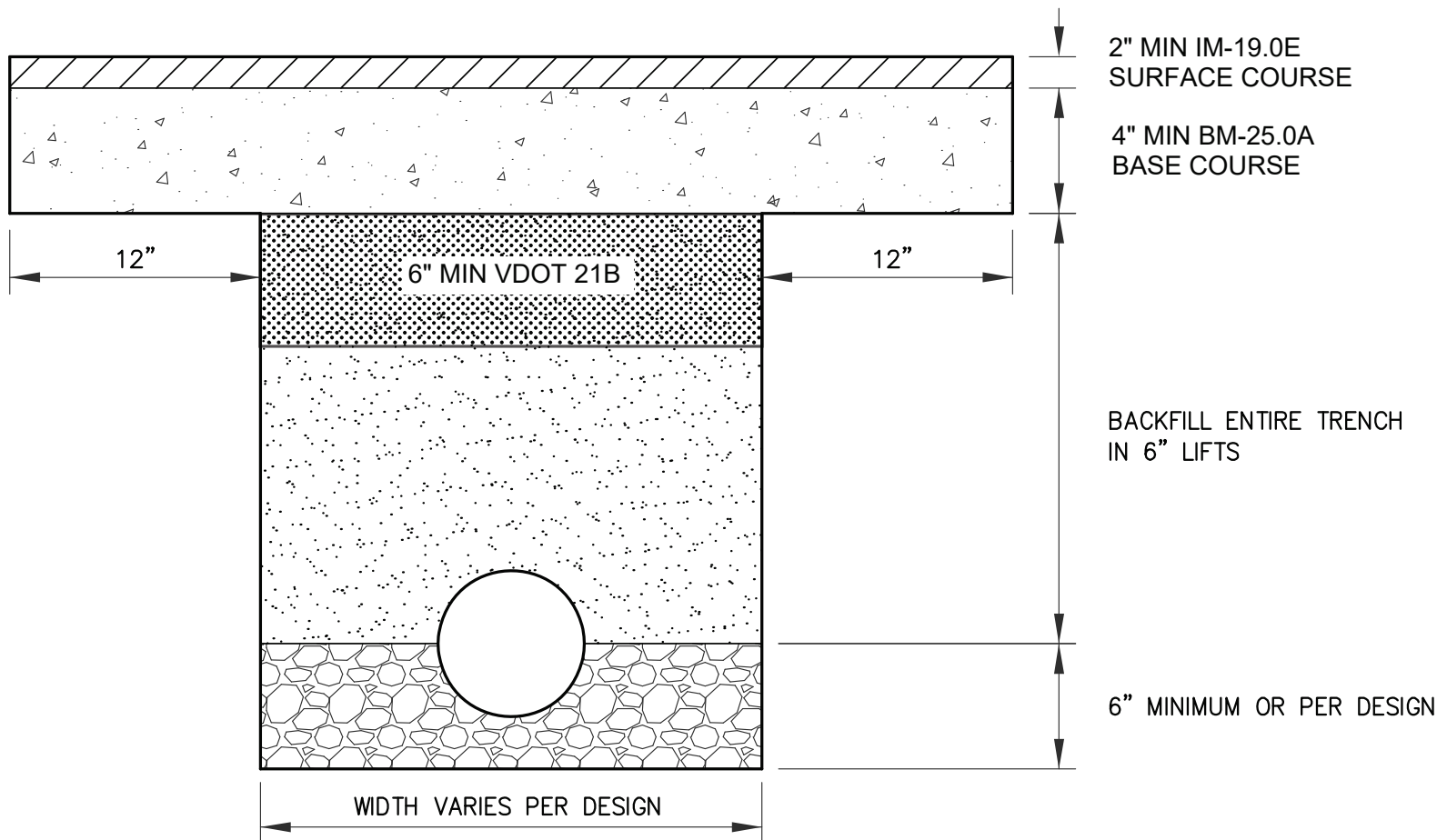


EXHIBIT C
Road Standard

[Attached]



GENERAL NOTES:

1. BACKFILL TO BE PLACED AND COMPACTED ACCORDING TO VDOT ROAD AND BRIDGE SPECIFICATIONS SECTION 302 AND 303.
2. BACKFILL MATERIAL PER VDOT SPECIFICATIONS.

**EXHIBIT C-1
OWNER'S TITLE V PERMIT**

[Attached.]



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

TIDEWATER REGIONAL OFFICE

5636 Southern Boulevard, Virginia Beach, Virginia 23462

(757) 518-2000 Fax (757) 518-2009

www.deq.virginia.gov

Doug Domenech
Secretary of Natural Resources

David K. Paylor
Director

Maria R. Nold
Regional Director

December 3, 2012

Mr. Rowland L. Taylor
Executive Director
Southeastern Public Service Authority of Virginia
723 Woodlake Drive
Chesapeake, Virginia 23320

Location: Suffolk
Registration No.: 61341
AFS Id. No.: 51-800-00121

Dear Mr. Taylor:

Attached is a renewal permit (Title V operating permit) and accompanying Statement of Basis (SOB) for the operation of the Southeastern Public Service Authority of Virginia - Regional Landfill pursuant to 9 VAC 5 Chapter 80 of the Virginia Regulations for the Control and Abatement of Air Pollution.

This permit contains legally enforceable conditions. Failure to comply may result in a Notice of Violation and a civil penalty. Please read all permit conditions carefully.

In evaluating the application and arriving at a final decision to issue the permit, the Virginia Department of Environmental Quality deemed the application complete on September 17, 2012 and solicited written public comments by placing a newspaper advertisement in the Tidewater News on Wednesday, October 17, 2012. The thirty day comment period (provided for in 9 VAC 5-80-270) expired on Friday, November 16, 2012 with no comments having been received in this office.

This approval to operate shall not relieve Southeastern Public Service Authority of Virginia of the responsibility to comply with all other local, state and federal permit regulations.

The Board's Regulations as contained in Title 9 of the Virginia Administrative Code 5-170-200 provide that you may request a formal hearing from this case decision by filing a petition with the Board within 30 days after this case decision notice was mailed or delivered to you. 9 VAC 5-170-200 provides that you may request direct consideration of the decision by the Board if the Director of the DEQ made the decision. Please consult the relevant regulations for additional requirements for such requests.

As provided by Rule 2A:2 of the Supreme Court of Virginia, you have 30 days from the date you actually received this permit or the date on which it was mailed to you, whichever occurred first, within which to initiate an appeal of this decision by filing a Notice of Appeal with:

David K. Paylor, Director
Department of Environmental Quality
PO Box 1105
Richmond, VA 23218-1105

If this permit was delivered to you by mail, three days are added to the thirty-day period in which to file an appeal. Please refer to Part Two A of the Rules of the Supreme Court of Virginia for information on the required content of the Notice of Appeal and for additional requirements governing appeals from decisions of administrative agencies.

If you have questions concerning this permit, please contact Mr. James A. White, Jr. either by phone at (757) 518-2180 or by e-mail at james.white@deg.virginia.gov.

Sincerely,



Troy D. Breathwaite
Regional Air Permits Manager

TDB/JIM/61341_008_12_T5Renewal_cvrltr_SPSA.doc

Attachments: Operating Permit
Statement of Basis

cc: Manager, Data Analysis (electronic file submission)
Chief, Air Enforcement Branch (3AP13), U.S. EPA, Region III (electronic file submission)
Manager/Inspector, Air Compliance (hard copy)



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

TIDEWATER REGIONAL OFFICE

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(757) 518-2000 Fax (757) 518-2009

www.deq.virginia.gov

Doug Domenech
Secretary of Natural Resources

David K. Paylor
Director

Maria R. Nold
Regional Director

Federal Operating Permit Article 1

This permit is based upon the requirements of Title V of the Federal Clean Air Act and Chapter 80, Article 1 of the Commonwealth of Virginia Regulations for the Control and Abatement of Air Pollution. Until such time as this permit is reopened and revised, modified, revoked, terminated or expires, the permittee is authorized to operate in accordance with the terms and conditions contained herein. This permit is issued under the authority of Title 10.1, Chapter 13, §10.1-1322 of the Air Pollution Control Law of Virginia. This permit is issued consistent with the Administrative Process Act, and 9 VAC 5-80-50 through 9 VAC 5-80-300 of the State Air Pollution Control Board Regulations for the Control and Abatement of Air Pollution of the Commonwealth of Virginia.

Authorization to operate a Stationary Source of Air Pollution as described in this permit is hereby granted to:

Permittee Name: Southeastern Public Service Authority of Virginia
Co-Operator Name: Suffolk Energy Partners, L.L.C.
Facility Name: SPSA Regional Landfill
Facility Location: One Bob Foeller Drive,
Suffolk, Virginia 23434

Registration Number: 61341
Permit Number: TRO-61341

This permit includes the following programs:

Federally Enforceable Requirements - Clean Air Act (Pages 4 through 29)
State Only Enforceable Requirements (Page 29)

December 5, 2012

Effective Date

December 4, 2017

Expiration Date

Regional Director

Signature Date

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Permit Conditions, 26 pages

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Facility Information

Permittee

Southeastern Public Service Authority of Virginia
723 Woodlake Drive
Chesapeake, Virginia 23320

Responsible Official

Mr. Rowland L. Taylor
Executive Director

Facility

SPSA Regional Landfill
One Bob Foeller Drive
Suffolk, Virginia 23434

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Landfill and Environmental Superintendent
757-961-3582 / cell 757-449-5349

Co-Operator

Suffolk Energy Partners, L.L.C.
Two Bob Foeller Drive
Suffolk, Virginia 23434

Contact Person

Jamie Margaritas
Facility Manager
757-538-2513 / cell 757-576-9576

County-Plant Identification Number: 51-800-00121

Facility Description: SIC Code 4953, NAICS Code 562212 - The source is a municipal solid waste (MSW) landfill with a tire shredder installation, leachate collection system, and a landfill gas collection and control system (GCCS). An energy recovery plant managed by Suffolk Energy Partners, L.L.C. operates combustion equipment, which includes four (4) landfill gas (LFG) fired internal combustion (IC) Caterpillar engines, each powering an electrical generator, and a flare. Power Generation (Registration No. 61137) was issued an NSR permit on August 18, 1995 for the operation of these combustion devices. Treated LFG is sold and piped directly to BASF Corporation (formally Ciba Specialty Chemicals, Inc.) for use as supplemental boiler fuel. Any excess LFG produced after supplying the IC gas engines and BASF is combusted on site by the flare. On July 29, 2011 an NSR permit was issued to SPSA for the replacement of the 1,500 scfm main burner used on the existing exempted flare with a new burner rated at 3,000 scfm.

Emission Units

Equipment to be operated consists of:

Emission Unit ID	Stack ID	Emission Unit Description	Size/Rated Capacity*	Pollution Control Device (PCD) Description	PCD ID	Pollutant Controlled	Applicable Permit Date
Fuel Burning Equipment							
FL-1B	STK0	LFG Specialties Utility Flare	3,000 scfm	No additional devices	FL-1B	NMOCs	July 29, 2011
GEN-1	STK1	Caterpillar generator set G3516, #4EK00178	325 scfm LFG 820 kW	No additional devices	GEN-1	NMOCs	August 18, 1995
GEN-2	STK2	Caterpillar generator set G3516, #4EK00179	325 scfm LFG 820 kW	No additional devices	GEN-2	NMOCs	August 18, 1995
GEN-3	STK3	Caterpillar generator set G3516, #4EK00177	325 scfm LFG 820 kW	No additional devices	GEN-3	NMOCs	August 18, 1995
GEN-4	STK4	Caterpillar generator set G3516, #4EK00175	325 scfm LFG 820 kW	No additional devices	GEN-4	NMOCs	August 18, 1995
Process A							
LFO-1	1A	Landfill operations (Cells I - VII)	38,141,510 yd ³	LFG collection and control system	GCCS	NMOCs	None
Process B							
GCCS	1B	LFG collection and control system	5,957 scfm	Combustion devices	GCCS	NMOCs	None
MAINT	1C	Vehicle and other facility equipment maintenance	N/A	None	---	VOCs	None
08	N/A	Fugitive dust	N/A	None	---	PM	None

* The Size/Rated Capacity and PCD efficiency is provided for informational purposes only and is not an applicable requirement

Landfill Operations and Combustion Equipment Requirements - (emission unit ID# LFO-1, FL-1B, GEN-1, GEN-2, GEN-3, and GEN-4)

1. **Landfill Operation Requirements - (emission unit ID# GCCS) - Gas Collection and Control System** - Prior to December 7, 2004, the permittee installed an active gas collection and control system (GCCS), approved by the Administrator, that captures the landfill gas (LFG) generated within the landfill. The GCCS installed at the Suffolk Regional Landfill meets the requirements stipulated in 40 CFR 60.752 (b)(2)(ii)(A). The active collection system shall be designed to handle the maximum expected LFG flow rate from the entire area of the landfill that warrants control over the intended use period of the gas control or treatment system equipment. The maximum expected collection rate for the five (5) year term of this permit is 5,957 scfm. The system shall collect LFG from each cell in the landfill in which solid waste has been placed for a period of five (5) years or more if active or two (2) years or more if closed or at final grade. The system shall collect gas at a sufficient extraction rate to meet all operational requirements. Also, the system shall be designed to minimize the off-site migration of subsurface gas. Based on the SPSA report of June 6, 2002 describing the 2002 calculated NMOC rate of 66.99 Mg, SPSA was required to submit a Gas Collection and Control System Design Plan by June 6, 2003. The original GCCS Design Plan was received at DEQ on June 6, 2003 with an updated version dated June 28, 2007 received on July 6, 2007. A subsequent GCCS Design Plan and Landfill Odor Control Plan update was received by the DEQ on July 8, 2010.
(9 VAC 5-80-110, 40 CFR 60.752 (b)(2)(ii)(A) and 40 CFR 60.753(a))
2. **Landfill Operation Requirements - (emission unit ID# FL-1B, GEN-1, GEN-2, GEN-3, GEN-4, and OS-1) - NMOC Emission Controls** - The GCCS shall route all collected LFG to one or more of the following combustion devices where it is to be combusted: the candlestick flare, FL-1B, the four (4) LFG-fired internal combustion engine driven generators, GEN-1, GEN-2, GEN-3, GEN-4 and the off-site devices, OS-1. During normal operations, all of the LFG collected by the GCCS shall be routed to one or more of these devices for the destruction of NMOCs. The candlestick flare, FL-1B shall be designed and operated in accordance with 40 CFR 60.18.
(9 VAC 5-80-110, 9 VAC 5-80-40, 40 CFR 60.752 (b)(2)(iii), 60.756(b)(1), 60.753(e) and Conditions 4 and 5 of NSR permit issued July 29, 2011)
3. **Landfill Operation Requirements - (emission unit ID# GCCS) - Gas Collection and Control System** - The permittee shall operate the GCCS such that negative pressure is maintained at each active wellhead except in case of fire or increased well temperature. Additionally, the permittee shall operate each interior, active wellhead in the LFG collection system such that the gas temperature is less than 55 degrees Centigrade and with either a nitrogen level of less than 20 percent (20%) or an oxygen level of less than five percent (5%).
(9 VAC 5-80-110 and 40 CFR 60.753(b) & (c))

4. **Landfill Operation Requirements - (emission unit ID# GCCS) - Control of Surface Methane** - The permittee shall operate the GCCS such that the surface methane concentration is less than 500 ppm above the background level at the surface of the landfill. The permittee shall conduct surface testing around the perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals and where visual observations indicate elevated concentrations of LFG, such as distressed vegetation and cracks or seeps in the surface cover. Areas with steep slopes or other dangerous areas such as the working face of the landfill may be excluded after receiving approval from the Director of the DEQ Tidewater Regional Office.
(9 VAC 5-80-110 and 40 CFR 60.753(d))
5. **Landfill Operation Requirements - (emission unit ID# GCCS) - Operating Parameters** - The provisions for oxygen (or nitrogen), temperature, pressure and surface methane concentrations shall apply at all times except during periods of start-up, shut down, or malfunction, provided that the duration of start-up, shut down, or malfunction does not exceed five (5) days for the GCCS and does not exceed one (1) hour for the LFG treatment or combustion devices.
(9 VAC 5-80-110 and 40 CFR 60.755(e))
6. **Landfill Operation Requirements - (emission unit ID# GCCS) - GCCS Shutdown** - The permittee shall operate the GCCS such that all collected LFG is routed to one or more of the combustion devices. In the event that the collection and control system malfunctions, the GCCS gas moving equipment shall be shut down and all vents to the atmosphere shall be closed within one (1) hour.
(9 VAC 5-80-110 and 40 CFR 60.753(e))
7. **Landfill Operation Requirements - (emission unit ID# GCCS) - Placement of New Wells** - The permittee shall place each new well or design component as specified in the GCCS design plan and shall install wells no later than 60 calendar days after the date on which the initial solid waste has been in place in any cell or group of cells for a period of five (5) years or more if active or two (2) years or more if closed or at final grade.
(9 VAC 5-80-110 and 40 CFR 60.755(b))
8. **Landfill Operation Requirements - NSPS, Subpart WWW** - The municipal solid waste landfill, as well as the GCCS shall be constructed and operated in accordance with 40 CFR 60 Subpart WWW. When 'The Administrator' is prescribed as the recipient of reports required by this Subpart, it shall be understood to be the Director of the DEQ Tidewater Regional Office.
(9 VAC 5-80-110 and 40 CFR 60.750 through 40 CFR 60.759)
9. **Combustion Equipment Requirements - (emission unit ID# FL-1B, GEN-1, GEN-2, GEN-3, and GEN-4) - Approved Fuel** - The approved fuel for the four (4) gas-fired engines and candlestick flare is LFG. No makeup fuel is authorized in conjunction with the operation of the GCCS. Any request to add a new fuel type may require a permit modification.
(9 VAC 5-80-110, Condition 4 of NSR permit issued August 18, 1995, and Condition 11 of NSR permit issued July 29, 2011)

10. **Combustion Equipment Requirements - (emission unit ID# GEN-1, GEN-2, GEN-3, and GEN-4) - Fuel Throughput Limit** - The four (4) LFG-fired engines (combined) shall consume no more than 656 million cubic feet (scf) of LFG per year at standard atmospheric conditions (68°F and 14.7 psi), calculated monthly as the sum of each consecutive 12 month period.
(9 VAC 5-80-110 and Condition 5 of NSR permit issued August 18, 1995)
11. **Fugitive Dust Emissions** - Fugitive dust and fugitive emission controls shall include the following, or equivalent, as a minimum:
- All cover material being stockpiled shall be kept adequately moist to control dust during storage and handling or covered at all times to minimize emissions as appropriate;
 - Dust from haul roads and traffic areas shall be controlled by the application of asphalt, water, suitable chemicals or equivalent methods approved by the DEQ;
 - Reasonable precautions shall be taken to prevent deposition of dirt on public roads and subsequent dust emissions. These measures shall include paving the entrance road to the facility up to the vicinity of the process areas. Trucks leaving the site shall have clean wheels - achieved by use of a wheel washer or equivalent. Dirt, product or raw material spilled or tracked onto paved surfaces shall be promptly removed or wetted to prevent particulate matter from becoming airborne; and
 - Effective speed controls for through traffic shall be implemented at the facility.
(9 VAC 5-80-110, 9 VAC 5-50-20, and 9 VAC 5-50-90)
12. **Combustion Equipment Requirements - (emission unit ID# FL-1B) - Emission Limits** - Emissions from the operation of the candlestick flare, FL-1B, shall not exceed the limits specified below:
- | | |
|---------------------------------------|---------------|
| Total Suspended Particulate | 7.4 tons/yr |
| PM-10 | 7.4 tons/yr |
| PM-2.5 | 7.4 tons/yr |
| Sulfur Dioxide | 6.0 tons/yr |
| Nitrogen Oxides (as NO ₂) | 29.5 tons/yr |
| Volatile Organic Compounds (as NMOCs) | 0.8 tons/yr |
| Carbon Monoxide | 160.4 tons/yr |
| Total Hazardous Air Pollutants | 3.5 tons/yr |
- Annual emissions are to be determined for each 12-month consecutive period.
(9 VAC 5-80-110 and Condition 16 of NSR permit issued July 29, 2011)

13. **Combustion Equipment Requirements - (emission unit ID# GEN-1, GEN-2, GEN-3, and GEN-4) - Emission Limits** - Emissions from the operation of the four (4) LFG-fired engine driven generators (combined) shall not exceed the limits specified below:
- | | |
|---------------------------------------|--------------|
| Total Suspended Particulate | 5.3 tons/yr |
| PM-10 | 5.3 tons/yr |
| PM-2.5 | 5.3 tons/yr |
| Sulfur Dioxide | 2.5 tons/yr |
| Nitrogen Oxides (as NO ₂) | 63.0 tons/yr |
| Volatile Organic Compounds (as NMOCs) | 0.5 tons/yr |
| Carbon Monoxide | 82.3 tons/yr |
| Total Hazardous Air Pollutants | 1.4 tons/yr |
- Annual emissions are to be determined for each 12-month consecutive period.
(9 VAC 5-80-110 and Condition 8 in NSR permit issued August 18, 1995)
14. **Combustion Equipment Requirements - (emission unit ID# FL-1B) - Visible Emissions Limit** - The candlestick flare, FL-1B, when utilized, shall be operated with no visible emissions, as determined by EPA Method 22 (reference 40 CFR 60, Appendix A), except for periods not to exceed a total of five (5) minutes during any two (2) consecutive hours. This condition applies at all times except for start-up, shutdown, and malfunction.
(9 VAC 5-80-110, 40 CFR 60.18, and Condition 16 of NSR permit issued July 29, 2011)
15. **Combustion Equipment Requirements - (emission unit ID# GEN-1, GEN-2, GEN-3, and GEN-4) - Visible Emissions Limit** - Visible emissions from any of the four (4) LFG-fired engine exhaust stacks shall not exceed five percent (5%) opacity, as determined by EPA Method 9 (reference 40 CFR 60, Appendix A). A visible emissions evaluation (VEE) shall be conducted on each of the engine exhaust stacks. This condition applies at all times except during start-up, shutdown, and malfunction.
(9 VAC 5-80-110 and Condition 9 of NSR permit issued August 18, 1995)
16. **Combustion Emissions Requirement - (emission unit ID# FL-1B, GEN-1, GEN-2, GEN-3, and GEN-4)** - Combustion emissions from the candlestick flare and LFG-fired engines shall be controlled by proper operation and maintenance. Equipment operators shall be trained in the proper operation of all such devices. Training shall consist of a review and familiarization of the manufacturer's operating instructions, at minimum.
(9 VAC 5-80-110)
17. **Combustion Equipment Requirements - (emission unit ID# FL-1B, GEN-1, GEN-2, GEN-3, and GEN-4)** - A copy of the August 18, 1995 and July 29, 2011 NSR permits shall be maintained on the premises of the landfill facility.
(9 VAC 5-80-110 and Condition 17 of NSR permit issued August 18, 1995 and Condition 31 of NSR permit issued July 29, 2011)

18. **Landfill Operation Requirements - Start-up, Shutdown, and Malfunction Plan** - As an affected source, the SPSA Regional Landfill is categorized as a 'new/reconstructed landfill' in 40 CFR Part 63, Subpart AAAAA. The additional requirements beyond those imposed in the NSPS include development of the 'SSM' plan and the start of semi-annual reporting for the GCCS system, beginning January 16, 2003.
(9 VAC 5-80-110 and 40 CFR 63.1930 through 63.1990)
19. **Landfill Operation Requirements - Wellhead Pressure Monitoring** - The permittee shall measure the gauge pressure in the header at each individual active well monthly. If a positive pressure exists, action shall be initiated to correct the exceedance within five (5) calendar days. If a negative pressure cannot be achieved without excess air infiltration within 15 calendar days of the first measurement, the system shall be expanded within 120 days of the initial measurement of positive pressure. Exceptions to this requirement are listed under 40 CFR 60.753 (b)(1)-(b)(3). If corrective actions are taken as specified in 60.755, the monitored exceedance is not a violation of the operational requirements.
(9 VAC 5-80-110 and 40 CFR 60.755(a)(3))
20. **Landfill Operation Requirements - Wellhead Parameters Monitoring** - The permittee shall monitor each active well monthly for temperature and nitrogen or oxygen as specified in Condition 3 of this permit. If a well exceeds one of these operating parameters, action shall be initiated to correct the exceedance within five (5) calendar days. If correction of the exceedance cannot be achieved within 15 calendar days of the first measurement, the LFG collection system shall be expanded to correct the exceedance within 120 calendar days of the initial exceedance.
(9 VAC 5-80-110 and 40 CFR 60.755(a)(5))
21. **Landfill Operation Requirements - Surface Methane Monitoring** - The permittee shall monitor surface concentrations of methane along the entire perimeter of the collection area and along a pattern that transverses the landfill at 30 meter intervals for each collection area for which waste has been in place for two (2) or more years if closed or at final grade or for which waste has been in place for five (5) or more years if active. This surface methane monitoring shall take place on a quarterly schedule and using an organic vapor analyzer, flame ionization detector or other portable monitor meeting the specifications provided in paragraph (d) of 40 CFR 60.755. Areas with steep slopes, the active working face or other dangerous areas may be excluded from this monitoring as approved by the Director of the DEQ Tidewater Regional Office.
(9 VAC 5-80-110 and 40 CFR 60.755(c)(1))
22. **Landfill Operation Requirements - Surface Methane Exceedances** - Any reading of surface methane of 500 ppm or more above background at any location shall be recorded as a monitored exceedance and the actions specified below shall be taken. As long as the specified actions are taken, the exceedance is not a violation of the operational requirements.
 - a. The location of the exceedance shall be marked and recorded;
 - b. The permittee shall perform cover maintenance or make adjustments to the vacuum of the adjacent wells to increase the gas collection in the vicinity of the exceedance. The location shall be re-monitored within 10 calendar days of detecting the exceedance;

- c. If the re-monitoring of the location shows a second exceedance, the permittee shall take additional corrective action and shall monitor the location again within 10 days of the second exceedance. If the re-monitoring shows a third exceedance for the location, the permittee shall install a new well or other collection device within 120 calendar days after the initial exceedance;
 - d. Any location that initially showed an exceedance but has methane concentration less than 500 ppm above background at the 10-day re-monitoring shall be re-monitored one (1) month from the initial exceedance. If the one-month re-monitoring shows a concentration less than 500 ppm above background, no further monitoring of that location is required until the next quarterly monitoring. If the one-month re-monitoring shows an exceedance, the permittee shall repeat the requirements of either paragraph (c) or (e) of this condition; and
 - e. For any location where the monitored methane concentration equals or exceeds 500 ppm above background three (3) times within a quarterly period, a new well or other collection device shall be installed within 120 calendar days of the initial exceedance. An alternative remedy to the exceedance, such as upgrading the blower, header pipes, or control devices, and a corresponding timeline for installation may be submitted to the Director of the DEQ Tidewater Regional Office.
(9 VAC 5-80-110 and 40 CFR 60.755(c)(4)(i) through 60.755 (c)(4)(v))
23. **Landfill Operation Requirements - Surface Cover Integrity Monitoring** - The permittee shall implement a program to monitor for surface cover integrity and accomplish cover repairs as necessary on a monthly basis.
(9 VAC 5-80-110 and 40 CFR 60.755(c)(4))
24. **Landfill Operation Requirements - Sampling Ports for Parametric Monitoring** - The permittee shall install a sampling port and a port for temperature measurements at each wellhead. The permittee shall measure the gauge pressure in the LFG collection header on a monthly schedule. The permittee shall monitor nitrogen or oxygen concentrations in the LFG on a monthly schedule. The permittee shall monitor the temperature of the LFG on a monthly schedule.
(9 VAC 5-80-110 and 40 CFR 60.756(a))
25. **Landfill Operation Requirements - Monitoring Devices** - The GCCS shall be equipped with a gas flow rate measuring device that records the flow of LFG to all combustion devices at least every 15 minutes. Individual LFG volumes to the (1) gas-fired engines, (2) Flare, and (3) Off-site devices shall be recorded on a daily basis. The flare, FL-1B, shall be equipped with a temperature-monitoring device equipped with a continuous recorder to ensure the proper operation of the flare on a continuing basis. Each monitoring device shall be installed, maintained, calibrated, and operated in accordance with approved procedures which shall include, as a minimum, the manufacturer's written requirements or recommendations. Each monitoring device shall be provided with adequate access for inspection and shall be in operation when the GCCS is operating.
(9 VAC 5-80-110, 9 VAC 5-50-20 C, 40 CFR 60.756(b)(1) &(b)(2), Condition 3 of NSR permit issued August 18, 1995, and Condition 8 of NSR permit issued July 29, 2011)

26. **Combustion Equipment Requirements - (emission unit ID# GEN-1, GEN-2, GEN-3, and GEN-4) - Periodic Monitoring** - The permittee or co-operator shall perform periodic visual emission evaluations (VEE) on each LFG-fired engine at least once per calendar week. The observations shall be conducted during daylight hours and under normal operating conditions, for at least a one-minute period to determine compliance with the opacity standards for fuel burning equipment. If no visible emissions are observed, no further action shall be required. However, if visible emissions are noted, the permittee shall take appropriate action immediately to return the unit to normal operations such that no visible emissions exist. If such corrective action fails to correct the problem, the permittee or co-operator shall conduct a VEE for a period of six (6) minutes (24 consecutive observations at 15-second intervals) using Method 9 (40 CFR 60, Appendix A). If the six-minute VEE opacity average exceeds five percent (5%), the VEE shall continue for an additional 12 minutes. If any of the six-minute averages exceeds ten percent (10%) opacity during the 18 minutes, the VEE shall continue for one (1) hour from initiation, to determine compliance with the opacity limit. The permittee shall record the details of the visual emissions observations and any corrective actions taken. (9 VAC 5-80-110 E)
27. **Combustion Equipment Requirements - (emission unit ID# FL-1B) - Periodic Monitoring** - The permittee or co-operator shall perform periodic visual emission evaluations (VEE) on the candlestick flare, FL-1B, at least once per calendar week, when operating. The observations shall be conducted during daylight hours and under normal operating conditions, for at least a one-minute period to compliance with the opacity standards for fuel burning equipment. If no visible emissions are observed, no further action shall be required. However, if such periodic evaluations indicate any visible emissions, the permittee shall take appropriate action immediately, to return the unit to normal operation such that no visible emissions exist. If such corrective action fails to correct the problem, the permittee or co-operator shall conduct a visible emissions evaluation (VEE) utilizing EPA Method 22 (reference 40 CFR 60, Appendix A). If a Method 22 evaluation and/or corrective action become necessary, the permittee or co-operator shall record the details of the incident in a logbook. The logbook shall be kept on site and available for inspection by the DEQ for the most recent five (5) year period. (9 VAC 5-80-110 E)
28. **Landfill Operation Recordkeeping - Wellhead Inspections** - The permittee shall record and maintain a logbook of wellhead inspections that indicates a positive pressure had existed and the corrective action taken to alleviate the abnormal condition at the wellhead. Exceptions to this requirement include; a fire or increased well temperature, use of a geomembrane or synthetic cover, or a decommissioned wellhead. (9 VAC 5-80-110 and 40 CFR 60.753 (b)(1) - (3))
29. **Landfill Operation Recordkeeping - Surface Monitoring Design Plan** - The permittee shall develop and maintain a surface monitoring design plan that includes a topographical map with the monitoring route and the rationale for any site-specific deviations from the 30 meter intervals. (9 VAC 5-80-110 and 40 CFR 60.753(d))

30. **Landfill Operation Recordkeeping - Landfill Design Capacity** - The permittee shall keep for at least five (5) years, current, readily accessible, on-site records of the design capacity report, based on the original report, dated May 1, 1996; the current amount of waste in place; and the annual placement rates for solid waste. Off-site records may be maintained if they are retrievable within four (4) hours. Either paper copy or electronic formats, approved by the DEQ, are acceptable.
(9 VAC 5-80-110 and 40 CFR 60.758(a))
31. **Landfill Operation Recordkeeping - Operating Parameters** The permittee shall maintain for five (5) years, readily accessible records of the following monitoring observations:
- Wellhead gauge pressures measured monthly;
 - Wellhead temperatures measured monthly;
 - Wellhead nitrogen or oxygen concentrations measured monthly;
 - Flow rate of the LFG to the GCCS;
 - Results of the quarterly surface methane monitoring; and
 - Malfunction reports for control or collection devices.
- (9 VAC 5-80-110, 9 VAC 5-50-410, 40 CFR 60.753 (c) & (d), and 40 CFR 60.758(c))
32. **Landfill Operation Recordkeeping - Collection System** - The permittee shall keep for the life of the GCCS an up-to-date, readily accessible plot map showing each existing and planned collector in the system. The map shall also provide a unique identification location label for each collector. Additionally, each owner or operator shall keep up-to-date, readily accessible records of the installation date and location of all newly installed collectors specified under 40 CFR 60.755(b).
(9 VAC 5-80-110 and 40 CFR 60.758(d))
33. **Landfill Operation Recordkeeping - Collection System** - The permittee shall maintain for five (5) years, readily accessible records of all GCCS exceedances of the operational standards, including the readings taken in subsequent months showing a return to compliance, and the location where the exceedance occurred.
(9 VAC 5-80-110 and 40 CFR 60.758(e))
34. **Landfill Operation Recordkeeping - Malfunctions** - The permittee shall maintain records of the occurrence and duration of any start-up, shutdown, or malfunction in the operation of the LFG GCCS, any malfunction of the on-site combustion devices, or any periods during which a continuous monitoring system or monitoring device is inoperative for more than one (1) hour.
(9 VAC 5-80-110 and 40 CFR 60.758(c)(1))
35. **Landfill Operation Recordkeeping - Compliance** - All records, reports, and measurements required to demonstrate compliance with NSPS, Subpart WWW shall be prepared and submitted to the Director of the DEQ Tidewater Regional Office, as listed in 40 CFR 60.755.
(9 VAC 5-80-110, 9 VAC 5-50-50 and 40 CFR 60.755)

36. **Combustion Equipment Recordkeeping - (emission unit ID# FL-1B, GEN-1, GEN-2, GEN-3, and GEN-4) - Training Records** - The permittee or co-operator shall maintain records of the required training, including a statement of the time, place and nature of the training provided. The permittee or co-operator shall have available good written operating procedures and a maintenance schedule for the combustion devices. These procedures shall be based on the manufacturer's recommendations, at minimum. All records required by this condition shall be kept at the permitted facility and made available for inspection by the DEQ.
(9 VAC 5-80-110)
37. **Combustion Equipment Testing - (emission unit ID# GEN-1, GEN-2, GEN-3, and GEN-4) - Emissions Testing** - The permitted facility shall be constructed so as to allow for emissions testing and monitoring upon reasonable notice at any time, using appropriate methods. Test ports will be provided, as necessary, in order to facilitate testing at the appropriate locations.
(9 VAC 5-80-110 and Condition 6 of NSR permit issued August 18, 1995)
38. **Landfill Operation Testing - (emission unit ID# GCCS) - Nitrogen Testing** - If measured, the nitrogen level at each wellhead shall be determined by using EPA Method 3C.
(9 VAC 5-80-110 and 40 CFR 60.753(c)(1))
39. **Landfill Operation Testing - (emission unit ID# GCCS) - Oxygen Testing** - The oxygen level at each wellhead shall be determined by an oxygen meter using EPA Method 3A, except for the following:
- a. The span be set so that the regulatory limit is between 20 and 50 percent (%) of the span;
 - b. A data recorder is not required;
 - c. Only a zero and a span calibration gas are required. Ambient air may be used as the span;
 - d. A calibration error check is not required; and
 - e. The allowable sample bias, zero drift, and calibration drift are plus-or-minus (\pm) ten percent (10%).
- (9 VAC 5-80-110 and 40 CFR 60.753 (c)(2))
40. **Landfill Operation Testing - (emission unit ID# GCCS) - Background Methane Concentrations** - The background concentration of methane during surface emissions monitoring shall be determined for the instrument measuring the surface concentrations of methane by moving the probe inlet upwind and downwind outside the boundary of the landfill at a distance of at least 30 meters from the perimeter wells. Surface emission monitoring shall be performed in accordance with 40 CFR 60 Appendix A, Method 21, Section 4.3.1, except that the probe inlet shall be placed within 5 to 10 centimeters of the ground. Monitoring shall be performed during typical meteorological conditions.
(9 VAC 5-80-110 and 40 CFR 60.755(b)(3))

41. **Landfill Operation Testing - (emission unit ID# GCCS) - Surface Methane Concentrations** - The portable analyzer used to determine the surface methane concentration shall meet the instrument specifications provided in 40 CFR 60, Appendix A, Method 21, Section 3, except that methane shall replace all references to VOC. The calibration gas shall be methane, diluted to a nominal concentration of 500 ppm in air. To meet the performance evaluation requirements in section 3.1.3 of Method 21, the instrument evaluation procedures of Section 4.4 of Method 21 shall be used. The calibration procedures in Section 4.2 of Method 21 shall be followed immediately before commencing a surface monitoring survey.
(9 VAC 5-80-110 and 40 CFR 60.755(d))
42. **Combustion Equipment Testing - (emission unit ID# FL-1B) - Flared Gas Exit Velocity** - Concurrently with the visible emissions performance tests on the candlestick flare, FL-1B, the actual combusted gas exit velocity of the flare shall be determined by EPA Reference Methods 2, 2A, 2C, or 2D, as appropriate; by the unobstructed (free) cross-sectional area of the flare's main burner tip.
(9 VAC 5-50-410 and 40 CFR 60.18(f)(3))
43. **Combustion Equipment Testing - (emission unit ID# FL-1B, GEN-1, GEN-2, GEN-3, and GEN-4) - Initial Performance Testing** - NSPS, Subpart WWW provides for alternate procedures other than initial performance testing, when adequate treatment of the LFG is performed on-site. The recognized treatment scenario includes dewatering, filtering with a 10-micron screen, and compression of the LFG prior to being combusted. Combustion devices on-site include a candlestick flare, FL-1B, and the four (4) LFG-fired engines, GEN-1, GEN-2, GEN-3 and GEN-4. SPSA and Suffolk Energy Partners, L.P. have indicated that the LFG will be treated on-site with dewatering by passing through three (3) knockouts, filtering through two (2) 10-micron screens, cooling in an air-to-air cooler, and compressing to eight (8) psig in a 300 horsepower blower before being transmitted to the LFG-fired engines, flare, and off-site devices, OS-1. 40 CFR 60.752(b)(2)(iii)(C) does not include an initial performance test for the LFG treatment control option. Therefore, any LFG energy recovery device, utilizing LFG from the facility, having met the treatment standards included in this condition, will not require an initial performance test of the control equipment.
(9 VAC 5-80-110, 9 VAC 5-50-30, 9 VAC 5-80-10 J, and 40 CFR 60.752(b)(2)(iii)(C))

44. **Landfill Operation Reporting - NSPS, Subpart WWW and MACT, Subpart AAAA -**
 On March 1st and September 1st of each calendar year, routine reports required by the Landfill MACT and the NSPS for the operation of the GCCS shall be submitted to the DEQ. The Table below outlines all reports required by the NSPS and Landfill MACT.

Report Name	Periods Covered	Report Due Dates	Permit Condition Number	Regulation Citations
NSPS and MACT Compliance	Jan. 1 st to June 30 th July 1 st to Dec. 31 st	March 1 st & Sept. 1 st The annual report is now semi-annual	9, 18, and 36	40 CFR 60.753 to 60.757 and 40 CFR 63.1980 (a)
Landfill MACT SSM Report	Jan. 1 st to June 30 th July 1 st to Dec. 31 st	March 1 st & Sept. 1 st	18 and 45	40 CFR 63.1980
GCCS Design Plan	None specified	As required by GCCS construction activities	1	40 CFR 60.752 (b)(2)(ii)(A) and 40 CFR 60.755
Semi-annual Monitoring	Jan. 1 st to June 30 th July 1 st to Dec. 31 st	March 1 st & Sept. 1 st	68	9 VAC 5-80-110

(9 VAC 5-80-110)

45. **Landfill Operation Reporting - (emission unit ID# GCCS) - Important Reporting Details:**

- a. Instances when positive pressure at a wellhead occurred due to efforts to avoid a fire. If no such instances occur, the permittee shall submit a negative report;
- b. Values and time periods for exceedances of pressure, temperature, nitrogen, or oxygen measurements at wellheads. Exceptions exist for pressure where a geomembrane or synthetic cover is used and for decommissioned wells;
- c. Any periods of GCCS equipment malfunction or diversion of the LFG stream exceeding one (1) hour, including dates and duration of the equipment outage;
- d. All instances when the GCCS was not operating for more than five (5) consecutive days;
- e. All instances where surface methane concentrations exceeded 500 ppm; the actual concentration recorded and location on the plot plan of that exceedance;
- f. Records of GCCS expansion, including dates, locations, and equipment installed in the process of expanding the GCCS; and
- g. Start-up, shutdown and malfunction (SSM) plan activity reports.

(9 VAC 5-50-410, 40 CFR 60.757 (f), 40 CFR 60.753 (b)(1) and 40 CFR 63.1980)

46. **Landfill Operation and Combustion Equipment Reporting - Performance Tests -** The permittee shall submit written notification to the Director of the DEQ Tidewater Regional Office of the anticipated dates of performance tests, postmarked at least 30 calendar days prior to the date of the tests. Copies of these written notifications shall be sent to:

Chief, Air Enforcement Branch (3AT20)
U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

(9 VAC 5-80-110, 9 VAC 5-50-410 and 40 CFR 60.7 (a))

Landfill Closure Requirements

47. **Landfill Closure Requirements - GCCS Closure -** The GCCS may be capped in-place or removed provided that all of the following conditions have been satisfied:

- a. The landfill shall be a closed landfill. A closed landfill is defined as a landfill in which solid waste is no longer being placed and in which no additional solid wastes will be placed without first filing a notification of modification as prescribed in the General Provisions of 40 CFR 60. A closure report shall be submitted to the DEQ as provided in 40 CFR 60.757(d);
- b. The GCCS shall have been operating for at least 15 years from installation; and
- c. The calculated NMOC gas production shall be less than 50 Mg per year on three (3) successive test dates. The test dates shall be no less than 90 calendar days apart and no more than 180 calendar days apart.

(9 VAC 5-80-110, 9 VAC 5-50-410, 40 CFR 60.752(b)(2)(v) and 40 CFR 60.757(d))

48. **Landfill Closure Requirements - NMOC Emission Rate -** The permittee shall calculate the NMOC emission rate for purposes of determining when the GCCS can be removed using the following equation:

$$\text{MNMOC} = 1.89 \times 10^{-3} \times \text{QLFG} \times \text{CNMOC} \quad \text{where:}$$

MNMOC = mass emission rate of NMOC, Megagrams per year;

QLFG = flow rate of landfill gas, cubic meters per minute; and

CNMOC = NMOC concentration, ppmvd as hexane

- a. QLFG shall be determined by measuring the total LFG flow rate at the common header pipe to the control device using a gas flow measuring device calibrated according to the provisions of 40 CFR 60, Appendix A, Method 2E, Section 4, or other methods approved by the Administrator; and

- b. CNMOC shall be determined by collecting and analyzing LFG sampled from the common header pipe before the gas moving or condensate removal equipment using the procedures in EPA Method 25C or EPA Method 18. If using EPA Method 18, the minimum list of compounds to be tested shall be those published in the most recent version of AP-42. The sample location on the common header shall be located upstream of any condensate removal or other refining units. The permittee shall divide the NMOC concentration (as methane) from EPA Method 25C by the number six (6) to obtain the NMOC concentration as hexane.
(9 VAC 5-80-110, 9 VAC 5-50-410 and 40 CFR 60.754(b))
49. **Landfill Closure Requirements - Closure Report** - The permittee shall submit a closure report to the DEQ and the Administrator within 30 calendar days of waste acceptance cessation. The DEQ may request additional information as may be necessary to verify that permanent closure has taken place in accordance with the requirements of 9 VAC 20-80-250 E and F, and 40 CFR 258.60. If a closure report has been submitted, no additional wastes may be placed in the landfill without filing a notification of modification.
(9 VAC 5-80-110, 9 VAC 5-50-410, and 40 CFR 60.757(d))
50. **Landfill Closure Requirements - Equipment Removal Report** - The permittee shall submit an equipment removal report to the DEQ at least 30 calendar days prior to removal or cessation of operation of the control equipment. The report shall contain the following:
- A copy of the landfill closure report;
 - A copy of the GCCS start-up report demonstrating that the 15-year minimum control period has expired;
 - Dated copies of three (3) successive NMOC emission rate reports demonstrating that the landfill is no longer producing 50 Mg or greater of NMOC per year; and
 - DEQ may request additional information to verify that all conditions for removal have been met.
- (9 VAC 5-80-110, 9 VAC 5-50-410, and 40 CFR 60.757(e))

Facility Wide Conditions

51. **Facility Wide Conditions - Limitations** - The opacity standard (visible emission standard) shall apply at all times except during periods of start-up, shutdown, and malfunction.
(9 VAC 5-80-110 and 9 VAC 5-50-20 A)
52. **Facility Wide Conditions - Limitations** - At all times, including periods of start-up, shutdown, and malfunction, owners shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with air pollution control practices for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the DEQ, which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspections of the source.
(9 VAC 5-80-110, 9 VAC 5-50-20 E, 9 VAC 5-50-380, and 9 VAC 5-20-180 A)

53. **Facility Wide Conditions - Limitations** - In case of a shutdown or bypassing, or both, of air pollution control equipment for necessary scheduled maintenance which results in excess emissions for more than one (1) hour, the intent to shut down such equipment shall be reported to the DEQ, if any, at least 24 hours prior to the planned shutdown. Such prior notice shall include, but is not limited to, the following:
- a. Identification of the specific air pollution control equipment to be taken out of service as well as its location and permit or registration number;
 - b. The expected length of time that the air pollution control equipment will be out of service;
 - c. The nature and quantity of emissions of air pollutants likely to occur during the shutdown period; and
 - d. Measures that will be taken to minimize the length of the shutdown or to negate the effect of the outage of the air pollution control equipment.
- (9 VAC 5-80-110, 9 VAC 5-50-380, and 9 VAC 5-20-180)

54. **Facility Wide Conditions - Limitations** - In the event that any affected facility or related air pollution equipment fails or malfunctions in such a manner that may cause excess emissions for more than one (1) hour, the owner shall, as soon as is practicable but no later than four (4) daytime business hours, notify the DEQ by facsimile transmission, telephone, or electronic mail of such failure or malfunction and shall within two (2) weeks provide a written statement giving all pertinent facts, including the estimated duration of the breakdown. When the condition causing the failure or malfunction has been corrected and the equipment is again in operation, the owner shall notify the DEQ. (9 VAC 5-80-110, 9 VAC 5-50-380, and 9 VAC 5-20-180 C)

55. **Facility Wide Conditions - Emission Limits** - Emissions from the operation of the MSW landfill facility shall not exceed the limits specified below:

Total Suspended Particulate	21.2 tons/yr
PM-10	21.2 tons/yr
PM-2.5	21.2 tons/yr
Sulfur Dioxide	8.5 tons/yr
Nitrogen Oxides (as NO ₂)	103.8 tons/yr
Volatile Organic Compounds (as NMOCs)	32.3 tons/yr
Carbon Monoxide	283.7 tons/yr
Total Hazardous Air Pollutants	20.5 tons/yr

Annual emissions are to be determined for each 12-month consecutive period
(9 VAC 5-80-110)

56. **Facility Wide Conditions - Recordkeeping** - The permittee shall maintain records of all emission data and operating parameters necessary to demonstrate compliance with this permit and 40 CFR 60.758. The content and format of such records shall be arranged with the Director of the Tidewater Regional Office. These records shall include, but are not limited to:
- a. Annual throughput of LFG to the LFG-fired engines, flare, and off-site devices (in million scf), calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months;
 - b. The total annual throughput of LFG (in million scf), calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months;
 - c. Annual placement of solid waste in the landfill, calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months;
 - d. All GCCS, LFG-fired engine, and flare system monitoring data, including any observations of opacity;
 - e. All visual emissions observations and VEEs for the engines and flare, including the date and time of the observations, whether or not visible emissions were noted, the results of any EPA Method 9 or Method 22 VEEs and any corrective action taken; and
 - f. The content and format of any such additional records shall be arranged with the DEQ Tidewater Regional Office. All records required by this condition and Subpart WWW (40 CFR 60.758) shall be made available for inspection by the DEQ and shall be current for the most recent five (5) years.
- (9 VAC 5-80-110, 9 VAC 5-50-410, and 40 CFR 60.758)

Insignificant Emission Units

57. **Insignificant Emission Units** - The following emission units at the facility are identified in the application as insignificant emission units under 9 VAC 5-80-720:

Emission Unit No.	Emission Unit Description	Citation	Pollutant(s) Emitted (9 VAC 5-80-720 B)	Rated Capacity (9 VAC 5-80-720 C)
03	Ferrous Metals Recovery	5-80-720B	PM	N/A
04	Tire Shredding	5-80-720B	PM	N/A
05	Leachate Lagoon	5-80-720B	VOCs	N/A
06	Diesel Storage Tank	5-80-720C	VOCs	10,000 gallons
07	Diesel Storage Tank	5-80-720C	VOCs	10,000 gallons
08	Hydraulic Oil Tank	5-80-720C	VOCs	3,000 gallons
09	Motor Oil Tank	5-80-720C	VOCs	2,500 gallons
10	Waste Oil Tank	5-80-720C	VOCs	2,000 gallons
11	Diesel Water Tank	5-80-720C	POCs	100 HP

These emission units are presumed to be in compliance with all requirements of the federal Clean Air Act as may apply. Based on this presumption, no monitoring, recordkeeping, or reporting shall be required for these emission units in accordance with 9 VAC 5-80-110.

Permit Shield & Inapplicable Requirements

58. **Permit Shield & Inapplicable Requirements** - Compliance with the provisions of this permit shall be deemed compliance with all applicable requirements in effect as of the permit issuance date as identified in this permit. This permit shield covers only those applicable requirements covered by terms and conditions in this permit and the following requirements which have been specifically identified as being not applicable to this permitted facility:

Citation	Title of Citation	Description of Applicability
40 CFR 60, Subpart Cc	Emission Guidelines for Control of Existing Sources: Municipal Solid Waste Landfills	This Subpart is not applicable to the landfill because of recent modifications to the facility
40 CFR 60, Subpart WWW	Landfill New Source Performance Standard	Engines combusting treated LFG are not subject to the NSPS testing, monitoring, recordkeeping and reporting requirements
40 CFR 63, Subpart AAAA	Landfill MACT	Recordkeeping and reporting requirements of the Landfill MACT do not apply to fuel burning units that combust treated LFG
40 CFR 63, Subpart ZZZZ	RICE MACT	Engines combusting LFG equivalent to ten percent or more of the gross heat input on an annual basis are not subject to the MACT
40 CFR 60, Subpart JJJJ	Stationary Spark-Ignited Engines New Source Performance Standard	This Subpart is not applicable to the four (4) IC gas engines because their construction date precedes the NSPS applicability dates.

Nothing in this permit shield shall alter the provisions of §303 of the federal Clean Air Act, including the authority of the administrator under that section, the liability of the owner for any violation of applicable requirements prior to or at the time of permit issuance, or the ability to obtain information by (i) the administrator pursuant to §114 of the federal Clean Air Act, (ii) the Board pursuant to §10.1-1314 or §10.1-1315 of the Virginia Air Pollution Control Law or (iii) the Department pursuant to §10.1-1307.3 of the Virginia Air Pollution Control Law.
 (9 VAC 5-80-140)

General Conditions

59. **General Conditions - Federal Enforceability** - All terms and conditions in this permit are enforceable by the administrator and citizens under the federal Clean Air Act, except those that have been designated as only state-enforceable.
 (9 VAC 5-80-110 N)

60. **General Conditions - Permit Expiration** - This permit has a fixed term of five (5) years. The expiration date shall be the date five (5) years from the date of issuance. Unless the owner submits a timely and complete application for renewal to the Department consistent with the requirements of 9 VAC 5-80-80, the right of the facility to operate shall be terminated upon permit expiration.
(9 VAC 5-80-80 B, C, and F, 9 VAC 5-80-110 D, and 9 VAC 5-80-170 B)
61. **General Conditions - Permit Expiration** - The owner shall submit an application for renewal at least six (6) months but no earlier than 18 months prior to the date of permit expiration.
(9 VAC 5-80-80 B, C, and F, 9 VAC 5-80-110 D, and 9 VAC 5-80-170 B)
62. **General Conditions - Permit Expiration** - If an applicant submits a timely and complete application for an initial permit or renewal under this section, the failure of the source to have a permit or the operation of the source without a permit shall not be a violation of Article 1, Part II of 9 VAC 5 Chapter 80, until the DEQ takes final action on the application under 9 VAC 5-80-150.
(9 VAC 5-80-80 B, C, and F, 9 VAC 5-80-110 D, and 9 VAC 5-80-170 B)
63. **General Conditions - Permit Expiration** - No source shall operate after the time that it is required to submit a timely and complete application under subsections C and D of 9 VAC 5-80-80 for a renewal permit, except in compliance with a permit issued under Article 1, Part II of 9 VAC 5 Chapter 80.
(9 VAC 5-80-80 B, C, and F, 9 VAC 5-80-110 D and 9 VAC 5-80-170 B)
64. **General Conditions - Permit Expiration** - If an applicant submits a timely and complete application under section 9 VAC 5-80-80 for a permit renewal but the DEQ fails to issue or deny the renewal permit before the end of the term of the previous permit, (i) the previous permit shall not expire until the renewal permit has been issued or denied and (ii) all the terms and conditions of the previous permit, including any permit shield granted pursuant to 9 VAC 5-80-140, shall remain in effect from the date the application is determined to be complete until the renewal permit is issued or denied.
(9 VAC 5-80-80 B, C, and F, 9 VAC 5-80-110 D, and 9 VAC 5-80-170 B)
65. **General Conditions - Permit Expiration**-The protection under subsections F 1 and F 5 (ii) of section 9 VAC 5-80-80 F shall cease to apply if, subsequent to the completeness determination made pursuant section 9 VAC 5-80-80 D, the applicant fails to submit by the deadline specified in writing by the DEQ any additional information identified as being needed to process the application.
(9 VAC 5-80-80 B, C, and F, 9 VAC 5-80-110 D, and 9 VAC 5-80-170 B)
66. **General Conditions - Recordkeeping and Reporting** - All records of monitoring information maintained to demonstrate compliance with the terms and conditions of this permit shall contain, where applicable, the following:
 - a. The date, place as defined in the permit, and time of sampling or measurements;
 - b. The date(s) analyses were performed;
 - c. The company or entity that performed the analyses;

- d. The analytical techniques or methods used;
 - e. The results of such analyses; and
 - f. The operating conditions existing at the time of sampling or measurement.
(9 VAC 5-80-110 F)
67. **General Conditions - Recordkeeping and Reporting** - Records of all monitoring data and support information shall be retained for at least five (5) years from the date of the monitoring sample, measurement, report, or application. Support information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by the permit.
(9 VAC 5-80-110 F)
68. **General Conditions - Recordkeeping and Reporting** - The permittee shall submit the results of monitoring contained in any applicable requirement to the DEQ no later than **March 1st** and **September 1st** of each calendar year. This report must be signed by a responsible official, consistent with 9 VAC 5-80-80 G, and shall include:
- a. The time period included in the report. The time periods to be addressed are January 1st to June 30th and July 1st to December 31st.
 - b. All deviations from permit requirements. For purposes of this permit, deviations include, but are not limited to:
 - (1) Exceedance of emission limitations or operational restrictions;
 - (2) Excursions from control device operating parameter requirements, as documented by continuous emission monitoring, periodic monitoring, or Compliance Assurance Monitoring (CAM), which indicates an exceedance of emission limitations or operational restrictions; or
 - (3) Failure to meet monitoring, recordkeeping, or reporting requirements contained in this permit.
 - c. If there were no deviations from permit conditions during the time period, the permittee shall include a statement in the report that “no deviations from permit requirements occurred during this semi-annual reporting period.”
(9 VAC 5-80-110 F)
69. **General Conditions - Annual Compliance Certification** - Exclusive of any reporting required to assure compliance with the terms and conditions of this permit or as part of a schedule of compliance contained in this permit, the permittee shall submit to EPA and DEQ no later than March 1st each calendar year a certification of compliance with all terms and conditions of this permit including emission limitation standards or work practices for the period ending December 31st. The compliance certification shall comply with such additional requirements that may be specified pursuant to §114(a)(3) and §504(b) of the federal Clean Air Act. The permittee shall maintain a copy of the certification for five (5) years after submittal of the certification. This certification shall be signed by a responsible official, consistent with 9 VAC 5-80-80 G, and shall include:
- a. The time period included in the certification. The time period to be addressed is January 1st to December 31st;

- b. The identification of each term or condition of the permit that is the basis of the certification;
- c. The compliance status;
- d. Whether compliance was continuous or intermittent, and if not continuous, documentation of each incident of non-compliance;
- e. Consistent with subsection 9 VAC 5-80-110 E, the method or methods used for determining the compliance status of the source at the time of certification and over the reporting period;
- f. Such other facts as the permit may require to determine the compliance status of the source; and
- g. One copy of the annual compliance certification shall be submitted to EPA in electronic format only. The certification document should be sent to the following electronic mailing address: R3_APD_Permits@epa.gov
(9 VAC 5-80-110 K.5)

70. **General Conditions - Permit Deviation Reporting** - The permittee shall notify the Director of the Tidewater Regional Office within four (4) daytime business hours after discovery of any deviations from permit requirements which may cause excess emissions for more than one hour, including those attributable to upset conditions as may be defined in this permit. In addition, within 14 calendar days of the discovery, the permittee shall provide a written statement explaining the problem, any corrective actions or preventative measures taken, and the estimated duration of the permit deviation. Owners subject to the requirements of 9 VAC 5-40-50 C and 9 VAC 5-50-50 C are not required to provide the written statement prescribed in this paragraph for facilities subject to the monitoring requirements of 9 VAC 5-40-40 and 9 VAC 5-50-40. The occurrences should also be reported in the next semi-annual compliance monitoring report pursuant to Condition 68 of this permit.
(9 VAC 5-80-110 F.2 and 9 VAC 5-80-250)

71. **General Conditions - Failure/Malfunction Reporting** - In the event that any affected facility or related air pollution control equipment fails or malfunctions in such a manner that may cause excess emissions for more than one (1) hour, the owner shall, as soon as practicable but no later than four (4) daytime business hours after the malfunction is discovered, notify the Director of the Tidewater Regional Office by facsimile transmission, telephone or electronic mail of such failure or malfunction and shall within 14 calendar days of discovery provide a written statement giving all pertinent facts, including the estimated duration of the breakdown. Owners subject to the requirements of 9 VAC 5-40-50 C and 9 VAC 5-50-50 C are not required to provide the written statement prescribed in this paragraph for facilities subject to the monitoring requirements of 9 VAC 5-40-40 and 9 VAC 5-50-40. When the condition causing the failure or malfunction has been corrected and the equipment is again in operation, the owner shall notify the Director of the Tidewater Regional Office.
(9 VAC 5-20-180 C)

72. **General Conditions - Severability** - The terms of this permit are severable. If any condition, requirement or portion of the permit is held invalid or inapplicable under any circumstance, such invalidity or inapplicability shall not affect or impair the remaining conditions, requirements, or portions of the permit.
(9 VAC 5-80-110 G.1)
73. **General Conditions - Duty to Comply** - The permittee shall comply with all terms and conditions of this permit. Any permit noncompliance constitutes a violation of the federal Clean Air Act or the Virginia Air Pollution Control Law or both and is ground for enforcement action; for permit termination, revocation and reissuance, or modification; or, for denial of a permit renewal application.
(9 VAC 5-80-110 G.2)
74. **General Conditions - Need to Halt or Reduce Activity not a Defense** - It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
(9 VAC 5-80-110 G.3)
75. **General Conditions - Permit Modification** - A physical change in, or change in the method of operation of, this stationary source may be subject to permitting under State Regulations 9 VAC 5-80-50, 9 VAC 5-80-1100, 9 VAC 5-80-1605, or 9 VAC 5-80-2000 and may require a permit modification and/or revisions except as may be authorized in any approved alternative operating scenarios.
(9 VAC 5-80-190 and 9 VAC 5-80-260)
76. **General Conditions - Property Rights** - The permit does not convey any property rights of any sort, or any exclusive privilege.
(9 VAC 5-80-110 G.5)
77. **General Conditions - Duty to Submit Information** - The permittee shall furnish to the DEQ, within a reasonable time, any information that the DEQ may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the DEQ copies of records required to be kept by the permit and, for information claimed to be confidential, the permittee shall furnish such records to the DEQ along with a claim of confidentiality.
(9 VAC 5-80-110 G.6)
78. **General Conditions - Duty to Submit Information** - Any document (including reports) required in a permit condition to be submitted to the DEQ shall contain a certification by a responsible official that meets the requirements of 9 VAC 5-80-80 G.
(9 VAC 5-80-110 K.1)

79. **General Conditions - Duty to Pay Permit Fees** - The owner of any source for which a permit under 9 VAC 5-80-50 through 9 VAC 5-80-300 was issued shall pay permit fees consistent with the requirements of 9 VAC 5-80-310 through 9 VAC 5-80-350. The actual emissions covered by the permit program fees for the preceding year shall be calculated by the owner and submitted to the Department by April 15th of each year. The calculations and final amount of emissions are subject to verification and final determination by the Department.
(9 VAC 5-80-110 H and 9 VAC 5-80-340 C)
80. **General Conditions - Fugitive Dust Emission Standards** - During the operation of a stationary source or any other building, structure, facility, or installation, no owner or other person shall cause or permit any materials or property to be handled, transported, stored, used, constructed, altered, repaired, or demolished without taking reasonable precautions to prevent particulate matter from becoming airborne. Such reasonable precautions may include, but are not limited to, the following:
- a. Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads, or the clearing of land;
 - b. Application of asphalt, water, or suitable chemicals on dirt roads, materials stockpiles, and other surfaces which may create airborne dust; the paving of roadways and the maintaining of them in a clean condition;
 - c. Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty material. Adequate containment methods shall be employed during sandblasting or similar operations;
 - d. Open equipment for conveying or transporting material likely to create objectionable air pollution when airborne shall be covered or treated in an equally effective manner at all times when in motion; and
 - e. The prompt removal of spilled or tracked dirt or other materials from paved streets and of dried sediments resulting from soil erosion.
- (9 VAC 5-50-90)
81. **General Conditions - Startup, Shutdown, and Malfunction** - At all times, including periods of startup, shutdown, and malfunction, owners shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with air pollution control practices for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the DEQ, which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source.
(9 VAC 5-50-20 E)

82. **General Conditions - Alternative Operating Scenarios** - Contemporaneously with making a change between reasonably anticipated operating scenarios identified in this permit, the permittee shall record in a log at the permitted facility a record of the scenario under which it is operating. The permit shield described in 9 VAC 5-80-140 shall extend to all terms and conditions under each such operating scenario. The terms and conditions of each such alternative scenario shall meet all applicable requirements including the requirements of 9 VAC 5 Chapter 80, Article 1.
(9 VAC 5-80-110 J)

83. **General Conditions - Inspection and Entry Requirements** - The permittee shall allow DEQ, upon presentation of credentials and other documents as may be required by law, to perform the following:

- a. Enter upon the premises where the source is located or emissions-related activity is conducted, or where records must be kept under the terms and conditions of the permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under the terms and conditions of the permit;
- c. Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and
- d. Sample or monitor at reasonable times, substances or parameters for the purpose of assuring compliance with the permit or applicable requirements.

(9 VAC 5-80-110 K.2)

84. **General Conditions - Reopening For Cause** - The permit shall be reopened by the DEQ if additional federal requirements become applicable to a major source with a remaining permit term of three (3) years or more. Such reopening shall be completed no later than 18 months after promulgation of the applicable requirement. No such reopening is required if the effective date of the requirement is later than the date on which the permit is due to expire, unless the original permit or any of its terms and conditions has been extended pursuant to 9 VAC 5-80-80 F. The conditions for reopening a permit are as follows:

- a. The permit shall be reopened if the DEQ or the administrator determines that the permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of the permit;
- b. The permit shall be reopened if the administrator or the DEQ determines that the permit must be revised or revoked to assure compliance with the applicable requirements; and
- c. The permit shall not be reopened by the DEQ if additional applicable state requirements become applicable to a major source prior to the expiration date established under 9 VAC 5-80-110 D.

(9 VAC 5-80-110 L)

85. **General Conditions - Permit Availability** - Within five (5) days after receipt of the issued permit, the permittee shall maintain the permit on the premises for which the permit has been issued and shall make the permit immediately available to the DEQ upon request.
(9 VAC 5-80-150 E)
86. **General Conditions - Transfer of Permits** - No person shall transfer a permit from one location to another, unless authorized under 9 VAC 5-80-130, or from one piece of equipment to another.
(9 VAC 5-80-160)
87. **General Conditions - Transfer of Permits** - In the case of a transfer of ownership of a stationary source, the new owner shall comply with any current permit issued to the previous owner. The new owner shall notify the DEQ of the change in ownership within 30 calendar days of the transfer and shall comply with the requirements of 9 VAC 5-80-200.
(9 VAC 5-80-160)
88. **General Conditions - Transfer of Permits** - In the case of a name change of a stationary source, the owner shall comply with any current permit issued under the previous source name. The owner shall notify the DEQ of the change in source name within 30 calendar days of the name change and shall comply with the requirements of 9 VAC 5-80-200.
(9 VAC 5-80-160)
89. **General Conditions - Malfunction as an Affirmative Defense** - A malfunction constitutes an affirmative defense to an action brought for noncompliance with technology-based emission limitations if the requirements of Condition 90 in this permit are met.
(9 VAC 5-80-250)
90. **General Conditions - Malfunction as an Affirmative Defense** - The affirmative defense of malfunction shall be demonstrated by the permittee through properly signed, contemporaneous operating logs, or other relevant evidence that show the following:
- a. A malfunction occurred and the permittee can identify the cause or causes of the malfunction;
 - b. The permitted facility was at the time being properly operated;
 - c. During the period of the malfunction the permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards, or other requirements in the permit; and

- d. The permittee notified the DEQ of the malfunction within two (2) working days following the time when the emission limitations were exceeded due to the malfunction. This notification shall include a description of the malfunction, any steps taken to mitigate emissions, and corrective actions taken. The notification may be delivered either orally or in writing. The notification may be delivered by electronic mail, facsimile transmission, telephone, or any other method that allows the permittee to comply with the deadline. This notification fulfills the requirements of 9 VAC 5-80-110 F.2.b to report promptly deviations from permit requirements. This notification does not release the permittee from the malfunction reporting requirement under 9 VAC 5-20-180 C.
(9 VAC 5-80-250)
91. **General Conditions - Malfunction as an Affirmative Defense** - In any enforcement proceeding, the permittee seeking to establish the occurrence of a malfunction shall have the burden of proof.
(9 VAC 5-80-250)
92. **General Conditions - Malfunction as an Affirmative Defense** - The provisions of this section are in addition to any malfunction, emergency or upset provision contained in any applicable requirement.
(9 VAC 5-80-250)
93. **General Conditions - Permit Revocation or Termination for Cause** - A permit may be revoked or terminated prior to its expiration date if the owner knowingly makes material misstatements in the permit application or any amendments thereto or if the permittee violates, fails, neglects or refuses to comply with the terms or conditions of the permit, any applicable requirements or the applicable provisions of 9 VAC 5 Chapter 80 Article 1. The DEQ may suspend, under such conditions and for such period of time as the DEQ may prescribe any permit for any grounds for revocation or termination or for any other violations of these regulations.
(9 VAC 5-80-190 C and 9 VAC 5-80-260)
94. **General Conditions - Duty to Supplement or Correct Application** - Any applicant who fails to submit any relevant facts or who has submitted incorrect information in a permit application shall, upon becoming aware of such failure or incorrect submittal, promptly submit such supplementary facts or corrections. An applicant shall also provide additional information as necessary to address any requirements that become applicable to the source after the date a complete application was filed but prior to release of a draft permit.
(9 VAC 5-80-80 E)
95. **General Conditions - Stratospheric Ozone Protection** - If the permittee handles or emits one or more Class I or II substances subject to a standard promulgated under or established by Title VI (Stratospheric Ozone Protection) of the federal Clean Air Act, the permittee shall comply with all applicable sections of 40 CFR Part 82, Subparts A to F.
(40 CFR Part 82, Subparts A - F)

96. **General Conditions - Emissions Trading** - Where the trading of emissions increases and decreases within the permitted facility is to occur within the context of this permit and to the extent that the regulations provide for trading such increases and decreases without a case-by-case approval of each emissions trade:
- a. All terms and conditions required under 9 VAC 5-80-110, except subsection N, shall be included to determine compliance;
 - b. The permit shield described in 9 VAC 5-80-140 shall extend to all terms and conditions that allow such increases and decreases in emissions; and
 - c. The owner shall meet all applicable requirements including the requirements of 9 VAC 5-80-50 through 9 VAC 5-80-300.
(9 VAC 5-80-110 I)

State-Only Enforceable Requirements

97. **State-Only Enforceable Requirements** - The following terms and conditions are not required under the federal Clean Air Act or under any of its applicable federal requirements, and are not subject to the requirements of 9 VAC 5-80-290 concerning review of proposed permits by EPA and draft permits by affected states.
- 9 VAC 5 Chapter 50, Part II, Article 2: Standards of Performance for Odorous Emissions.
- 9 VAC Chapter 50, Part II, Article 3: Standards of Performance for Toxic Pollutants.
(9 VAC 5-80-110 N and 9 VAC 5-80-300)

**EXHIBIT C-2
GASCO'S TITLE V PERMIT**

[Attached.]



Commonwealth of Virginia

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

TIDEWATER REGIONAL OFFICE
5636 Southern Boulevard, Virginia Beach, Virginia 23462
(757) 518-2000 FAX (804) 698-4178
www.deq.virginia.gov

Matthew J. Strickler
Secretary of Natural Resources

David K. Paylor
Director
(804) 698-4000

Craig R. Nicol
Regional Director

January 26, 2021

Mr. Michael Hall
Manager
MAS Energy, LLC
3340 Peachtree Road NE, Suite 170
Atlanta, Georgia 30326

Location: Suffolk
Registration No.: 61137

Dear Mr. Hall:

Attached is a permit to construct and operate a renewable natural gas (RNG) facility in accordance with the provisions of the Virginia State Air Pollution Control Board Regulations for the Control and Abatement of Air Pollution.

In the course of evaluating the application and arriving at a final decision to approve the project, the Department of Environmental Quality (DEQ) deemed the application complete on December 8, 2020.

This permit contains legally enforceable conditions. Failure to comply may result in a Notice of Violation and/or civil charges. Please read all permit conditions carefully.

This permit approval to construct and operate shall not relieve Suffolk Energy Partners, LLC of the responsibility to comply with all other local, state, and federal permit regulations.

The Board's Regulations as contained in Title 9 of the Virginia Administrative Code 5-170-200 provide that you may request a formal hearing from this case decision by filing a petition with the Board within 30 days after this case decision notice was mailed or delivered to you. Please consult the relevant regulations for additional requirements for such requests.

As provided by Rule 2A:2 of the Supreme Court of Virginia, you have 30 days from the date you actually received this permit or the date on which it was mailed to you, whichever occurred first, within which to initiate an appeal of this decision by filing a Notice of Appeal with:

David K. Paylor, Director
Department of Environmental Quality
PO Box 1105
Richmond, VA 23218

If this permit was delivered to you by mail, three days are added to the thirty-day period in which to file an appeal. Please refer to Part Two A of the Rules of the Supreme Court of Virginia for information on the required content of the Notice of Appeal and for additional requirements governing appeals from decisions of administrative agencies.

If you have any questions concerning this permit, please contact James White by email at james.white@deq.virginia.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "CR Nicol", is centered below the text "Sincerely,".

Craig R. Nicol
Regional Director

CRN/JIM/61137_001_21_mNSRnew_SuffolkEnergyPartners_cvrltr.docx

Attachment: Permit



Commonwealth of Virginia

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

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Director
(804) 698-4000

Craig R. Nicol
Regional Director

STATIONARY SOURCE PERMIT TO CONSTRUCT AND OPERATE

This permit includes designated equipment subject to New Source Performance Standards (NSPS).

In compliance with the Federal Clean Air Act and the Commonwealth of Virginia Regulations for the Control and Abatement of Air Pollution,

Suffolk Energy Partners, LLC
3340 Peachtree Road NE, Suite 170
Atlanta, Georgia 30326
Registration No.: 61137

is authorized to construct and operate a

Renewable Natural Gas Facility

located at

One Bob Foeller Drive
Suffolk, Virginia 23434

in accordance with the Conditions of this permit.

Approved on: **January 26, 2021.**

A handwritten signature in black ink, appearing to read 'CR Nicol'.

Craig R. Nicol

Permit consists of 12 pages.
Permit Conditions 1 to 38.

INTRODUCTION

This permit approval is based on the permit application dated April 16, 2020, including amendment information dated September 14, 2020 and supplemental information dated December 8, 2020. Any changes in the permit application specifications or any existing facilities which alter the impact of the facility on air quality may require a permit. Failure to obtain such a permit prior to construction may result in enforcement action. In addition, this facility may be subject to additional applicable requirements not listed in this permit.

Words or terms used in this permit shall have meanings as provided in 9VAC5-10-10 of the State Air Pollution Control Board Regulations for the Control and Abatement of Air Pollution. The regulatory reference or authority for each condition is listed in parentheses () after each condition.

Annual requirements to fulfill legal obligations to maintain current stationary source emissions data will necessitate a prompt response by the permittee to requests by the DEQ or the Board for information to include, as appropriate: process and production data; changes in control equipment; and operating schedules. Such requests for information from the DEQ will either be in writing or by personal contact.

The availability of information submitted to the DEQ or the Board will be governed by applicable provisions of the Freedom of Information Act, §§ 2.2-3700 through 2.2-3714 of the Code of Virginia, § 10.1-1314 (addressing information provided to the Board) of the Code of Virginia, and 9VAC5-170-60 of the State Air Pollution Control Board Regulations. Information provided to federal officials is subject to appropriate federal law and regulations governing confidentiality of such information.

Equipment List - Equipment at this facility covered by this permit consists of:

Equipment to be Constructed:

Reference No.	Equipment Description	Rated Capacity	Delegated Federal Requirements
RNG	Renewable natural gas processing facility consisting of a series of gas compression, adsorption, and separation process equipment necessary to convert raw LFG from the SPSA Regional Landfill into pipeline quality gas	180,000 scf/hr	NSPS, Subpart WWW
TOx	Perennial Energy Model No. EI-FL-76X68-52-TP thermal oxidizer to control emissions from the waste gas produced by the Gas Upgrading System process	24.16 MMBtu/hr	None
BF	Perennial Energy Biogas Candlestick back-up flare (10" diameter x 29 ft. high stack, with a 46" diameter shroud) to control emissions from the off-specification gas produced by the Gas Upgrading System process	82.62 MMBtu/hr	None

Specifications included in the above table are for informational purposes only and do not form enforceable terms or conditions of the permit.

PROCESS REQUIREMENTS

1. Emission Controls - The landfill gas (LFG) collected at the Southeastern Public Service Authority of Virginia (SPSA) Regional collection system (Registration No. 61341) shall be routed to a treatment system (Ref. No. RNG) that processes the collected gas for subsequent sale or use. If the collected LFG cannot be routed to a treatment system (Ref. No. RNG) for subsequent sale or use, the collected LFG shall be routed to a control system that complies with the requirements in either paragraph (b)(2)(iii) (A) or (B) of 40 CFR 60. 752.
(9VAC5-80-1180 and 40 CFR 60.752)
2. Emission Controls - Venting of treated LFG to the ambient air shall not be allowed. If the treated LFG cannot be processed for subsequent use as pipeline quality gas, then the treated gas shall be controlled in accordance with Condition 3 of the permit. Atmospheric vents located on condensate storage tanks are not part of the treatment system.
(9VAC5-80-1180)
3. Emission Controls - A 24.16 MMBtu/hr thermal oxidizer (Ref. No. TOx) shall be used to incinerate (oxidation) volatile organic compound (VOC), H₂S, and TRS emissions from the waste gas produced by the Gas Upgrading System process. A 82.62 MMBtu/hr back-up candlestick flare (Ref. No. BF) shall be used to control VOC, H₂S, and TRS emissions from the off-specification gas produced from the Gas Upgrading System process. The back-up candlestick flare shall be designed in accordance and comply with the requirements of 40 CFR Part 60.18 for minimum heating value and maximum tip velocity. Each emission control device shall be provided with adequate access for inspection and shall be in operation whenever gas is being routed to the device.
(9VAC5-80-1180 and 9VAC5-50-260)
4. Control Efficiency - The thermal oxidizer (Ref. No. TOx) shall be designed and operated to either reduce NMOC by 98 weight percent or reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis as hexane at three percent oxygen. The reduction efficiency or parts per million by volume shall be established by an initial performance test to be completed in accordance with Condition 22.
(9VAC5-80-1180 and 9VAC5-50-260)
5. Control Efficiency - The thermal oxidizer (Ref. No. TOx) shall achieve a VOC, H₂S, and TRS destruction efficiency of not less than 99 weight-percent on a mass basis and the back-up candlestick flare (Ref. No. BF) shall achieve a VOC, H₂S, and TRS destruction efficiency of not less than 98 weight-percent on a mass basis.
(9VAC5-80-1180 and 9VAC5-50-260)
6. Best Management Practices (BMPs) - The permittee shall use good combustion practices at all times to ensure emissions from the emissions control devices (Ref. Nos. TOx and BF) are minimized. All operators of the devices shall be properly trained in the operation and maintenance of the equipment systems in accordance with the guidelines and procedures established by the equipment manufacturers.
(9VAC5-80-1180 and 9VAC5-50-260)

7. Monitoring Devices - Each emissions control device (Ref. Nos. TOx and BF) shall maintain a continuous pilot flame during all operations involving the associated control device. Each pilot flame shall be equipped with a thermocouple(s) or other DEQ-approved equivalent heat sensing monitoring devices to detect the presence of the pilot flame. In addition, the pilot flame shall be equipped with an automatic alarm system that shall provide immediate notification to appropriate personnel of situations involving a flame failure or malfunction. The monitoring devices shall be installed, maintained, calibrated, and operated in accordance with approved procedures which shall include, as a minimum, the manufacturer's written requirements and/or recommendations. The flame sensing devices shall be provided with adequate access for inspection and be in operation whenever the emissions control device is operating.
(9VAC5-80-1180 and 9VAC5-50-260)
8. Monitoring Devices - The thermal oxidizer (Ref. No. TOx) shall be equipped with a monitoring system(s) to continuously measure and record the temperature (in °F) at or near the combustion chamber outlet to indicate the temperature in the chamber of the thermal oxidizer. The temperature shall be recorded at 15-minute intervals to generate three-hour temperature averages during periods when the thermal oxidizer is operating. Thermocouple(s) utilized by the monitoring system shall be calibrated annually, at a minimum. Each device shall be installed, maintained, calibrated, and operated in accordance with approved procedures which shall include, as a minimum, the manufacturer's written requirements and/or recommendations and be provided with adequate access for inspection, and be in operation when the thermal oxidizer is operating.
(9VAC5-80-1180(D) and 9VAC5-50-260)
9. Monitoring Devices - The back-up candlestick flare (Ref. No. BF) shall be equipped with a device to measure the main flame temperature (in °F) of the emissions control device. The monitoring system shall be capable of performing temperature measurements at 15-minute intervals and generating three-hour temperature averages during periods when the back-up candlestick flare is operating. The monitoring device shall be installed, maintained, calibrated, and operated in accordance with approved procedures which shall include, as a minimum, the manufacturer's written requirements or recommendations. The monitoring device shall be provided with adequate access for inspection and shall be in operation whenever the flare is operating.
(9VAC5-80-1180(D) and 9VAC5-50-260)
10. Monitoring Device Observation - The recording device used to measure the main flame temperature for the back-up candlestick flare (Ref. No. BF) shall be observed by the permittee at a frequency of not less than once per operating day, or at another unit-specific frequency as recommended by the flare equipment manufacturer. The permittee shall keep a record log of the observations of the flame temperature. The record log should include the flame temperature reading (in °F) at the time of the observation, the date, time, the observer's name, and any corrective actions taken when the flare temperature is outside the acceptable range. Alternatively, the flame temperature may be monitored electronically if equipped with an automatic alarm to indicate to the permittee that the flare flame temperature is outside the acceptable range and corrective action is needed.
(9VAC5-80-1180(D))

11. Flame Malfunction Occurrences - The permittee shall keep a record log documenting all occurrences when there was a flame malfunction to the thermal oxidizer (Ref. No. TOx) and/or back-up candlestick flare (Ref. No. BF) during operation of the associated emissions control device. The record log should include the name of the person reporting the occurrence, date, time, and duration of the occurrence, and a description of corrective actions taken, including date and time the repairs were completed. The log book shall be made available for inspection by DEQ and be current for the most recent five years.
(9VAC5-80-1180(D))

OPERATING LIMITATIONS

12. Thermal Oxidizer Operating Hours - The permittee shall be allowed to operate the thermal oxidizer (Ref. No. TOx) continuously (8,760 hours per year).
(9VAC5-80-1180)
13. Thermal Oxidizer Minimum Operating Temperature and Gas Retention Time - The thermal oxidizer (Ref. No. TOx) shall be operated such that the one-hour averaged temperature, as measured at the combustion chamber outlet, be maintained at or above the temperature during the initial performance test in which control efficiency was achieved per Condition 22. Prior to the date of the initial performance test, the thermal oxidizer shall be operated such that the one-hour averaged temperature is at or above the minimum temperature recommended by the manufacturer (compliant operation). After twelve months of compliant operation, the averaging time for the temperature monitoring required by this condition shall be revised to a rolling three-hour average. Unless otherwise approved by the DEQ Tidewater Regional Office, if a monitored rolling three-hour average temperature is less than the DEQ approved set-point temperature, the averaging time for the temperature monitoring required by this condition shall be revised to a one-hour average. The gases in the thermal oxidizer's combustion chamber shall have a minimum retention time of one second at or above the minimum specified combustion chamber temperature.
(9VAC5-80-1180)
14. Back-up Candlestick Flare Operating Hours - The back-up candlestick flare (Ref. No. BF) shall not operate more than 2,000 hours per year, calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
(9VAC5-80-1180)
15. Back-up Candlestick Flare Heat Content and Tip Velocity - In accordance with 40 CFR 60.18(c)(3), the permittee shall operate the back-up candlestick flare (Ref. No. BF) using either the heat content specifications of 40 CFR 60.18(c)(3)(ii) and the maximum tip velocity specifications of 40 CFR 60.18(c)(4) or the requirements of 40 CFR 60.18 (c)(3)(i). The permittee shall notify the DEQ Tidewater Regional Office of the selected operating specifications in writing within ten days of commencing start-up of the back-up candlestick flare's operation.
(9VAC5-80-1180)

16. Pilot Flame Fuel - The approved fuel for use by the pilot flame burners in the emissions control devices (Ref. Nos. TOx and BF) is natural gas. The use of other fuels shall be considered a change in the method of operation of the affected emissions control device and may require a new or amended permit. However, if a change in the fuel is not subject to new source review permitting requirements, this condition should not be construed to prohibit such a change.
(9VAC5-80-1180)
17. Fuel - The approved fuel for incineration in the thermal oxidizer (Ref. No. TOx) is waste gas produced from the Gas Upgrading System process. Approved fuel for combustion in the back-up candlestick flare (Ref. No. BF) is off-specification gas produced from the Gas Upgrading System process. A change in the fuel supplied to the associated emission control device shall be considered a change in the method of operation for the emission control device and may require a new or amended permit. However, if a change in the fuel is not subject to new source review permitting requirements, this condition should not be construed to prohibit such a change.
(9VAC5-80-1180)
18. Requirements by Reference - Except where this permit is more restrictive than the applicable requirement, the NSPS equipment as described in the Introduction table of the permit shall be operated in compliance with the requirements of 40 CFR 60 (NSPS), Subpart WWW - Standards of Performance for Municipal Solid Waste Landfills.
(9VAC5-80-1180, 9VAC5-50-400, and 9VAC5-50-410)

EMISSION LIMITS

19. Thermal Oxidizer Emission Limits - Emissions from the operation of the thermal oxidizer (Ref. No. TOx) shall not exceed the limits specified below:

PM	0.9 lb/hr	3.8 tons/yr
PM10	0.9 lb/hr	3.8 tons/yr
PM2.5	0.9 lb/hr	3.8 tons/yr
Sulfur Dioxide	2.2 lb/hr	9.7 tons/yr
Nitrogen Oxides (as NO ₂)	2.2 lb/hr	9.5 tons/yr
Carbon Monoxide	5.4 lb/hr	23.8 tons/yr
Volatile Organic Compounds	0.08 lb/hr	0.4 tons/yr

These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 3 - 6, 8, 11 - 13, 16, 17, 20, and 26.
(9VAC5-80-1180)

20. Visible Emission Limit - Visible emissions from the thermal oxidizer (Ref. No. TOx) exhaust stack shall not exceed five percent opacity, as determined by 40 CFR 60, Appendix A, Method 9. (9VAC5-80-1180, 9VAC5-50-80, and 9VAC5-50-260)
21. Visible Emission Limit - The back-up candlestick flare (Ref. No. BF) shall be operated with no visible emissions, as determined by 40 CFR 60, Appendix A, Method 22, except for periods not to exceed a total of five minutes during two consecutive hours. (9VAC5-80-1180, 9VAC5-50-80, and 9VAC5-50-260)
22. Initial Performance Test - Initial performance tests shall be conducted for NMOC emissions from the thermal oxidizer (Ref. No. TOx) using the procedure described in 40 CFR 60,754 (d) to determine compliance with the operating limits and control efficiency requirements listed in Condition 4 of this permit. The tests shall be conducted by the owner within 180 days after initial startup of the thermal oxidizer. The details of the test are to be arranged with the DEQ Tidewater Regional Office. One copy of the test results shall be submitted to the DEQ Tidewater Regional Office within 45 days after test completion and shall conform to the test report format enclosed with this permit. (9VAC5-80-1180 and 9VAC5-80-1200)
23. Initial Visible Emissions Evaluation - Concurrently with the initial performance test as required in Condition 22 an initial Visible Emission Evaluation (VEE) shall be conducted on the thermal oxidizer (Ref. No. TOx) in accordance with 40 CFR 60, Appendix A, Method 9 to determine compliance with the visible emission limits specified in Condition 20 of the permit. The details of the test are to be arranged with the DEQ Tidewater Regional Office. The evaluation shall be performed no later than 180 calendar days after commencing initial start-up of the device. Should conditions prevent concurrent opacity observations, the DEQ shall be notified in writing, within seven days, and visible emissions testing shall be rescheduled within 30 days. Rescheduled testing shall be conducted under the same conditions (as possible) as the initial performance tests. One copy of the test results shall be submitted to the DEQ Tidewater Regional Office within 45 days after test completion and shall conform to the test report format enclosed with this permit. (9VAC5-80-1180 and 9VAC5-80-1200)
24. Stack Tests and Visible Emissions Evaluations - Upon reasonable request by the DEQ, the permittee shall conduct additional performance tests and visible emission evaluations on the emissions control devices to demonstrate compliance with the visible emission limits contained in the permit. Details of the tests shall be arranged with the DEQ Tidewater Regional Office. (9VAC5-80-1200 and 9VAC5-50-30(G))

RECORDS

25. On Site Records - The permittee shall maintain records of emission data and operating parameters as necessary to demonstrate compliance with this permit. The content and format of such records shall be arranged with the DEQ Tidewater Regional Office. These records shall include, but are not limited to:
- a. Annual hours of operation for the back-up candlestick flare (Ref. No. BF), calculated monthly as the sum of each consecutive 12 month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months;
 - b. Monitoring records of the recorded three-hour combustion chamber temperature averages (in °F) for the thermal oxidizer (Ref. No. TOx) as required by Condition 8 of the permit;
 - c. The record logbook documentation (or electronic monitoring records) for the observations of the temperature readings (in °F) for main flame of the back-up candlestick flare (Ref. No. BF) as required by Condition 10 of the permit;
 - d. The record logbook documentation (or electronic monitoring records) for all malfunction episodes to the thermal oxidizer (Ref. No. TOx) and/or back-up candlestick flare (Ref. No. BF) as required by Condition 11 of the permit;
 - e. Results of all performance tests, visible emissions observations (VEO), and visible emissions evaluations (VEE) performed using EPA Method 9 or Method 22 (40 CFR 60, Appendix A) as required by this permit; and
 - f. Scheduled and unscheduled maintenance and operator training.

These records shall be available for inspection by the DEQ and shall be current for the most recent five years.

(9VAC5-80-1180 and 9VAC5-50-50)

26. Emissions Testing - The thermal oxidizer (Ref. No. TOx) and back-up flare (Ref. No. BF) shall be constructed so as to allow for emissions testing upon reasonable notice at any time, using appropriate methods. This includes constructing the equipment such that volumetric flow rates and pollutant emission rates can be accurately determined by applicable test methods and providing a stack or duct that is free from cyclonic flow. Sampling ports shall be provided when requested at the appropriate locations and safe sampling platforms and access shall be provided.
- (9VAC5-50-30(F) and 9VAC5-80-1180)

NOTIFICATIONS

27. Initial Notifications - The permittee shall furnish written notification to the DEQ Tidewater Regional Office (TRO address on cover page of this permit) of:
- a. The actual date on which construction of the RNG facility commenced within 30 days after such date.
 - b. The actual start-up date of the RNG facility within 15 days after such date.
 - c. The anticipated date of performance tests of the RNG facility postmarked at least 30 days prior to such date.

Copies of the written notification referenced in items a through c above are to be sent to:

Chief, Air Section
Enforcement & Compliance Assurance Division
Air, RCRA and Toxics Branch
US EPA Region 3
1650 Arch Street - 3ED21
Philadelphia, PA 19103
(9VAC5-50-50 and 9VAC5-80-1180)

GENERAL CONDITIONS

28. Permit Invalidation - This permit to construct the project (Renewable Natural Gas Facility) shall become invalid, unless an extension is granted by the DEQ, if:
- a. A program of continuous construction is not commenced within 18 months from the date of this permit.
 - b. A program of construction is discontinued for a period of 18 months or more, or is not completed within a reasonable time, except for a DEQ approved period between phases of the phased construction of a new stationary source or project.
(9VAC5-80-1210)
29. Permit Suspension/Revocation - This permit may be suspended or revoked if the permittee:
- a. Knowingly makes material misstatements in the permit application or any amendments to it;
 - b. Fails to comply with the conditions of this permit;
 - c. Fails to comply with any emission standards applicable to a permitted emissions unit;
 - d. Causes emissions from the stationary source which result in violations of, or interfere with the attainment and maintenance of, any ambient air quality standard; or

- e. Fails to operate in conformance with any applicable control strategy, including any emission standards or emissions limitations, in the State Implementation Plan in effect at the time an application for this permit is submitted.

(9VAC5-80-1210(G))

30. Right of Entry - The permittee shall allow authorized local, state, and federal representatives, upon the presentation of credentials:

- a. To enter upon the permittee's premises on which the facility is located or in which any records are required to be kept under the terms and conditions of this permit;
- b. To have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit or the State Air Pollution Control Board Regulations;
- c. To inspect at reasonable times any facility, equipment, or process subject to the terms and conditions of this permit or the State Air Pollution Control Board Regulations; and
- d. To sample or test at reasonable times.

For purposes of this condition, the time for inspection shall be deemed reasonable during regular business hours or whenever the facility is in operation. Nothing contained herein shall make an inspection time unreasonable during an emergency.

(9VAC5-170-130 and 9VAC5-80-1180)

31. Maintenance/Operating Procedures - At all times, including periods of start-up, shutdown, and malfunction, the permittee shall, to the extent practicable, maintain and operate the affected source, including associated air pollution control equipment, in a manner consistent with good air pollution control practices for minimizing emissions.

The permittee shall take the following measures in order to minimize the duration and frequency of excess emissions, with respect to the emissions control equipment which affect such emissions:

- a. Develop a maintenance schedule and maintain records of all scheduled and non-scheduled maintenance.
- b. Maintain an inventory of spare parts.
- c. Have available written operating procedures for equipment. These procedures shall be based on the manufacturer's recommendations, at a minimum.
- d. Train operators in the proper operation of all such equipment and familiarize the operators with the written operating procedures, prior to their first operation of such equipment. The permittee shall maintain records of the training provided including the names of trainees, the date of training and the nature of the training.

Records of maintenance and training shall be maintained on site for a period of five years and shall be made available to DEQ personnel upon request.

(9VAC5-50-20(E) and 9VAC5-80-1180(D))

32. Record of Malfunctions - The permittee shall maintain records of the occurrence and duration of any bypass, malfunction, shutdown or failure of the facility or its associated air pollution control equipment that results in excess emissions for more than one hour. Records shall include the date, time, duration, description (emission unit, pollutant affected, cause), corrective action, preventive measures taken and name of person generating the record.
(9VAC5-20-180(J) and 9VAC5-80-1180(D))
33. Notification for Facility or Control Equipment Malfunction - The permittee shall furnish notification to the DEQ Tidewater Regional Office of malfunctions of the affected facility or related air pollution control equipment that may cause excess emissions for more than one hour. Such notification shall be made no later than four daytime business hours after the malfunction is discovered. The permittee shall provide a written statement giving all pertinent facts, including the estimated duration of the breakdown, within 14 days of discovery of the malfunction. When the condition causing the failure or malfunction has been corrected and the equipment is again in operation, the permittee shall notify the DEQ Tidewater Regional Office.
(9VAC5-20-180(C) and 9VAC5-80-1180)
34. Violation of Ambient Air Quality Standard - The permittee shall, upon request of the DEQ, reduce the level of operation or shut down a facility, as necessary to avoid violating any primary ambient air quality standard and shall not return to normal operation until such time as the ambient air quality standard will not be violated.
(9VAC5-20-180(I) and 9VAC5-80-1180)
35. Change of Ownership - In the case of a transfer of ownership of a stationary source, the new owner shall abide by any current minor NSR permit issued to the previous owner. The new owner shall notify the DEQ Tidewater Regional Office of the change of ownership within 30 days of the transfer.
(9VAC5-80-1240)
36. Permit Copy - The permittee shall keep a copy of this permit on the premises of the facility to which it applies.
(9VAC5-80-1180)

STATE ONLY ENFORCEABLE (SOE) REQUIREMENTS

37. (SOE) The following terms and conditions are included in this permit to implement the requirements of 9VAC5-40-130 et seq., 9VAC5-50-130 et seq., 9VAC5-60-200 et seq. and/or 9VAC5-60-300 et seq. and are enforceable only by the Virginia Air Pollution Control Board. Neither their inclusion in this permit nor any resulting public comment period make these terms federally enforceable.
38. **Odor Management Plan (SOE)** - The permittee shall develop and maintain an Odor Management Plan (OMP) in accordance with 9VAC5 Chapter 50, Part II, Article 2: Standards of Performance for Odorous Emissions. The OMP shall describe the practices and technology that will be used to minimize off-site odors. The initial plan shall be submitted to the Tidewater Regional Office Air Compliance Manager for approval within 60 days of permit issuance. A log of all odor complaints received and actions taken shall be kept and made available for inspection by authorized officials. The OMP shall be evaluated for the need and feasibility of new or modified odor control technology or practices based on actions taken to address odor complaints or when requested by the DEQ. Revisions to the OMP shall be submitted to the Tidewater Regional Office for approval within 15 days after such change.
(9VAC5-80-1180, 9VAC5-80-1120(F), 9VAC5-50-140, 9VAC5-80-110(N), and 9VAC5-80-300)

SOURCE TESTING REPORT FORMAT

Report Cover

1. Plant name and location
2. Units tested at source (indicate Ref. No. used by source in permit or registration)
3. Test Dates
4. Tester; name, address and report date

Certification

1. Signed by team leader/certified observer (include certification date)
2. Signed by responsible company official
3. *Signed by reviewer

Copy of approved test protocol

Summary

1. Reason for testing
2. Test dates
3. Identification of unit tested & the maximum rated capacity
4. *For each emission unit, a table showing:
 - a. Operating rate
 - b. Test Methods
 - c. Pollutants tested
 - d. Test results for each run and the run average
 - e. Pollutant standard or limit
5. Summarized process and control equipment data for each run and the average, as required by the test protocol
6. A statement that test was conducted in accordance with the test protocol or identification & discussion of deviations, including the likely impact on results
7. Any other important information

Source Operation

1. Description of process and control devices
2. Process and control equipment flow diagram
3. Sampling port location and dimensioned cross section Attached protocol includes: sketch of stack (elevation view) showing sampling port locations, upstream and downstream flow disturbances and their distances from ports; and a sketch of stack (plan view) showing sampling ports, ducts entering the stack and stack diameter or dimensions

Test Results

1. Detailed test results for each run
2. *Sample calculations
3. *Description of collected samples, to include audits when applicable

Appendix

1. *Raw production data
2. *Raw field data
3. *Laboratory reports
4. *Chain of custody records for lab samples
5. *Calibration procedures and results
6. Project participants and titles
7. Observers' names (industry and agency)
8. Related correspondence
9. Standard procedures

* Not applicable to visible emission evaluations

Exhibit D

Title V Permit Responsibility Allocation Matrix

General Notes:

1. All references to the GCCS (GCCS) and to component parts thereof, including, without limitation, wellheads, control devices, wells, engines, combustion devices, flare, combustion equipment, headers, and blowers, refer to the GCCS, or the respective component part thereof, as described in the GCCS Design Plan for the SPSA Regional Landfill, prepared by HDR Engineering and submitted to the Virginia Department of Environmental Quality, and approved on September 29, 2021 and attached hereto (as amended, the “Design Plan”).
2. Note that the Federal New Source Performance Standards (NSPS) and Emission Guidelines (EG) have been modified in recent years (subsequent to the active Title V permit referenced in this Exhibit). Specific to SPSA, it is noted that Virginia’s state plan for the EG rules was recently approved by the EPA. This is documented in the Federal Register / Vol. 85, No. 121, dated June 23, 2020. Since SPSA does not yet fall under the category of a “new landfill” (subject to 40 CFR Part 60, Subpart XXX) and has not had construction, reconstruction or modification (as defined by the rule) that commenced after July 17, 2014, SPSA is therefore regulated by the EG rules: 40 CFR Part 60, Subpart Cf that has been implemented by VDEQ (effective July 23, 2020).
Therefore, additional commentary has been added in red to this responsibility matrix to amend certain requirements and update certain responsibilities pursuant with these currently applicable regulations. This is in an effort to bridge the current time period prior to renewal and update of the Title V permit. In all cases, the original language has been preserved to reflect the current Title V permit requirements that are assumed to be superseded by the currently applicable regulations.
3. All references refer to that certain Federal Operating Permit, Permit Number TRO-61341 and Registration Number 61341 (as amended, the “Title V Permit”), issued to Southeastern Public Service Authority of Virginia, as Permittee, and Suffolk Energy Partners, L.L.C., as Co-Operator, for the Suffolk Regional Landfill, located at 1 Bob Foeller Drive, City of Suffolk, Virginia, effective as of December 5, 2012.

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/ Frequency	Cure Period
Development of the GCCS Design Plan to meet all design requirements set forth in the Title V Permit.	Gasco will install and expand the GCCS in accordance with the Design Plan in order that landfill gas will be collected at a sufficient extraction rate to meet all operational requirements.	1		
	Gasco will operate the GCCS to route Recovered Landfill Gas to one or more of the control devices described in this section of the Title V Permit. Gasco will operate the candle flare FL-1 in accordance with 40 CFR 60.18.	2		
	Gasco will operate the GCCS such that (i) negative pressure is maintained at each active wellhead except in case of fire or increased well temperature and (ii) for each interior, active wellhead in the GCCS, the gas temperature is less than 55 degrees C and with either a nitrogen level less than 20% or an oxygen level less than 5%. <i>Amended by current regulations – nitrogen and oxygen levels no longer applicable.</i>	3		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
<p>Owner shall conduct surface testing around the perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals and where visible observations indicate elevated concentrations of landfill gas. Owner shall be responsible for all repairs to the landfill cap or cover if such repairs are necessary to maintain surface emissions below required limits.</p> <p>Amended by current regulations – penetration monitoring and additional GPS data required.</p>	<p>Gasco will operate the GCCS such that the surface methane concentration is less than 500 ppm above the background level at the surface of the landfill; provided that the exceedance, if any, is the result of the operations of the GCCS and not the result of fissures or cracks in the landfill cap or other issues pertaining to the operation of the landfill by Owner.</p>	4		
[See Item 3 above]	[See Item 3 above]	5		
	<p>Gasco shall route all Recovered Landfill Gas to one or more control devices as described in the Title V Permit. In the event of a malfunction of the GCCS, Gasco shall shut down the GCCS and gas moving equipment and shall close all vents to the atmosphere within 1 hour. If the system is shut down for more than 1 hour, Gasco shall prepare and file a</p>	6	SSM report/form to be transmitted to Owner within 7 days of event.	24 hours

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
	System Shutdown Malfunction (“SSM”) report/form.			
	Gasco shall place each well or design component as specified in the Design Plan and shall install wells no later than 60 days after the date on which the initial solid waste has been in place in any cell or group of cells for a period of 5 years or more if active or 2 years or more if closed or at final grade.	7		
<p>Except for Gasco’s responsibility with respect to the construction and operation of the GCCS, Owner shall be responsible for the construction and operation of the Landfill in accordance with NSPS Subpart WWW.</p> <p><i>Amended by current regulations – 40 CFR Subpart Cf applies.</i></p>	<p>Gasco shall be responsible for the construction and operation of the GCCS in accordance with NSPS Subpart WWW.</p> <p><i>Amended by current regulations – 40 CFR Subpart Cf applies.</i></p>	8		
	Gasco shall use only Recovered Landfill Gas, which is the approved fuel under the Title V permit, for the engines and flare. No makeup fuel is authorized under the Title V Permit.	9		
	Gasco shall comply with the throughput consumption limits on the	10		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
	four engines as set forth in this section.			
Owner shall be responsible for all fugitive dust emission controls as set forth in this section.		11		
	Gasco shall operate the landfill gas flare (FL-1B) so that the limits set forth are not exceeded.	12		
	Gasco shall operate the landfill gas combustion devices (GEN-1, GEN-2, GEN-3 and GEN-4) so that the limits set forth are not exceeded.	13		
	Gasco shall comply with the visible emissions limit for the flare as set forth in this section.	14		
	Gasco shall comply with the visible emissions limit for each internal combustion engine exhaust stack as set forth in this section and shall conduct a visible emissions evaluation on each engine exhaust stack.	15		
	Combustion equipment emissions shall be controlled by proper operation and maintenance by Gasco.	16		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
	Gasco shall train its combustion equipment operators in the proper operation and maintenance of all equipment in accordance with this section.			
Owner shall be responsible for the maintenance of a copy of the August 8, 1995 NSR permit on the premises of the landfill.	Gasco shall maintain a copy of the August 8, 1995 NSR permit as provided by the Owner.	17		
Owner shall be responsible for the development of the SSM plan and shall perform semi-annual reporting for the GCCS based on reports and information provided to Owner by Gasco.	Gasco shall generate SSM reports and data collection, and submit such information to Owner.	18	SSM report/form to be transmitted to Owner or designated representative within 7 days of event.	48 hours
	Gasco shall measure gauge pressure in the header at each individual active well monthly. Gasco shall take appropriate action, in accordance with the time limits set forth in this section and the applicable regulatory requirements, to correct positive pressure including, without limitation, the expansion of the GCCS if positive pressure continues to exist and such positive pressure cannot be rectified through	19	Root Cause Analysis required to be transmitted to Owner or designated representative for each exceedance over 15 days within 20 days of initial exceedance.	48 hours

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/ Frequency	Cure Period
	<p>the adjustment of the operation of the system or the replacement or upgrading of the system's components.</p> <p>Amended by current regulation – Root Cause Analysis and Corrective Action Plan requirements are applicable.</p>			
	<p>Gasco shall monitor each active well monthly for temperature and nitrogen or oxygen as specified, and take corrective action, in accordance with the time limits set forth in this section and the applicable regulatory requirements, to correct exceedances in temperature and nitrogen or oxygen levels, including, without limitation, adjustments to the operation of the GCCS, the replacement or upgrading of components of the system (including, blowers, headers and other control devices), or the expansion of the system; provided that such exceedances are not the result of fissures or cracks in the landfill cap or other issues pertaining to the operation of the landfill by Owner.</p>	20	<p>Root Cause Analysis required to be transmitted to Owner or designated representative for each exceedance over 15 days within 20 days of initial exceedance.</p>	48 hours

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
	Amended by current regulation – nitrogen and oxygen levels no longer applicable. Root Cause Analysis and Corrective Action Plan requirements are applicable.			
<p>Owner shall monitor surface concentrations of methane along the entire perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals for each collection area for which waste has been in place for two or more years if closed or at final grade or for which waste has been in place for 5 or more years if active. Owner shall perform the quarterly surface emission monitoring using an organic vapor analyzer, flame ionization detector or other portable monitor meeting applicable regulatory requirements. Owner shall be responsible for all repairs to the landfill cap or cover if such repairs are necessary to maintain surface emissions below the required limits.</p> <p>Amended by current regulations – penetration monitoring and</p>		21		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
additional GPS data required.				
	<p>If the quarterly surface emission monitoring performed by Owner indicates a surface methane concentration in excess of 500 ppm and if the exceedance is not the result of fissures or cracks in the landfill cap or other issues pertaining to the operation of the landfill by Owner, Gasco shall take the actions set forth - pertaining to the operation of the GCCS to reduce the emissions below the required amounts. Such actions may include, without limitation, adjustments to the operation of the GCCS, the replacement or upgrading of components of the system (including, blowers, headers and other control devices), or the installation by Gasco of new extraction wells. All such actions by Gasco are subject to appropriate Owner and regulatory approval.</p>	22		
Owner shall be responsible for all monthly cover integrity monitoring and any necessary repairs to the cover to maintain the required		23		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
integrity.				
	Gasco shall install a sampling port and a port for temperature measurements at each wellhead. Gasco shall measure the gauge pressure in the gas collection header, monitor nitrogen or oxygen concentration in the Recovered Landfill Gas, and monitor the temperature of the Recovered Landfill Gas, all on a monthly schedule.	24	Gasco shall complete monthly GCCS monitoring before the 25 th of each calendar month.	24 hours
	Gasco shall equip the GCCS with a gas flow rate-measuring device that shall record the flow to all the combustion equipment at least every 15 minutes. Gasco shall record on a daily basis individual gas volumes to the (i) engines, (ii) flare, and (iii) any offsite processes. Gasco shall equip the flare with a temperature-monitoring device equipped with a continuous recorder to ensure the proper operation of the flare on a continuing basis. Gasco shall install, maintain, calibrate, and operate each monitoring device in accordance with approved	25		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
	<p>procedures which shall include, as a minimum, the manufacturer's written requirements or recommendations. Gasco shall provide adequate access for inspection to each monitoring device and each monitoring device shall be in operation when the GCCS is being operated.</p>			
	<p>Gasco shall conduct Weekly Visible Emissions Evaluations (<i>EPA Method 9 for the engines and EPA Method 22 for the flare</i>). If periodic evaluations of the engines and/or the flare indicate any visible emissions, Gasco shall take appropriate action, immediately, to correct or remedy such visible emissions in accordance with the time limits set forth in this section. Gasco shall maintain a logbook in which are recorded any incidents of visible emissions and any corrective action taken by Gasco to correct or remedy any visible emissions. Gasco shall keep the log book on the premises of the Landfill and shall make the log book available for inspection by the DEQ for the most recent 5 year period.</p>	26, 27		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
	Gasco shall record and maintain a log of all inspections of landfill gas wells, which log shall indicate each incidence of positive pressure and the corrective action taken by Gasco to alleviate positive pressure at the wellhead, subject to the regulatory exceptions set forth in this section.	28		
Owner shall develop and maintain a surface monitoring design plan. Such plan shall include a topographical map with monitoring route and the rationale for any site-specific deviations from the required 30-meter intervals.		29		
Owner is responsible for keeping for at least 5 years, current, readily accessible, on the premises of the Landfill, records of the design capacity report, based on the original 1996 report, and for all reporting related to the current amount of waste in place and the annual placement rates for solid waste.		30		
Owner shall be responsible for the submission of emission data and operating parameters reports including the annual throughput of	Gasco shall maintain records of emission data and operating parameters pertaining to the GCCS as necessary to demonstrate	31		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
Recovered Landfill Gas to engines, flares, and offsite processes. Data for the annual throughput of Recovered Landfill Gas will be provided by Gasco. Owner shall maintain records relating to the annual placement of MSW in the landfill.	compliance with the Title V Permit and the provisions of 40 CFR 60.758. <i>Amended by current regulation – provisions of 40 CFR Subpart Cf.</i>			
	Gasco shall produce and maintain current GCCS drawings and records, including drawings related to the installation of existing and planned extraction wells. Gasco shall provide a unique identification location label for each extraction well. Gasco shall keep up-to-date, readily accessible records of the installation date and location of all newly installed extraction wells as specified under 40 CFR 60.755(b). Gasco shall provide Owner with current drawings and records. <i>Amended by current regulation – provisions of 40 CFR Subpart Cf.</i>	32	Gasco shall annually provide to Owner an updated GCCS as-built set of drawings showing in-place system. Drawing should be dated and highlight new construction in previous year.	7 calendar days
Owner shall maintain for 5 years, readily accessible records of the results of quarterly surface methane	Gasco shall maintain for 5 years, readily accessible records of the following monitoring observations: wellhead gauge pressures measured	33		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
monitoring performed by the Owner.	monthly, wellhead temperatures measured monthly, wellhead nitrogen or oxygen concentrations measured monthly, flow rate of landfill gas to the GCCS, results of quarterly surface methane monitoring (as provided by Owner), and malfunction reports for control or collection devices.			
	Gasco shall maintain records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of the GCCS, any malfunction of the air pollution control equipment or any periods during which a continuous monitoring system or monitoring device is inoperative for more than 1 hour. <i>Amended by current regulation – provisions of 40 CFR Subpart Cf.</i>	34	SSM report/form to be transmitted to Owner within 7 days of event.	24 hours
	Gasco shall maintain all records, reports, and measurements pertaining to the GCCS required to show compliance with Subpart WWW. <i>Amended by current regulation – provisions of 40 CFR Subpart Cf.</i>	35		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
	Gasco shall maintain records of the required training, including a statement of time, place and nature of training provided. Gasco shall have available good written operating procedures and a maintenance schedule for the combustion equipment. Such operating procedures shall be based on the manufacturer's recommendations, at a minimum. Gasco shall maintain all such records on the premises of the Landfill and shall make all such records available for inspection by the DEQ.	36		
	Gasco shall construct the GCCS to allow for emissions testing and monitoring upon reasonable notice and shall provide test reports, as necessary, in order to facilitate testing at the appropriate locations.	37		
	Gasco shall measure nitrogen levels at each wellhead in accordance with this section	38		
	Gasco shall measure oxygen levels in accordance with the provisions set forth in this section.	39		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/ Frequency	Cure Period
<p>Owner shall perform surface monitoring of landfill emissions in accordance with the provisions of this section.</p> <p><i>Amended by current regulation – provisions of 40 CFR Subpart Cf.</i></p>		40		
<p>In performing surface monitoring of landfill gas emissions, Owner shall use the method of operation set forth in this section.</p> <p><i>Amended by current regulation – provisions of 40 CFR Subpart Cf.</i></p>		41		
	<p>Gasco shall perform the actual exit velocity measurement of the flare in accordance with the provisions of this section.</p>	42		
	<p>Gasco shall perform any initial performance test for any new or modified landfill gas treatment or control equipment in accordance with the provisions of this section. If Gasco elects to use any of the alternate procedures other than the initial performance test as set forth, then Gasco shall comply with the requirements for adequate treatment of Recovered Landfill Gas.</p>	43		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
	Amended by current regulation – provisions of 40 CFR Subpart Cf.			
<p>Owner shall maintain responsibility for compliance with its Design Plan.</p> <p>Owner shall submit to the VDEQ the routine reports required by the Landfill MACT and the NSPS in connection with the operation of the GCCS.</p>	<p>Gasco shall provide to Owner information concerning the operation of the GCCS in order that Owner can submit the routine reports to VDEQ required by this section.</p> <p>Amended by current regulation – provisions of 40 CFR Subpart Cf.</p>	44		
<p>Owner shall be responsible for the routine report details concerning surface methane concentration exceedances. Owner shall be responsible for the report details to be included in the routine reports as set forth in this section.</p>	<p>Gasco shall be responsible for the report details to be included in the routine reports as set forth in this section.</p>	45		
<p>Owner shall provide written notification to the VDEQ of the anticipated dates of performance tests at least 30 days prior to the date of the tests.</p>	<p>Gasco shall provide to Owner the anticipated dates of any performance tests relating to the GCCS, any combustion engines, and the flare.</p>	46		
<p>Owner shall be responsible for compliance with requirements for GCCS closure and NMOC Emission Rate reporting.</p>		47, 48		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/ Frequency	Cure Period
Amended by current regulation – provisions of 40 CFR Subpart Cf.				
Owner shall be responsible for the completion and submission of its Closure Report.		49		
Owner shall be responsible for the completion and submission of its Control Equipment Removal Report. Amended by current regulation – provisions of 40 CFR Subpart Cf.		50		
Except for Gasco’s responsibility with respect to the construction and operation and maintenance of the GCCS, Owner shall be responsible for the operation and maintenance of the Landfill in a manner consistent with air pollution control practices.	Gasco shall be responsible for the operation and maintenance of the GCCS in a manner consistent with air pollution control practices.	51, 52		
Owner shall be responsible for the completion and submission of prior notice of shutdown or bypassing of air pollution control equipment.	Gasco shall notify Owner of any shutdown or bypassing of any component or portion of the GCCS and/or the intent to shutdown or bypass any component or portion of the GCCS. Gasco shall provide information to Owner for the GCCS in accordance with the provisions set forth in this section.	53		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
Owner shall be responsible for the completion and submission of air pollution equipment failure or malfunction reports.	Gasco shall notify Owner of any failure or malfunction of any component or portion of the GCCS. Gasco shall provide information to Owner for the GCCS in accordance with the provisions set forth in this section.	54		
Facility-wide emission limits	Facility-wide emission limits	55		
Owner shall be responsible maintaining records of monitoring information in order to demonstrate compliance with the terms and conditions of the Title V Permit. Such records shall contain the information set forth in this section. Owner shall maintain such records of monitoring data and support information in accordance with the provisions set forth in this section of the Title V Permit. Owner shall submit the results of any such monitoring to the VDEQ no later than March 1 and September 1 of each calendar year. Such monitoring report shall include the information set forth in this section of the Title V Permit.	Gasco shall maintain and provide to Owner the records required by this section. with respect to the GCCS. Gasco shall provide to Owner records maintained by Gasco with respect to the GCCS as may be necessary for Owner to complete and submit its Title V semi-annual certification report.	56	Gasco shall submit to Owner all requested/required information necessary to the complete the semi-annual reporting one month prior to the deadlines established in this section.	7 calendar days

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
Listing of Insignificant Emission Units	Listing of Insignificant Emission Units	57		
Permit Shield Statement	Permit Shield Statement	58		
Federal enforceability and permit expiration/renewal requirements. Owner shall be responsible for permit administrative compliance, application, renewal, and modification conditions in these sections.	Federal enforceability and permit expiration/renewal requirements.	59 - 65		
Owner shall be responsible for furnishing any information or records requested.	Gasco shall reasonably cooperate with Owner in furnishing any information or records requested. Gasco shall keep all records for at least 5 years, as specified in these sections.	66, 67		
<i>See Item 56</i>	<i>See Item 56</i>	68		
Owner shall be responsible for the completion and submission of its Title V Annual Compliance Certification Report <i>(Due March 1 of each year)</i>	Gasco shall provide to Owner information concerning the GCCS as may be necessary for Owner to complete and submit its Title V Annual Compliance Certification Report.	69	Gasco shall submit to Owner all requested/required information necessary to the complete the semi-annual reporting one month prior to the	7 calendar days

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/ Frequency	Cure Period
			deadlines established in this section.	
Owner shall provide notice of any deviations from the requirements of the Title V Permit which may cause excess emissions for more than one hour. In addition, Owner shall provide a written statement explaining the problem, any corrective actions or preventative measures taken, and the estimated duration of the permit deviation.	To enable Owner to provide reports and written statements as required, Gasco shall provide to Owner, with respect to any portion or component of the GCCS, information about any deviations from the requirements of the Title V Permit which may cause excess emissions for more than one hour and shall also provide information about any corrective actions or preventative measures taken by Gasco to address any deviations or problems.	70	Gasco shall be held to the four (4) daytime business hour timeframe as outlined in this section.	None
Owner shall provide notice of any failure or malfunction of equipment that may cause excess emissions for more than one hour as provided in this section. Owner shall also provide a written statement with respect to any such equipment failures or malfunctions as required by the provisions of this section.	Gasco shall provide information to Owner about any failure or malfunction of any portion or component of the GCCS in order that Owner can make the reports and submit the written statements required by this section.	71	Gasco shall be held to the four (4) daytime business hour timeframe as outlined in this section.	None
General conditions and exclusions. Owner responsibility to comply with	General conditions and exclusions.	72-78		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/ Frequency	Cure Period
these sections.				
<p>Owner shall be responsible for the completions and submission of its Annual Emissions Inventory for Flare and Passive Landfill Emissions.</p> <p><i>(Due April 1)</i></p>	<p>Gasco will provide Owner with an Annual Emissions Inventory for the electric generators at the Power Station Site for inclusion in Owner's Annual Emissions Inventory.</p> <p><i>(Due March 1)</i></p>	79	<p>Gasco shall submit to Owner all requested/required information necessary to the complete the semi-annual reporting one month prior to the deadlines established in this section.</p>	7 calendar days
<i>See Item 11</i>		80		
<i>See Items 70-71]</i>	<i>See items 70-71</i>	81		
<p>Owner shall comply with the logbook and recordkeeping requirements of this section with respect to the making of any change between reasonably anticipated operating scenarios.</p>	<p>Gasco shall comply with the logbook and recordkeeping requirements with respect to the making of any change of the GCCS between reasonably anticipated operating scenarios.</p>	82		
<p>Owner shall comply with the inspection and entry requirements with respect to either the Landfill or the GCCS.</p>	<p>Gasco shall comply with the inspection and entry requirements with respect to the GCCS.</p>	83		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
General condition – reopening for cause	General condition – reopening for cause	84		
Owner shall be responsible for the maintenance of the Title V Permit on the premises and shall make the Title V Permit immediately available to VDEQ upon request.		85		
Owner shall comply with the permit transfer restrictions.	Gasco shall comply with the permit transfer restrictions.	86-88		
	Gasco shall take all reasonable steps and comply with (or assist Owner to comply with) the deadlines outlined in these sections regarding malfunction of Gasco equipment and/or the GCCS.	89-92		
General conditions – permit revocation and duty to supplement	General conditions – permit revocation and duty to supplement	93, 94		
In the event that Owner has or will have more than a threshold quantity of a regulated substance in process, it shall comply with the accidental release prevention requirements.	In the event that Gasco has or will have more than a threshold quantity of a regulated substance in process, it shall comply with the accidental release prevention requirements.	95		
General conditions – emissions trading	General conditions – emissions trading	96		
General conditions – state	General conditions – state	97		

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
enforceable requirements	enforceable requirements			
	<p>(ii) <i>Site-specific treatment monitoring plan</i>, to include:</p> <p>(A) Monitoring records of parameters that are identified in the <u>treatment system</u> monitoring plan and that ensure the <u>treatment system</u> is operating properly for each intended end use of the <u>treated landfill gas</u>. At a minimum, records should include records of filtration, de-watering, and compression parameters that ensure the <u>treatment system</u> is operating properly for each intended end use of the <u>treated landfill gas</u>.</p> <p>(B) Monitoring methods, frequencies, and operating ranges for each monitored operating parameter based on manufacturer's recommendations or engineering analysis for each intended end use of the <u>treated landfill gas</u>.</p> <p>(C) Documentation of the monitoring methods and ranges, along with justification for their use.</p> <p>(D) Identify who is responsible (by</p>	<p>Additional compliance term for current regulations (not addressed in current Title V permit):</p> <p>40 CFR 60.39f(b)(5)(ii)</p>	As soon as possible	As soon as possible

Owner Responsibilities	Gasco Responsibilities	Title V Permit Item Reference	Due Date/Frequency	Cure Period
	<p>job title) for data collection.</p> <p>(E) Processes and methods used to collect the necessary data.</p> <p>(F) Description of the procedures and methods that are used for quality assurance, maintenance, and repair of all continuous monitoring systems.</p>			



Landfill Gas Collection and Control System (GCCS) Design Plan

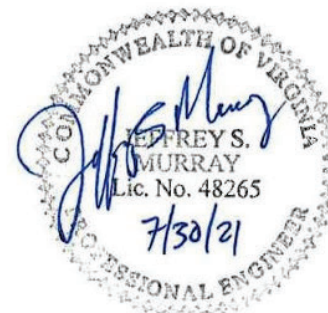
SPSA Regional Landfill

Solid Waste Permit #417
Title V Permit #61341

Suffolk, Virginia

Southeastern Public Service Authority
Chesapeake, Virginia

REVISED July 2021



CERTIFICATION STATEMENT

The undersigned hereby certifies that the landfill gas collection and control system for the Southeastern Public Service Authority Regional Landfill described in this Design Plan submittal meets the design requirements specified in 40 CFR 60.40f. By specific reference in 40 CFR 63.1955 and 9VAC5-40-5935(E), this includes applicable requirements in 40 CFR 63.1962 and 9VAC5-40-5935(A). This Design Plan is revised from original and revised Design Plans dated 6/6/03 and 6/28/07, respectively. Noted alternatives are described pursuant to 40 CFR 60.38f(d)(2). This Design Plan has been prepared by me or under my direct supervision as a licensed Professional Engineer in the State of Virginia.



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MURRAY
Lic. No. 48265

Jeffrey S. Murray, PE
HDR Engineering, Inc.

7/30/21

Date



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- Attachment B – Existing Landfill Gas Collection and Control System
- Attachment C – Landfill Gas Generation Data
- Attachment D – Conceptual Radius of Influence Calculations
- Attachment E – Conceptual Landfill Gas Well Layout/Coverage
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- Attachment G – KYPipe Conceptual Header Sizing/Capacity Calculations
- Attachment H – Landfill Condensate Calculations
- Attachment I – Surface Emission Monitoring Drawings

1 Introduction and Background

This report has been prepared by HDR Engineering, Inc. (HDR) on behalf of the Southeastern Public Service Authority (SPSA) to fulfill the requirements of the New Source Performance Standards / Emission Guidelines (NSPS/EG), 40 CFR Part 60, Subpart Cf, and by extension the requirements outlined in the recent amendments to the National Emission Standards for Hazardous Air Pollutants (NESHAP – 40 CFR 63 Subpart AAAAA) and the recently promulgated VAC Article 43.1 (9VAC5-40-5935). These regulations are promulgated in Virginia by the Virginia Department of Environmental Quality (VDEQ).

This Landfill Gas (LFG) Collection and Control System (GCCS) Design Plan is for the Regional Landfill (Landfill). The Landfill is located in Suffolk, VA and is owned and operated by SPSA, with a separate party contracted to operate the GCCS (Mas Energy, LLC).

1.1 Site Background Information

The Landfill was permitted by the Virginia Department of Health on September 12, 1983; and has a current waste footprint encompassing approximately 188 acres on the 833-acre facility. Cells I-IV were certified closed on May 29, 2009. Cell V commenced waste receipt in May 2000 and Cell VI commenced waste receipt in July 2006. The current Cell VII expansion permit application was approved by the VDEQ on June 8, 2011. Construction of Cells VII is anticipated to commence by the end of 2026 for continued operations after Cell VI reaches capacity in 2028.

The Landfill previously submitted a GCCS Design Plan in accordance with 40 CFR Subpart WWW requirements on June 6, 2003, revised on October 1, 2003. The GCCS became operational at the Landfill on December 7, 2004. The Landfill later submitted a GCCS Design Plan update on June 28, 2007.

The current renewal of the Facility's Title V permit has been submitted on May 16, 2017 and is currently administratively complete and under final VDEQ review.

Attachment A provides a map showing the size and location of the landfill, as reproduced from the solid waste permit application (Part B), identifying all areas where solid waste may be landfilled according to the permit.

1.1.1 Important Dates

Previous Amended Design Capacity Report:	Dec. 9, 2005
Latest (Cell VII) Expansion Permit Approved:	Jun. 8, 2011
Original Title V Permit Issued:	Jan. 31, 2005 (effective Nov. 28, 2002)
Title V Permit Renewal Submitted:	May 16, 2017



1.1.2 Design Capacity Information

Cell	Status	Maximum Waste Design Capacity (cy)	Maximum Waste Design Capacity (m ³)	Maximum Waste Design Capacity (tons)	Maximum Waste Design Capacity (Mg)
I-IV	Closed	12.2 million	9.33 million	7.41 million	6.72 million
V	Active	6.2 million	4.74 million	3.77 million	3.42 million
VI	Active	8.9 million	6.8 million	5.41 million	4.91 million
VII	Pending	10.8 million	8.26 million	6.56 million	5.95 million
	Total:	38.1 million	29.1 million	23.15 million	21 million

Notes:

- 1 Waste density assumption = 1,215 lbs/yd³ (SPSA Title V Permit Renewal, May 2017)
- 2 1 ton = 0.9072 Mg
- 3 1 cy = 0.7646 m³

1.2 GCCS Background Information

The Landfill has had an operational and regulated GCCS since December 7, 2004. In April 2020, Mas Energy, LLC (MAS) purchased the LFG assets from the previous operator. MAS currently operates, maintains, and monitors the GCCS for SPSA and maintains records of operational and performance data.

Drawings depicting the as-built GCCS can be found in **Attachment B**.

The GCCS installed in Cells I-IV currently consists of 88 operational vertical extraction wells. Collected LFG is routed to a common collection manifold and flows to the inlet of the gas processing skid at the MAS Plant. Connections to leachate cleanouts and manholes have been established to collect additional LFG. However, these points are not considered NSPS/EG regulated collection points as the current vertical well system provides acceptable coverage across the waste mass for Cells I-IV.

The GCCS in Cell V was installed in 2005 and is currently comprised of 54 vertical extraction wells. Collected LFG from Cell V is routed to a common collection manifold and flows to the inlet of the gas processing skid at the MAS Plant.

The GCCS in Cell VI was installed in 2010 and is currently comprised of 47 vertical gas extraction wells. In addition to the vertical extraction wells, four (4) horizontal collectors were installed in the Cell VI area. These horizontal collectors were installed in 2012; but are not considered NSPS/EG regulated collection points as the current vertical well system provides acceptable coverage across the waste mass for Cell VI.

The MAS plant currently processes the collected LFG through a treatment system consisting of a series of blowers, filters, and dewatering units. The LFG is then distributed to either: Solenis, LLC (formerly BASF, formerly Ciba Specialty Chemicals) via a dedicated transmission pipeline; four (4) Caterpillar engine gensets; and/or a candlestick flare. The Caterpillar engine gensets (Model G3516) are utilized to produce electricity. The engines operate 24 hours a day, 365 days a year, except for scheduled and/or unscheduled downtime. The LFG routed to Solenis is utilized as supplemental fuel for retrofitted boilers to process steam.

Excess LFG collected from the Landfill (that is not routed to the MAS plant) is combusted as necessary by the LFG Specialties, Inc. candlestick flare. The facility obtained a permit (dated July

29, 2011) to increase flare capacity to 3,000 standard cubic feet per minute (scfm). The flare was installed in 2011 and it replaced the previous 1,500-scfm utility flare.

The objectives of the current LFG system are to control subsurface migration, odors, and emissions at the site, and to fuel the renewable energy project(s). All LFG collected at the Landfill is routed to the MAS Plant and is utilized (destroyed) in either the engine gensets, transmitted to Solenis, or combusted in the candlestick flare. The candlestick flare has been designed to provide the LFG destruction efficiency required by §60.33f(c)(1) and §60.18. Future plans for the MAS facility include conversion of the LFG to renewable natural gas (RNG) for beneficial use as a fuel in compliance with §60.33f(c)(3). The future MAS RNG facility will have a thermal oxidizer and off-spec flare as part of the RNG process. If alternative control devices or scenarios are utilized in the future, they will be designed to comply with applicable NSPS/EG requirements.

1.3 GCCS Elevated Wellhead Temperature Investigation and Corrective Actions Background

Historically, the wellhead temperatures at some wells in Cell V have been higher than the NSPS/EG threshold of 131°F. Therefore, a request was made in a letter to VDEQ (and approved on July 17, 2008) to raise the allowable operating temperature to 145°F for the following wells:

EW-73; EW-79; EW-82; EW-85; EW-101; EW-104; EW-106; EW-107; EW-110; EW-124; EW-126; and EW-127.

It was assumed that the climatic condition in southeastern Virginia was promoting vigorous microbial activity and, in turn, higher wellhead temperatures. As the wellhead temperatures began to increase beyond 145°F, SPSA commissioned a more detailed investigation to ascertain the cause for these excessive temperatures in Cell V.

1.3.1 Cell V Temperature Investigations

A report entitled “Elevated Temperature Investigation” was submitted to VDEQ in March 2011 explaining possible reasons behind the high temperature readings. The report concluded that the data did not support subsurface landfill fire (or combustion event) and that the high temperatures were likely the result of chemical reactions between the solid waste and incinerator ash, generating both heat and hydrogen gas. Recommendations, including immediate and future actions, were also submitted as part of the report.

To further investigate the elevated temperature issue, SPSA obtained approval from EPA on December 19, 2011, to operate the Cell V gas wells at a non-negative wellhead pressure. Specifically, the approval letter provided for a six-month period of allowable non-negative wellhead pressure on Cell V. The six-month investigation period started on June 1, 2012, by reducing wellhead vacuum to nearly zero for Cell V extraction wells. SPSA submitted monthly status reports to EPA and VDEQ.

A report entitled “*Cell V Elevated Temperature Investigation – Final Report*” was submitted to EPA and VDEQ in January 2013, detailing the results of the six-month investigation. The recommendations included continuing the vacuum shutoff with monthly status updates and

providing additional soil cover for the Cell V area. The vacuum shutoff was continued throughout 2013 in accordance with the Operational Variance Extension Request to EPA (letter dated January 15, 2013). Another report entitled “*Report of Findings and Request for Extension of Operational Variance*” (dated December 17, 2013) was submitted listing the results for the 12-month shutdown period. This report also requested an extension for Cell V vacuum shutoff until cover soil could be placed on Cell V.

An EPA letter (3AP20) received on January 8, 2014, authorized extension of the vacuum shutoff period. A response letter to EPA dated January 30, 2014, listed a schedule of the planned activities and procedures to be followed during the vacuum shutoff period. As per the schedule, a cover soil placement update was submitted to VDEQ via a letter dated April 29, 2014. The intent of placing additional cover soil was to preclude atmospheric intrusion of oxygen into the waste mass and avoid the potential for subsurface combustion. During a portion of the six-month reporting period, the vacuum shutoff period continued, and status reports detailing remedial activities were submitted on monthly basis.

On September 24, 2014, SPSA submitted a letter to VDEQ as notification of the initiation of gradual re-activation of Cell V gas wells. The additional soil placement had been completed, and SPSA began gradual re-activation of the Cell V wells in November 2015. The re-activation methodology and procedures followed are detailed in the “*Cell V Elevated Temperature Investigation – Final Report*” submitted to EPA and VDEQ in January 2013. The wells began to stabilize and were gradually able to achieve non-negative pressure. The wells continued to exhibit elevated temperatures, as predicted by the theorized reactions in the study. Monthly status update emails were provided to VDEQ, and SPSA continued to monitor the Cell V area and reduce air intrusion into the waste mass unit.

1.3.2 Cell VI Temperature Investigations

In addition, several Cell VI wells have shown elevated temperatures. SPSA has also investigated the cause for high temperatures in Cell VI. A report entitled “*Cell VI Temperature Investigation*” dated January 2014, explained possible reasons behind high wellhead temperatures. Similarly, the report concluded that the data did not support the existence of subsurface landfill fire or combustion and the high temperatures are likely the result of chemical reactions between the solid waste and incinerator ash; generating both heat and hydrogen gas. Recommendations including immediate and future actions were also submitted as a part of the report.

1.3.3 Current and Future Corrective Actions and Operating Conditions

Cell V was gradually re-activated in 2015/2016. This re-activation involved a very gradual and focused increase in the vacuum in Cell V to allow for collection of LFG, and to promote compliance with NSPS/EG wellhead pressure and oxygen requirements, while allowing for higher temperatures and monitoring the response of the waste mass. Cell V was generally considered to be “fully” reactivated as of August 1, 2016. Starting from August 1, 2016, wells with temperature wellhead parameter exceedances were re-checked per NSPS/EG requirements. However, these wells continued to exhibit elevated temperatures as explained in the aforementioned temperature investigations.

SPSA carefully studied wells with consistent temperature exceedances from August 1, 2016 through December 31, 2016 under a fully reactivated vacuum paradigm. This data provided an indication of wells that required a steady-state temperature variance from the NSPS/EG regulations. Given SPSA's continued focus on compliance with current NSPS requirements and given that the chemical reactions, not sub-surface combustion, were the likely cause of the elevated temperatures; SPSA submitted a formal request to VDEQ for the increase in allowable operating temperature for the extraction wells with elevated temperatures. VDEQ approved this alternate temperature request on April 27, 2017. Per the alternate temperature request (approved by VDEQ):

- **145 degrees F** is the new operating temperature limit for extraction wells EW-73, EW-79, EW-82, EW-85, EW-101, EW-102, EW-105, EW-106, EW-113 and EW-123.
- **165 degrees F** is the new operating temperature limit for extraction wells EW-104, EW-107, EW-114, EW-116, EW-124, EW-125, EW-126 and EW-127.
- **185 degrees F** is the new operating temperature limit for extraction wells EW-115, EW-117, EW-118, EW-119, EW-120, EW-121 and EW-122.

2 Purpose and Organization

2.1 Regulatory Necessity

Because the Landfill received a permit modification to increase design capacity after May 30, 1991 and has a total site design capacity greater than 2.5 million Mg and 2.5 million m³, the Landfill was subject to the original NSPS (Subpart WWW). In accordance with 40 CFR 60.754(a)(2)(ii), the Landfill calculated the non-methane organic compound (NMOC) emissions using the site-specific NMOC concentration obtained from Method 25C sampling conducted in March 1997 and February 2002. Because the NMOC emission rate exceeded the regulatory threshold of 50 Mg/yr, the Landfill was required to install the initial GCCS and operate and expand it in accordance with these regulations.

The following regulatory changes/updates have occurred in recent years that are now becoming applicable to the Regional Landfill and require updated reporting and/or action:

- In 2016, the Federal New Source Performance Standards and Emission Guidelines (40 CFR Subparts XXX and Cf) were modified.
- Since the Regional Landfill does not yet fall under the category of a “new landfill” (subject to 40 CFR Part 60, Subpart XXX) and has not had construction, reconstruction or modification (as defined by the rule) that commenced after July 17, 2014, the site was therefore to be regulated by the EG rules: 40 CFR Part 60, Subpart Cf (upon EPA’s approval of Virginia’s state plan).
- Virginia’s state plan for the Emission Guidelines (EG) rules was approved by the EPA in the Federal Register / Vol. 85, No. 121, dated June 23, 2020. Upon approval, these federal guidelines were incorporated by reference into 9VAC5-40 Article 43.1 (Article 43.1). Requiring compliance with EG rules effective July 23, 2020.
- As required by these recently promulgated rules, an initial Design Capacity Report was submitted on August 25, 2020 - within 90 days of the effective date in accordance with 40 CFR 60.38f(a).
- The Landfill updated the surface emissions monitoring standard operating procedure (SOP) and began compliance and reporting in accordance with these updated rules regarding operational changes and reporting requirements.
- Separately, the EPA also finalized amendments to the 2003 National Emission Standards for Hazardous Air Pollutants (NESHAP) for Municipal Solid Waste (MSW) Landfills under 40 CFR Part 63, Subpart AAAA. The final 2020 NESHAP rule was published in the Federal Register on March 26, 2020, which included various operational and reporting changes that generally overlap with the EG rules (Subpart Cf). By September 27, 2021, the Landfill must comply with the new NESHAP requirements. These requirements overlap with the already applicable Subpart Cf / EG / Article 43.1 requirements.
- In order to simplify the transition to these new overlapping requirements, VDEQ requested that a new GCCS Design Plan be submitted to the applicable VDEQ Regional Office Air Compliance Manager no later than July 31, 2021. This time frame is requested (earlier than

the September 27, 2021 deadline in the rule) to allow VDEQ staff time to review and approve the design plan. This will allow the approval effective date of the Design Plan to be synchronized with the compliance time frames in the new NESHAP rules. The associated requirements of Article 43.1 / Subpart Cf / EG will become applicable on September 27, 2021 to coincide even if the Design Plan is approved prior to that.

- Thereafter, the Landfill will (effectively) be subject to only one set of rule requirements.

This Plan fulfills the requirements of a GCCS Design Plan as set forth in NSPS/EG, 40 CFR Part 60, Subpart Cf, and by extension the requirements outlined in the recent amendments to NESHAP – 40 CFR 63 Subpart AAAA and VAC Article 43.1 (9VAC5-40-5935). The scope of this Plan is limited to description, documentation, and certification that the GCCS will meet the requirements set forth in §60.33f – Emission Guidelines for Municipal Solid Waste Landfill Emissions and §60.40f - Specifications for Active Collection Systems. This Design Plan is submitted per the requirements of the current regulations. As new applicable regulations are promulgated, the Landfill will be able to comply with the requirements as appropriate. Where applicable, this Design Plan addresses future operational adjustments that might occur as a result of proposed or expected regulations.

2.2 Design Plan Organization

This Design Plan is organized into seven sections:

- Section 1 – Introduction and Background
- Section 2 – Purpose and Organization
- Section 3 – Landfill Gas Generation
- Section 4 – Landfill Gas Collection and Control
- Section 5 – Future Site Development
- Section 6 – Compliance Review and Documentation
- Section 7 – Requested Alternative Procedures

Information presented in this Design Plan has been compiled from review of Landfill background information provided by SPSA, review of available construction phasing, and discussions with SPSA and MAS personnel.

3 Landfill Gas Generation

§60.36f(a)(1) requires sites with known waste acceptance rates to utilize the following first order equation for calculation of the maximum gas flow rate (utilized in the LandGEM model):

$$Q_{lfg} = \sum_{i=1}^n 2kL_oM_i(e^{-kt_i})$$

Where:

Q_{lfg} = maximum expected gas generation flow rate, cubic meters per year

k = methane generation rate constant, per year or year⁻¹

L_o = methane generation potential, cubic meters per megagram solid waste

M_i = mass of solid waste in the i^{th} section, megagrams

t_i = age of the i^{th} section, years

The EPA has developed the LandGEM program to predict maximum landfill gas generation volumes. The EPA LandGEM gas generation model has been used to determine the total LFG generated by the Landfill over time. The inputs to the model are consistent with AP-42 and EPA guidance, with the additional analysis and incorporation of actual LFG flow and quality data as allowed per §60.36f(a)(1)(iii). Waste tonnages used in the model are provided by landfill records and tonnage increases in future years are based on baseline assumptions regarding population and disposal growth estimates. The specific variables and assumptions used to develop the LFG model are briefly discussed in the following subsections, and the final annual tonnage values and compiled LandGEM output/summation is provided in **Attachment C**.

3.1 LandGEM Model Variables and Calibration

3.1.1 Waste Receipt

Historical waste tonnages and future anticipated tonnages are required to complete any LFG generation model. Detailed historical annual tonnages have been provided by SPSA and included in **Attachment C**. For this modeling exercise, ash and other non-degradable tonnages have been discounted from annual totals. Future tonnages have been contemplated in various scenarios with the “baseline model” presented in this Design Plan - assuming an annual waste receipt growth rate of 0.085% (based on projected population growth) to be consistent with other recent permitting and regulatory reporting. It is also assumed that Cell VII construction will take place in the future, with nominal operations in Cell VII beginning in 2028, and full waste placement operations will be active in Cell VII by 2030.

3.1.2 Observed Collection Efficiency and Methane Content

As stated, actual LFG flow and quality data has been incorporated into the model as allowed per §60.36f(a)(1)(iii). Collection efficiency is the percentage of generated LFG that is collected based on the design, capacity, coverage and operation of the GCCS. This estimation is based upon a

combination of actual collected and compiled flow rate data, as well as an understanding of the history and future of the GCCS. Experience with similar landfills and GCCS design and operation also informs these observations that are then used in calibrating the LandGEM models (i.e. selection of LandGEM variables by observing past performance).

Actual LFG recovery flow and methane content data is available for the Landfill from 2008 to 2020. In order to calibrate the generation model variables, the LFG is first normalized to 50% methane content, which adjusts the 'effective' flow rate. This effective flow rate seen in the past can be attributed to an estimated collection efficiency for each year/area and the most appropriate LandGEM generation variables for each area can then be chosen for future predictions.

3.1.3 Methane Generation Rate Variable (k)

The Methane Generation Rate, k , determines the rate of methane generation for a unit mass of waste in the Landfill. This value is highly dependent upon moisture in the waste mass. The higher the value of k , the faster the methane generation rate increases and then subsequently decays over time. EPA's LandGEM model includes a range of values depending on site climate conditions and model purpose. These values range from 0.02 year⁻¹ (for arid locations) to 0.7 year⁻¹ (for bioreactor conditions). Per EPA's LandGEM model guidelines, arid landfills are sites located in areas that receive less than 25 inches of rainfall per year. A review of SPSA's actual rainfall data indicates that the actual rainfall values are well above 25 inches per year (approximately 46-48 inches per year, depending on source). Therefore, a k value of greater than 0.02 year⁻¹ should be chosen.

In the development of the model, the results of various k values have been analyzed to best-fit the data to the actual LFG flowrates compiled from 2008 to 2020. Based on the average site precipitation and observed flow rate data, a k value of 0.05 year⁻¹ has been chosen for the baseline model.

3.1.4 Potential Methane Generation Capacity Variable (Lo)

The Potential Methane Generation Capacity, Lo , depends on the type and composition of waste placed in the Landfill. The default Lo values used by LandGEM are representative of municipal solid waste (MSW). The Lo value, as it is used in the first-order decomposition rate equation, is measured in metric units of cubic meters per megagram (m³/Mg). The methodology for choosing this variable involves LandGEM calibration by comparing modeling results to historical LFG collection data and observed/estimated historical collection efficiency. For Lo selection, LFG generation model results are compared over a range of Lo values. These results/plots are then compared to LFG collection data and observed collection efficiency to find the best-fit value for Lo . This methodology allows comparison of the generated versus historical collected LFG to make an educated choice of Lo value.

Based on this methodology, an Lo value of 110 m³/Mg is the best-fit value based on LandGEM calibration. This is commensurate with the tonnage values reflecting only MSW (not diluted by non-degradable waste/ash). Based on the calibration of this value from historical data, this value is then utilized in the forward-looking model.

3.2 Baseline LFG Generation Model Results

The baseline model has been developed using the selected variables as described in the previous subsections. The results of this analysis are tabulated for each permitted area and summed in **Attachment C** and shown in Figure 1.

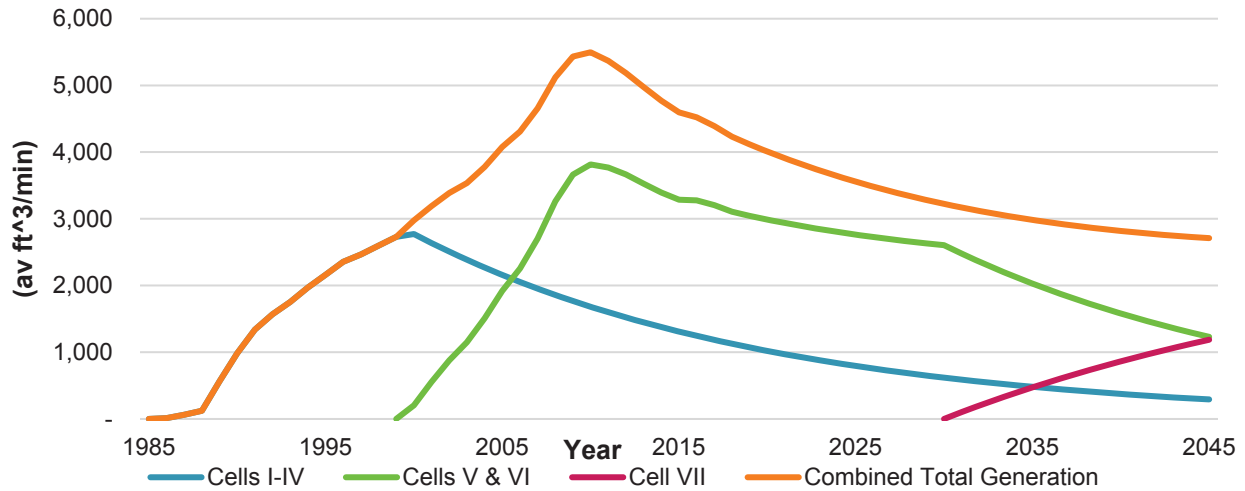


Figure 1: Baseline LFG Generation

The resulting 2021 LFG generation rate for the combined waste disposal areas is 3,908 scfm (normalized to 50% methane), as shown in the figure and the model output included in **Attachment C**. Note that the estimated maximum LFG generation rate has already occurred in 2010 at 5,497 scfm (normalized to 50% methane). Although the Landfill will continue to accept waste, the older waste that exists in the closed Cells I-IV is on the declining portion of the LFG generation curve, so the combined total generation is declining.

3.2.1 Baseline LFG Collection Results

For the purpose of future planning, two collection efficiency scenarios are modeled to compare against the combined total generated LFG flowrate. The first collection efficiency scenario, identified as the “Status Quo” collection scenario, assumes no added GCCS infrastructure (additional wells/collectors) to Cells I through VI. The second collection efficiency scenario, identified as the “Enhanced Recovery” scenario, assumes adding GCCS infrastructure (additional wells/collectors). These scenarios encompass the spectrum of potential future collection system operations.

Figure 2 displays the baseline model collected LFG summary which compares the total generated flowrate to the potential collection efficiency scenarios.

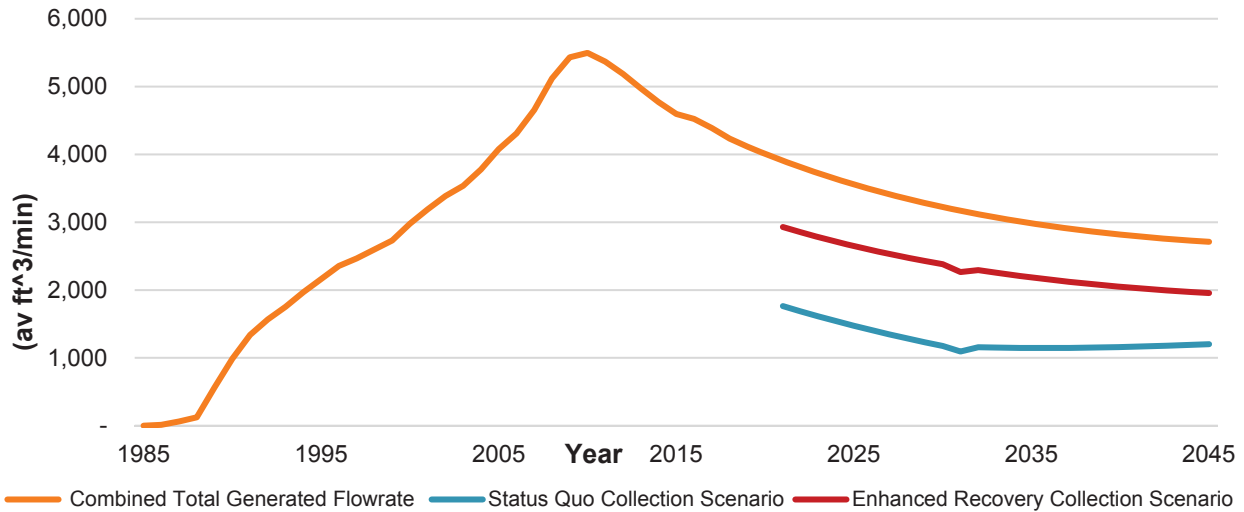


Figure 2: Baseline Collected LFG Summary

The resulting 2021 LFG Status Quo collection rate for the combined waste disposal areas is 1,764 scfm (normalized to 50% methane), as shown in the figure and the model output included in **Attachment C**. Note that the estimated maximum LFG collection rate is characterized by the Enhanced Recovery collection scenario and is modeled in 2021 at 2,929 scfm (normalized to 50% methane). As described above, although the Landfill will continue to accept waste, the older waste that exists in the closed Cells I-IV is on the declining portion of the LFG generation curve, so the combined total collection (even with Enhanced Recovery) is declining.

Based on the capacity of the wellfield, collection piping, condensate sumps, blower/compressor station, process equipment providing treatment, and control devices (engine gensets, transmission pipeline to boiler, and candlestick flare) currently installed, the existing GCCS is sized to handle the maximum anticipated LFG quantities. Future plans for the MAS facility for conversion of LFG to RNG will have equal or greater capacity. If alternative control devices or scenarios are utilized in the future, they will be designed to comply with applicable NSPS/EG requirements.

Additional collection and processing capacity will be added to the system, if needed, based on performance monitoring activities described in Section 6 and measurements of actual LFG production and collection rates. At the discretion of the Landfill and MAS, additional collection and/or processing capacity may be added at any time for the purposes of energy recovery.

Of primary importance are the approximately 15-year useful life horizons for planning of GCCS equipment. As stated, LFG generation and collection are expected to decline from current levels. See Section 5 of this Plan for a more detailed discussion of future site development.

4 Landfill Gas Collection and Control

This section presents a description of the existing and proposed GCCS design and planned future build-out. The GCCS design incorporates vertical extraction wells, horizontal collectors, and allows for tie-ins to the leachate collection system (LCS) (manholes and/or leachate cleanouts) for LFG collection. Future GCCS expansions will use a similar approach, and decisions regarding the utilization of each type of collection device will be addressed during future detailed design. The existing GCCS design has been constructed to accommodate future expansion. This includes sizing the main loop header to accommodate future LFG flow rates expected during the life of the system components.

LFG currently collected from the Landfill is routed to the MAS Plant and is utilized (destroyed) in either the engine gensets, transmitted to Solenis, or combusted in the candlestick flare. The candlestick flare has been designed to provide the LFG destruction efficiency required by §60.33f(c)(1) and §60.18. Future plans for the MAS facility include conversion of the LFG to RNG for beneficial use as a fuel in compliance with §60.33f(c)(3). The future MAS RNG facility will have a thermal oxidizer and off-spec flare as part of the RNG process. If alternative control devices or scenarios are utilized in the future, they will be designed to comply with applicable NSPS/EG requirements.

LFG extraction will continue to be provided by a combination of vertical extraction wells, horizontal collectors, and possible tie-ins to the LCS. While the Landfill intends to install vertical extraction wells to the maximum extent practical, particularly in areas at or near final (or long-term interim) grades, horizontal collectors may be employed when installation of vertical wells is not appropriate due to site geometry, waste depth or sequence of filling. In areas where horizontal collectors are installed, additional vertical wells may be required at final build-out depending on the performance of the collectors. Vertical extraction wells and/or horizontal collectors will be designed to provide comprehensive coverage over the Landfill.

The spacing (or horizontal distance) between the extraction wells is determined by a calculated Radius of Influence (ROI). The ROI defines an area from which LFG can be extracted without drawing excessive amounts of air into the landfill. Well spacing is also the first requirement listed under §60.40f: Specifications for Active Collection Systems. When vacuum (or negative pressure) is applied to a well, the recoverable LFG in the ROI zone of the well will begin to migrate towards the well. This ROI is affected within the landfill by multiple variables and, therefore, the ROI is not consistent among all the wells. Also, the ROI will vary with depth/length as the vacuum decreases along the length of each well. Standard engineering practice is to assume the ROI to be cylindrical with the vertical well shaft at the center of the cylinder. The edge of the ROI is reached when the pull of vacuum exerted by the well is zero; i.e., LFG will no longer move towards the well from beyond a certain point due to the vacuum on the well. **Attachment D** provides conceptual ROI calculations. The actual extent of influence will vary from well to well and cannot be measured until the well is installed. However, for design purposes a theoretical ROI has been calculated based on certain assumptions made about the well and the surrounding refuse environment.

4.1 Extraction Wells

4.1.1 Vertical Extraction Wells

Vertical wells are utilized where slopes are at final grade, or operations have ceased for an extended period of time. Specific to the Landfill, vertical wells will also be utilized in areas that have received interim soil cover with or without flexible membrane liners. The design of vertical extraction wells at the site will vary depending on the area in which the wells will be installed. Vertical wells will typically terminate at a minimum of 10 feet above the bottom of refuse.

As stated, vertical wells typically have an effective ROI that is estimated based on factors such as waste depth, location, and landfill interim cover properties. Based on conceptual ROI calculations, the drawings provided in **Attachment E** present the overlapping ROI coverage for 195' for Cells I-IV, 166' for Cell V, and 151' for Cells VI and VII. These estimated ROIs are based on various well, waste and cover properties specific to each area. For example, final or interim closure areas with soil cover allow for more vacuum to be exerted at each wellhead with less potential for atmospheric intrusion, thereby increasing the theoretical ROI.

The drawings show overlapping ROI coverage resulting from vertical well placement. Overlap of the ROIs ensures collection coverage over the Landfill. Note that the drawings included with this Design Plan represent the conceptual GCCS design. The exact locations of new wells will be determined during future detailed design and may be subject to relocation due to site conditions or filling operations. The appropriateness of GCCS designs and expansions will be demonstrated through compliance with the surface emissions monitoring requirements of the NSPS/EG.

Vertical wells will be constructed of either HDPE, PVC, CPVC or stainless-steel pipe installed in 30-inch or 36-inch diameter boreholes, unless an engineering judgment is made that an alternate sized borehole is more appropriate. Typically, approximately the lower three-quarters of the well pipe length will be perforated, and perforations will not be closer than 10 feet from the Landfill surface unless the wells are being installed in an active area and additional refuse will be filled around the wells within a reasonable period of time. Perforations typically will be either ½-inch – ¾-inch diameter holes spaced at 14 holes per foot, or 3/8-inch wide by 8-inch long slots spaced at approximately four slots per foot. However, alternative slot or perforation designs which provide comparable performance may be considered.

4.1.2 Horizontal Collectors

The GCCS design may incorporate horizontal collectors for the active areas of the Landfill in order to accommodate ongoing filling activities and keep LFG extraction components such as wellheads away from the active area. Horizontal collector lengths will vary depending on site conditions at the time of system expansion, but generally will be less than 1,000 feet long. Horizontal collectors will be constructed to include the following features:

- Collector pipe will generally be 6- or 8-inch diameter solid or corrugated HDPE pipe.
- The collector pipe may be designed with an expansion coupling (pipe within a pipe) to allow for the ability of the collector to accommodate minor settling of the waste mass.

- The perforated collector pipe will be installed in a trench filled with appropriate aggregate material such as gravel, chipped tires or crushed glass. The permeable backfill material will be sized so as not to pose significant risk of clogging the pipe perforations.
- Perforated pipe will cease at least 50 feet inward from the end of the collector. The remaining length of collector will be solid-wall pipe. This will reduce the potential for air infiltration into the collectors.

4.1.3 Wellheads

Each vertical extraction well and horizontal collector will include a wellhead constructed of appropriate materials, such as SCH 80 PVC. Wellheads will include a valve for flow control and monitoring ports for measuring pressure, gas quality, temperature, and flow rate. Wellheads will be connected to the GCCS system by means of flexible piping to accommodate waste settlement. The Landfill may also employ the use of “monitoring stations” that would allow for the lateral piping from multiple wells to come together at one location where the wellheads are placed for monitoring and well vacuum control. This provides for ease of operation and monitoring. The Landfill may also employ the use of automated wellheads that would rely on automated LFG sampling and valve adjustment for monitoring and well vacuum control. This automated system would be overseen by operators but would allow for more frequent wellhead monitoring and valve control. In all cases, the design will include one wellhead per well to ensure monitoring and control of each well per NSPS/EG regulations.

4.2 Header and Lateral Collection Piping

The header and lateral collection piping have been and will be constructed of fusion-welded HDPE pipe. Header and lateral piping may be installed either below or above grade. In locations where above grade header and laterals are used, the piping will be appropriately anchored, if necessary.

The header system has been and will be sized to handle the maximum projected future flow rates over the useable life of the system. As described above, although the Landfill will continue to accept waste, the older waste that exists in the closed Cells I-IV is on the declining portion of the LFG generation curve, so the combined total collection (even with enhanced recovery) is declining. See Section 5 of this Plan for a more detailed discussion of future site development.

The header system incorporates loops of piping in order to allow for partial or total loss of header function in one direction without losing GCCS functionality. The as-built drawings in **Attachment B** and conceptual future design shown in **Attachment F** show the header line routing. The final design diameter of each future segment of header pipe may vary in size, depending on the volume of LFG it will be expected to convey. The header line that connects the wells furthest from the source of vacuum is anticipated to carry the least amount of LFG flow. As the header piping gets closer to the source of vacuum, more and more gas wells will contribute flow, sometimes necessitating an increase in the header pipe size. Calculations for header sizing showing available capacities are presented in **Attachment G**. Criteria considered in sizing header piping include:

- LFG velocity – In general, design gas velocities will not exceed 40 feet per second (fps), except in short piping runs as necessary.

- Multiple flow path options – Allowing LFG to flow in multiple directions in case of blockage or valve closure resulting in obstruction of the loop system.
- Future expansion – Header piping may include blind flanges for system expansion into future Landfill phases or will be buried to a depth shallow enough to allow for tie-ins using electro-fusion couplings. The tie-ins for future new laterals to the existing laterals or header may be accomplished by connecting to vertical risers or access points.

4.2.1 Header Isolation Valves

In order to allow for isolation of certain sections of the header to perform repairs without shutting down the entire system, or for troubleshooting purposes, header isolation valves may be installed throughout the GCCS. These valves will be constructed of corrosion resistant materials such as PVC, and all metal parts potentially exposed to LFG will be coated with enamel or similar coatings to increase corrosion resistance. Both the seals and valve bodies will be appropriate for the specified application. Additional header isolation valves may be installed as the GCCS is expanded.

4.2.2 Condensate Production and Management

Condensate is formed as collected LFG cools in the lateral and header piping and releases liquid. The rate at which it is generated depends upon the LFG flow rate and the temperature differential between the warmer LFG in the waste mass and the cooler piping in the surrounding soil or air. For the GCCS at the Landfill, condensate generation rates were estimated based on an average LFG temperature of 84 degrees Fahrenheit and an average ambient air temperature (in the piping) of 60 degrees Fahrenheit.

Attachment G provides conceptual calculations for the average condensate generation. The estimated daily condensate generation rate based on a 14-degree temperature differential is approximately 350 gallons per day (gpd). This value represents an average anticipated daily amount of condensate but is highly dependent upon seasonal weather. For example, maximum condensate generation would occur during cool days in winter months when temperature differentials between collected LFG and ambient air are greatest.

The GCCS design includes condensate sumps installed at low points in the header loop coinciding with the topography of the site. These pump condensate into the nearest LCS within the footprint of waste. Additional condensate traps and/or sumps may be required for final buildout.

4.3 Landfill Gas Control/Destruction

Per §60.33f(c), landfills' active collection of LFG must route all collected gas to a control system that is either: (a) an open flare, (b) a control system designed and operated to achieve 98% destruction efficiency, or (c) a treatment system that processes the collected gas for subsequent sale or use.

The LFG is currently routed to control devices (engine gensets, transmission pipeline to boiler, and candlestick flare) currently installed and permitted for greater than the anticipated flow rates. Future plans for the MAS facility for conversion of LFG to RNG will have equal or greater capacity.

If alternative control devices or scenarios are utilized in the future, they will be designed to comply with applicable NSPS/EG requirements. In all cases, the Landfill will continue to utilize the candlestick flare as a redundant control device capable of handling the total combined collected LFG flow rate.

The locations of the flare and the MAS facilities are shown on the drawings in **Attachment E**. The Landfill phasing plan allows for this general location to serve for the entire life of the site, and it is not anticipated that these components will be moved in the future.

5 Future Site Development

5.1 Landfill Development

Currently Cells I-IV have undergone final closure and capping, Cell V has interim cover in place, and Cell VI is the active waste placement cell. Permitted Landfill development plans are maintained on site and are on file with VDEQ. The Landfill has permitted approval through future Cell VII and is currently projected to receive waste through at least 2050 (based on current estimates). The Landfill is in the process of permitting future expansions of Cell VIII and IX at the site for additional long-term disposal capacity. It is assumed that Cell VII nominal operations will begin in 2028, and the requirement for operation of an LFG collection system in 2033 for compliance purposes. This Plan assumes that full waste placement operations will be active in Cell VII by 2030, and GCCS expansion into Cell VII will take place two years later (2032), to capture LFG on an accelerated schedule.

5.2 GCCS Expansion Capabilities

Typically, it is assumed that the more durable GCCS components such as header, laterals, wells, sumps, and blower/flare station will have a maximum life of approximately 15 years. Header and lateral piping will last significantly longer, but a 15-year life is assumed for blower/flare station components. After that length of time it may become necessary to perform significant maintenance or to replace some of these components. Therefore, this Design Plan provides design information and planning through 2027 – which will be 15 years since permitting/installation of the current 3,000 scfm candlestick flare. At that time, the Landfill may choose to replace the entire flare, or components of the blower/flare station as necessary. As shown in Section 3, increased capacity will not be required.

The attachments previously referenced provide conceptual layout and design calculations that include future expansion of the GCCS into Cell VII. The drawing in **Attachment F** shows the final buildout of Cell VII, and there may be interim phases depending upon fill timing/strategy. **Attachment G** provides conceptual calculations showing GCCS capacity for all future flow including Cell VII.

Over time, as the Landfill grows and site conditions dictate, various features of the GCCS may be relocated or replaced in order to accommodate landfill operations and/or replace components that have completed their useful life. It is intended that future GCCS designs will incorporate similar engineering judgment and methods as explained in this Design Plan. The specific layout of the phased installation of system components will be addressed during the design of those future LFG system expansions. While the specific layout of future LFG system components that may be necessary in future permitted Landfill areas are not decided at this point, the GCCS design will accommodate expansion of the system into future Landfill areas. Design considerations include appropriate header and condensate trap/sump sizing, additional blower and flare capacity, and tie-in locations for connection to the expansion areas. Header and condensate traps/sumps are sized based on the projected LFG recovery rates from the current landfill areas based on historical and projected future waste disposal rates.

6 Compliance Review and Documentation

The purpose of this Section is to document and certify compliance of the proposed GCCS with the applicable sections of 40 CFR 60.40f - *Specifications for Active Collection Systems*, including:

- §60.40f(a) - Compliance with §60.33f(b)(2).
- §60.40f(b) - Construction procedures.
- §60.40f(c) - Conveyance of LFG in compliance with §60.33f(c).

Additionally, portions of §60.36f - *Compliance Provisions* relevant to GCCS specifications are addressed, including:

- §60.36f(a)(1) - Calculations for maximum expected gas generation flow rate.
- §60.36f(a)(2) - Sufficient density of gas collectors.
- §60.36f(a)(3) - Collection system flow rate sufficiency.
- §60.36f(a)(5) - Identification of excess air infiltration.

6.1 Compliance with §60.40f(a)(1)

6.1.1 Control of Surface Emissions

The existing and future proposed GCCS is designed to minimize surface emissions. An updated surface emissions monitoring standard operating procedure (SOP) and monitoring route maps for the both the current and final Landfill buildout are shown in **Attachment I**. Note that the SOP is updated to include the penetration monitoring, GPS accuracy and other requirements. These document that surface emissions monitoring will continue to be conducted at the Landfill in accordance with §60.36f(c). Actual surface emissions monitoring routes may vary depending on site conditions.

6.1.2 Refuse Gas Generation Rates and Flow Characteristics

LFG modeling has been performed to estimate the future generation and collection rates for the Landfill by using the U.S. EPA LandGEM model. Section 3 provides details on the use and calibration of the model, and the model output is provided in **Attachment C**.

6.1.3 Landfill Cover Properties

Cells I-IV have received final cover and are certified as closed by VDEQ. Cell V currently has received interim cover. The final cover system for Cells V, VI and future Cell VII will be designed in accordance with the approved VDEQ solid waste permit closure details and the applicable rules at the time of closure. These closure and interim cap conditions have been factored into the design of the LFG collectors and wells in order to minimize the potential for pulling ambient air into the Landfill.

6.1.4 Gas System Expandability

The GCCS design has sufficient capacity to accommodate collection LFG based on the flow capacity of the existing/proposed header, blower station and/or control devices over the design

life of these components and the period of this Design Plan. In the future, when preparing to expand the GCCS, SPSA may evaluate whether additional modifications beyond those shown in this Design Plan are necessary to maintain adequate flow and collection efficiency. Modifications may include changes to the proposed header size for future areas, locations of vertical wells and horizontal collectors, blower/compressor capacity, or condensate management options. These modifications will be presented in future NSPS/EG Compliance Reports for submittal to VDEQ.

6.1.5 Leachate and Condensate Management

Leachate is collected by a series of pipes and sumps that overlay the bottom liner system of the Landfill cells. Leachate collected in the sumps is pumped to an on-site leachate storage lagoon (or future tank with the planned development of Cell VII). Leachate disposal is accomplished by discharge to the Hampton Roads Sanitation District (HRSD) sanitary sewer and wastewater treatment plants. The Landfill is generating under 50,000 gallons per day of leachate. Approximately half of the daily leachate generated is sent via direct discharge into the sanitary system via the on-site pump station and forcemain, with the other half hauled to a separate HRSD wastewater treatment plant.

Condensate collected within header piping is generally drained directly to the LCS in the cells. Condensate collected at the blower/flare station and the MAS facility is containerized in above ground storage tanks (ASTs) and pumped into the leachate lagoons (and potentially the future leachate tank).

6.1.6 Accessibility

Site access is provided by paved and unpaved access roads. Site mowing and maintenance allows access for wellhead monitoring and surface emissions monitoring. Future access will be provided by access roads as needed.

6.1.7 Compatibility with Filling

The existing and proposed GCCS design includes a combination of vertical extraction wells, horizontal collectors, and optional LCS/manhole tie-ins. In order to provide GCCS coverage to all parts of the Landfill in the future, vertical wells may be installed in areas that will receive additional waste, thus requiring them to be raised. For GCCS components installed in areas not filled to final grade, SPSA will protect exposed wellheads and piping during subsequent filling activities. Concrete bollards may be installed around sumps, etc. to provide protection from traffic or other damage.

6.1.8 Integration with Closure End Use

Waste disposal activities are on-going at the Landfill and projected to continue until at least 2050. At Landfill closure the closure plan will address any integration of the GCCS with the intended end use, which has not yet been determined.

6.1.9 Air Intrusion Control

Air intrusion control for the GCCS will be provided by the engineered final cover system installed over areas filled to final grade, and by responsible operation of the GCCS by well tuning. Air intrusion control also will be provided by the extraction well design, in as much as the slotted pipe in vertical wells is set no closer than 10 feet of the ground surface. SPSA (or its designee) will

conduct wellfield tuning to optimize sustainable LFG collection and reduce air intrusion. Air intrusion control in future years will be accomplished by the final cover system after completion of filling in the individual areas and by proper tuning of the wellfield during operation of the GCCS.

6.1.10 Corrosion Resistance

In general, the system components described in Section 4 of this Design Plan represent “industry-standard” design and materials, and have proven to be resistant to corrosion with proper installation, operation, and maintenance in GCCS applications across the United States.

6.1.11 Fill Settlement

Settlement or subsidence of waste fill due to decomposition can affect a GCCS in numerous ways, including:

- Damage or destruction of below grade header and lateral piping systems.
- Blockage of header and lateral piping systems as a result of condensate collecting in the piping (at locations where settlement has caused an unintended low point in the pipe), thereby blocking the flow of LFG.
- Damage, displacement, or destruction of well casings, seals, and filter materials as a result of settlement in the landfill mass adjacent to the well.

Components or features that are incorporated into the GCCS design or may be used in future designs to address potential effects of settlement include:

- Installation of below-grade laterals and headers installed within the waste mass will have a preferred 5% (minimum 3%) slope, thereby providing allowance for some settlement without damage or blockage of the piping systems.
- Installation of headers or other piping installed in native ground (i.e. the perimeter road) will have a minimum 1% slope.
- Installation of periodic header access risers, which allow landfill personnel to identify the location of the below grade header in order to aid troubleshooting and repairs as settlement occurs.
- Use of fusion-welded HDPE piping for the headers and laterals. Fusion-welded HDPE pipe is less susceptible than PVC pipes to damage or collapse due to settlement of the waste. HDPE also is less susceptible to damage resulting from loss of plasticizers over time (i.e., aging), which can cause PVC pipe to become brittle.
- Placement of the well casings in 30 or 36-inch diameter boreholes, which provide additional separation between the waste and the well casings, thereby reducing the potential for differential stresses being placed on the casings.

6.1.12 Resistance to Decomposition Heat

The components incorporated into the GCCS design are resistive to temperatures greater than 160-degree Fahrenheit with no loss of performance. The GCCS components most susceptible to heat damage are the well casings and any lateral or header piping systems installed within the

waste mass. Both HDPE and PVC pipe have proven successful for numerous GCCS applications across the United States.

Some of the temperatures exhibited in the wells have been and may be above the recommended temperatures for HDPE piping (see Section 1 for elevated wellhead temperature background). Therefore, SPSA may decide to investigate wells for melting or kinking if there is reason to believe the casing is compromised. If necessary, wells can be re-drilled, retrofitted or repaired. Future GCCS expansion design may include options for either PVC, CPVC or stainless-steel casing if waste temperatures warrant.

6.1.13 Ability to Isolate for Repair or Troubleshooting

As described in Section 4.2, header isolation valves may be installed throughout the GCCS in order to allow for isolation of certain sections of the header to perform repairs without shutting down the entire system, or for troubleshooting purposes. These valves will be constructed of corrosion resistant materials such as PVC, and all metal parts potentially exposed to LFG will be coated with enamel or similar coatings to increase corrosion resistance. Both the seals and valve bodies will be appropriate for the specified application. Additional header isolation valves may be installed as the GCCS is expanded.

6.2 Compliance with §60.40f(a)(2) – Density of Gas Collection Devices

As described in Section 4, the wells and collectors have been and will be designed to provide comprehensive coverage with appropriate zones of influence. The GCCS is intended to provide sufficient collection coverage to meet the NSPS/EG surface emissions monitoring requirements. The adequacy of the well density will be confirmed during future surface emissions monitoring, including identifying areas that may require additional control measures based on monitoring results.

6.3 Compliance with §60.40f(a)(3) – Collection Device Placement

Collection devices will be installed in all areas of the Landfill where waste has been in place for five years or more in active areas, or two years or longer if the landfill is closed or at final grade with the exception of certain exempt areas. SPSA is not currently proposing to exempt any areas from LFG control due to the presence of non-degradable wastes.

6.4 Compliance with §60.40f(b)(1), (2), and (3) – Construction of System Components

As described in previous sections of this report, the GCCS components will be constructed of materials suitable for LFG applications. Wells shall be placed so as not to endanger the underlying liners. Wellheads include throttle valves, couplings, and sample ports as required.

6.5 Compliance with §60.40f(c)(1) and (2) – Landfill Gas Conveyance

The resulting 2021 LFG generation rate for the combined waste disposal areas is 3,908 scfm (normalized to 50% methane), as shown in **Figure 1** (Section 3) and the model output included



in **Attachment C**. Note that the estimated maximum LFG generation rate has already occurred in 2010 at 5,497 scfm (normalized to 50% methane). Although the Landfill will continue to accept waste, the older waste that exists in the closed Cells I-IV is on the declining portion of the LFG generation curve, so the combined total generation is declining.

Figure 2 (Section 3) displays the baseline model collected LFG summary which compares the total generated flowrate to the potential collection efficiency scenarios. The resulting 2021 LFG Status Quo collection rate for the combined waste disposal areas is 1,764 scfm (normalized to 50% methane), as shown in the figure and the model output included in **Attachment C**. Note that the estimated maximum LFG collection rate is characterized by the Enhanced Recovery collection scenario and is modeled in 2021 at 2,929 scfm (normalized to 50% methane). As described above, although the Landfill will continue to accept waste, the older waste that exists in the closed Cells I-IV is on the declining portion of the LFG generation curve, so the combined total collection (even with enhanced recovery) is declining.

Based on the capacity of the wellfield, collection piping, condensate sumps, blower/compressor station, process equipment providing treatment, and control devices (engine gensets, transmission pipeline to boiler, and candlestick flare) currently installed, the existing GCCS is sized to handle the maximum anticipated LFG quantities (which is currently the case, as the LFG curve is declining). Future plans for the MAS facility for conversion of LFG to RNG will have equal or greater capacity. If alternative control devices or scenarios are utilized in the future, they will be designed to comply with applicable NSPS/EG requirements.

Additional collection and processing capacity will be added to the system, if needed, based on performance monitoring activities and measurements of actual LFG production and collection rates. At the discretion of the Landfill and MAS, additional collection and/or processing capacity may be added at any time for the purposes of energy recovery.

6.6 Compliance Summary Table

A summary of the compliance requirements and the project-specific conditions is presented in **Table 1**.

Table 1: Regulatory Compliance Checklist

Regulatory Reference	Regulatory Requirement	Description of Site-Specific Conditions
§60.40f(a)(1)	Collection devices within the interior and along the perimeter areas shall be certified to achieve comprehensive control of surface gas emissions by a professional engineer.	Collection devices included in the design will provide control of surface emissions as has been and will be confirmed by future surface emissions monitoring. This GCCS Design Plan is signed and sealed by a Virginia-registered Professional Engineer.

Regulatory Reference	Regulatory Requirement	Description of Site-Specific Conditions
§60.40f(a)(2)	Gas collection devices shall be installed in sufficient density to address landfill gas migration issues and augmentation of the collection system through use of active or passive systems at the landfill perimeter or exterior.	Gas collection devices will be installed at a sufficient density to facilitate control as has been and will continue to be confirmed by future LFG migration and surface emissions monitoring.
§60.40f(a)(3)	Placement of gas collection devices shall control all gas producing areas, except those from asbestos, non-degradable, and non-productive areas of the landfill.	Gas will be controlled in all regulatory-required gas-producing areas of the Landfill. SPSA is not proposing any non-productive areas at this time.
§60.40f(b)(1)	The collection system shall be constructed of appropriate materials and shall extend as necessary to comply with the emission and migration standards.	The GCCS will be comprised of HDPE, PVC, CPVC, stainless steel or other acceptable materials. The GCCS will be expanded as necessary to conform to emission standards set forth in the NSPS/EG. Future expansion of the GCCS will be performed in accordance with scheduling requirements set forth in the NSPS or an approved alternative schedule.
§60.40f(b)(1) (continued)	Collection devices such as wells and horizontal collectors shall be perforated to allow gas entry without head loss sufficient to impair performance across the intended extent of control.	Collection pipes in extraction wells and collectors will be perforated so as not to increase head loss.
§60.40f(b)(1) (continued)	Perforations shall be situated with regards to the need to prevent excessive air infiltration.	The effective depth of perforations typically will be at least 10 feet below existing grade, which will be sufficient to control excessive air infiltration.
§60.40f(b)(2)	Vertical wells shall be placed so as not to endanger underlying liners and shall address the occurrence of water within the landfill.	Survey data for the base Landfill liner will be used for vertical well design depths. Vertical extraction wells will be installed with the bottom of the borehole at least 10 feet above the liner system. Drilling logs for the vertical extraction wells will document the occurrence of perched water in the Landfill.



Regulatory Reference	Regulatory Requirement	Description of Site-Specific Conditions
§60.40f(b)(2) (continued)	Holes and trenches constructed for piped wells and horizontal collectors shall be of sufficient cross-sectional area so as to allow for their proper construction and completion including the centering of pipes and placement of gravel backfill.	Vertical wells will be installed in 30- or 36- inch diameter boreholes, which are sufficient for proper installation of well casings and backfill materials. All holes and trenches for piped wells and horizontal collectors will be of sufficient cross-sectional area so as to allow for their proper construction and completion including the centering of pipes and placement of gravel (or alternative stone or tire-chip) backfill.
§60.40f(b)(2) (continued)	Collection devices shall be designed so as not to allow indirect short-circuiting of air into the cover or refuse into the collection system or gas into the air.	Wells will be designed to prohibit short-circuiting of air into cover or refuse.

7 Requested Alternative Procedures

Per 40 CFR 60.38f(d)(2), this section of the Design Plan includes proposed alternatives to the prescriptive monitoring, record keeping, and reporting requirements outlined in the NSPS/EG. This section addresses proposed exemptions/alternatives requested by SPSA regarding the operational standards for the Landfill as described below.

7.1 Wellhead Monitoring and Operation

The NSPS/EG requires that each well must be under vacuum (§60.34f(b)). The only time that a well is allowed to operate under non-negative pressure is in the case of a landfill fire or increased well temperature, when there is the use of a geomembrane or synthetic cap over the waste and positive pressures are accommodated in the design, or for a decommissioned well.

In the special case where a well is inadvertently “overpulled,” either as a result of aggressive LFG system operation or declining LFG production in a portion of the Landfill, oxygen may be present in concentrations greater than desirable (generally greater than 5% by volume). While this is no longer a compliance condition, this can occur when LFG is extracted at a rate that is faster than it is being generated by the decomposing refuse. To remediate this situation, the most immediate course of action is to decrease the vacuum that is applied to the well or to shut off the well.

If wellhead valve adjustments are not effective in decreasing the oxygen concentration, even at vacuum readings on the order of 0.1 inches water column, it may be necessary to temporarily shut the wellhead valve and allow the methane concentration to increase and oxygen to decrease. Otherwise, to continue to exert vacuum on the well, even at low levels, could contribute to conditions conducive for subsurface combustion.

If temporarily closing a wellhead valve is necessary to remediate overpulling of a well, SPSA will communicate with VDEQ and will continue to monitor the well on a monthly basis for oxygen concentration and pressure. However, non-negative vacuum readings recorded during this period will not be considered an exceedance of the NSPS/EG wellhead operating criteria.

During this temporary period, the well will be maintained such that increasing positive pressure does not occur. If positive pressure occurs, the wellhead valve will be opened to relieve the pressure. If the oxygen concentration has decreased to less than five percent by volume, the well will remain online. However, if the oxygen concentration remains above five percent, the wellhead valve will be shut off again after the pressure is relieved. Once oxygen concentration returns to less than five percent, the wellhead valve will be opened and the well returned to service.

As stated, this will be communicated on a case-by-case basis to VDEQ.

7.2 Wellfield Expansion

The drawings included with this Design Plan show the current as-built GCCS design and the conceptual design of the future GCCS at final buildout. As filling progresses, the locations and number of various GCCS components may vary from that which is shown on the attached drawings. While the configuration of the future GCCS will almost certainly vary from the enclosed drawings, subsequent GCCS designs will result in similar overall wellfield coverage, which will be

demonstrated through surface emissions monitoring. Record drawings for future GCCS expansions will be maintained on site to document the as-built conditions, and surface emissions monitoring will demonstrate the adequacy of the GCCS wellfield to control LFG emissions. In addition, SPSA will submit updated site plans showing the location of any new GCCS components in semi-annual NSPS/EG compliance reports.

7.3 Alternative Surface Emission Remediation Actions

Section 60.36f(c)(4)(v) of the NSPS/EG requires that for any location where monitored methane concentrations exceed 500 parts per million by volume (ppmv) above background three times in a quarter, a new well or collector shall be installed within 120 days of the initial exceedance. An alternative to installing additional wells or collectors, such as upgrading the blower, header pipes, or control device must be approved by the Administrator for approval.

While alternatives are permitted if approved by the Administrator, SPSA recognizes that requesting and receiving approval within 120 days may not always be possible, depending on the review schedule of VDEQ or EPA. Therefore, in order to streamline implementation of alternative remedial actions that may be appropriate for correcting surface emissions monitoring exceedances and minimizing fugitive LFG emissions, SPSA proposes that the following remedial actions be accepted as alternatives to installing additional wells:

- Installation of leachate dewatering pumps in wells at which a significant portion of the slotted well pipe is submerged in liquid. Dewatering of wells often increases LFG extraction rates, which can both improve the quality of the LFG extracted from a particular well and reduce the likelihood of surface emissions.
- Upgrades to the blower system. This may include installing larger or additional blowers, making improvements to the blower station piping system, including valves, etc., or upgrading the condensate knockout system at the blower station. A description of the constructed improvements will be included in the semi-annual NSPS/EG report following the remediation.
- Troubleshooting and upgrades or repairs to header and lateral pipes, condensate sumps, or header isolation valves, which may be the cause of decreased vacuum or LFG collection capacity in the vicinity of the exceedance. A description of the improvements will be included in the semi-annual NSPS/EG report following the remediation.

7.4 Exclusion of Unsafe Areas from Wellhead Monitoring

As allowed by §60.34f(d), surface emissions monitoring will be conducted so as to avoid dangerous areas such as steep slopes, active or dangerous areas, etc. SPSA also proposes that a similar alternative is occasionally appropriate for monthly monitoring of the wells that are located within the limits of, or immediately adjacent to, the Landfill's active face. Safety concerns include field personnel attempting to monitor wells in the midst of the operation of heavy equipment and waste disposal vehicles, and the need for personnel to tune wellheads that may be at a significant height above ground surface.

In order to provide for the safety of field personnel, SPSA recognizes that in some instances it may be excessively dangerous to monitor certain LFG extraction wells or collectors within or near the active face of the Landfill. SPSA proposes that if unsafe conditions exist due to waste filling

activities, monthly monitoring of the affected wells may not be possible. Two examples of potential situations in which monthly monitoring may be omitted for affected wells are described below.

7.4.1 LFG Wells and Collectors at the Active Face

Personnel in the vicinity of the active face of the landfill encounter numerous hazards that render wellhead monitoring dangerous. This includes traffic from waste hauling vehicles and heavy equipment (i.e., from dozers, compactors, and off-road dump trucks) and spreading and compacting the waste. In addition, walking over exposed waste presents trip/fall and puncture hazards. Therefore, because these hazards are consistent with the hazards described in §60.34f(d) related to surface emissions monitoring, SPSA requests a similar variance with respect to monitoring wellheads within and immediately adjacent to the active face of the landfill if unsafe conditions exist. If this situation arises and prevents the monthly monitoring of a wellhead, SPSA will document that such conditions exist for semi-annual report and will resume monthly monitoring when filling activities have moved away from the affected wells. However, failure to obtain a monthly wellhead reading as a result of dangerous conditions at a well will not constitute a violation of §60.36f(a).

7.4.2 Raised Wells and Collectors

In order to accommodate waste disposal activities, certain wells, lateral risers, and wellheads may be raised up to 10 to 20 feet into the air as waste is placed around the wells. This may be an ongoing process for periods exceeding one month at a time and affected wells may not be accessible for all or a portion of this time. If this situation prevents the monthly monitoring of a wellhead, SPSA will document that such conditions exist for the semi-annual report and will resume monthly monitoring when filling activities have moved away from the affected wells and the wellheads are within 5 to 7 feet of ground surface. The required monthly monitoring will resume at that time. Failure to obtain a monthly wellhead reading as a result of dangerous conditions at a well will not constitute a violation of §60.36f(a).

7.5 Well Abandonment

SPSA may abandon a vertical extraction well or horizontal collector in the GCCS upon provision of a statement that the Landfill will maintain sufficient well field density in compliance with NSPS/EG coverage requirements. This statement will be supported by data and shall be certified by the design engineer.

7.6 Early Installation of Collection Devices

Per 40 CFR 60.36f(b), each extraction well shall be installed no later than 60 days after the date on which the initial solid waste has been in place for a period of five years or more in active areas or two years or more if closed or at final grade. However, there may be occasions when SPSA will decide to install extraction wells prior to the onset of this NSPS/EG requirement. Based on the foregoing regulatory citation, any extraction wells installed prior to the requirements of NSPS will not be subject to the operational, record-keeping, and reporting requirements of NSPS until the age of the initial waste placed reaches five years old if in an active area or two years old if closed or at final grade.

7.7 Monitoring of LCS Risers and/or Manholes

SPSA has and may continue the practice of selectively connecting the GCCS to LCS risers and/or manholes in order to help control odors, to increase the quantity of LFG available for beneficial use, or to meet other Landfill operating needs beyond regulatory compliance. The GCCS described and depicted in this Design Plan has been designed to meet the required level of LFG control without collecting LFG from the LCS or manholes. For this reason, SPSA does not believe that the operating requirements should be applied to voluntarily-added collectors because these collectors only act to enhance the performance of the system beyond that required by NSPS/EG. Furthermore, because these devices are installed for purposes other than to meet the requirements of the rule, their design may preclude their ability to meet the stipulated operational requirements. Therefore, SPSA is requesting that connections to the LCS risers not be required to be operated and monitored in compliance with the NSPS. Note that this is consistent with the currently approved practice at the Landfill.

7.8 Horizontal Collectors

SPSA may elect to install horizontal collectors in relatively close proximity to the interim ground surface prior to resuming waste disposal activities in an area of the Landfill. This proactive construction will ensure that the infrastructure is in place to capture LFG from active areas where vertical wells could be damaged and rendered useless. While this approach to LFG collection is desirable in some ways, the disadvantage is that oxygen exceedances might occur until at least 20 feet of refuse is placed on top of the collectors. Horizontal collectors typically have a vertical zone of influence of at least 20 feet; therefore, if there is less than 20 feet of waste on top of them, ambient air can be pulled into the Landfill.

To avoid air infiltration into horizontal collectors, SPSA proposes that horizontal collectors not be subject to the pressure operating requirements until a minimum of 20 feet of waste has been placed on top of the collector. SPSA will monitor each installed collector on a monthly basis; however, non-negative pressure will not be considered an exceedance and remedial actions will not be performed.



A

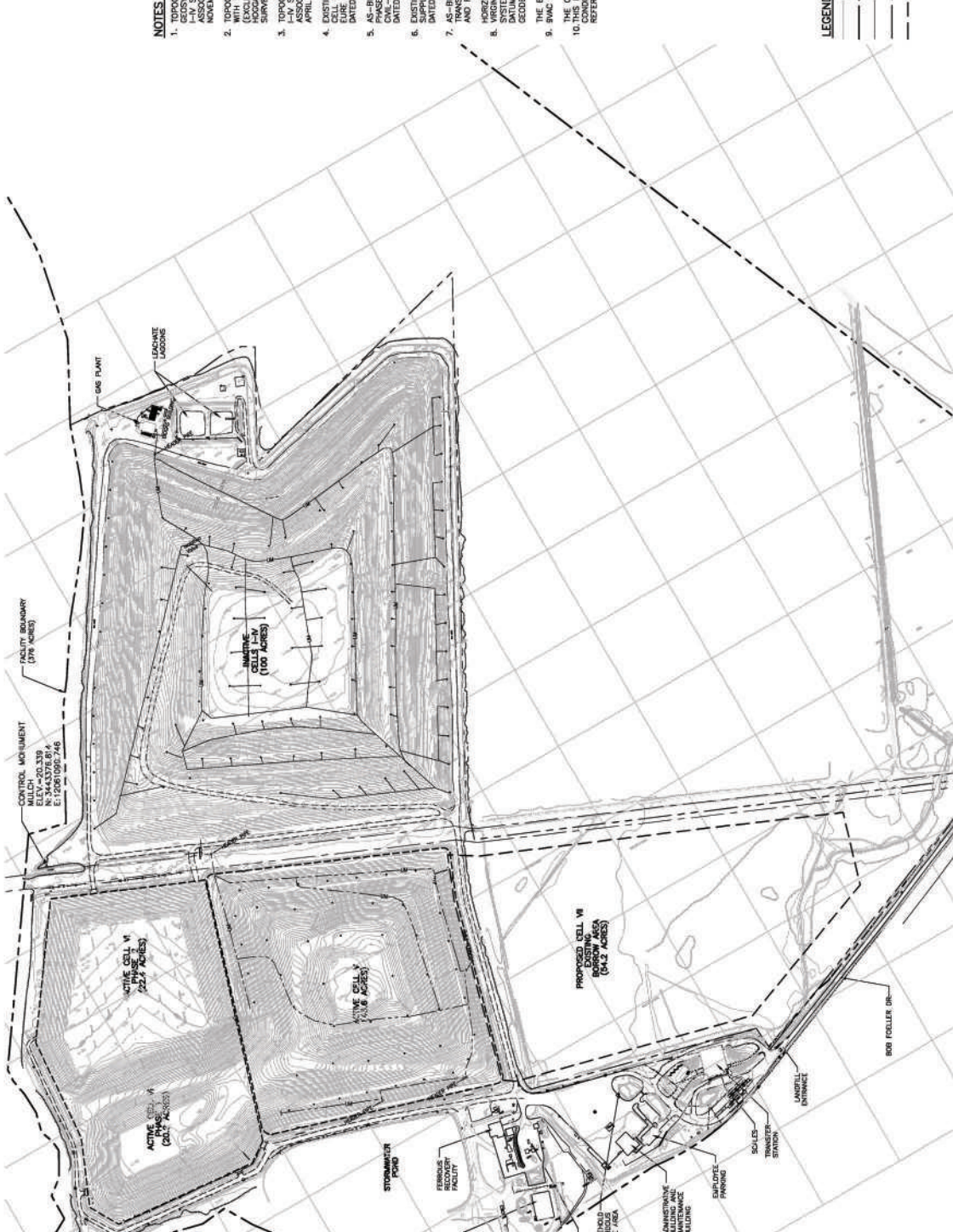
Attachment A – Landfill Site Map





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1 2 3 4 5 6 7 8



- NOTES**
1. TOPOGRAPHY WITHIN AREA OF PROPOSED FACILITY WITHIN CELLS I-IV SUPPLIED BY HOGGARD & LURE ASSOC., PC FROM FIELD SURVEY DATED NOVEMBER 6 AND 15, 2007.
 2. TOPOGRAPHY WITHIN AREAS OF CELLS I-IV EXCLUDING EAST SLOPE SUPPLIED BY HOGGARD & LURE ASSOC., PC FROM FIELD SURVEY DATED MAY 7, 2008.
 3. TOPOGRAPHY WITHIN EAST SLOPE OF CELLS I-IV SUPPLIED BY HOGGARD & LURE ASSOC., PC FROM FIELD SURVEY DATED APRIL 1, 2008.
 4. EXISTING TOPOGRAPHY WITHIN CELL V AND EAST SLOPE WITHIN CELL V SUPPLIED BY HOGGARD & LURE ASSOC., PC FROM FIELD SURVEY DATED DECEMBER 27, 2007.
 5. AS-BUILT TOPOGRAPHY WITHIN CELL VI PHASE 2 SUPPLIED BY BATEMAN SURVEYING FROM FIELD SURVEY DATED NOVEMBER 12, 2007.
 6. EXISTING TOPOGRAPHY WITHIN CELL VI SUPPLIED BY AER SURVEY BY AERIAL SURVEY DATED DECEMBER 30, 2004.
 7. AS-BUILT TOPOGRAPHY WITHIN THE TRANSFER STATION AREA SUPPLIED BY AER AND PROFITITTI DATED SEPTEMBER 19, 2005.
 8. HORIZONTAL DATUM IS BASED ON THE SYSTEM-SOUTH ZONE (NAD 83). VERTICAL DATUM IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM (NGVD 29).
 9. THE BUFFERS OUTLINED IN 304C 20-80-250 (47) WILL BE MAINTAINED.
 10. THE CONDITIONS SHOWN AS EXISTING ON THIS PLAN ARE BASED ON THE SURVEY CONDITIONS AT THE TIME OF THE SURVEYS REFERENCED HEREIN.

- LEGEND**
- 1:1000 - EXISTING CONTOURS
 - PROPERTY BOUNDARY
 - GAS EASEMENT
 - FACILITY BOUNDARY
 - - - CONSTRUCTION BASELINE

EXISTING SITE CONDITIONS

FILENAME: 00C-01.dwg
SCALE: 1"=300'

SHEET: C-01

SPSA Regional Landfill Cell VII Expansion
Part B Application

SUFFOLK VIRGINIA



PROJECT MANAGER	D.T. DECEWAKE, P.E.
	T.M. YANDOSCHAK
	G.M. WILLIAMS
PROJECT NUMBER	00002899.DTB

ISSUE	DATE	ISSUED FOR APPROVAL	DESCRIPTION
A	8/2/2008		

HDR
Hydrologic Design Resources, Inc.
4714 Old Dominion Blvd.
Suite 200
Falls Church, VA 22041




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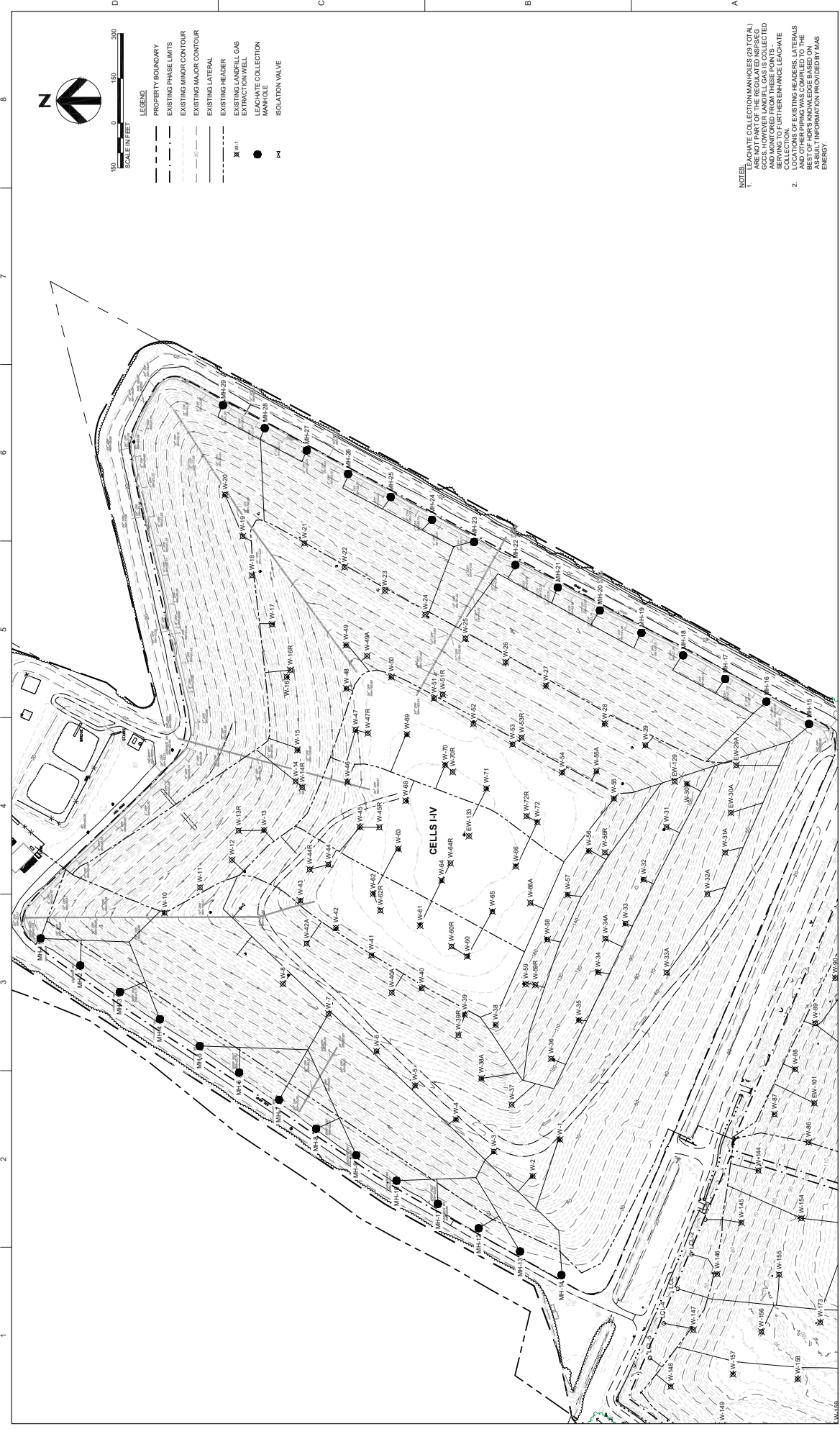
B

Attachment B – Existing Landfill Gas Collection and Control System





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- LEGEND**
- PROPERTY BOUNDARY
 - - - EXISTING PHASE LIMITS
 - · - · - EXISTING MINOR CONTOUR
 - - - EXISTING MAJOR CONTOUR
 - - - EXISTING LATERAL
 - - - EXISTING HEADER
 - - - EXISTING LANDFILL GAS EXTRACTION WELL
 - LEACHATE COLLECTION MANHOLE
 - ⊕ ISOLATION VALVE

NOTES:

- LEACHATE COLLECTION MANHOLES (20" DIA.) ARE LOCATED AT THE PERIPHERY OF THE GCS. HOWEVER LANDFILL GAS IS COLLECTED FROM MANHOLES THROUGH THE EXISTING SEWERS TO OTHER PHASES OF LEACHATE COLLECTION. EXISTING LEACHATE MANHOLES AND OTHER PIPING WAS COMPILED TO THE BEST OF HDR'S KNOWLEDGE BASED ON INFORMATION PROVIDED BY MAS ENERGY.

**EXISTING GAS EXTRACTION WELLS
CELLS HV**

SPSA
WASTE SOLUTIONS

**SOUTHEASTERN PUBLIC SERVICE AUTHORITY
REGIONAL LANDFILL
LANDFILL GAS COLLECTION AND CONTROL SYSTEM
SUFFOLK, VIRGINIA**



PROJECT MANAGER: A. WHITE, P.E.
 DESIGNED BY: C. WILLIAMS, EIT
 DRAWN BY: J. RAYMOND
 CHECKED BY: J. MILLER, P.E.

ISSUE	DATE	DESCRIPTION





- LEGEND**
- PROPERTY BOUNDARY
 - - - EXISTING PHASE LIMITS
 - - - EXISTING MINOR CONTOUR
 - - - EXISTING MAJOR CONTOUR
 - - - EXISTING LATERAL
 - - - EXISTING HEADER
 - - - EXISTING HORIZONTAL WELL
 - - - EXISTING FORCE MAIN
 - - - EXISTING LANDFILL GAS EXTRACTION WELL
 - MH#1
 - MANTHOLE

NOTES:

- LEACHATE COLLECTION MANHOLES (2019/21) ARE SHOWN TO BE COLLECTING LEACHATE AND GGS; HOWEVER LANDFILL GAS IS COLLECTED BY THE EXISTING GAS EXTRACTION WELLS. SEWERS TO OTHER THERMOPHILIC BACTERIA COLLECTION SYSTEMS ARE BASED ON MANUALS AND OTHER PIPING WAS COMPILED TO THE BEST OF HDR'S KNOWLEDGE BASED ON INFORMATION PROVIDED BY MAS ENERGY.

**EXISTING GAS EXTRACTION WELLS
CELLS V-VI**

SPSA
WASTE SOLUTIONS

**SOUTHEASTERN PUBLIC SERVICE AUTHORITY
REGIONAL LANDFILL
LANDFILL GAS COLLECTION AND CONTROL SYSTEM
SUFFOLK, VIRGINIA**



PROJECT MANAGER	A. WHITE, P.E.
DESIGNED BY	C. WILLIAMS, EIT
DRAWN BY	J. RAYMOND
CHECKED BY	J. MILLER, P.E.
PROJECT NUMBER	10289587

ISSUE	DATE	DESCRIPTION





Attachment C – Landfill Gas
Generation Data



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Year	Tonnage	Source
1985	20,097.00	2017 Landgem Model for Title V Permit Renewal
1986	74,678.00	
1987	98,358.00	
1988	679,859.00	
1989	685,702.00	
1990	608,533.00	
1991	448,683.00	
1992	397,972.00	
1993	458,604.00	
1994	440,966.00	
1995	455,297.00	
1996	340,646.00	
1997	385,023.00	
1998	394,026.00	
1999*	267,004.02	
1999*	312,119.98	Historic Tonnages Provided by SPSA *Note 1999 tonnages were provided from July - December 2019 and used for Cells V & VI modeling in addition to the Cells I-IV 1999 tonnage information above.
2000	546,516.59	
2001	534,261.71	
2002	479,776.59	
2003	629,726.00	
2004	737,704.00	
2005	652,051.00	
2006	850,316.00	
2007	1,051,935.76	
2008	853,994.00	
2009	502,017.00	
2010	213,107.00	
2011	120,634.00	
2012	62,421.00	
2013	61,099.00	
2014	87,549.56	
2015	228,521.27	
2016	132,477.00	
2017	87,643.63	
2018	136,838.58	
2019	142,245.47	
2020	143,440.82	

Year	Generated Flowrate					Collected Flowrate					Baseline Scenario				
	Cells I-IV Generated Flowrate	Cells V & VI Generated Flowrate	Cell VII Generated Flowrate	Combined Total Generated Flowrate	Cells I-IV Status Quo	Cells V & VI Status Quo	Cell VII Status Quo	Status Quo Collection Scenario	Cells I-IV Enhanced Recovery	Cells V & VI Enhanced Recovery	Cell VII Enhanced Recovery	Enhanced Recovery Collection Scenario			
1985	-	-	-	-	-	-	-	-	-	-	-	-			
1986	13.20	-	-	13.20	-	-	-	-	-	-	-	-			
1987	61.62	-	-	61.62	-	-	-	-	-	-	-	-			
1988	123.24	-	-	123.24	-	-	-	-	-	-	-	-			
1989	563.91	-	-	563.91	-	-	-	-	-	-	-	-			
1990	986.93	-	-	986.93	-	-	-	-	-	-	-	-			
1991	1,338.61	-	-	1,338.61	-	-	-	-	-	-	-	-			
1992	1,568.12	-	-	1,568.12	-	-	-	-	-	-	-	-			
1993	1,753.12	-	-	1,753.12	-	-	-	-	-	-	-	-			
1994	1,968.93	-	-	1,968.93	-	-	-	-	-	-	-	-			
1995	2,162.62	-	-	2,162.62	-	-	-	-	-	-	-	-			
1996	2,356.29	-	-	2,356.29	-	-	-	-	-	-	-	-			
1997	2,465.18	-	-	2,465.18	-	-	-	-	-	-	-	-			
1998	2,597.92	-	-	2,597.92	-	-	-	-	-	-	-	-			
1999	2,730.10	-	-	2,730.10	-	-	-	-	-	-	-	-			
2000	2,772.38	205.07	-	2,977.45	-	-	-	-	-	-	-	-			
2001	2,637.17	554.14	-	3,191.31	-	-	-	-	-	-	-	-			
2002	2,508.55	878.13	-	3,386.68	-	-	-	-	-	-	-	-			
2003	2,386.21	1,150.53	-	3,536.73	-	-	-	-	-	-	-	-			
2004	2,269.83	1,508.16	-	3,777.99	-	-	-	-	-	-	-	-			
2005	2,159.13	1,919.29	-	4,078.42	-	-	-	-	-	-	-	-			
2006	2,053.83	2,254.09	-	4,307.92	-	-	-	-	-	-	-	-			
2007	1,953.66	2,702.83	-	4,656.49	-	-	-	-	-	-	-	-			
2008	1,858.38	3,262.15	-	5,120.53	-	-	-	-	-	-	-	-			
2009	1,767.75	3,664.14	-	5,431.89	-	-	-	-	-	-	-	-			
2010	1,681.53	3,815.28	-	5,496.81	-	-	-	-	-	-	-	-			
2011	1,599.52	3,769.22	-	5,368.74	-	-	-	-	-	-	-	-			
2012	1,521.51	3,664.65	-	5,186.16	-	-	-	-	-	-	-	-			
2013	1,447.31	3,526.93	-	4,974.24	-	-	-	-	-	-	-	-			
2014	1,376.72	3,395.07	-	4,771.79	-	-	-	-	-	-	-	-			
2015	1,309.58	3,287.01	-	4,596.59	-	-	-	-	-	-	-	-			
2016	1,245.71	3,276.84	-	4,522.55	-	-	-	-	-	-	-	-			
2017	1,184.96	3,204.07	-	4,389.02	-	-	-	-	-	-	-	-			
2018	1,127.16	3,105.39	-	4,232.55	-	-	-	-	-	-	-	-			
2019	1,072.19	3,043.84	-	4,116.03	-	-	-	-	-	-	-	-			
2020	1,019.90	2,988.85	-	4,008.75	-	-	-	-	-	-	-	-			
2021	970.16	2,937.32	-	3,907.48	617.99	-	1,145.56	873.14	2,056.13	-	2,929.27	-			
2022	922.84	2,889.11	-	3,811.96	587.85	-	1,097.86	830.56	2,022.38	-	2,852.94	-			
2023	877.84	2,844.06	-	3,721.90	559.18	-	1,052.30	790.05	1,990.84	-	2,780.90	-			
2024	835.02	2,802.02	-	3,637.05	531.91	-	1,008.73	751.52	1,961.42	-	2,712.94	-			
2025	794.30	2,762.85	-	3,557.15	505.97	-	967.00	714.87	1,934.00	-	2,648.87	-			
2026	755.56	2,726.43	-	3,481.99	481.29	-	926.98	680.00	1,908.50	-	2,588.50	-			
2027	718.71	2,692.61	-	3,411.32	457.82	-	888.56	646.84	1,884.83	-	2,531.67	-			
2028	683.66	2,661.28	-	3,344.94	435.49	-	851.61	615.29	1,862.90	-	2,478.19	-			
2029	650.32	2,632.34	-	3,282.66	414.25	-	816.02	585.29	1,842.64	-	2,427.92	-			
2030	618.60	2,605.66	-	3,224.26	394.05	-	781.70	556.74	1,823.96	-	2,380.70	-			
2031	588.43	2,478.58	102.57	3,169.58	374.83	-	748.79	529.59	1,735.01	-	2,264.59	-			
2032	559.73	2,357.70	201.00	3,118.44	356.55	-	718.79	503.76	1,650.39	140.70	2,294.85	-			
2033	532.43	2,242.71	295.52	3,070.67	339.16	-	690.53	479.19	1,569.90	206.86	2,255.95	-			
2034	506.47	2,133.33	386.31	3,026.11	322.62	-	665.46	455.82	1,493.33	270.42	2,219.57	-			
2035	481.77	2,029.29	473.57	2,984.63	306.89	-	642.32	433.59	1,420.50	331.50	2,185.59	-			
2036	458.27	1,930.32	557.47	2,946.07	291.92	-	620.23	412.44	1,351.22	390.23	2,153.90	-			
2037	435.92	1,836.18	638.20	2,910.29	277.68	-	600.23	392.33	1,285.32	446.74	2,124.39	-			
2038	414.66	1,746.63	715.90	2,877.19	264.14	-	581.26	373.19	1,222.64	501.13	2,096.96	-			
2039	394.44	1,665.44	790.74	2,846.62	251.26	-	562.86	354.99	1,163.01	553.52	2,071.52	-			
2040	375.20	1,580.41	862.86	2,818.47	239.00	-	545.67	337.68	1,106.29	604.00	2,047.97	-			
2041	356.90	1,503.34	932.40	2,792.64	227.35	-	529.59	321.21	1,052.33	652.68	2,026.23	-			
2042	339.50	1,430.02	999.50	2,769.01	216.26	-	514.43	305.55	1,001.01	699.65	2,006.21	-			
2043	322.94	1,360.27	1,064.29	2,747.50	205.71	-	500.23	290.64	952.19	745.00	1,987.84	-			
2044	307.19	1,293.93	1,126.88	2,728.00	195.68	-	487.82	276.47	905.75	788.82	1,971.04	-			
2045	292.21	1,230.83	1,187.90	2,710.92	186.14	-	476.82	262.99	861.58	831.17	1,955.74	-			

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Attachment D – Conceptual
Radius of Influence
Calculations



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SPSA Regional Landfill



Vertical Wells Radius of Influence Calculation for Cells I-IV

Assumptions:

1. Steady state flow conditions exist
2. The pore space of the refuse is 100% saturated with the flowing fluid (LFG)
3. The viscosity of the flowing fluid is constant
4. Flow is laminar, horizontal, and linear since refuse grain size is relatively small and the velocity of the fluid is low

Methodology:

Utilization of an individual gas extraction well's Darcy Radius of Influence (ROI) to determine well spacings to distribute an induced vacuum uniformly throughout the waste disposal area. ROI calculation is based on modified Darcy's Equation - as indicated below:

$$r_1 = \left[\frac{2 g_c K T_s (h_s / h_T)}{P_s (dG / dt) \rho \mu T} (P_1^2 - P_0^2) \right]^{1/2}$$

Where,

- g_c Acceleration of gravity constant = 32.2 (lb_M·ft/lb_F·sec²)
- K Absolute permeability of the porous media (refuse) in (ft²) units
- T_s Standard temperature = 60(°F) = 520(°R) constant
- h_s Total vacuum well length in feet (perforated well depth)
- h_T Total extraction well length in feet (total well depth)
- P_s Standard pressure = zero inches W.C. = 14.7 (psia) = 2,116.8 (lb_f/ft²) absolute
- P₁ Pressure at extreme ROI (r₁) convention pressure gradient (assumed zero inches W.C.)
- P₀ Applied pressure/vacuum at extraction well
- (dG/dt) Landfill gas generation rate (scfm LFG per lb_M waste)
- μ Absolute viscosity of the flowing fluid (landfill gas) in (lb_M/ft·sec)
- ρ Density of refuse in lb_M/ft³
- T Flowing temperature of the fluid (landfill gas)

g _c	32.2	lb _M *ft / lb _F *sec ²
K	2.68E-11	ft ²
T _s	520	°R

Length of Solid Pipe	40	ft
Length of Perf Pipe (h _s)	42	ft
h _s /h _T	0.512	

P _s	2,116.8	lb _f /ft ² absolute
P ₁	2,116.8	lb _f /ft ² absolute

P ₀	1.9	" W.C.
P ₀	2106.9	lb _f /ft ² absolute

LFG Flowrate	970	cfm (2021 Value)
Mass in Landfill	5,232,225	Mg (2021 Value)
dG/dt	0.000185428	ft ³ /Mg*min
dG/dt	1.40181E-09	ft ³ /lb _M *sec

LFG Composition: CH₄ 50.0%
LFG Composition: CO₂ 50.0%
LFG Composition: Other Gases 0.0%
 μ (@ 60°F) 8.45E-06 lb_M/ft*sec

ρ 1000 lb_M / yd³
 ρ 37.04 lb_M / ft³

T 86 °F
T 545.67 °R

ROI Calculated = 195 ft

SPSA Regional Landfill



Vertical Wells Radius of Influence Calculation for Cell V

Assumptions:

1. Steady state flow conditions exist
2. The pore space of the refuse is 100% saturated with the flowing fluid (LFG)
3. The viscosity of the flowing fluid is constant
4. Flow is laminar, horizontal, and linear since refuse grain size is relatively small and the velocity of the fluid is low

Methodology:

Utilization of an individual gas extraction well's Darcy Radius of Influence (ROI) to determine well spacings to distribute an induced vacuum uniformly throughout the waste disposal area. ROI calculation is based on modified Darcy's Equation - as indicated below:

$$r_1 = \left[\frac{2 g_c K T_s (h_s / h_T)}{P_s (dG / dt) \rho \mu T} (P_1^2 - P_0^2) \right]^{1/2}$$

Where,

- g_c Acceleration of gravity constant = 32.2 (lb_M·ft/lb_F·sec²)
- K Absolute permeability of the porous media (refuse) in (ft²) units
- T_s Standard temperature = 60(°F) = 520(°R) constant
- h_s Total vacuum well length in feet (perforated well depth)
- h_T Total extraction well length in feet (total well depth)
- P_s Standard pressure = zero inches W.C. = 14.7 (psia) = 2,116.8 (lb_f/ft²) absolute
- P₁ Pressure at extreme ROI (r₁) convention pressure gradient (assumed zero inches W.C.)
- P₀ Applied pressure/vacuum at extraction well
- (dG/dt) Landfill gas generation rate (scfm LFG per lb_M waste)
- μ Absolute viscosity of the flowing fluid (landfill gas) in (lb_M/ft·sec)
- ρ Density of refuse in lb_M/ft³
- T Flowing temperature of the fluid (landfill gas)

g _c	32.2	lb _M *ft / lb _F *sec ²
K	2.68E-11	ft ²
T _s	520	°R

Length of Solid Pipe	16.0	ft
Length of Perf Pipe (h _s)	64.0	ft
h _s /h _T	0.800	

P _s	2,116.8	lb _f /ft ² absolute
P ₁	2,116.8	lb _f /ft ² absolute

P ₀	1.8	" W.C.
P ₀	2107.4	lb _f /ft ² absolute

LFG Flowrate	2,925	cfm (2021 Value)
Mass in Landfill	7,769,977	Mg (2021 Value)
dG/dt	0.000376449	ft ³ /Mg*min
dG/dt	2.84591E-09	ft ³ /lb _M *sec

LFG Composition: CH₄ 50.0%
LFG Composition: CO₂ 50.0%
LFG Composition: Other Gases 0.0%
 μ (@ 60°F) 8.45E-06 lb_M/ft*sec

ρ 1000 lb_M / yd³
 ρ 37.04 lb_M / ft³

T 86 °F
T 545.67 °R

ROI Calculated = 166 ft

SPSA Regional Landfill

Vertical Wells Radius of Influence Calculation for Cell VI



Assumptions:

1. Steady state flow conditions exist
2. The pore space of the refuse is 100% saturated with the flowing fluid (LFG)
3. The viscosity of the flowing fluid is constant
4. Flow is laminar, horizontal, and linear since refuse grain size is relatively small and the velocity of the fluid is low

Methodology:

Utilization of an individual gas extraction well's Darcy Radius of Influence (ROI) to determine well spacings to distribute an induced vacuum uniformly throughout the waste disposal area. ROI calculation is based on modified Darcy's Equation - as indicated below:

$$r_1 = \left[\frac{2 g_c K T_s (h_s / h_T)}{P_s (dG / dt) \rho \mu T} (P_1^2 - P_0^2) \right]^{1/2}$$

Where,

- g_c Acceleration of gravity constant = 32.2 (lb_M·ft/lb_F·sec²)
- K Absolute permeability of the porous media (refuse) in (ft²) units
- T_s Standard temperature = 60(°F) = 520(°R) constant
- h_s Total vacuum well length in feet (perforated well depth)
- h_T Total extraction well length in feet (total well depth)
- P_s Standard pressure = zero inches W.C. = 14.7 (psia) = 2,116.8 (lb_f/ft²) absolute
- P₁ Pressure at extreme ROI (r₁) convention pressure gradient (assumed zero inches W.C.)
- P₀ Applied pressure/vacuum at extraction well
- (dG/dt) Landfill gas generation rate (scfm LFG per lb_M waste)
- μ Absolute viscosity of the flowing fluid (landfill gas) in (lb_M/ft·sec)
- ρ Density of refuse in lb_M/ft³
- T Flowing temperature of the fluid (landfill gas)

g _c	32.2	lb _M *ft / lb _F *sec ²
K	2.68E-11	ft ²
T _s	520	°R

Length of Solid Pipe	24.0	ft
Length of Perf Pipe (h _s)	56.0	ft
h _s /h _T	0.700	

P _s	2,116.8	lb _f /ft ² absolute
P ₁	2,116.8	lb _f /ft ² absolute

P ₀	1.7	" W.C.
P ₀	2108.0	lb _f /ft ² absolute

LFG Flowrate	2,925	cfm (2021 Value)
Mass in Landfill	7,769,977	Mg (2021 Value)
dG/dt	0.000376449	ft ³ /Mg*min
dG/dt	2.84591E-09	ft ³ /lb _M *sec

LFG Composition: CH₄ 50.0%
LFG Composition: CO₂ 50.0%
LFG Composition: Other Gases 0.0%
 μ (@ 60°F) 8.45E-06 lb_M/ft*sec

ρ 1000 lb_M / yd³
 ρ 37.04 lb_M / ft³

T 86 °F
T 545.67 °R

ROI Calculated = 151 ft

SPSA Regional Landfill

Vertical Wells Radius of Influence Calculation for Cell VII



Assumptions:

1. Steady state flow conditions exist
2. The pore space of the refuse is 100% saturated with the flowing fluid (LFG)
3. The viscosity of the flowing fluid is constant
4. Flow is laminar, horizontal, and linear since refuse grain size is relatively small and the velocity of the fluid is low

Methodology:

Utilization of an individual gas extraction well's Darcy Radius of Influence (ROI) to determine well spacings to distribute an induced vacuum uniformly throughout the waste disposal area. ROI calculation is based on modified Darcy's Equation - as indicated below:

$$r_1 = \left[\frac{2 g_c K T_s (h_s / h_T)}{P_s (dG / dt) \rho \mu T} (P_1^2 - P_0^2) \right]^{1/2}$$

Where,

- g_c Acceleration of gravity constant = 32.2 (lb_M·ft/lb_F·sec²)
- K Absolute permeability of the porous media (refuse) in (ft²) units
- T_s Standard temperature = 60(°F) = 520(°R) constant
- h_s Total vacuum well length in feet (perforated well depth)
- h_T Total extraction well length in feet (total well depth)
- P_s Standard pressure = zero inches W.C. = 14.7 (psia) = 2,116.8 (lb_f/ft²) absolute
- P₁ Pressure at extreme ROI (r₁) convention pressure gradient (assumed zero inches W.C.)
- P₀ Applied pressure/vacuum at extraction well
- (dG/dt) Landfill gas generation rate (scfm LFG per lb_M waste)
- μ Absolute viscosity of the flowing fluid (landfill gas) in (lb_M/ft·sec)
- ρ Density of refuse in lb_M/ft³
- T Flowing temperature of the fluid (landfill gas)

g _c	32.2	lb _M *ft / lb _F *sec ²
K	2.68E-11	ft ²
T _s	520	°R

Length of Solid Pipe	15	ft
Length of Perf Pipe (h _s)	65	ft
h _s /h _T	0.813	

P _s	2,116.8	lb _f /ft ² absolute
P ₁	2,116.8	lb _f /ft ² absolute

P ₀	1.8	" W.C.
P ₀	2107.4	lb _f /ft ² absolute

LFG Flowrate	1,410	cfm (2019 Value)
Mass in Landfill	3,027,139	Mg (2019 Value)
dG/dt	0.000465786	ft ³ /Mg*min
dG/dt	3.52129E-09	ft ³ /lb _M *sec

LFG Composition: CH₄ 50.0%
LFG Composition: CO₂ 50.0%
LFG Composition: Other Gases 0.0%
 μ (@ 60°F) 8.45E-06 lb_M/ft*sec

ρ 1000 lb_M / yd³
 ρ 37.04 lb_M / ft³

T 86 °F
T 545.67 °R

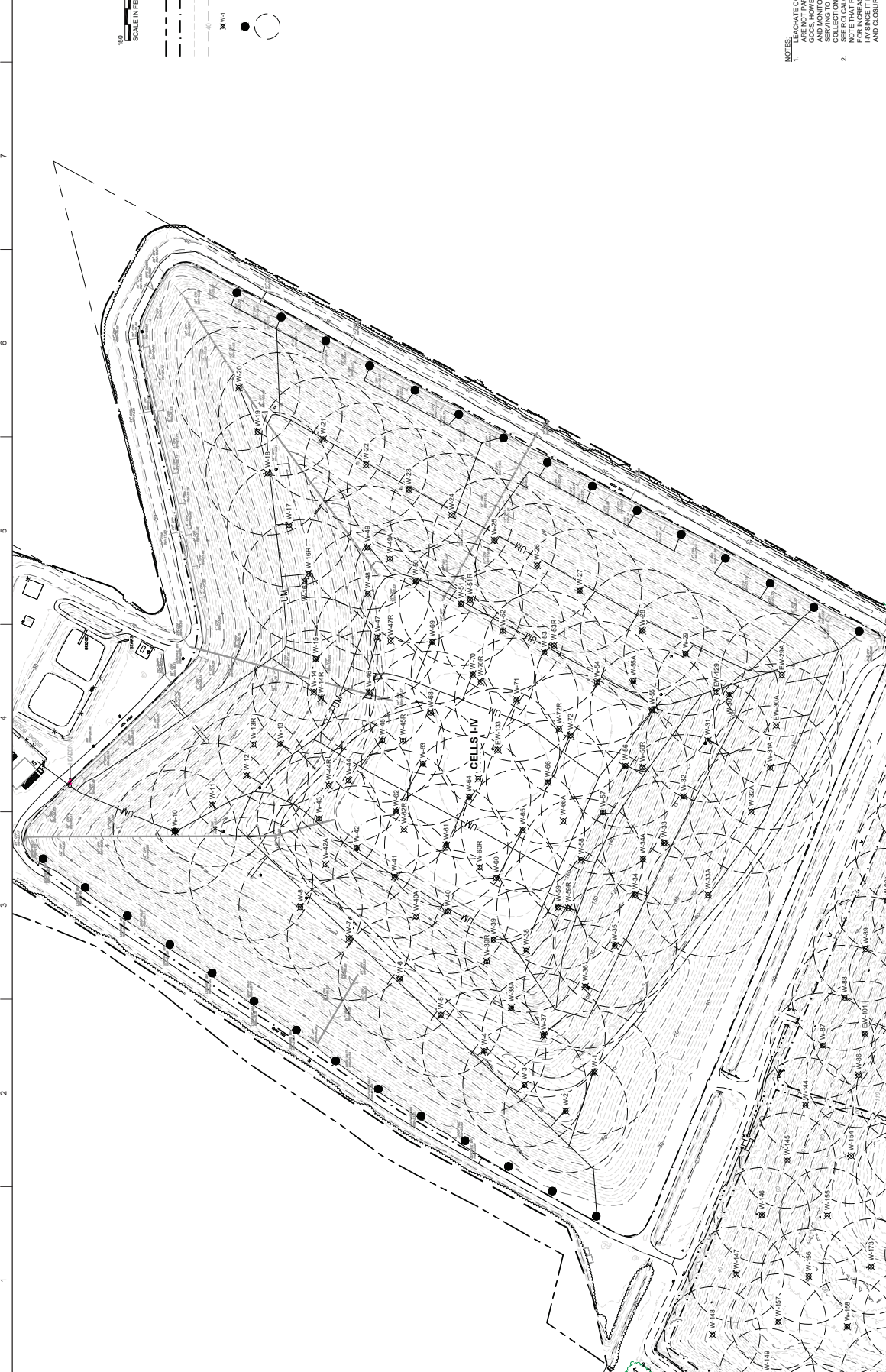
ROI Calculated = 151 ft

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Attachment E – Conceptual
Landfill Gas Well
Layout/Coverage



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- LEGEND**
- PROPERTY BOUNDARY
 - - - EXISTING PHASE LIMITS
 - · - · - EXISTING MINOR CONTOUR
 - - - EXISTING MAJOR CONTOUR
 - · - · - EXISTING LANDFILL GAS EXTRACTOR WELLS
 - EXISTING MAJOR CONTOUR
 - CONCEPTUAL MAJOR CONTOUR
 - RADIUS OF INFLUENCE

NOTES:

1. LEGEND COLLECTION MANHOLES (20" DIA.) GCS; HOWEVER LANDFILL GAS IS COLLECTED IN MANHOLES. THEREFORE THE LEGEND SHOWS TO BE THE PHASE OF LEGUATE COLLECTION. THE GAS IS COLLECTED IN LEGUATE COLLECTION MANHOLES. NOTE THAT ROI IS ENHANCED BY THE ABILITY FOR INCREASED WELLS HEAD VACUUM IN CELLS AND CLOSURE.
- 2.

EXISTING GAS EXTRACTION WELLS CELLS HV

SCALE 1" = 150'

FILENAME 00C-01.dwg

SHEET 00C-01

SPSA
WASTE SOLUTIONS

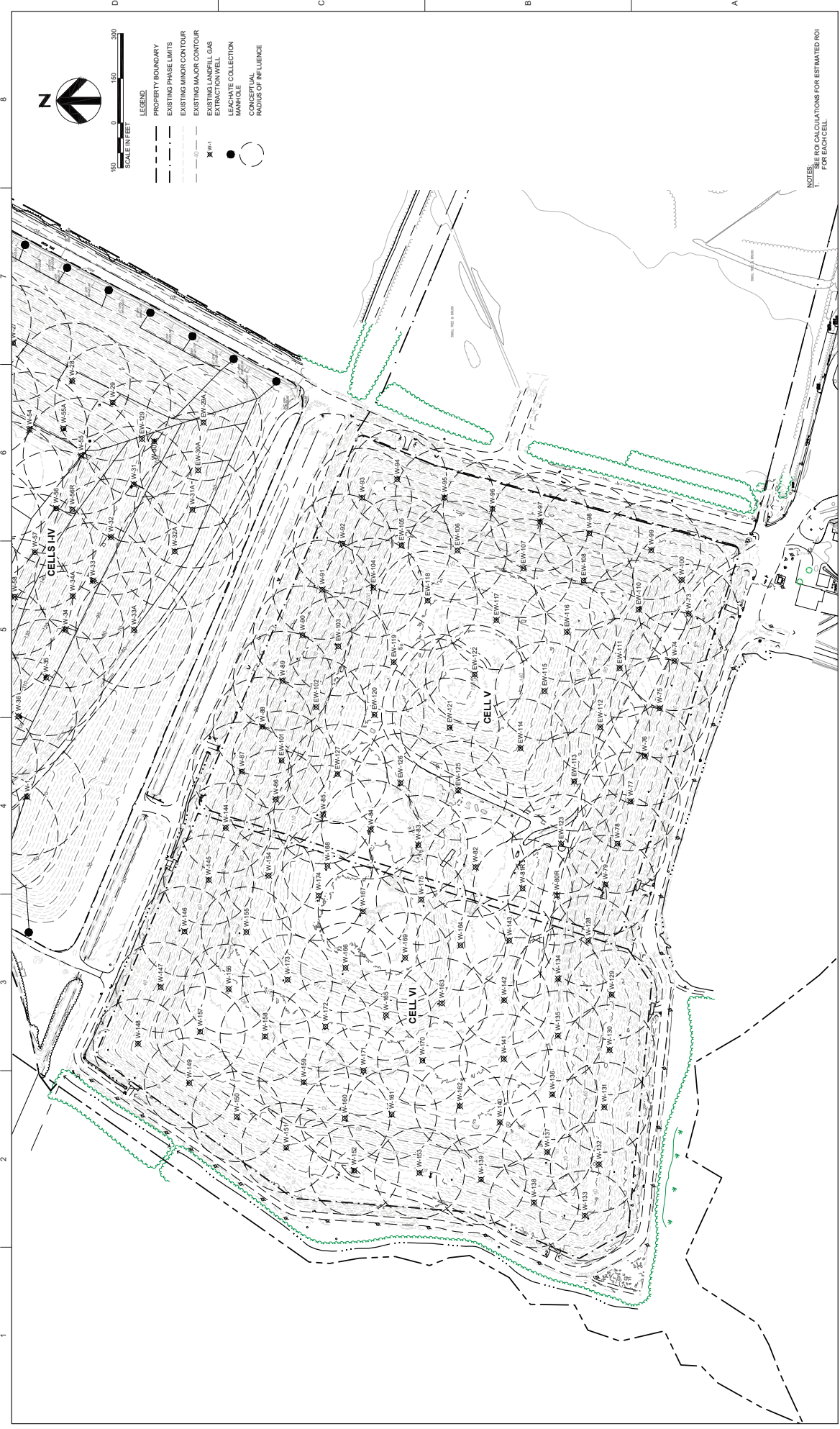
SOUTHEASTERN PUBLIC SERVICE AUTHORITY
REGIONAL LANDFILL
LANDFILL GAS EXPANSION
SUFFOLK, VIRGINIA



PROJECT MANAGER	A. WHITE, P.G.
DESIGNED BY	C. WILLIAMS, EIT
DRAWN BY	J. RAYMOND
CHECKED BY	J. MILLER, P.E.
PROJECT NUMBER	10289987

ISSUE	DATE	DESCRIPTION





- LEGEND**
- PROPERTY BOUNDARY
 - - - EXISTING PHASE LIMITS
 - - - EXISTING MINOR CONTOUR
 - - - EXISTING MAJOR CONTOUR
 - EXISTING LANDFILL GAS EXTRACTION WELL
 - EXISTING LANDFILL GAS EXTRACTION WELL
 - CONCEPTUAL RADIUS OF INFLUENCE

NOTES:
1. SEE P&ID CALCULATIONS FOR ESTIMATED ROI FOR EACH CELL

**EXISTING GAS EXTRACTION WELLS
CELLS V-VI**

SPSA
WASTE SOLUTIONS

**SOUTHEASTERN PUBLIC SERVICE AUTHORITY
REGIONAL LANDFILL
LANDFILL GAS EXPANSION
SUFFOLK, VIRGINIA**



PROJECT MANAGER	A. WHITE, P.G.
DESIGNED BY	C. WILLIAMS, EIT
DRAWN BY	J. RAYMOND
CHECKED BY	J. MILLER, P.E.
PROJECT NUMBER	1028987

ISSUE	DATE	DESCRIPTION



SHEET
00C-02

FILENAME: 00C-02.dwg
SCALE: 1" = 150'



LEGEND

- PROPERTY BOUNDARY
- EXISTING PHASE LIMITS
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING LANDFILL GAS EXTRACTION WELL
- PROPOSED PHASE LIMITS
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED LANDFILL GAS EXTRACTION WELL
- CONCEPTUAL RADIUS OF INFLUENCE

SCALE IN FEET

0 100 200

NOTES:

1. SEE CALCULATIONS FOR ESTIMATED ROI FOR EACH CELL.
2. FINAL PROPOSED GRADES AND FINAL CCDS FOR EACH CELL AND PHASES MAY BE REQUIRED AS THE CELLS DEVELOPED OVER TIME. INTERIM PHASES MAY DEVELOP OVER TIME. INTERIM PHASES MAY DEVELOP OVER TIME. INTERIM PHASES MAY DEVELOP OVER TIME. INTERIM PHASES MAY DEVELOP OVER TIME. INTERIM PHASES MAY DEVELOP OVER TIME.

**PROPOSED GAS EXTRACTION WELLS
CELL VII**

FILENAME: 00C-03.dwg
SCALE: 1" = 150'

SHEET: 00C-03

SPSA
WHITE SOLUTIONS

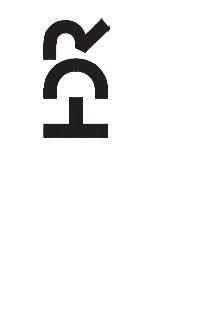
SOUTHEASTERN PUBLIC SERVICE AUTHORITY
REGIONAL LANDFILL
LANDFILL GAS EXPANSION
SUFFOLK, VIRGINIA



PROJECT MANAGER: A. WHITE, P.E.
DESIGNED BY: C. WILLIAMS, EIT
DRAWN BY: J. RAYMOND
CHECKED BY: J. MILLER, P.E.

PROJECT NUMBER: 1029597

ISSUE	DATE	DESCRIPTION





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Attachment F – Conceptual
Future Cell VII
Header/Lateral Layout



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SCALE IN FEET
 0 50 100 150 200

- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING PHASE LIMITS
 - EXISTING MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING HEADER
 - EXISTING LANDFILL GAS EXTRACTION WELL
 - PROPOSED PHASE LIMITS
 - PROPOSED MINOR CONTOUR
 - PROPOSED MAJOR CONTOUR
 - PROPOSED LANDFILL GAS EXTRACTION WELL
 - PROPOSED HEADER
 - PROPOSED LATERAL

NOTES:

1. SEE CALCULATIONS FOR ESTIMATED ROI FOR EACH CELL.
2. FINAL PROPOSED GRADES AND FINAL CCs FOR EACH CELL AND PHASES MAY BE REQUIRED AS THE CELLS DEVELOPE OVER TIME. INTERIM PHASES MAY BE DEVELOPED VERTICALLY AND/OR HORIZONTAL COLLECTORS.

**PROPOSED HEADER LAYOUT
 CELL VII**

SPSA
 WASTE SOLUTIONS

**SOUTHEASTERN PUBLIC SERVICE AUTHORITY
 REGIONAL LANDFILL
 LANDFILL GAS EXPANSION
 SUFFOLK, VIRGINIA**



PROJECT MANAGER: A. WHITE, P.G.
 DESIGNED BY: C. WILLIAMS, EIT
 DRAWN BY: J. RAYMOND
 CHECKED BY: J. MILLER, P.E.

ISSUE	DATE	DESCRIPTION

PROJECT NUMBER: 1028987



FILENAME: 00C-01.dwg
 SCALE: 1" = 100'



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Attachment G – KYPipe
Conceptual Header
Sizing/Capacity Calculations



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KYGAS RESULTS SUMMARY

Background

KYGAS was developed by Dr. Don J. Wood and Dr. James E. Funk at the University of Kentucky. The program was modeled after KYPIPE, which models water distribution systems. KYGAS is used to determine head losses, system pressures, and velocities in piping systems controlled under vacuum. KYGAS operates under the assumptions that all flow in the piping system is steady, one-dimensional, isothermal flow for an ideal gas. The program uses the Darcy-Weisbach equation for head losses related to incompressible flow and the Ideal Gas Law for pressure-temperature-density relationships.

KYGAS has several useful options to develop a LFG system. The program allows the user to model any type of piping system material or configuration to coincide with field conditions. The program includes tabular and graphic interfaces for the input of information regarding the system. Multiple blower locations may be used in the program to simulate actual field conditions. In addition, blower performance curves may be entered into the program for comparison to operational and actual field conditions. KYGAS is capable of running multiple scenarios for any piping configuration including looped header systems. LFG flow units and pressure values at the wells are user specified for comparison to values obtained in the field.

Methodology

The following parameters are required for operation of KYGAS.

- Pipe diameter (varies)
- Pipe length (varies)
- Roughness within the pipe (0.1 millifeet)
- LFG flow rate into the system at each well or node (see text below)
- LFG operating temperature (86 deg F)
- Specific gravity of the LFG (1.037)
- Ratio of specific heats (1.3)
- Absolute viscosity of LFG (2.7×10^{-7} lb*sec/ft²)

The design process begins with the development of the LFG flow rates for use in the program. The LFG flow is determined from the USEPA LandGEM LFG model. The LFG model is developed based on site-specific information relating to waste inflow, composition, landfill capacity, and site life. The second step involves evaluating the conceptual design of the LFG system to be installed. Based on the conceptual design and a general understanding of the planned phasing of the landfill, the total LFG flow for a landfill is divided into various amounts to simulate varied flow rates at the wellheads over the life of the site. For SPSA, the 223 wells (189 existing, 34 proposed future wells) were assumed to contribute 14.5 scfm each for a total flowrate of 2,958 scfm.

KYGAS allows the user to input information in either a tabular or graphical method. The graphical method is called KYCAD. KYCAD allows the user to input the piping network to scale in an AutoCAD format. The user constructs the system in the computer by drawing the system as it will

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appear in the field, and then adjusts the necessary pipe lengths and locations of wells (nodes) as required. Site-specific conditions are considered when laying out a system. No elevations are used for the various nodes in this analysis. It is assumed that all LFG flow will proceed through the system regardless of node elevations.

Once all of the required information is in the program, the user can begin to evaluate the system. Evaluation of the system is an iterative process. The initial design is based on the engineer's previous design experience for similar sized systems. Once the results of the initial model are reviewed, the iterative process begins by balancing the system to control LFG velocity, pressure loss, and pipe diameter for various parts of the system.

The initial flow rates and their input locations into the system remain unchanged throughout this process. The main factor adjusted for every iteration is the pipe diameter. The inside pipe diameter determines the LFG velocity and pressure drop in each pipe. Once the velocities in the system piping and the vacuum pressure remaining at the furthest node meet design requirements, the engineer may proceed with developing and finalizing the system for construction.

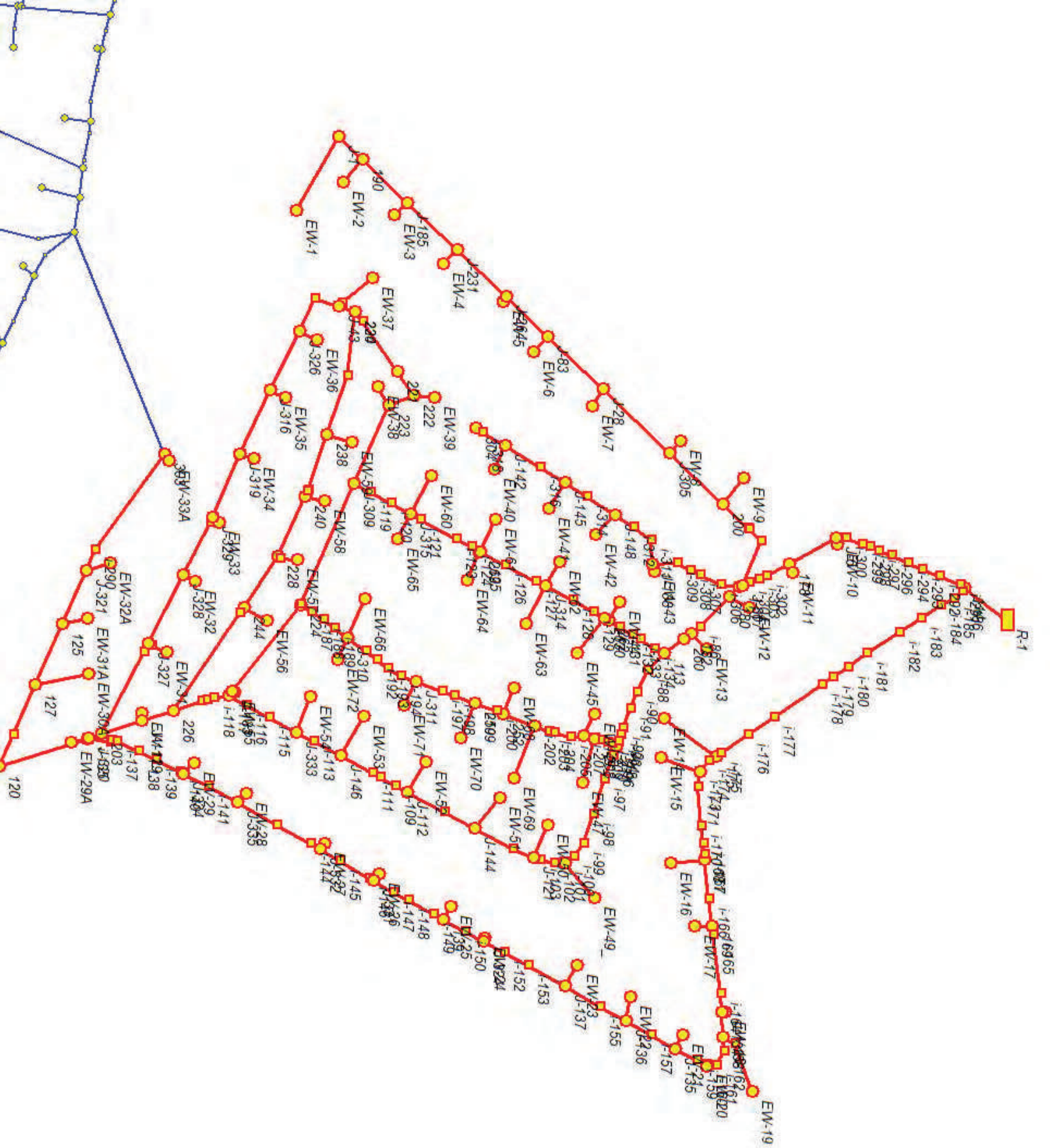
The design criteria for the header system are:

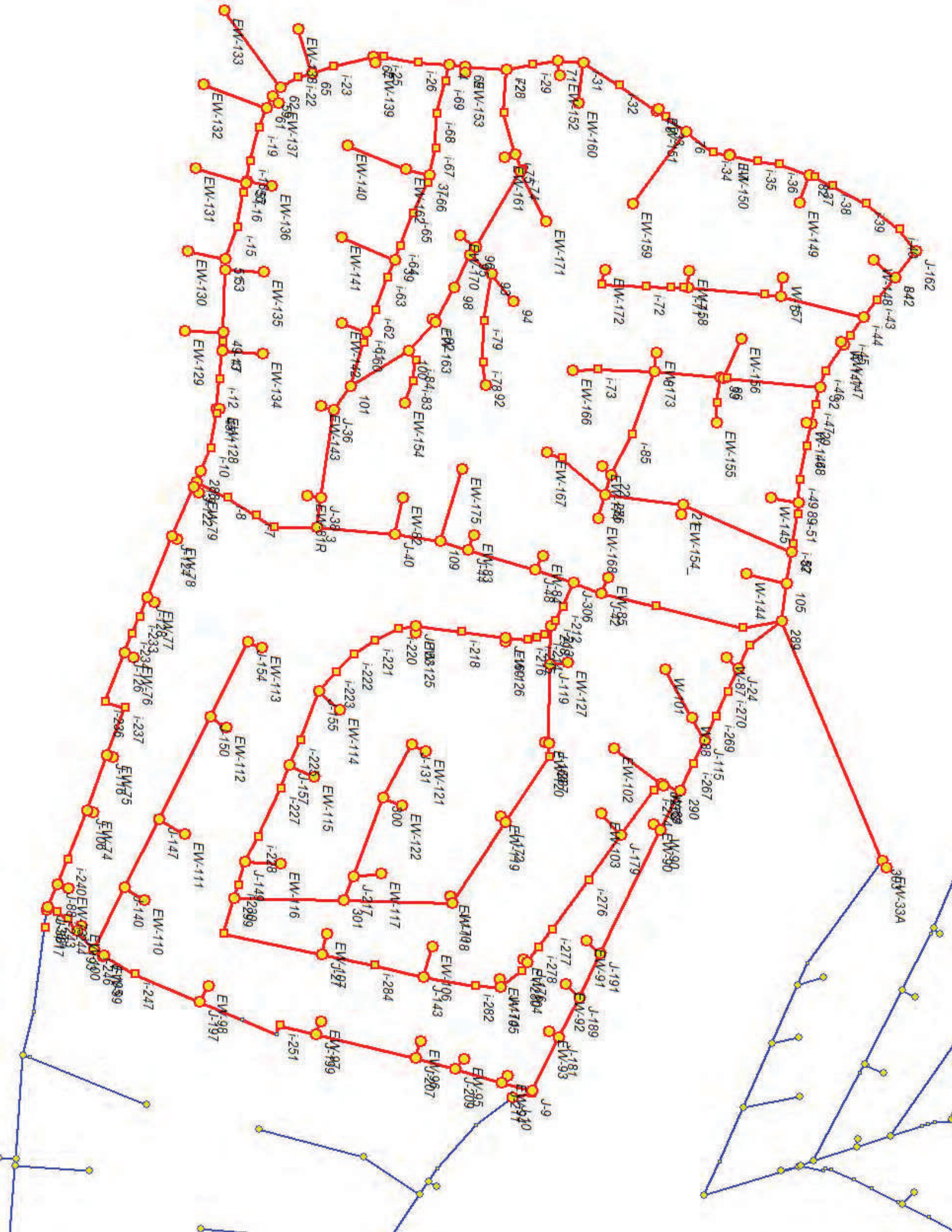
- Maximum Con-Current Velocity 40 fps
- Maximum Counter-Current Velocity 20 fps
- Maximum Pressure Drop 1" w.c. per 100 feet of pipe

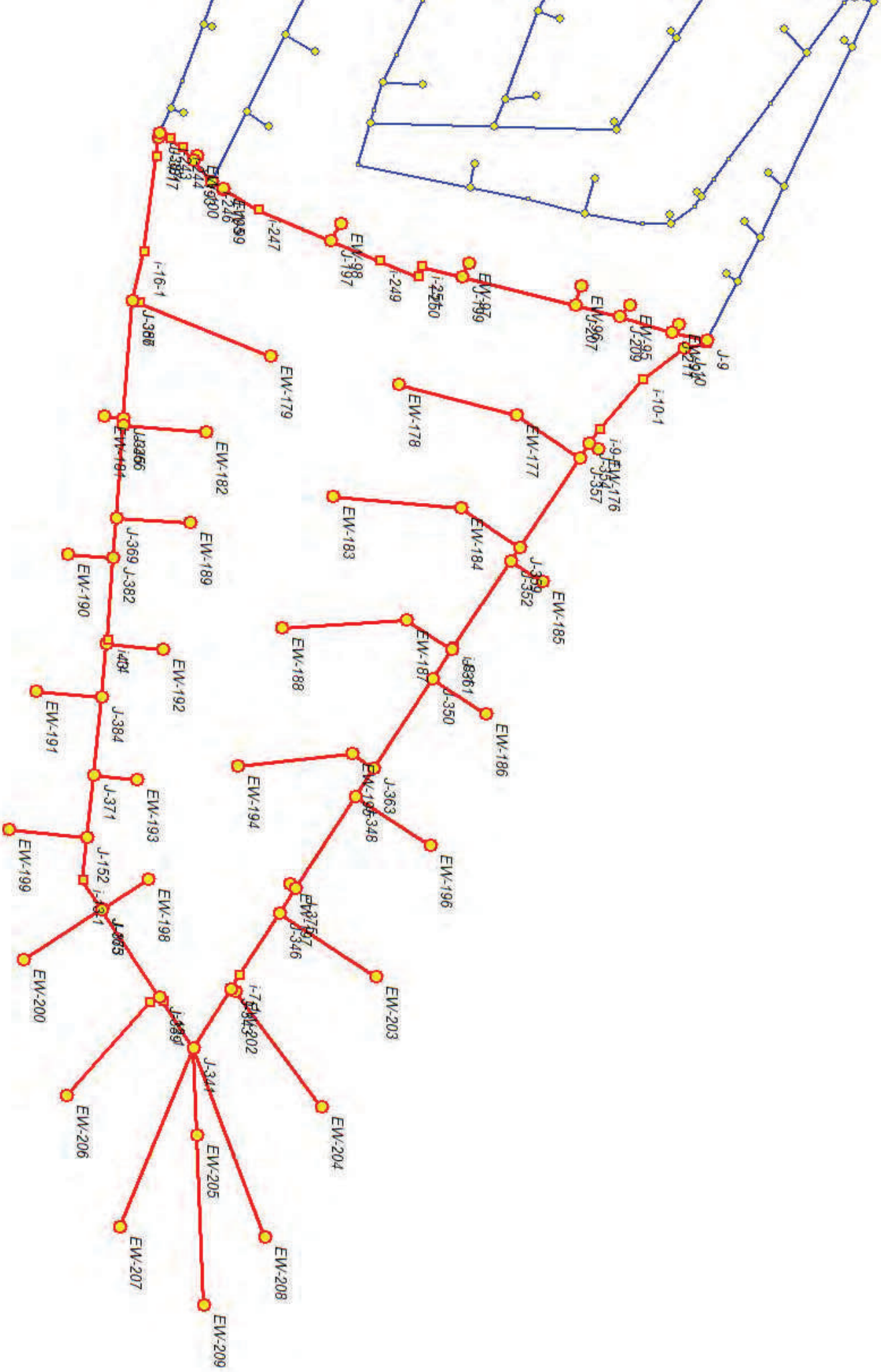
Results

The results of the KYGAS analysis indicate a total system pressure drop of approximately 12" w.c. Please refer to the attached KYGAS output files. This should occur at Node EW-159. The maximum con-current velocity is 34.60 fps (Pipe P-7), which is below the maximum 40 fps con-current criteria. The counter-current flow is well below 20 fps in the system. All values are well within allowable operational ranges.

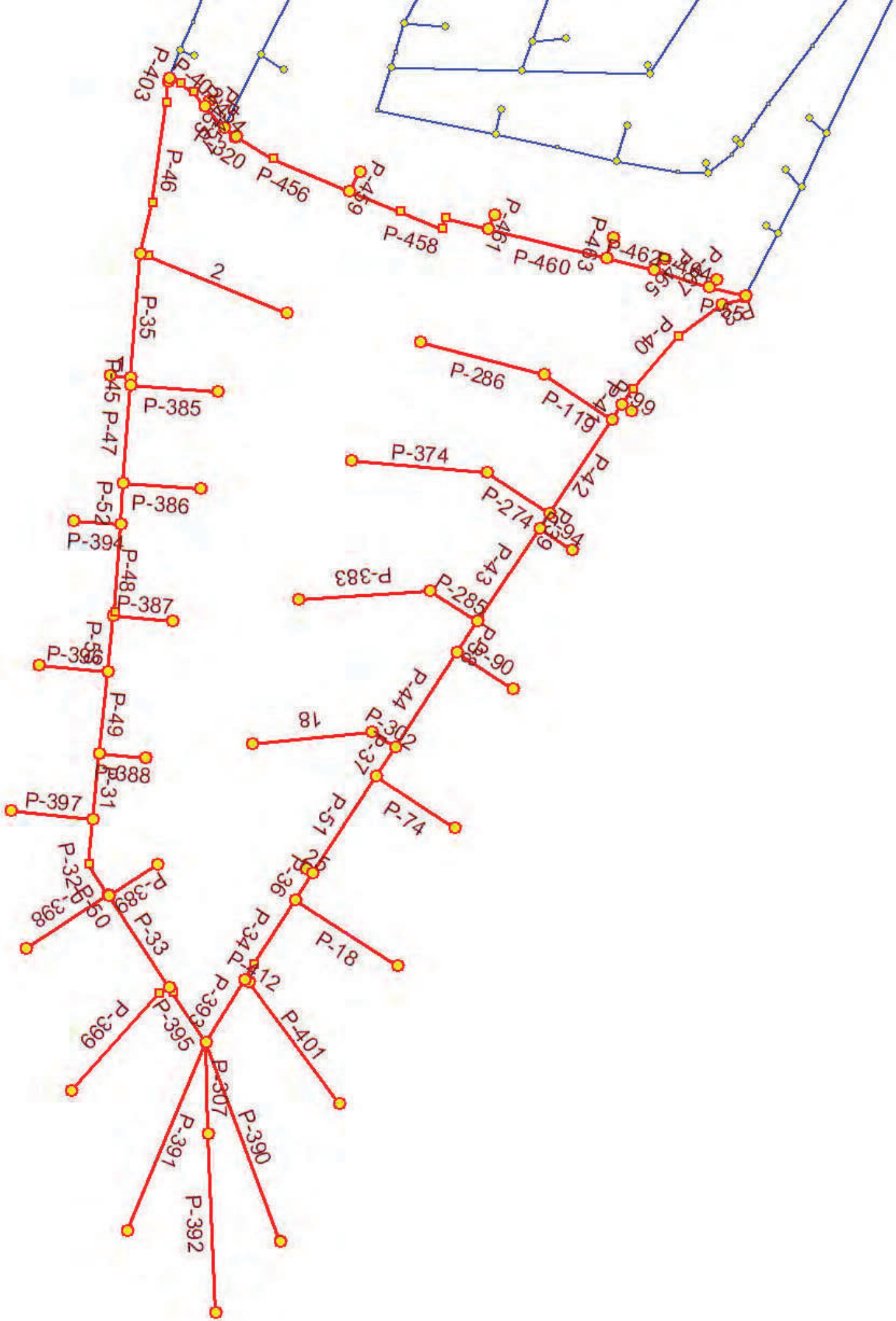
Attachment: KY Pipe Report











```

* * * * * K Y G A S * * * * *
*
* Gas Network Analysis Software
*
* CopyRighted by KYPIPE LLC (www.kypipe.com)
* Version: 10.009 10/01/2019
* Serial #: 10-10289534
* Interface: KYnetic
* Licensed for Pipe2014
*
* * * * *

```

```

INPUT DATA FILE NAME FOR THIS SIMULATION = C:\Users\chwillia\Desktop\SPSAV3~1.
KYP\spsa_v3.DAT
OUTPUT DATA FILE NAME FOR THIS SIMULATION = C:\Users\chwillia\Desktop\SPSAV3~1.
KYP\spsa_v3.OT2

```

```

DATE FOR THIS COMPUTER RUN      : 6-15-2021
START TIME FOR THIS COMPUTER RUN : 20: 7:58: 4

```

SUMMARY OF DISTRIBUTION SYSTEM CHARACTERISTICS:

```

NUMBER OF PIPES           = 442
NUMBER OF JUNCTION NODES = 438

UNITS SPECIFIED           = ENGLISH

```

PROPERTIES OF THE GAS FOR THIS ANALYSIS ARE:

```

OPERATING TEMPERATURE      = 86.000 DEGREES FAHRENHEIT
REFERENCE DENSITY (@ STD. PRESSURE) = .75E-01 POUNDS/CUBIC FOOT
GAS MOLECULAR WEIGHT       = 30.030
GAS SPECIFIC GRAVITY       = 1.037
RATIO OF SPECIFIC HEATS    = 1.300
GAS CONSTANT               = 51.460
ABSOLUTE VISCOSITY         = .270E-06 POUND SECONDS/SQUARE FOOT

```

```

USER SPEC. FLOW UNITS (USFU) = SCF / MIN.
USER SPEC. PRESSURE UNITS(USPU) = INCHES OF WATER (GAUGE)

```

----- SUMMARY OF PIPE NETWORK GEOMETRIC AND OPERATING DATA -----

PIPE NAME	NODE #1	NODE #2	LENGTH (FT.)	DIAM. (IN.)	ROUGHNESS (MILLIFEET)	SUM-M FACT.	PUMP ID	ELEVATION CHANGE
1	EW-181	J-345	40.0	6.0	.100	.0	0	.0
2	J-386	EW-179	307.0	6.0	.100	.0	0	.0
4	17	EW-172	236.0	6.0	.100	.0	0	.0
5	8	EW-166	191.0	6.0	.100	.0	0	.0
6	EW-167	i-76	168.0	6.0	.100	.0	0	.0
8	EW-171	i-74	129.0	4.0	.100	.0	0	.0
9	EW-158	17	40.0	4.0	.100	.0	0	.0
10	EW-173	8	43.0	4.0	.100	.0	0	.0
11	EW-155	33	104.0	4.0	.100	.0	0	.0
12	21	i-76	183.0	6.0	.100	.0	0	.0
13	22	23	48.0	6.0	.100	.0	0	.0
14	W-147	EW-147	10.0	4.0	.100	.0	0	.0
15	i-44	i-42	117.0	10.0	.100	.0	0	.0
16	W-157	5	43.0	4.0	.100	.0	0	.0
17	W-146	29	12.0	4.0	.100	.0	0	.0
18	EW-194	EW-195	234.0	6.0	.100	.0	0	.0
19	32	86	224.0	6.0	.100	.0	0	.0
20	33	8	152.0	6.0	.100	.0	0	.0
22	EW-140	EW-162	145.0	4.0	.100	.0	0	.0
23	EW-141	39	132.0	4.0	.100	.0	0	.0
25	EW-197	J-375	16.0	6.0	.100	.0	0	.0
26	EW-128	45	6.0	4.0	.100	.0	0	.0
27	EW-134	47	95.0	4.0	.100	.0	0	.0
28	EW-129	49	88.0	4.0	.100	.0	0	.0
29	EW-130	51	88.0	4.0	.100	.0	0	.0
30	EW-135	53	88.0	4.0	.100	.0	0	.0
31	EW-136	55	59.0	4.0	.100	.0	0	.0
32	EW-131	57	121.0	4.0	.100	.0	0	.0
33	EW-137	59	21.0	4.0	.100	.0	0	.0
34	EW-132	61	155.0	4.0	.100	.0	0	.0
35	62	EW-133	220.0	4.0	.100	.0	0	.0
36	EW-138	65	107.0	4.0	.100	.0	0	.0
37	EW-139	67	14.0	4.0	.100	.0	0	.0
38	EW-153	69	15.0	4.0	.100	.0	0	.0
39	EW-152	71	35.0	4.0	.100	.0	0	.0
40	72	i-75	200.0	6.0	.100	.0	0	.0
42	EW-159	76	207.0	4.0	.100	.0	0	.0
43	EW-151	78	5.0	4.0	.100	.0	0	.0
45	EW-149	82	69.0	4.0	.100	.0	0	.0
46	W-148	i-42	64.0	4.0	.100	.0	0	.0
48	EW-156	86	99.0	4.0	.100	.0	0	.0
49	21	87	272.0	6.0	.100	.0	0	.0
50	W-145	89	65.0	4.0	.100	.0	0	.0
52	92	93	258.0	4.0	.100	.0	0	.0
53	94	93	80.0	4.0	.100	.0	0	.0
54	93	95	66.0	4.0	.100	.0	0	.0

57	98	i-82	89.0	6.0	.100	.0	0	.0
58	100	101	156.0	6.0	.100	.0	0	.0
59	EW-154	100	130.0	4.0	.100	.0	0	.0
61	105	W-144	97.0	4.0	.100	.0	0	.0
62	EW-168	23	56.0	4.0	.100	.0	0	.0
63	22	8	261.0	6.0	.100	.0	0	.0
65	110	180	34.0	10.0	.100	.0	0	.0
67	114	R-1	134.0	18.0	.100	.0	0	.0
68	EW-29A	i-135	41.0	4.0	.100	.0	0	.0
69	224	J-309	331.0	10.0	.100	.0	0	.0
71	120	i-135	228.0	18.0	.100	.0	0	.0
72	EW-32A	J-321	62.0	4.0	.100	.0	0	.0
73	EW-31A	125	63.0	4.0	.100	.0	0	.0
87	EW-24	J-324	8.0	4.0	.100	.0	0	.0
93	158	EW-19	160.0	4.0	.100	.0	0	.0
95	i-160	J-135	93.0	18.0	.100	.0	0	.0
100	169	EW-17	44.0	4.0	.100	.0	0	.0
101	171	EW-16	86.0	4.0	.100	.0	0	.0
103	175	EW-14	161.0	4.0	.100	.0	0	.0
104	EW-11	178	23.0	4.0	.100	.0	0	.0
105	EW-12	180	56.0	4.0	.100	.0	0	.0
106	EW-13	182	55.0	4.0	.100	.0	0	.0
108	J-307	200	254.0	18.0	.100	.0	0	.0
110	EW-1	J-1	213.0	6.0	.100	.0	0	.0
111	EW-2	190	74.0	4.0	.100	.0	0	.0
113	EW-4	J-231	49.0	4.0	.100	.0	0	.0
115	EW-8	J-305	40.0	4.0	.100	.0	0	.0
116	EW-9	200	82.0	4.0	.100	.0	0	.0
118	203	J-327	253.0	10.0	.100	.0	0	.0
120	J-329	J-328	160.0	10.0	.100	.0	0	.0
121	EW-36	J-326	48.0	4.0	.100	.0	0	.0
122	EW-35	J-316	41.0	4.0	.100	.0	0	.0
123	EW-34	J-319	36.0	4.0	.100	.0	0	.0
124	EW-33	J-329	28.0	4.0	.100	.0	0	.0
125	EW-32	J-328	33.0	4.0	.100	.0	0	.0
126	EW-31	J-327	49.0	4.0	.100	.0	0	.0
127	J-43	J-326	153.0	10.0	.100	.0	0	.0
129	221	222	70.0	10.0	.100	.0	0	.0
130	222	223	68.0	10.0	.100	.0	0	.0
131	223	J-309	212.0	10.0	.100	.0	0	.0
132	224	J-133	274.0	10.0	.100	.0	0	.0
133	226	244	317.0	10.0	.100	.0	0	.0
135	228	240	164.0	10.0	.100	.0	0	.0
136	EW-37	J-43	108.0	4.0	.100	.0	0	.0
137	238	240	162.0	10.0	.100	.0	0	.0
138	220	238	316.0	10.0	.100	.0	0	.0
140	EW-59	238	65.0	4.0	.100	.0	0	.0
141	EW-58	240	48.0	4.0	.100	.0	0	.0
142	EW-57	228	49.0	4.0	.100	.0	0	.0
143	EW-56	244	65.0	4.0	.100	.0	0	.0

144	EW-72	J-310	58.0	4.0	.100	.0	0	.0
145	EW-71	J-311	68.0	4.0	.100	.0	0	.0
146	EW-70	i-199	92.0	4.0	.100	.0	0	.0
147	EW-68	252	69.0	4.0	.100	.0	0	.0
148	EW-69	i-202	140.0	4.0	.100	.0	0	.0
149	EW-49	i-207	60.0	4.0	.100	.0	0	.0
150	EW-47	i-208	112.0	4.0	.100	.0	0	.0
152	EW-44	262	53.0	4.0	.100	.0	0	.0
153	EW-62	J-314	71.0	4.0	.100	.0	0	.0
155	EW-45	i-130	110.0	4.0	.100	.0	0	.0
156	EW-61	i-125	89.0	4.0	.100	.0	0	.0
157	EW-60	J-315	108.0	4.0	.100	.0	0	.0
159	EW-49_	i-101	114.0	4.0	.100	.0	0	.0
161	EW-28	J-335	30.0	4.0	.100	.0	0	.0
162	EW-27	J-332	19.0	4.0	.100	.0	0	.0
163	EW-26	J-331	22.0	4.0	.100	.0	0	.0
164	EW-29	J-334	38.0	4.0	.100	.0	0	.0
166	288	i-9	26.0	6.0	.100	.0	0	.0
167	290	i-273	46.0	10.0	.100	.0	0	.0
168	i-246	J-140	159.0	10.0	.100	.0	0	.0
169	W-101	W-88	129.0	4.0	.100	.0	0	.0
170	EW-102	i-273	136.0	4.0	.100	.0	0	.0
171	298	J-119	88.0	10.0	.100	.0	0	.0
172	300	J-217	193.0	12.0	.100	.0	0	.0
174	114	J-6	345.0	18.0	.100	.0	0	.0
175	4	69	36.0	6.0	.100	.0	0	.0
177	51	57	183.0	6.0	.100	.0	0	.0
178	55	61	174.0	6.0	.100	.0	0	.0
179	62	65	80.0	6.0	.100	.0	0	.0
180	67	4	177.0	6.0	.100	.0	0	.0
181	71	i-31	58.0	6.0	.100	.0	0	.0
182	89	87	116.0	10.0	.100	.0	0	.0
183	17	5	216.0	6.0	.100	.0	0	.0
185	101	i-61	132.0	6.0	.100	.0	0	.0
186	105	289	87.0	10.0	.100	.0	0	.0
187	110	J-138	229.0	10.0	.100	.0	0	.0
188	113	118	264.0	10.0	.100	.0	0	.0
189	118	i-101	323.0	10.0	.100	.0	0	.0
190	290	J-115	128.0	12.0	.100	.0	0	.0
EW-7	J-28	EW-7	10.0	4.0	.100	.0	0	.0
P-1	J-42	289	428.0	12.0	.100	.0	0	.0
P-102	J-6	EW-10	17.0	4.0	.100	.0	0	.0
P-107	96	95	23.0	10.0	.100	.0	0	.0
P-109	J-333	J-146	124.0	10.0	.100	.0	0	.0
P-112	J-185	EW-3	44.0	4.0	.100	.0	0	.0
P-114	EW-5	J-264	15.0	4.0	.100	.0	0	.0
P-117	J-83	J-264	145.0	18.0	.100	.0	0	.0
P-119	EW-177	J-357	157.0	6.0	.100	.0	0	.0
P-128	96	EW-170	44.0	4.0	.100	.0	0	.0
P-134	i-75	EW-161	24.0	6.0	.100	.0	0	.0

P-139	223	EW-38	52.0	4.0	.100	.0	0	.0
P-151	J-144	J-112	190.0	10.0	.100	.0	0	.0
P-154	289	303	598.0	18.0	.100	.0	0	.0
P-158	269	EW-64	76.0	18.0	.100	.0	0	.0
P-160	J-333	EW-54	95.0	4.0	.100	.0	0	.0
P-165	i-173	EW-15	103.0	18.0	.100	.0	0	.0
P-173	252	i-202	84.0	18.0	.100	.0	0	.0
P-176	J-306	J-42	71.0	12.0	.100	.0	0	.0
P-18	EW-203	J-346	236.0	6.0	.100	.0	0	.0
P-184	J-311	J-310	204.0	10.0	.100	.0	0	.0
P-191	125	J-321	146.0	18.0	.100	.0	0	.0
P-192	127	125	163.0	18.0	.100	.0	0	.0
P-193	J-121	EW-50	88.0	4.0	.100	.0	0	.0
P-194	139	J-324	112.0	18.0	.100	.0	0	.0
P-195	J-112	J-146	189.0	10.0	.100	.0	0	.0
P-196	158	J-134	64.0	18.0	.100	.0	0	.0
P-197	J-112	EW-52	87.0	4.0	.100	.0	0	.0
P-198	169	171	165.0	18.0	.100	.0	0	.0
P-2	109	EW-175	174.0	4.0	.100	.0	0	.0
P-200	178	J-307	129.0	18.0	.100	.0	0	.0
P-201	180	182	133.0	10.0	.100	.0	0	.0
P-202	203	J-111	104.0	10.0	.100	.0	0	.0
P-203	226	i-117	154.0	10.0	.100	.0	0	.0
P-204	J-138	J-148	169.0	10.0	.100	.0	0	.0
P-205	J-7	82	191.0	6.0	.100	.0	0	.0
P-206	J-7	EW-150	4.0	4.0	.100	.0	0	.0
P-207	J-115	J-24	184.0	12.0	.100	.0	0	.0
P-209	EW-147	32	115.0	10.0	.100	.0	0	.0
P-21	21	EW-154_	24.0	4.0	.100	.0	0	.0
P-211	J-115	W-88	60.0	4.0	.100	.0	0	.0
P-213	269	i-125	2.0	4.0	.100	.0	0	.0
P-214	J-121	i-101	81.0	10.0	.100	.0	0	.0
P-215	29	89	184.0	10.0	.100	.0	0	.0
P-216	3	i-9	307.0	12.0	.100	.0	0	.0
P-217	32	29	87.0	10.0	.100	.0	0	.0
P-219	37	4	259.0	6.0	.100	.0	0	.0
P-220	39	37	213.0	6.0	.100	.0	0	.0
P-222	45	47	135.0	6.0	.100	.0	0	.0
P-223	47	49	42.0	6.0	.100	.0	0	.0
P-224	49	53	144.0	6.0	.100	.0	0	.0
P-225	53	51	26.0	6.0	.100	.0	0	.0
P-227	59	62	28.0	6.0	.100	.0	0	.0
P-228	61	59	31.0	6.0	.100	.0	0	.0
P-229	65	67	148.0	6.0	.100	.0	0	.0
P-230	69	i-28	97.0	6.0	.100	.0	0	.0
P-233	76	J-7	116.0	6.0	.100	.0	0	.0
P-234	78	76	84.0	6.0	.100	.0	0	.0
P-235	82	J-162	308.0	6.0	.100	.0	0	.0
P-237	86	33	8.0	6.0	.100	.0	0	.0
P-238	87	105	74.0	10.0	.100	.0	0	.0

P-239	96	i-74	203.0	6.0	.100	.0	0	.0
P-24	i-61	EW-142	62.0	6.0	.100	.0	0	.0
P-240	i-75	i-74	43.0	6.0	.100	.0	0	.0
P-245	i-82	100	91.0	6.0	.100	.0	0	.0
P-246	J-43	220	43.0	10.0	.100	.0	0	.0
P-247	J-306	J-48	93.0	12.0	.100	.0	0	.0
P-248	J-306	298	115.0	10.0	.100	.0	0	.0
P-249	J-83	EW-6	52.0	4.0	.100	.0	0	.0
P-25	3	J-38	70.0	6.0	.100	.0	0	.0
P-250	J-307	110	8.0	18.0	.100	.0	0	.0
P-251	J-185	190	154.0	18.0	.100	.0	0	.0
P-254	J-309	J-315	160.0	10.0	.100	.0	0	.0
P-255	J-310	EW-66	106.0	4.0	.100	.0	0	.0
P-262	118	i-208	57.0	10.0	.100	.0	0	.0
P-263	J-314	EW-63	106.0	4.0	.100	.0	0	.0
P-264	J-314	267	167.0	10.0	.100	.0	0	.0
P-265	J-315	EW-65	71.0	4.0	.100	.0	0	.0
P-266	J-315	269	196.0	10.0	.100	.0	0	.0
P-267	J-231	J-185	170.0	18.0	.100	.0	0	.0
P-269	J-317	J-179	151.0	10.0	.100	.0	0	.0
P-270	J-317	W-89	5.0	4.0	.100	.0	0	.0
P-271	127	120	222.0	18.0	.100	.0	0	.0
P-273	J-264	J-231	169.0	18.0	.100	.0	0	.0
P-274	EW-184	J-359	145.0	6.0	.100	.0	0	.0
P-275	J-320	J-334	257.0	18.0	.100	.0	0	.0
P-276	J-320	203	33.0	10.0	.100	.0	0	.0
P-278	J-321	303	350.0	18.0	.100	.0	0	.0
P-281	J-144	J-121	164.0	10.0	.100	.0	0	.0
P-282	J-144	EW-51	98.0	4.0	.100	.0	0	.0
P-283	J-324	J-137	233.0	18.0	.100	.0	0	.0
P-284	J-305	J-28	230.0	18.0	.100	.0	0	.0
P-285	EW-187	J-361	109.0	6.0	.100	.0	0	.0
P-286	EW-178	EW-177	249.0	6.0	.100	.0	0	.0
P-287	J-138	EW-43	19.0	4.0	.100	.0	0	.0
P-288	J-316	J-326	163.0	10.0	.100	.0	0	.0
P-292	J-146	EW-53	114.0	4.0	.100	.0	0	.0
P-293	J-142	304	86.0	10.0	.100	.0	0	.0
P-294	J-142	EW-40	66.0	4.0	.100	.0	0	.0
P-295	171	i-173	222.0	18.0	.100	.0	0	.0
P-297	175	114	749.0	18.0	.100	.0	0	.0
P-298	182	260	23.0	10.0	.100	.0	0	.0
P-3	J-10	J-9	51.0	18.0	.100	.0	0	.0
P-301	200	J-305	181.0	18.0	.100	.0	0	.0
P-302	EW-195	J-363	54.0	6.0	.100	.0	0	.0
P-303	J-319	J-316	176.0	10.0	.100	.0	0	.0
P-305	224	J-310	141.0	10.0	.100	.0	0	.0
P-306	234	221	182.0	10.0	.100	.0	0	.0
P-307	EW-205	J-341	177.0	6.0	.100	.0	0	.0
P-308	J-145	J-142	173.0	10.0	.100	.0	0	.0
P-309	244	228	152.0	10.0	.100	.0	0	.0

P-31	J-152	J-371	128.0	18.0	.100	.0	0	.0
P-312	260	113	60.0	10.0	.100	.0	0	.0
P-313	262	113	160.0	10.0	.100	.0	0	.0
P-317	288	45	150.0	6.0	.100	.0	0	.0
P-319	J-327	J-328	192.0	10.0	.100	.0	0	.0
P-32	J-165	J-152	159.0	18.0	.100	.0	0	.0
P-320	J-195	i-246	28.0	12.0	.100	.0	0	.0
P-321	298	J-160	116.0	10.0	.100	.0	0	.0
P-322	299	J-27	322.0	10.0	.100	.0	0	.0
P-323	301	299	254.0	10.0	.100	.0	0	.0
P-326	J-140	J-147	178.0	10.0	.100	.0	0	.0
P-329	i-125	J-314	185.0	10.0	.100	.0	0	.0
P-33	J-339	J-373	213.0	18.0	.100	.0	0	.0
P-330	J-329	J-319	176.0	10.0	.100	.0	0	.0
P-331	i-130	262	11.0	10.0	.100	.0	0	.0
P-333	i-135	J-320	5.0	18.0	.100	.0	0	.0
P-334	J-145	EW-41	78.0	4.0	.100	.0	0	.0
P-335	J-148	J-145	148.0	10.0	.100	.0	0	.0
P-336	J-148	EW-42	71.0	4.0	.100	.0	0	.0
P-338	J-140	EW-110	53.0	4.0	.100	.0	0	.0
P-339	i-160	158	100.0	18.0	.100	.0	0	.0
P-34	J-343	J-346	184.0	18.0	.100	.0	0	.0
P-340	J-147	J-150	265.0	10.0	.100	.0	0	.0
P-341	J-331	139	199.0	18.0	.100	.0	0	.0
P-343	i-173	175	56.0	18.0	.100	.0	0	.0
P-347	J-332	J-331	155.0	18.0	.100	.0	0	.0
P-349	i-199	252	77.0	10.0	.100	.0	0	.0
P-35	J-345	J-386	240.0	18.0	.100	.0	0	.0
P-351	i-202	i-207	128.0	10.0	.100	.0	0	.0
P-352	J-333	i-117	191.0	10.0	.100	.0	0	.0
P-355	i-207	i-208	28.0	10.0	.100	.0	0	.0
P-358	J-334	J-335	161.0	18.0	.100	.0	0	.0
P-36	J-346	J-375	61.0	18.0	.100	.0	0	.0
P-362	J-335	J-332	234.0	18.0	.100	.0	0	.0
P-363	i-28	71	120.0	6.0	.100	.0	0	.0
P-365	i-31	78	203.0	6.0	.100	.0	0	.0
P-369	i-44	EW-147	78.0	10.0	.100	.0	0	.0
P-37	J-348	J-363	68.0	18.0	.100	.0	0	.0
P-370	i-44	5	198.0	6.0	.100	.0	0	.0
P-371	i-61	39	178.0	6.0	.100	.0	0	.0
P-372	J-147	EW-111	68.0	4.0	.100	.0	0	.0
P-374	EW-183	EW-184	264.0	6.0	.100	.0	0	.0
P-375	J-150	J-154	192.0	10.0	.100	.0	0	.0
P-377	J-150	EW-112	45.0	4.0	.100	.0	0	.0
P-378	i-9	J-122	14.0	12.0	.100	.0	0	.0
P-379	J-154	EW-113	35.0	4.0	.100	.0	0	.0
P-38	J-350	J-361	73.0	18.0	.100	.0	0	.0
P-380	J-311	250	154.0	10.0	.100	.0	0	.0
P-383	EW-188	EW-187	255.0	6.0	.100	.0	0	.0
P-385	EW-182	J-366	170.0	6.0	.100	.0	0	.0

P-386	EW-189	J-369	151.0	4.0	.100	.0	0	.0
P-387	EW-192	43	115.0	6.0	.100	.0	0	.0
P-388	EW-193	J-371	89.0	6.0	.100	.0	0	.0
P-389	EW-198	J-373	113.0	6.0	.100	.0	0	.0
P-39	J-352	J-359	34.0	18.0	.100	.0	0	.0
P-390	EW-208	J-341	413.0	6.0	.100	.0	0	.0
P-391	EW-207	J-341	396.0	6.0	.100	.0	0	.0
P-392	EW-209	EW-205	348.0	6.0	.100	.0	0	.0
P-393	J-341	J-343	143.0	18.0	.100	.0	0	.0
P-394	EW-190	J-382	92.0	6.0	.100	.0	0	.0
P-395	J-341	J-339	128.0	18.0	.100	.0	0	.0
P-396	EW-191	J-384	134.0	6.0	.100	.0	0	.0
P-397	EW-199	J-152	161.0	6.0	.100	.0	0	.0
P-398	EW-200	J-165	190.0	6.0	.100	.0	0	.0
P-399	EW-206	J-339	277.0	6.0	.100	.0	0	.0
P-40	J-354	J-10	277.0	18.0	.100	.0	0	.0
P-400	J-27	EW-107	50.0	4.0	.100	.0	0	.0
P-401	EW-204	EW-202	295.0	6.0	.100	.0	0	.0
P-402	J-387	J-193	89.0	12.0	.100	.0	0	.0
P-403	J-381	J-387	9.0	6.0	.100	.0	0	.0
P-404	J-24	289	153.0	12.0	.100	.0	0	.0
P-405	J-24	W-87	37.0	4.0	.100	.0	0	.0
P-406	W-90	290	103.0	12.0	.100	.0	0	.0
P-407	J-143	J-27	241.0	10.0	.100	.0	0	.0
P-408	J-143	EW-106	73.0	4.0	.100	.0	0	.0
P-409	J-149	299	88.0	10.0	.100	.0	0	.0
P-41	J-357	J-354	35.0	18.0	.100	.0	0	.0
P-410	J-149	EW-116	80.0	10.0	.100	.0	0	.0
P-411	J-155	J-157	183.0	10.0	.100	.0	0	.0
P-412	EW-202	J-343	11.0	6.0	.100	.0	0	.0
P-413	J-28	J-83	188.0	18.0	.100	.0	0	.0
P-414	303	EW-33A	19.0	4.0	.100	.0	0	.0
P-415	127	EW-30A	132.0	4.0	.100	.0	0	.0
P-416	J-155	EW-114	64.0	10.0	.100	.0	0	.0
P-417	J-88	J-387	57.0	12.0	.100	.0	0	.0
P-418	J-88	EW-73	28.0	4.0	.100	.0	0	.0
P-419	J-106	J-88	184.0	12.0	.100	.0	0	.0
P-42	J-359	J-357	220.0	18.0	.100	.0	0	.0
P-420	J-106	EW-74	16.0	4.0	.100	.0	0	.0
P-421	J-116	J-106	135.0	12.0	.100	.0	0	.0
P-422	J-116	EW-75	13.0	4.0	.100	.0	0	.0
P-423	J-122	J-124	125.0	12.0	.100	.0	0	.0
P-424	J-122	EW-79	17.0	4.0	.100	.0	0	.0
P-425	J-124	J-128	152.0	12.0	.100	.0	0	.0
P-426	J-124	EW-78	13.0	4.0	.100	.0	0	.0
P-427	J-126	J-116	290.0	12.0	.100	.0	0	.0
P-428	J-126	EW-76	24.0	4.0	.100	.0	0	.0
P-429	J-128	J-126	137.0	12.0	.100	.0	0	.0
P-43	J-361	J-352	218.0	18.0	.100	.0	0	.0
P-430	J-128	EW-77	20.0	4.0	.100	.0	0	.0

P-431	J-153	J-155	276.0	10.0	.100	.0	0	.0
P-432	J-153	EW-125	16.0	4.0	.100	.0	0	.0
P-433	J-160	J-153	209.0	10.0	.100	.0	0	.0
P-434	J-160	EW-126	11.0	4.0	.100	.0	0	.0
P-435	J-166	J-172	213.0	10.0	.100	.0	0	.0
P-436	J-166	EW-120	9.0	4.0	.100	.0	0	.0
P-437	J-170	301	249.0	10.0	.100	.0	0	.0
P-438	J-170	EW-118	16.0	10.0	.100	.0	0	.0
P-439	J-172	J-170	224.0	10.0	.100	.0	0	.0
P-44	J-363	J-350	219.0	18.0	.100	.0	0	.0
P-440	J-172	EW-119	18.0	4.0	.100	.0	0	.0
P-441	J-174	J-143	179.0	10.0	.100	.0	0	.0
P-442	J-174	EW-105	18.0	4.0	.100	.0	0	.0
P-443	J-176	J-174	85.0	10.0	.100	.0	0	.0
P-444	J-176	EW-104	12.0	4.0	.100	.0	0	.0
P-445	J-179	J-176	364.0	10.0	.100	.0	0	.0
P-446	J-179	EW-103	68.0	4.0	.100	.0	0	.0
P-447	J-181	J-189	102.0	12.0	.100	.0	0	.0
P-448	J-181	EW-93	28.0	4.0	.100	.0	0	.0
P-449	J-189	J-191	114.0	12.0	.100	.0	0	.0
P-45	J-366	J-345	16.0	18.0	.100	.0	0	.0
P-450	J-189	EW-92	45.0	4.0	.100	.0	0	.0
P-451	J-191	W-90	317.0	12.0	.100	.0	0	.0
P-452	J-191	EW-91	44.0	4.0	.100	.0	0	.0
P-453	W-90	EW-90	22.0	4.0	.100	.0	0	.0
P-454	J-193	i-246	58.0	12.0	.100	.0	0	.0
P-455	J-193	EW-100	13.0	4.0	.100	.0	0	.0
P-456	J-195	J-197	245.0	12.0	.100	.0	0	.0
P-457	J-195	EW-99	3.0	4.0	.100	.0	0	.0
P-458	J-197	J-199	302.0	12.0	.100	.0	0	.0
P-459	J-197	EW-98	41.0	4.0	.100	.0	0	.0
P-46	J-367	J-381	340.0	18.0	.100	.0	0	.0
P-460	J-199	J-207	237.0	12.0	.100	.0	0	.0
P-461	J-199	EW-97	31.0	4.0	.100	.0	0	.0
P-462	J-207	J-209	94.0	12.0	.100	.0	0	.0
P-463	J-207	EW-96	41.0	4.0	.100	.0	0	.0
P-464	J-209	J-211	111.0	12.0	.100	.0	0	.0
P-465	J-209	EW-95	30.0	4.0	.100	.0	0	.0
P-467	J-211	EW-94	22.0	4.0	.100	.0	0	.0
P-468	300	J-131	141.0	12.0	.100	.0	0	.0
P-469	300	EW-122	47.0	4.0	.100	.0	0	.0
P-47	J-369	J-366	189.0	18.0	.100	.0	0	.0
P-470	J-217	301	60.0	12.0	.100	.0	0	.0
P-471	J-217	EW-117	64.0	4.0	.100	.0	0	.0
P-472	J-157	J-149	246.0	10.0	.100	.0	0	.0
P-473	J-157	EW-115	62.0	10.0	.100	.0	0	.0
P-474	EW-162	37	56.0	4.0	.100	.0	0	.0
P-475	J-36	101	67.0	6.0	.100	.0	0	.0
P-476	J-36	EW-143	31.0	4.0	.100	.0	0	.0
P-477	J-38	J-36	206.0	6.0	.100	.0	0	.0

P-478	J-38	EW-81R	33.0	4.0	.100	.0	0	.0
P-479	J-40	3	183.0	12.0	.100	.0	0	.0
P-48	43	J-382	177.0	18.0	.100	.0	0	.0
P-480	J-40	EW-82	87.0	4.0	.100	.0	0	.0
P-481	J-44	109	68.0	12.0	.100	.0	0	.0
P-482	J-44	EW-83	37.0	4.0	.100	.0	0	.0
P-483	J-48	J-44	160.0	12.0	.100	.0	0	.0
P-484	J-48	EW-84	35.0	4.0	.100	.0	0	.0
P-485	J-42	EW-85	40.0	4.0	.100	.0	0	.0
P-486	22	EW-174	29.0	4.0	.100	.0	0	.0
P-49	J-371	J-384	159.0	18.0	.100	.0	0	.0
P-50	J-373	J-165	2.0	18.0	.100	.0	0	.0
P-51	J-375	J-348	225.0	18.0	.100	.0	0	.0
P-52	J-382	J-369	81.0	18.0	.100	.0	0	.0
P-53	J-384	43	111.0	18.0	.100	.0	0	.0
P-55	J-211	J-9	74.0	18.0	.100	.0	0	.0
P-56	109	J-40	104.0	12.0	.100	.0	0	.0
P-60	i-82	EW-163	10.0	6.0	.100	.0	0	.0
P-64	98	95	84.0	6.0	.100	.0	0	.0
P-66	J-111	226	83.0	10.0	.100	.0	0	.0
P-7	i-31	EW-160	206.0	4.0	.100	.0	0	.0
P-70	J-119	J-166	183.0	10.0	.100	.0	0	.0
P-74	EW-196	J-348	183.0	6.0	.100	.0	0	.0
P-75	222	EW-39	52.0	4.0	.100	.0	0	.0
P-76	J-1	190	82.0	18.0	.100	.0	0	.0
P-77	J-119	EW-127	40.0	4.0	.100	.0	0	.0
P-78	J-131	EW-121	35.0	4.0	.100	.0	0	.0
P-79	J-9	J-181	137.0	12.0	.100	.0	0	.0
P-80	J-133	i-117	14.0	10.0	.100	.0	0	.0
P-81	J-133	EW-55	7.0	4.0	.100	.0	0	.0
P-82	J-134	169	214.0	18.0	.100	.0	0	.0
P-83	J-134	EW-18	9.0	4.0	.100	.0	0	.0
P-84	i-160	EW-20	2.0	4.0	.100	.0	0	.0
P-85	J-6	178	133.0	18.0	.100	.0	0	.0
P-86	J-162	84	78.0	10.0	.100	.0	0	.0
P-88	J-135	EW-21	38.0	4.0	.100	.0	0	.0
P-89	J-136	J-135	139.0	18.0	.100	.0	0	.0
P-90	EW-186	J-350	131.0	6.0	.100	.0	0	.0
P-91	J-136	EW-22	61.0	4.0	.100	.0	0	.0
P-92	J-137	J-136	175.0	18.0	.100	.0	0	.0
P-94	EW-185	J-352	78.0	6.0	.100	.0	0	.0
P-96	J-137	EW-23	60.0	4.0	.100	.0	0	.0
P-97	139	EW-25	38.0	4.0	.100	.0	0	.0
P-98	J-111	EW-129_	19.0	4.0	.100	.0	0	.0
P-99	EW-176	J-354	21.0	6.0	.100	.0	0	.0

JUNCTION NAME	NODE TITLE	ELEV	DEMAND (USFU)	FPN PRESSURE
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3	.00	.00
4	.00	.00
5	.00	.00
8	.00	.00
17	.00	.00
21	.00	.00
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23	.00	.00
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37	.00	.00
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43	.00	.00
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89	.00	.00
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98	.00	.00
100	.00	.00
101	.00	.00
105	.00	.00
109	.00	.00
110	.00	.00
113	.00	.00
114	.00	.00
118	.00	.00

120	.00	.00
125	.00	.00
127	.00	.00
139	.00	.00
158	.00	.00
169	.00	.00
171	.00	.00
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178	.00	.00
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298	.00	.00
299	.00	.00
300	.00	.00
301	.00	.00
303	.00	.00
304	.00	.00
EW-1	.00	-14.50
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EW-11	.00	-14.50

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i-246	.00	.00
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i-76	.00	.00
i-82	.00	.00
i-9	.00	.00
J-1	.00	.00
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J-207	.00	.00
J-209	.00	.00
J-211	.00	.00
J-217	.00	.00
J-231	.00	.00
J-24	.00	.00
J-264	.00	.00
J-27	.00	.00
J-28	.00	.00
J-305	.00	.00
J-306	.00	.00
J-307	.00	.00
J-309	.00	.00
J-310	.00	.00
J-311	.00	.00
J-314	.00	.00
J-315	.00	.00
J-316	.00	.00
J-317	.00	.00
J-319	.00	.00
J-320	.00	.00
J-321	.00	.00
J-324	.00	.00
J-326	.00	.00
J-327	.00	.00
J-328	.00	.00
J-329	.00	.00
J-331	.00	.00
J-332	.00	.00
J-333	.00	.00
J-334	.00	.00
J-335	.00	.00
J-339	.00	.00
J-341	.00	.00
J-343	.00	.00
J-345	.00	.00
J-346	.00	.00
J-348	.00	.00
J-350	.00	.00
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J-354	.00	.00
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J-359	.00	.00	
J-36	.00	.00	
J-361	.00	.00	
J-363	.00	.00	
J-366	.00	.00	
J-367	.00	.00	
J-369	.00	.00	
J-371	.00	.00	
J-373	.00	.00	
J-375	.00	.00	
J-38	.00	.00	
J-381	.00	.00	
J-382	.00	.00	
J-384	.00	.00	
J-386	.00	.00	
J-387	.00	.00	
J-40	.00	.00	
J-42	.00	.00	
J-43	.00	.00	
J-44	.00	.00	
J-48	.00	.00	
J-6	.00	.00	
J-7	.00	.00	
J-83	.00	.00	
J-88	.00	.00	
J-9	.00	.00	
R-1	.00	.00	-40.00
W-101	.00	-14.50	
W-144	.00	-14.50	
W-145	.00	-14.50	
W-146	.00	-14.50	
W-147	.00	-14.50	
W-148	.00	-14.50	
W-157	.00	-14.50	
W-87	.00	-14.50	
W-88	.00	-14.50	
W-89	.00	-14.50	
W-90	.00	-14.50	

=====
Set = 0

===== RESULTS FOR THIS SIMULATION FOLLOW =====

Solution was obtained in 10 trials

Flow Accuracy = .1296E-04[< .500E-02]

RV Accuracy = .0000E+00[< .100E-02]

PIPE NO.	NODE #1	NODE #2	FLOW (USFU)	LOSS (USPU)	VELOCITY (FT/S)	DENSITY (#/CF)	FRICTION FACTOR	AREA RATIO
1	EW-181	J-345	14.500	.00	1.41	.069	.0368	.002
2	J-386	EW-179	-14.500	.01	1.41	.069	.0368	.002
4	17	EW-172	-14.500	.01	1.42	.069	.0368	.002
5	8	EW-166	-14.500	.01	1.41	.069	.0368	.002
6	EW-167	i-76	14.500	.01	1.42	.069	.0368	.002
8	EW-171	i-74	14.500	.03	3.15	.070	.0330	.005
9	EW-158	17	14.500	.01	3.18	.069	.0330	.005
10	EW-173	8	14.500	.01	3.18	.069	.0330	.005
11	EW-155	33	14.500	.02	3.18	.069	.0330	.005
12	21	i-76	-14.500	.01	1.42	.069	.0368	.002
13	22	23	-14.500	.00	1.41	.069	.0368	.002
14	W-147	EW-147	14.500	.00	3.18	.069	.0330	.005
15	i-44	i-42	-14.500	.00	.51	.069	.0430	.001
16	W-157	5	14.500	.01	3.18	.069	.0330	.005
17	W-146	29	14.500	.00	3.18	.069	.0330	.005
18	EW-194	EW-195	14.500	.01	1.41	.069	.0368	.002
19	32	86	-87.000	.16	8.49	.069	.0234	.013
20	33	8	-58.000	.05	5.66	.069	.0256	.009
22	EW-140	EW-162	14.500	.03	3.13	.070	.0330	.005
23	EW-141	39	14.500	.03	3.14	.070	.0330	.005
25	EW-197	J-375	14.500	.00	1.41	.069	.0368	.002
26	EW-128	45	14.500	.00	3.17	.069	.0330	.005
27	EW-134	47	14.500	.02	3.17	.069	.0330	.005
28	EW-129	49	14.500	.02	3.17	.069	.0330	.005
29	EW-130	51	14.500	.02	3.17	.069	.0330	.005
30	EW-135	53	14.500	.02	3.17	.069	.0330	.005
31	EW-136	55	14.500	.01	3.13	.070	.0330	.005
32	EW-131	57	14.500	.02	3.17	.069	.0330	.005
33	EW-137	59	14.500	.00	3.13	.070	.0330	.005
34	EW-132	61	14.500	.03	3.13	.070	.0330	.005
35	62	EW-133	-14.500	.04	3.13	.070	.0330	.005
36	EW-138	65	14.500	.02	3.13	.070	.0330	.005
37	EW-139	67	14.500	.00	3.13	.070	.0330	.005
38	EW-153	69	14.500	.00	3.13	.070	.0330	.005
39	EW-152	71	14.500	.01	3.13	.070	.0330	.005
40	72	i-75	.000	.00	.00	.070	.0000	.000
42	EW-159	76	14.500	.04	3.13	.070	.0330	.005
43	EW-151	78	14.500	.00	3.13	.070	.0330	.005
45	EW-149	82	14.500	.01	3.13	.070	.0330	.005
46	W-148	i-42	14.500	.01	3.18	.069	.0330	.005
48	EW-156	86	14.500	.02	3.18	.069	.0330	.005

49	21	87	29.000	.03	2.83	.069	.0304	.004
50	W-145	89	14.500	.01	3.19	.069	.0330	.005
52	92	93	.000	.00	.00	.070	.0000	.000
53	94	93	.000	.00	.00	.070	.0000	.000
54	93	95	.000	.00	.00	.070	.0000	.000
57	98	i-82	43.500	.02	4.20	.070	.0274	.007
58	100	101	72.500	.08	7.01	.070	.0243	.011
59	EW-154	100	14.500	.03	3.15	.070	.0330	.005
61	105	W-144	-14.500	.02	3.19	.069	.0330	.005
62	EW-168	23	14.500	.01	3.18	.069	.0330	.005
63	22	8	29.000	.03	2.83	.069	.0304	.004
65	110	180	-680.789	.08	24.24	.068	.0172	.038
67	114	R-1	2958.001	.28	32.55	.068	.0146	.051
68	EW-29A	i-135	14.500	.01	3.20	.069	.0330	.005
69	224	J-309	-116.000	.03	4.10	.069	.0243	.006
71	120	i-135	1928.500	.21	21.01	.069	.0156	.033
72	EW-32A	J-321	14.500	.01	3.19	.069	.0330	.005
73	EW-31A	125	14.500	.01	3.19	.069	.0330	.005
87	EW-24	J-324	14.500	.00	3.21	.068	.0330	.005
93	158	EW-19	-14.500	.03	3.21	.068	.0330	.005
95	i-160	J-135	-1958.212	.09	21.43	.068	.0155	.034
100	169	EW-17	-14.500	.01	3.22	.068	.0330	.005
101	171	EW-16	-14.500	.02	3.22	.068	.0330	.005
103	175	EW-14	-14.500	.03	3.22	.068	.0330	.005
104	EW-11	178	14.500	.00	3.23	.068	.0330	.005
105	EW-12	180	14.500	.01	3.23	.068	.0330	.005
106	EW-13	182	14.500	.01	3.22	.068	.0330	.005
108	J-307	200	-130.500	.00	1.43	.068	.0271	.002
110	EW-1	J-1	14.500	.01	1.43	.068	.0368	.002
111	EW-2	190	14.500	.02	3.23	.068	.0330	.005
113	EW-4	J-231	14.500	.01	3.23	.068	.0330	.005
115	EW-8	J-305	14.500	.01	3.23	.068	.0330	.005
116	EW-9	200	14.500	.02	3.23	.068	.0330	.005
118	203	J-327	-58.361	.01	2.06	.069	.0288	.003
120	J-329	J-328	29.361	.00	1.04	.069	.0347	.002
121	EW-36	J-326	14.500	.01	3.20	.069	.0330	.005
122	EW-35	J-316	14.500	.01	3.20	.069	.0330	.005
123	EW-34	J-319	14.500	.01	3.20	.069	.0330	.005
124	EW-33	J-329	14.500	.01	3.20	.069	.0330	.005
125	EW-32	J-328	14.500	.01	3.20	.069	.0330	.005
126	EW-31	J-327	14.500	.01	3.20	.069	.0330	.005
127	J-43	J-326	-28.639	.00	1.01	.069	.0349	.002
129	221	222	.000	.00	.00	.069	.0000	.000
130	222	223	14.500	.00	.51	.069	.0430	.001
131	223	J-309	29.000	.00	1.02	.069	.0348	.002
132	224	J-133	159.500	.05	5.63	.069	.0226	.009
133	226	244	-101.139	.02	3.57	.069	.0251	.006
135	228	240	-72.139	.01	2.55	.069	.0273	.004
136	EW-37	J-43	14.500	.02	3.20	.069	.0330	.005
137	238	240	57.639	.00	2.03	.069	.0289	.003

138	220	238	43.139	.01	1.52	.069	.0312	.002
140	EW-59	238	14.500	.01	3.20	.069	.0330	.005
141	EW-58	240	14.500	.01	3.20	.069	.0330	.005
142	EW-57	228	14.500	.01	3.20	.069	.0330	.005
143	EW-56	244	14.500	.01	3.20	.069	.0330	.005
144	EW-72	J-310	14.500	.01	3.20	.069	.0330	.005
145	EW-71	J-311	14.500	.01	3.20	.069	.0330	.005
146	EW-70	i-199	14.500	.02	3.22	.068	.0330	.005
147	EW-68	252	14.500	.01	3.22	.068	.0330	.005
148	EW-69	i-202	14.500	.03	3.22	.068	.0330	.005
149	EW-49	i-207	14.500	.01	3.22	.068	.0330	.005
150	EW-47	i-208	14.500	.02	3.22	.068	.0330	.005
152	EW-44	262	14.500	.01	3.22	.068	.0330	.005
153	EW-62	J-314	14.500	.01	3.20	.069	.0330	.005
155	EW-45	i-130	14.500	.02	3.22	.068	.0330	.005
156	EW-61	i-125	14.500	.02	3.20	.069	.0330	.005
157	EW-60	J-315	14.500	.02	3.20	.069	.0330	.005
159	EW-49_	i-101	14.500	.02	3.21	.068	.0330	.005
161	EW-28	J-335	14.500	.01	3.20	.069	.0330	.005
162	EW-27	J-332	14.500	.00	3.20	.069	.0330	.005
163	EW-26	J-331	14.500	.00	3.21	.068	.0330	.005
164	EW-29	J-334	14.500	.01	3.20	.069	.0330	.005
166	288	i-9	87.000	.02	8.47	.069	.0234	.013
167	290	i-273	-14.500	.00	.51	.069	.0430	.001
168	i-246	J-140	-58.000	.00	2.03	.069	.0288	.003
169	W-101	W-88	14.500	.03	3.18	.069	.0330	.005
170	EW-102	i-273	14.500	.03	3.18	.069	.0330	.005
171	298	J-119	-133.582	.01	4.69	.069	.0236	.007
172	300	J-217	29.000	.00	.71	.069	.0367	.001
174	114	J-6	-898.289	.08	9.87	.068	.0178	.016
175	4	69	-101.500	.03	9.74	.070	.0226	.015
177	51	57	-14.500	.01	1.41	.069	.0368	.002
178	55	61	14.500	.01	1.39	.070	.0368	.002
179	62	65	58.000	.03	5.56	.070	.0256	.009
180	67	4	87.000	.12	8.34	.070	.0234	.013
181	71	i-31	-72.500	.03	6.95	.070	.0243	.011
182	89	87	203.000	.03	7.14	.069	.0215	.011
183	17	5	29.000	.02	2.83	.069	.0304	.004
185	101	i-61	-246.500	.60	23.81	.070	.0191	.037
186	105	289	246.500	.03	8.67	.069	.0207	.014
187	110	J-138	-58.000	.01	2.06	.068	.0288	.003
188	113	118	-622.789	.55	22.13	.068	.0174	.035
189	118	i-101	-550.289	.54	19.52	.068	.0178	.031
190	290	J-115	703.767	.14	17.16	.069	.0175	.027
EW-7	J-28	EW-7	-14.500	.00	3.23	.068	.0330	.005
P-1	J-42	289	876.733	.68	21.39	.069	.0168	.034
P-102	J-6	EW-10	-14.500	.00	3.23	.068	.0330	.005
P-107	96	95	43.500	.00	1.51	.070	.0311	.002
P-109	J-333	J-146	477.789	.16	16.89	.069	.0182	.027
P-112	J-185	EW-3	-14.500	.01	3.23	.068	.0330	.005

P-114	EW-5	J-264	14.500	.00	3.23	.068	.0330	.005
P-117	J-83	J-264	-72.500	.00	.80	.068	.0317	.001
P-119	EW-177	J-357	29.000	.02	2.82	.069	.0304	.004
P-128	96	EW-170	-14.500	.01	3.15	.070	.0330	.005
P-134	i-75	EW-161	-14.500	.00	1.40	.070	.0368	.002
P-139	223	EW-38	-14.500	.01	3.20	.069	.0330	.005
P-151	J-144	J-112	-506.789	.27	17.94	.068	.0180	.028
P-154	289	303	1870.500	.53	20.32	.069	.0156	.032
P-158	269	EW-64	-14.500	.00	.16	.069	.1230	.000
P-160	J-333	EW-54	-14.500	.02	3.20	.069	.0330	.005
P-165	i-173	EW-15	-14.500	.00	.16	.068	.1368	.000
P-173	252	i-202	29.000	.00	.32	.068	.0415	.000
P-176	J-306	J-42	862.233	.11	21.01	.069	.0169	.033
P-18	EW-203	J-346	14.500	.01	1.41	.069	.0368	.002
P-184	J-311	J-310	14.500	.00	.51	.069	.0430	.001
P-191	125	J-321	-1899.500	.13	20.67	.069	.0156	.032
P-192	127	125	-1914.000	.15	20.83	.069	.0156	.033
P-193	J-121	EW-50	-14.500	.02	3.21	.068	.0330	.005
P-194	139	J-324	1900.212	.10	20.76	.068	.0156	.033
P-195	J-112	J-146	-492.289	.26	17.41	.068	.0181	.027
P-196	158	J-134	1987.212	.06	21.76	.068	.0155	.034
P-197	J-112	EW-52	-14.500	.02	3.21	.068	.0330	.005
P-198	169	171	2016.212	.17	22.10	.068	.0154	.035
P-2	109	EW-175	-14.500	.04	3.18	.069	.0330	.005
P-200	178	J-307	-869.289	.03	9.55	.068	.0179	.015
P-201	180	182	-666.289	.31	23.71	.068	.0172	.037
P-202	203	J-111	173.649	.02	6.13	.069	.0222	.010
P-203	226	i-117	289.289	.08	10.22	.069	.0200	.016
P-204	J-138	J-148	-43.500	.00	1.55	.068	.0311	.002
P-205	J-7	82	-14.500	.01	1.39	.070	.0368	.002
P-206	J-7	EW-150	-14.500	.00	3.13	.070	.0330	.005
P-207	J-115	J-24	732.767	.21	17.88	.069	.0173	.028
P-209	EW-147	32	87.000	.01	3.06	.069	.0260	.005
P-21	21	EW-154_	-14.500	.00	3.19	.069	.0330	.005
P-211	J-115	W-88	-29.000	.04	6.37	.069	.0276	.010
P-213	269	i-125	-43.500	.00	9.60	.069	.0252	.015
P-214	J-121	i-101	535.789	.13	18.99	.068	.0179	.030
P-215	29	89	188.500	.04	6.63	.069	.0218	.010
P-216	3	i-9	-195.233	.03	4.75	.069	.0225	.007
P-217	32	29	174.000	.02	6.12	.069	.0222	.010
P-219	37	4	-188.500	.71	18.10	.070	.0201	.028
P-220	39	37	-217.500	.76	20.93	.070	.0196	.033
P-222	45	47	-72.500	.07	7.05	.069	.0243	.011
P-223	47	49	-58.000	.01	5.64	.069	.0256	.009
P-224	49	53	-43.500	.03	4.23	.069	.0274	.007
P-225	53	51	-29.000	.00	2.82	.069	.0304	.004
P-227	59	62	43.500	.01	4.17	.070	.0274	.007
P-228	61	59	29.000	.00	2.78	.070	.0304	.004
P-229	65	67	72.500	.07	6.95	.070	.0243	.011
P-230	69	i-28	-87.000	.07	8.34	.070	.0234	.013

P-233	76	J-7	-29.000	.01	2.78	.070	.0304	.004
P-234	78	76	-43.500	.02	4.17	.070	.0274	.007
P-235	82	J-162	.000	.00	.00	.070	.0000	.000
P-237	86	33	-72.500	.00	7.07	.069	.0243	.011
P-238	87	105	232.000	.03	8.16	.069	.0209	.013
P-239	96	i-74	-29.000	.02	2.80	.070	.0304	.004
P-24	i-61	EW-142	-14.500	.00	1.40	.070	.0368	.002
P-240	i-75	i-74	14.500	.00	1.40	.070	.0368	.002
P-245	i-82	100	58.000	.03	5.60	.070	.0256	.009
P-246	J-43	220	43.139	.00	1.52	.069	.0312	.002
P-247	J-306	J-48	-601.233	.07	14.65	.069	.0179	.023
P-248	J-306	298	-261.000	.05	9.16	.069	.0204	.014
P-249	J-83	EW-6	-14.500	.01	3.23	.068	.0330	.005
P-25	3	J-38	-348.000	.60	33.87	.069	.0181	.053
P-250	J-307	110	-738.789	.00	8.12	.068	.0184	.013
P-251	J-185	190	-29.000	.00	.32	.068	.0415	.001
P-254	J-309	J-315	-87.000	.01	3.07	.069	.0260	.005
P-255	J-310	EW-66	-14.500	.02	3.20	.069	.0330	.005
P-262	118	i-208	-72.500	.00	2.57	.068	.0272	.004
P-263	J-314	EW-63	-14.500	.02	3.20	.069	.0330	.005
P-264	J-314	267	.000	.00	.00	.069	.0000	.000
P-265	J-315	EW-65	-14.500	.01	3.20	.069	.0330	.005
P-266	J-315	269	-58.000	.01	2.05	.069	.0288	.003
P-267	J-231	J-185	-43.500	.00	.48	.068	.0366	.001
P-269	J-317	J-179	14.500	.00	.51	.069	.0430	.001
P-270	J-317	W-89	-14.500	.00	3.18	.069	.0330	.005
P-271	127	120	1928.500	.21	21.00	.069	.0156	.033
P-273	J-264	J-231	-58.000	.00	.64	.068	.0337	.001
P-274	EW-184	J-359	29.000	.01	2.82	.069	.0304	.004
P-275	J-320	J-334	1827.712	.22	19.93	.069	.0157	.031
P-276	J-320	203	115.289	.00	4.07	.069	.0244	.006
P-278	J-321	303	-1885.000	.31	20.50	.069	.0156	.032
P-281	J-144	J-121	521.289	.25	18.47	.068	.0179	.029
P-282	J-144	EW-51	-14.500	.02	3.21	.068	.0330	.005
P-283	J-324	J-137	1914.712	.22	20.93	.068	.0156	.033
P-284	J-305	J-28	-101.500	.00	1.12	.068	.0289	.002
P-285	EW-187	J-361	29.000	.01	2.82	.069	.0304	.004
P-286	EW-178	EW-177	14.500	.01	1.41	.069	.0368	.002
P-287	J-138	EW-43	-14.500	.00	3.23	.068	.0330	.005
P-288	J-316	J-326	14.139	.00	.50	.069	.0433	.001
P-292	J-146	EW-53	-14.500	.02	3.20	.069	.0330	.005
P-293	J-142	304	.000	.00	.00	.068	.0000	.000
P-294	J-142	EW-40	-14.500	.01	3.23	.068	.0330	.005
P-295	171	i-173	2030.712	.23	22.27	.068	.0154	.035
P-297	175	114	2059.712	.80	22.62	.068	.0154	.036
P-298	182	260	-651.789	.05	23.18	.068	.0173	.036
P-3	J-10	J-9	464.000	.00	5.02	.069	.0202	.008
P-301	200	J-305	-116.000	.00	1.27	.068	.0279	.002
P-302	EW-195	J-363	29.000	.01	2.82	.069	.0304	.004
P-303	J-319	J-316	-.361	.00	.01	.069	.0155	.000

P-305	224	J-310	-43.500	.00	1.54	.069	.0311	.002
P-306	234	221	.000	.00	.00	.069	.0000	.000
P-307	EW-205	J-341	29.000	.02	2.82	.069	.0304	.004
P-308	J-145	J-142	-14.500	.00	.52	.068	.0430	.001
P-309	244	228	-86.639	.01	3.06	.069	.0261	.005
P-31	J-152	J-371	-116.000	.00	1.25	.069	.0279	.002
P-312	260	113	-651.789	.14	23.18	.068	.0173	.036
P-313	262	113	29.000	.00	1.03	.068	.0348	.002
P-317	288	45	-87.000	.10	8.47	.069	.0234	.013
P-319	J-327	J-328	-43.861	.00	1.55	.069	.0310	.002
P-32	J-165	J-152	-130.500	.00	1.41	.069	.0271	.002
P-320	J-195	i-246	-65.767	.00	1.60	.069	.0292	.003
P-321	298	J-160	-127.418	.01	4.47	.069	.0238	.007
P-322	299	J-27	-87.000	.02	3.05	.069	.0260	.005
P-323	301	299	-32.082	.00	1.13	.069	.0338	.002
P-326	J-140	J-147	-43.500	.00	1.52	.069	.0311	.002
P-329	i-125	J-314	-29.000	.00	1.02	.069	.0348	.002
P-33	J-339	J-373	-159.500	.00	1.72	.069	.0258	.003
P-330	J-329	J-319	-14.861	.00	.52	.069	.0426	.001
P-331	i-130	262	14.500	.00	.52	.068	.0430	.001
P-333	i-135	J-320	1943.000	.00	21.18	.069	.0155	.033
P-334	J-145	EW-41	-14.500	.02	3.23	.068	.0330	.005
P-335	J-148	J-145	-29.000	.00	1.03	.068	.0348	.002
P-336	J-148	EW-42	-14.500	.01	3.23	.068	.0330	.005
P-338	J-140	EW-110	-14.500	.01	3.18	.069	.0330	.005
P-339	i-160	158	1972.712	.10	21.60	.068	.0155	.034
P-34	J-343	J-346	261.000	.00	2.82	.069	.0230	.004
P-340	J-147	J-150	-29.000	.00	1.02	.069	.0348	.002
P-341	J-331	139	1885.712	.18	20.60	.068	.0156	.032
P-343	i-173	175	2045.212	.06	22.44	.068	.0154	.035
P-347	J-332	J-331	1871.212	.14	20.43	.068	.0156	.032
P-349	i-199	252	14.500	.00	.51	.068	.0430	.001
P-35	J-345	J-386	-14.500	.00	.16	.069	.0248	.000
P-351	i-202	i-207	43.500	.00	1.54	.068	.0311	.002
P-352	J-333	i-117	-463.289	.23	16.37	.069	.0183	.026
P-355	i-207	i-208	58.000	.00	2.06	.068	.0288	.003
P-358	J-334	J-335	1842.212	.14	20.09	.069	.0157	.032
P-36	J-346	J-375	275.500	.00	2.98	.069	.0227	.005
P-362	J-335	J-332	1856.712	.21	20.26	.069	.0156	.032
P-363	i-28	71	-87.000	.08	8.34	.070	.0234	.013
P-365	i-31	78	-58.000	.07	5.56	.070	.0256	.009
P-369	i-44	EW-147	58.000	.00	2.04	.069	.0288	.003
P-37	J-348	J-363	304.500	.00	3.29	.069	.0222	.005
P-370	i-44	5	-43.500	.04	4.25	.069	.0274	.007
P-371	i-61	39	-232.000	.72	22.37	.070	.0193	.035
P-372	J-147	EW-111	-14.500	.01	3.18	.069	.0330	.005
P-374	EW-183	EW-184	14.500	.01	1.41	.069	.0368	.002
P-375	J-150	J-154	-14.500	.00	.51	.069	.0430	.001
P-377	J-150	EW-112	-14.500	.01	3.18	.069	.0330	.005
P-378	i-9	J-122	-108.233	.00	2.63	.069	.0258	.004

P-379	J-154	EW-113	-14.500	.01	3.18	.069	.0330	.005
P-38	J-350	J-361	348.000	.00	3.76	.069	.0215	.006
P-380	J-311	250	.000	.00	.00	.069	.0000	.000
P-383	EW-188	EW-187	14.500	.01	1.41	.069	.0368	.002
P-385	EW-182	J-366	14.500	.01	1.41	.069	.0368	.002
P-386	EW-189	J-369	14.500	.03	3.17	.069	.0330	.005
P-387	EW-192	43	14.500	.00	1.41	.069	.0368	.002
P-388	EW-193	J-371	14.500	.00	1.41	.069	.0368	.002
P-389	EW-198	J-373	14.500	.00	1.41	.069	.0368	.002
P-39	J-352	J-359	391.500	.00	4.23	.069	.0210	.007
P-390	EW-208	J-341	14.500	.01	1.41	.069	.0368	.002
P-391	EW-207	J-341	14.500	.01	1.41	.069	.0368	.002
P-392	EW-209	EW-205	14.500	.01	1.41	.069	.0368	.002
P-393	J-341	J-343	232.000	.00	2.51	.069	.0236	.004
P-394	EW-190	J-382	14.500	.00	1.41	.069	.0368	.002
P-395	J-341	J-339	-174.000	.00	1.88	.069	.0253	.003
P-396	EW-191	J-384	14.500	.00	1.41	.069	.0368	.002
P-397	EW-199	J-152	14.500	.00	1.41	.069	.0368	.002
P-398	EW-200	J-165	14.500	.01	1.41	.069	.0368	.002
P-399	EW-206	J-339	14.500	.01	1.41	.069	.0368	.002
P-40	J-354	J-10	464.000	.02	5.02	.069	.0202	.008
P-400	J-27	EW-107	-14.500	.01	3.18	.069	.0330	.005
P-401	EW-204	EW-202	14.500	.01	1.41	.069	.0368	.002
P-402	J-387	J-193	-6.733	.00	.16	.069	.2440	.000
P-403	J-381	J-387	.000	.00	.00	.069	.0000	.000
P-404	J-24	289	747.267	.18	18.24	.069	.0173	.029
P-405	J-24	W-87	-14.500	.01	3.18	.069	.0330	.005
P-406	W-90	290	689.267	.11	16.80	.069	.0175	.026
P-407	J-143	J-27	72.500	.01	2.54	.069	.0272	.004
P-408	J-143	EW-106	-14.500	.02	3.18	.069	.0330	.005
P-409	J-149	299	-54.918	.00	1.93	.069	.0292	.003
P-41	J-357	J-354	449.500	.00	4.86	.069	.0204	.008
P-410	J-149	EW-116	-14.500	.00	.51	.069	.0430	.001
P-411	J-155	J-157	-83.918	.01	2.94	.069	.0263	.005
P-412	EW-202	J-343	29.000	.00	2.82	.069	.0304	.004
P-413	J-28	J-83	-87.000	.00	.96	.068	.0301	.002
P-414	303	EW-33A	-14.500	.00	3.19	.069	.0330	.005
P-415	127	EW-30A	-14.500	.03	3.20	.069	.0330	.005
P-416	J-155	EW-114	-14.500	.00	.51	.069	.0430	.001
P-417	J-88	J-387	-6.733	.00	.16	.069	.0579	.000
P-418	J-88	EW-73	-14.500	.01	3.18	.069	.0330	.005
P-419	J-106	J-88	-21.233	.00	.52	.069	.0403	.001
P-42	J-359	J-357	420.500	.01	4.55	.069	.0207	.007
P-420	J-106	EW-74	-14.500	.00	3.18	.069	.0330	.005
P-421	J-116	J-106	-35.733	.00	.87	.069	.0345	.001
P-422	J-116	EW-75	-14.500	.00	3.18	.069	.0330	.005
P-423	J-122	J-124	-93.733	.00	2.28	.069	.0267	.004
P-424	J-122	EW-79	-14.500	.00	3.18	.069	.0330	.005
P-425	J-124	J-128	-79.233	.00	1.93	.069	.0278	.003
P-426	J-124	EW-78	-14.500	.00	3.18	.069	.0330	.005

P-427	J-126	J-116	-50.233	.00	1.22	.069	.0314	.002
P-428	J-126	EW-76	-14.500	.00	3.18	.069	.0330	.005
P-429	J-128	J-126	-64.733	.00	1.58	.069	.0293	.002
P-43	J-361	J-352	377.000	.01	4.08	.069	.0212	.006
P-430	J-128	EW-77	-14.500	.00	3.18	.069	.0330	.005
P-431	J-153	J-155	-98.418	.02	3.45	.069	.0253	.005
P-432	J-153	EW-125	-14.500	.00	3.18	.069	.0330	.005
P-433	J-160	J-153	-112.918	.02	3.96	.069	.0245	.006
P-434	J-160	EW-126	-14.500	.00	3.18	.069	.0330	.005
P-435	J-166	J-172	-104.582	.02	3.67	.069	.0249	.006
P-436	J-166	EW-120	-14.500	.00	3.18	.069	.0330	.005
P-437	J-170	301	-75.582	.01	2.65	.069	.0270	.004
P-438	J-170	EW-118	-14.500	.00	.51	.069	.0430	.001
P-439	J-172	J-170	-90.082	.01	3.16	.069	.0258	.005
P-44	J-363	J-350	333.500	.01	3.61	.069	.0217	.006
P-440	J-172	EW-119	-14.500	.00	3.18	.069	.0330	.005
P-441	J-174	J-143	58.000	.01	2.03	.069	.0288	.003
P-442	J-174	EW-105	-14.500	.00	3.18	.069	.0330	.005
P-443	J-176	J-174	43.500	.00	1.53	.069	.0311	.002
P-444	J-176	EW-104	-14.500	.00	3.18	.069	.0330	.005
P-445	J-179	J-176	29.000	.00	1.02	.069	.0348	.002
P-446	J-179	EW-103	-14.500	.01	3.18	.069	.0330	.005
P-447	J-181	J-189	631.267	.09	15.37	.069	.0178	.024
P-448	J-181	EW-93	-14.500	.01	3.18	.069	.0330	.005
P-449	J-189	J-191	645.767	.10	15.73	.069	.0177	.025
P-45	J-366	J-345	-29.000	.00	.31	.069	.0415	.000
P-450	J-189	EW-92	-14.500	.01	3.18	.069	.0330	.005
P-451	J-191	W-90	660.267	.30	16.09	.069	.0177	.025
P-452	J-191	EW-91	-14.500	.01	3.18	.069	.0330	.005
P-453	W-90	EW-90	-14.500	.00	3.18	.069	.0330	.005
P-454	J-193	i-246	7.767	.00	.19	.069	.0375	.000
P-455	J-193	EW-100	-14.500	.00	3.18	.069	.0330	.005
P-456	J-195	J-197	80.267	.01	1.95	.069	.0277	.003
P-457	J-195	EW-99	-14.500	.00	3.18	.069	.0330	.005
P-458	J-197	J-199	94.767	.01	2.31	.069	.0266	.004
P-459	J-197	EW-98	-14.500	.01	3.18	.069	.0330	.005
P-46	J-367	J-381	.000	.00	.00	.069	.0000	.000
P-460	J-199	J-207	109.267	.01	2.66	.069	.0257	.004
P-461	J-199	EW-97	-14.500	.01	3.18	.069	.0330	.005
P-462	J-207	J-209	123.767	.00	3.01	.069	.0250	.005
P-463	J-207	EW-96	-14.500	.01	3.18	.069	.0330	.005
P-464	J-209	J-211	138.267	.01	3.36	.069	.0243	.005
P-465	J-209	EW-95	-14.500	.01	3.18	.069	.0330	.005
P-467	J-211	EW-94	-14.500	.00	3.18	.069	.0330	.005
P-468	300	J-131	-14.500	.00	.35	.069	.0456	.001
P-469	300	EW-122	-14.500	.01	3.18	.069	.0330	.005
P-47	J-369	J-366	-43.500	.00	.47	.069	.0366	.001
P-470	J-217	301	43.500	.00	1.06	.069	.0326	.002
P-471	J-217	EW-117	-14.500	.01	3.18	.069	.0330	.005
P-472	J-157	J-149	-69.418	.01	2.43	.069	.0275	.004

P-473	J-157	EW-115	-14.500	.00	.51	.069	.0430	.001
P-474	EW-162	37	29.000	.04	6.27	.070	.0276	.010
P-475	J-36	101	-319.000	.49	30.86	.070	.0184	.049
P-476	J-36	EW-143	-14.500	.01	3.16	.070	.0330	.005
P-477	J-38	J-36	-333.500	1.63	32.36	.069	.0182	.051
P-478	J-38	EW-81R	-14.500	.01	3.17	.069	.0330	.005
P-479	J-40	3	-543.233	.12	13.22	.069	.0183	.021
P-48	43	J-382	-72.500	.00	.78	.069	.0317	.001
P-480	J-40	EW-82	-14.500	.02	3.18	.069	.0330	.005
P-481	J-44	109	-572.233	.05	13.93	.069	.0181	.022
P-482	J-44	EW-83	-14.500	.01	3.18	.069	.0330	.005
P-483	J-48	J-44	-586.733	.12	14.29	.069	.0180	.022
P-484	J-48	EW-84	-14.500	.01	3.18	.069	.0330	.005
P-485	J-42	EW-85	-14.500	.01	3.18	.069	.0330	.005
P-486	22	EW-174	-14.500	.01	3.18	.069	.0330	.005
P-49	J-371	J-384	-101.500	.00	1.10	.069	.0289	.002
P-50	J-373	J-165	-145.000	.00	1.57	.069	.0264	.002
P-51	J-375	J-348	290.000	.01	3.14	.069	.0224	.005
P-52	J-382	J-369	-58.000	.00	.63	.069	.0337	.001
P-53	J-384	43	-87.000	.00	.94	.069	.0301	.001
P-55	J-211	J-9	152.767	.00	1.65	.069	.0261	.003
P-56	109	J-40	-557.733	.07	13.58	.069	.0182	.021
P-60	i-82	EW-163	-14.500	.00	1.40	.070	.0368	.002
P-64	98	95	-43.500	.02	4.20	.070	.0274	.007
P-66	J-111	226	188.149	.02	6.64	.069	.0219	.010
P-7	i-31	EW-160	-14.500	.04	3.13	.070	.0330	.005
P-70	J-119	J-166	-119.082	.02	4.18	.069	.0242	.007
P-74	EW-196	J-348	14.500	.01	1.41	.069	.0368	.002
P-75	222	EW-39	-14.500	.01	3.20	.069	.0330	.005
P-76	J-1	190	14.500	.00	.16	.068	.0941	.000
P-77	J-119	EW-127	-14.500	.01	3.18	.069	.0330	.005
P-78	J-131	EW-121	-14.500	.01	3.18	.069	.0330	.005
P-79	J-9	J-181	616.767	.11	15.01	.069	.0179	.024
P-80	J-133	i-117	174.000	.00	6.15	.069	.0222	.010
P-81	J-133	EW-55	-14.500	.00	3.20	.069	.0330	.005
P-82	J-134	169	2001.712	.22	21.93	.068	.0155	.034
P-83	J-134	EW-18	-14.500	.00	3.21	.068	.0330	.005
P-84	i-160	EW-20	-14.500	.00	3.21	.068	.0330	.005
P-85	J-6	178	-883.789	.03	9.71	.068	.0178	.015
P-86	J-162	84	.000	.00	.00	.070	.0000	.000
P-88	J-135	EW-21	-14.500	.01	3.21	.068	.0330	.005
P-89	J-136	J-135	1943.712	.13	21.27	.068	.0155	.033
P-90	EW-186	J-350	14.500	.00	1.41	.069	.0368	.002
P-91	J-136	EW-22	-14.500	.01	3.21	.068	.0330	.005
P-92	J-137	J-136	1929.212	.17	21.10	.068	.0156	.033
P-94	EW-185	J-352	14.500	.00	1.41	.069	.0368	.002
P-96	J-137	EW-23	-14.500	.01	3.21	.068	.0330	.005
P-97	139	EW-25	-14.500	.01	3.21	.068	.0330	.005
P-98	J-111	EW-129_	-14.500	.00	3.20	.069	.0330	.005
P-99	EW-176	J-354	14.500	.00	1.41	.069	.0368	.002

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JUNCTION	NODE	DEMAND	PRESSURE	PRESSURE	PRESSURE	DENSITY
NAME	TITLE	(USFU)	(USPU)	(PSIA)	(PSIG)	#/CF
3		.00	-33.71	13.48	-1.22	.069
4		.00	-28.20	13.68	-1.02	.070
5		.00	-34.74	13.44	-1.25	.069
8		.00	-34.58	13.45	-1.25	.069
17		.00	-34.71	13.44	-1.25	.069
21		.00	-34.85	13.44	-1.26	.069
22		.00	-34.55	13.45	-1.25	.069
23		.00	-34.55	13.45	-1.25	.069
29		.00	-34.80	13.44	-1.26	.069
32		.00	-34.79	13.44	-1.25	.069
33		.00	-34.63	13.45	-1.25	.069
37		.00	-28.91	13.65	-1.04	.070
39		.00	-29.67	13.63	-1.07	.070
43		.00	-33.61	13.48	-1.21	.069
45		.00	-33.56	13.49	-1.21	.069
47		.00	-33.49	13.49	-1.21	.069
49		.00	-33.48	13.49	-1.21	.069
51		.00	-33.44	13.49	-1.21	.069
53		.00	-33.45	13.49	-1.21	.069
55		.00	-27.96	13.69	-1.01	.070
57		.00	-33.44	13.49	-1.21	.069
59		.00	-27.97	13.69	-1.01	.070
61		.00	-27.97	13.69	-1.01	.070
62		.00	-27.98	13.69	-1.01	.070
65		.00	-28.00	13.69	-1.01	.070
67		.00	-28.08	13.68	-1.01	.070
69		.00	-28.17	13.68	-1.02	.070
71		.00	-28.02	13.69	-1.01	.070
72		.00	-30.83	13.58	-1.11	.070
76		.00	-27.91	13.69	-1.01	.070
78		.00	-27.92	13.69	-1.01	.070
82		.00	-27.89	13.69	-1.01	.070
84		.00	-27.89	13.69	-1.01	.070
86		.00	-34.63	13.45	-1.25	.069
87		.00	-34.88	13.44	-1.26	.069
89		.00	-34.85	13.44	-1.26	.069
92		.00	-30.85	13.58	-1.11	.070
93		.00	-30.85	13.58	-1.11	.070
94		.00	-30.85	13.58	-1.11	.070
95		.00	-30.85	13.58	-1.11	.070
96		.00	-30.85	13.58	-1.11	.070
98		.00	-30.86	13.58	-1.11	.070

100	.00	-30.91	13.58	-1.12	.070
101	.00	-30.99	13.58	-1.12	.070
105	.00	-34.90	13.44	-1.26	.069
109	.00	-33.90	13.47	-1.22	.069
110	.00	-39.58	13.27	-1.43	.068
113	.00	-38.99	13.29	-1.41	.068
114	.00	-39.72	13.26	-1.43	.068
118	.00	-38.44	13.31	-1.39	.068
120	.00	-36.27	13.39	-1.31	.069
125	.00	-35.91	13.40	-1.30	.069
127	.00	-36.07	13.39	-1.30	.069
139	.00	-37.37	13.35	-1.35	.068
158	.00	-38.18	13.32	-1.38	.068
169	.00	-38.46	13.31	-1.39	.068
171	.00	-38.63	13.30	-1.39	.068
175	.00	-38.92	13.29	-1.40	.068
178	.00	-39.61	13.27	-1.43	.068
180	.00	-39.49	13.27	-1.42	.068
182	.00	-39.18	13.28	-1.41	.068
190	.00	-39.57	13.27	-1.43	.068
200	.00	-39.58	13.27	-1.43	.068
203	.00	-36.50	13.38	-1.32	.069
220	.00	-36.49	13.38	-1.32	.069
221	.00	-36.53	13.38	-1.32	.069
222	.00	-36.53	13.38	-1.32	.069
223	.00	-36.53	13.38	-1.32	.069
224	.00	-36.56	13.38	-1.32	.069
226	.00	-36.54	13.38	-1.32	.069
228	.00	-36.50	13.38	-1.32	.069
234	.00	-36.53	13.38	-1.32	.069
238	.00	-36.49	13.38	-1.32	.069
240	.00	-36.50	13.38	-1.32	.069
244	.00	-36.51	13.38	-1.32	.069
250	.00	-36.56	13.38	-1.32	.069
252	.00	-38.44	13.31	-1.39	.068
260	.00	-39.13	13.28	-1.41	.068
262	.00	-38.99	13.29	-1.41	.068
267	.00	-36.51	13.38	-1.32	.069
269	.00	-36.52	13.38	-1.32	.069
288	.00	-33.66	13.48	-1.21	.069
289	.00	-34.94	13.44	-1.26	.069
290	.00	-34.41	13.45	-1.24	.069
298	.00	-34.10	13.47	-1.23	.069
299	.00	-34.02	13.47	-1.23	.069
300	.00	-34.03	13.47	-1.23	.069
301	.00	-34.03	13.47	-1.23	.069
303	.00	-35.47	13.42	-1.28	.069
304	.00	-39.57	13.27	-1.43	.068
EW-1	-14.50	-39.57	13.27	-1.43	.068
EW-10	-14.50	-39.63	13.27	-1.43	.068

EW-100	-14.50	-33.66	13.48	-1.21	.069
EW-102	-14.50	-34.38	13.46	-1.24	.069
EW-103	-14.50	-33.97	13.47	-1.23	.069
EW-104	-14.50	-33.98	13.47	-1.23	.069
EW-105	-14.50	-33.98	13.47	-1.23	.069
EW-106	-14.50	-33.98	13.47	-1.23	.069
EW-107	-14.50	-33.99	13.47	-1.23	.069
EW-11	-14.50	-39.60	13.27	-1.43	.068
EW-110	-14.50	-33.65	13.48	-1.21	.069
EW-111	-14.50	-33.64	13.48	-1.21	.069
EW-112	-14.50	-33.65	13.48	-1.21	.069
EW-113	-14.50	-33.65	13.48	-1.21	.069
EW-114	-14.50	-34.05	13.47	-1.23	.069
EW-115	-14.50	-34.04	13.47	-1.23	.069
EW-116	-14.50	-34.03	13.47	-1.23	.069
EW-117	-14.50	-34.01	13.47	-1.23	.069
EW-118	-14.50	-34.04	13.47	-1.23	.069
EW-119	-14.50	-34.05	13.47	-1.23	.069
EW-12	-14.50	-39.48	13.27	-1.42	.068
EW-120	-14.50	-34.07	13.47	-1.23	.069
EW-121	-14.50	-34.02	13.47	-1.23	.069
EW-122	-14.50	-34.02	13.47	-1.23	.069
EW-125	-14.50	-34.06	13.47	-1.23	.069
EW-126	-14.50	-34.08	13.47	-1.23	.069
EW-127	-14.50	-34.08	13.47	-1.23	.069
EW-128	-14.50	-33.56	13.49	-1.21	.069
EW-129	-14.50	-33.46	13.49	-1.21	.069
EW-129_	-14.50	-36.51	13.38	-1.32	.069
EW-13	-14.50	-39.17	13.28	-1.41	.068
EW-130	-14.50	-33.43	13.49	-1.21	.069
EW-131	-14.50	-33.41	13.49	-1.21	.069
EW-132	-14.50	-27.94	13.69	-1.01	.070
EW-133	-14.50	-27.93	13.69	-1.01	.070
EW-134	-14.50	-33.47	13.49	-1.21	.069
EW-135	-14.50	-33.43	13.49	-1.21	.069
EW-136	-14.50	-27.95	13.69	-1.01	.070
EW-137	-14.50	-27.97	13.69	-1.01	.070
EW-138	-14.50	-27.98	13.69	-1.01	.070
EW-139	-14.50	-28.07	13.68	-1.01	.070
EW-14	-14.50	-38.89	13.29	-1.40	.068
EW-140	-14.50	-28.84	13.66	-1.04	.070
EW-141	-14.50	-29.65	13.63	-1.07	.070
EW-142	-14.50	-30.39	13.60	-1.10	.070
EW-143	-14.50	-31.47	13.56	-1.14	.070
EW-147	-14.50	-34.78	13.44	-1.25	.069
EW-149	-14.50	-27.87	13.69	-1.01	.070
EW-15	-14.50	-38.86	13.29	-1.40	.068
EW-150	-14.50	-27.89	13.69	-1.01	.070
EW-151	-14.50	-27.92	13.69	-1.01	.070
EW-152	-14.50	-28.01	13.69	-1.01	.070

EW-153	-14.50	-28.16	13.68	-1.02	.070
EW-154	-14.50	-30.89	13.58	-1.11	.070
EW-154_	-14.50	-34.85	13.44	-1.26	.069
EW-155	-14.50	-34.60	13.45	-1.25	.069
EW-156	-14.50	-34.61	13.45	-1.25	.069
EW-158	-14.50	-34.71	13.44	-1.25	.069
EW-159	-14.50	-27.86	13.69	-1.00	.070
EW-16	-14.50	-38.61	13.30	-1.39	.068
EW-160	-14.50	-27.95	13.69	-1.01	.070
EW-161	-14.50	-30.82	13.58	-1.11	.070
EW-162	-14.50	-28.87	13.65	-1.04	.070
EW-163	-14.50	-30.88	13.58	-1.11	.070
EW-166	-14.50	-34.57	13.45	-1.25	.069
EW-167	-14.50	-34.84	13.44	-1.26	.069
EW-168	-14.50	-34.54	13.45	-1.25	.069
EW-17	-14.50	-38.45	13.31	-1.39	.068
EW-170	-14.50	-30.84	13.58	-1.11	.070
EW-171	-14.50	-30.80	13.58	-1.11	.070
EW-172	-14.50	-34.71	13.44	-1.25	.069
EW-173	-14.50	-34.57	13.45	-1.25	.069
EW-174	-14.50	-34.54	13.45	-1.25	.069
EW-175	-14.50	-33.87	13.47	-1.22	.069
EW-176	-14.50	-33.68	13.48	-1.21	.069
EW-177	-14.50	-33.66	13.48	-1.21	.069
EW-178	-14.50	-33.65	13.48	-1.21	.069
EW-179	-14.50	-33.60	13.48	-1.21	.069
EW-18	-14.50	-38.24	13.32	-1.38	.068
EW-181	-14.50	-33.61	13.48	-1.21	.069
EW-182	-14.50	-33.61	13.48	-1.21	.069
EW-183	-14.50	-33.64	13.48	-1.21	.069
EW-184	-14.50	-33.65	13.48	-1.21	.069
EW-185	-14.50	-33.66	13.48	-1.21	.069
EW-186	-14.50	-33.64	13.48	-1.21	.069
EW-187	-14.50	-33.64	13.48	-1.21	.069
EW-188	-14.50	-33.63	13.48	-1.21	.069
EW-189	-14.50	-33.58	13.48	-1.21	.069
EW-19	-14.50	-38.15	13.32	-1.38	.068
EW-190	-14.50	-33.61	13.48	-1.21	.069
EW-191	-14.50	-33.61	13.48	-1.21	.069
EW-192	-14.50	-33.61	13.48	-1.21	.069
EW-193	-14.50	-33.61	13.48	-1.21	.069
EW-194	-14.50	-33.63	13.48	-1.21	.069
EW-195	-14.50	-33.63	13.48	-1.21	.069
EW-196	-14.50	-33.63	13.48	-1.21	.069
EW-197	-14.50	-33.63	13.48	-1.21	.069
EW-198	-14.50	-33.61	13.48	-1.21	.069
EW-199	-14.50	-33.61	13.48	-1.21	.069
EW-2	-14.50	-39.56	13.27	-1.43	.068
EW-20	-14.50	-38.08	13.32	-1.37	.068
EW-200	-14.50	-33.61	13.48	-1.21	.069

EW-202	-14.50	-33.62	13.48	-1.21	.069
EW-203	-14.50	-33.62	13.48	-1.21	.069
EW-204	-14.50	-33.61	13.48	-1.21	.069
EW-205	-14.50	-33.60	13.48	-1.21	.069
EW-206	-14.50	-33.61	13.48	-1.21	.069
EW-207	-14.50	-33.61	13.48	-1.21	.069
EW-208	-14.50	-33.61	13.48	-1.21	.069
EW-209	-14.50	-33.59	13.48	-1.21	.069
EW-21	-14.50	-37.98	13.33	-1.37	.068
EW-22	-14.50	-37.85	13.33	-1.37	.068
EW-23	-14.50	-37.68	13.34	-1.36	.068
EW-24	-14.50	-37.47	13.34	-1.35	.068
EW-25	-14.50	-37.37	13.35	-1.35	.068
EW-26	-14.50	-37.19	13.35	-1.34	.068
EW-27	-14.50	-37.05	13.36	-1.34	.069
EW-28	-14.50	-36.84	13.37	-1.33	.069
EW-29	-14.50	-36.70	13.37	-1.32	.069
EW-29A	-14.50	-36.48	13.38	-1.32	.069
EW-3	-14.50	-39.56	13.27	-1.43	.068
EW-30A	-14.50	-36.04	13.40	-1.30	.069
EW-31	-14.50	-36.48	13.38	-1.32	.069
EW-31A	-14.50	-35.90	13.40	-1.30	.069
EW-32	-14.50	-36.48	13.38	-1.32	.069
EW-32A	-14.50	-35.77	13.41	-1.29	.069
EW-33	-14.50	-36.48	13.38	-1.32	.069
EW-33A	-14.50	-35.46	13.42	-1.28	.069
EW-34	-14.50	-36.48	13.38	-1.32	.069
EW-35	-14.50	-36.47	13.38	-1.32	.069
EW-36	-14.50	-36.47	13.38	-1.32	.069
EW-37	-14.50	-36.46	13.38	-1.32	.069
EW-38	-14.50	-36.52	13.38	-1.32	.069
EW-39	-14.50	-36.52	13.38	-1.32	.069
EW-4	-14.50	-39.56	13.27	-1.43	.068
EW-40	-14.50	-39.55	13.27	-1.43	.068
EW-41	-14.50	-39.55	13.27	-1.43	.068
EW-42	-14.50	-39.55	13.27	-1.43	.068
EW-43	-14.50	-39.57	13.27	-1.43	.068
EW-44	-14.50	-38.98	13.29	-1.41	.068
EW-45	-14.50	-38.97	13.29	-1.41	.068
EW-47	-14.50	-38.42	13.31	-1.39	.068
EW-49	-14.50	-38.43	13.31	-1.39	.068
EW-49_	-14.50	-37.88	13.33	-1.37	.068
EW-5	-14.50	-39.57	13.27	-1.43	.068
EW-50	-14.50	-37.76	13.33	-1.36	.068
EW-51	-14.50	-37.51	13.34	-1.35	.068
EW-52	-14.50	-37.24	13.35	-1.34	.068
EW-53	-14.50	-36.98	13.36	-1.33	.069
EW-54	-14.50	-36.83	13.37	-1.33	.069
EW-55	-14.50	-36.61	13.38	-1.32	.069
EW-56	-14.50	-36.50	13.38	-1.32	.069

EW-57	-14.50	-36.49	13.38	-1.32	.069
EW-58	-14.50	-36.49	13.38	-1.32	.069
EW-59	-14.50	-36.48	13.38	-1.32	.069
EW-6	-14.50	-39.56	13.27	-1.43	.068
EW-60	-14.50	-36.50	13.38	-1.32	.069
EW-61	-14.50	-36.49	13.38	-1.32	.069
EW-62	-14.50	-36.50	13.38	-1.32	.069
EW-63	-14.50	-36.49	13.38	-1.32	.069
EW-64	-14.50	-36.52	13.38	-1.32	.069
EW-65	-14.50	-36.51	13.38	-1.32	.069
EW-66	-14.50	-36.54	13.38	-1.32	.069
EW-68	-14.50	-38.42	13.31	-1.39	.068
EW-69	-14.50	-38.41	13.31	-1.39	.068
EW-7	-14.50	-39.57	13.27	-1.43	.068
EW-70	-14.50	-38.42	13.31	-1.39	.068
EW-71	-14.50	-36.55	13.38	-1.32	.069
EW-72	-14.50	-36.55	13.38	-1.32	.069
EW-73	-14.50	-33.66	13.48	-1.21	.069
EW-74	-14.50	-33.66	13.48	-1.21	.069
EW-75	-14.50	-33.66	13.48	-1.21	.069
EW-76	-14.50	-33.66	13.48	-1.21	.069
EW-77	-14.50	-33.67	13.48	-1.21	.069
EW-78	-14.50	-33.67	13.48	-1.21	.069
EW-79	-14.50	-33.68	13.48	-1.21	.069
EW-8	-14.50	-39.57	13.27	-1.43	.068
EW-81R	-14.50	-33.10	13.50	-1.19	.069
EW-82	-14.50	-33.81	13.48	-1.22	.069
EW-83	-14.50	-33.95	13.47	-1.22	.069
EW-84	-14.50	-34.07	13.47	-1.23	.069
EW-85	-14.50	-34.25	13.46	-1.24	.069
EW-9	-14.50	-39.56	13.27	-1.43	.068
EW-90	-14.50	-34.30	13.46	-1.24	.069
EW-91	-14.50	-34.00	13.47	-1.23	.069
EW-92	-14.50	-33.89	13.47	-1.22	.069
EW-93	-14.50	-33.81	13.48	-1.22	.069
EW-94	-14.50	-33.70	13.48	-1.22	.069
EW-95	-14.50	-33.69	13.48	-1.22	.069
EW-96	-14.50	-33.68	13.48	-1.22	.069
EW-97	-14.50	-33.67	13.48	-1.21	.069
EW-98	-14.50	-33.66	13.48	-1.21	.069
EW-99	-14.50	-33.67	13.48	-1.21	.069
i-101	.00	-37.91	13.33	-1.37	.068
i-117	.00	-36.62	13.37	-1.32	.069
i-125	.00	-36.51	13.38	-1.32	.069
i-130	.00	-38.99	13.29	-1.41	.068
i-135	.00	-36.49	13.38	-1.32	.069
i-160	.00	-38.08	13.32	-1.37	.068
i-173	.00	-38.86	13.29	-1.40	.068
i-199	.00	-38.44	13.31	-1.39	.068
i-202	.00	-38.44	13.31	-1.39	.068

i-207	.00	-38.44	13.31	-1.39	.068
i-208	.00	-38.44	13.31	-1.39	.068
i-246	.00	-33.67	13.48	-1.21	.069
i-273	.00	-34.41	13.45	-1.24	.069
i-28	.00	-28.10	13.68	-1.01	.070
i-31	.00	-27.99	13.69	-1.01	.070
i-42	.00	-34.78	13.44	-1.25	.069
i-44	.00	-34.78	13.44	-1.25	.069
i-61	.00	-30.39	13.60	-1.10	.070
i-74	.00	-30.83	13.58	-1.11	.070
i-75	.00	-30.83	13.58	-1.11	.070
i-76	.00	-34.85	13.44	-1.26	.069
i-82	.00	-30.88	13.58	-1.11	.070
i-9	.00	-33.68	13.48	-1.21	.069
J-1	.00	-39.57	13.27	-1.43	.068
J-10	.00	-33.70	13.48	-1.22	.069
J-106	.00	-33.67	13.48	-1.21	.069
J-111	.00	-36.52	13.38	-1.32	.069
J-112	.00	-37.26	13.35	-1.34	.068
J-115	.00	-34.55	13.45	-1.25	.069
J-116	.00	-33.67	13.48	-1.21	.069
J-119	.00	-34.09	13.47	-1.23	.069
J-121	.00	-37.78	13.33	-1.36	.068
J-122	.00	-33.68	13.48	-1.21	.069
J-124	.00	-33.68	13.48	-1.21	.069
J-126	.00	-33.67	13.48	-1.21	.069
J-128	.00	-33.67	13.48	-1.21	.069
J-131	.00	-34.03	13.47	-1.23	.069
J-133	.00	-36.61	13.38	-1.32	.069
J-134	.00	-38.24	13.32	-1.38	.068
J-135	.00	-37.99	13.33	-1.37	.068
J-136	.00	-37.86	13.33	-1.37	.068
J-137	.00	-37.69	13.34	-1.36	.068
J-138	.00	-39.57	13.27	-1.43	.068
J-140	.00	-33.66	13.48	-1.21	.069
J-142	.00	-39.57	13.27	-1.43	.068
J-143	.00	-33.99	13.47	-1.23	.069
J-144	.00	-37.53	13.34	-1.35	.068
J-145	.00	-39.57	13.27	-1.43	.068
J-146	.00	-37.01	13.36	-1.34	.069
J-147	.00	-33.66	13.48	-1.21	.069
J-148	.00	-39.57	13.27	-1.43	.068
J-149	.00	-34.03	13.47	-1.23	.069
J-150	.00	-33.66	13.48	-1.21	.069
J-152	.00	-33.62	13.48	-1.21	.069
J-153	.00	-34.07	13.47	-1.23	.069
J-154	.00	-33.66	13.48	-1.21	.069
J-155	.00	-34.05	13.47	-1.23	.069
J-157	.00	-34.04	13.47	-1.23	.069
J-160	.00	-34.09	13.47	-1.23	.069

J-162	.00	-27.89	13.69	-1.01	.070
J-165	.00	-33.62	13.48	-1.21	.069
J-166	.00	-34.07	13.47	-1.23	.069
J-170	.00	-34.04	13.47	-1.23	.069
J-172	.00	-34.05	13.47	-1.23	.069
J-174	.00	-33.99	13.47	-1.23	.069
J-176	.00	-33.99	13.47	-1.23	.069
J-179	.00	-33.98	13.47	-1.23	.069
J-181	.00	-33.81	13.48	-1.22	.069
J-185	.00	-39.57	13.27	-1.43	.068
J-189	.00	-33.90	13.47	-1.22	.069
J-191	.00	-34.01	13.47	-1.23	.069
J-193	.00	-33.67	13.48	-1.21	.069
J-195	.00	-33.67	13.48	-1.21	.069
J-197	.00	-33.67	13.48	-1.21	.069
J-199	.00	-33.68	13.48	-1.22	.069
J-207	.00	-33.69	13.48	-1.22	.069
J-209	.00	-33.69	13.48	-1.22	.069
J-211	.00	-33.70	13.48	-1.22	.069
J-217	.00	-34.03	13.47	-1.23	.069
J-231	.00	-39.57	13.27	-1.43	.068
J-24	.00	-34.76	13.44	-1.25	.069
J-264	.00	-39.57	13.27	-1.43	.068
J-27	.00	-34.00	13.47	-1.23	.069
J-28	.00	-39.58	13.27	-1.43	.068
J-305	.00	-39.58	13.27	-1.43	.068
J-306	.00	-34.15	13.46	-1.23	.069
J-307	.00	-39.58	13.27	-1.43	.068
J-309	.00	-36.53	13.38	-1.32	.069
J-310	.00	-36.56	13.38	-1.32	.069
J-311	.00	-36.56	13.38	-1.32	.069
J-314	.00	-36.51	13.38	-1.32	.069
J-315	.00	-36.52	13.38	-1.32	.069
J-316	.00	-36.48	13.38	-1.32	.069
J-317	.00	-33.98	13.47	-1.23	.069
J-319	.00	-36.48	13.38	-1.32	.069
J-320	.00	-36.49	13.38	-1.32	.069
J-321	.00	-35.78	13.41	-1.29	.069
J-324	.00	-37.48	13.34	-1.35	.068
J-326	.00	-36.48	13.38	-1.32	.069
J-327	.00	-36.49	13.38	-1.32	.069
J-328	.00	-36.48	13.38	-1.32	.069
J-329	.00	-36.48	13.38	-1.32	.069
J-331	.00	-37.19	13.35	-1.34	.068
J-332	.00	-37.06	13.36	-1.34	.069
J-333	.00	-36.85	13.37	-1.33	.069
J-334	.00	-36.71	13.37	-1.32	.069
J-335	.00	-36.85	13.37	-1.33	.069
J-339	.00	-33.62	13.48	-1.21	.069
J-341	.00	-33.62	13.48	-1.21	.069

J-343	.00	-33.62	13.48	-1.21	.069
J-345	.00	-33.61	13.48	-1.21	.069
J-346	.00	-33.63	13.48	-1.21	.069
J-348	.00	-33.64	13.48	-1.21	.069
J-350	.00	-33.65	13.48	-1.21	.069
J-352	.00	-33.66	13.48	-1.21	.069
J-354	.00	-33.68	13.48	-1.21	.069
J-357	.00	-33.68	13.48	-1.21	.069
J-359	.00	-33.66	13.48	-1.21	.069
J-36	.00	-31.48	13.56	-1.14	.070
J-361	.00	-33.65	13.48	-1.21	.069
J-363	.00	-33.64	13.48	-1.21	.069
J-366	.00	-33.61	13.48	-1.21	.069
J-367	.00	-33.67	13.48	-1.21	.069
J-369	.00	-33.61	13.48	-1.21	.069
J-371	.00	-33.61	13.48	-1.21	.069
J-373	.00	-33.62	13.48	-1.21	.069
J-375	.00	-33.63	13.48	-1.21	.069
J-38	.00	-33.11	13.50	-1.19	.069
J-381	.00	-33.67	13.48	-1.21	.069
J-382	.00	-33.61	13.48	-1.21	.069
J-384	.00	-33.61	13.48	-1.21	.069
J-386	.00	-33.61	13.48	-1.21	.069
J-387	.00	-33.67	13.48	-1.21	.069
J-40	.00	-33.83	13.48	-1.22	.069
J-42	.00	-34.26	13.46	-1.24	.069
J-43	.00	-36.48	13.38	-1.32	.069
J-44	.00	-33.95	13.47	-1.22	.069
J-48	.00	-34.08	13.47	-1.23	.069
J-6	.00	-39.64	13.27	-1.43	.068
J-7	.00	-27.89	13.69	-1.01	.070
J-83	.00	-39.57	13.27	-1.43	.068
J-88	.00	-33.67	13.48	-1.21	.069
J-9	.00	-33.70	13.48	-1.22	.069
R-1	.00	-40.00	13.25	-1.44	.068
W-101	-14.50	-34.48	13.45	-1.24	.069
W-144	-14.50	-34.88	13.44	-1.26	.069
W-145	-14.50	-34.83	13.44	-1.26	.069
W-146	-14.50	-34.80	13.44	-1.26	.069
W-147	-14.50	-34.78	13.44	-1.25	.069
W-148	-14.50	-34.76	13.44	-1.25	.069
W-157	-14.50	-34.73	13.44	-1.25	.069
W-87	-14.50	-34.75	13.44	-1.25	.069
W-88	-14.50	-34.50	13.45	-1.24	.069
W-89	-14.50	-33.98	13.47	-1.23	.069
W-90	-14.50	-34.31	13.46	-1.24	.069

* This designates the use of default density in a low pressure region

THE NET SYSTEM DEMAND (USFU) = -2958.000

SUMMARY OF INFLOWS(+).AND.OUTFLOWS(-) :

NAME	FLOW (USFU)	FPN TITLE
R-1	-2958.0	R-1

MAXIMUM MACH NUMBER = .04 IN LINE NO. P-25

SUMMARY OF MINIMUM.AND.MAXIMUM VELOCITIES (FT/S)

	MINIMUM		MAXIMUM
R-1	.01	P-25	33.87
P-303	.01	67	32.55
P-35	.16	P-477	32.36
P-158	.16	P-475	30.86
P-165	.16	65	24.24

SUMMARY OF MINIMUM.AND.MAXIMUM LOSS/1000. (PSI)

	MINIMUM		MAXIMUM
R-1	.00	P-25	.31
P-303	.00	P-477	.29
P-35	.00	P-475	.26
P-454	.00	185	.16
P-417	.00	P-371	.15

SUMMARY OF MINIMUM.AND.MAXIMUM PRESSURES (USPU)

	MINIMUM		MAXIMUM
R-1	-40.00	EW-159	-27.86
114	-39.72	EW-149	-27.87
J-6	-39.64	J-162	-27.89
EW-10	-39.63	EW-150	-27.89
178	-39.61	J-7	-27.89

***** END OF KYGAS SIMULATION *****

DATE FOR THIS COMPUTER RUN : 6-15-2021
START TIME FOR THIS COMPUTER RUN : 20: 7:58: 9



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Attachment H – Landfill
Condensate Calculations



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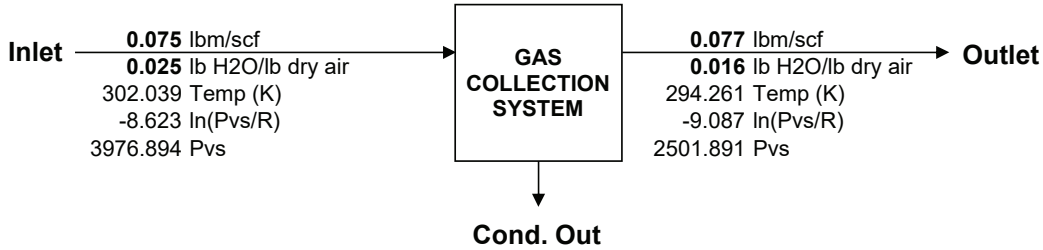
SPSA Regional Landfill



Landfill Condensate Calculation

VALID ONLY WHEN 32°F < T < 500°F

Altitude (ft): 171 Flow Rate (cfm): 2921 Inlet Sat. Temp (F): 84 Outlet Sat. Temp (F): 70	(average) (average)
--	------------------------



Inlet Mass of Dry Gas: 219.449 lb/min
Outlet Mass of Dry Gas: 225.249 lb/min
Inlet Water: 5.576 lb/min
Outlet Water: 3.547 lb/min
Cond Out: 2.029 lb/min
 8760 hrs/yr
 1,066,517 lbs/yr

101325 Atmospheric Pressure (Pa)
 14.700 Atmospheric Pressure (psia)
 0.994 Pressure Multiplier
14.610 Pressure at Location (psia)

127,880 gals/yr 0.24330 gals/min 44 gals/yr/scfm 0.00008 gals/min/scfm 350 gals/day
--

Notes:

Daily Mean Temperature = 60 degrees F. Source: USClimateData, Weather Averages. Assume gas temperature in piping is 10 degrees warmer.
 Assume LFG temperature = steady-state waste mass temperature = 84
 This is average condensate generation assuming YEARLY average. Will be large variation between winter and summer months.



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Attachment I – Surface
Emission Monitoring
Drawings



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Environmental SOPs

SOP 11.9 Landfill Surface Emission Monitoring

Page 1 of 8

(Formerly SOP# 5.13)

1.0 PURPOSE

The purpose of this plan is to satisfy the regulatory requirements for quarterly surface emissions monitoring (SEM) of methane from the landfill.

Note that the LFG related federal and state regulations in response to the Federal New Source Performance Standards (NSPS) and Emission Guidelines (EG) were recently changed as documented in the Federal Register / Vol. 85, No. 121, dated June 23, 2020. Since the Regional Landfill does not yet fall under the category of a "new landfill" (subject to 40 CFR Part 60, Subpart XXX) and has not had (and is not expected to have) construction, reconstruction or modification (as defined by the rule) that commenced after July 17, 2014, SPSA will therefore be regulated by the rule required by 40 CFR Part 60, Subpart Cf that has been implemented by VDEQ (effective July 23, 2020).

These updated standard operating procedures result from the recent changes in LFG related federal and state regulations in response to the Federal NSPS/EG for municipal solid waste landfills.

2.0 SCOPE

This procedure applies to the quarterly data collection and analysis of surface methane concentrations at the Regional Landfill. Subpart Cf (40 CFR 60.34f) requires operation of the gas collection and control system (GCCS) so that methane concentrations remain less than 500 parts per million (ppm) above background at the surface of the landfill in areas where a GCCS is required (i.e., areas with waste-in-place for 5 years or more or areas at final grade for a period of 2 years or more). The primary purpose of this requirement is to ensure adequate performance of the GCCS and landfill cover system in controlling atmospheric emissions of landfill gas (LFG) generated from the waste mass.

3.0 RESPONSIBILITIES

- 1) The Assistant Landfill & Environmental Manager is responsible for scheduling the monitoring events, and may delegate to the Environmental Specialist for reviewing sample results and taking any necessary corrective actions.
- 2) The Environmental Specialist is responsible for collecting the samples and reporting the results.

4.0 REFERENCES

- U.S. EPA Method 21 (provided in **Appendix C**)

SOP 11.9 Landfill Surface Emission Monitoring

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- Flame Ionization Detector (FID) (TVA-2020) User's Manual
- SPSA Regional Landfill Operations Manual
- Regional Landfill Title V Permit No. 61341
- NSPS Subpart Cf (40 CFR 60.34f and 40 CFR 60.36f)

5.0 PROCEDURE

- 1) The Assistant Landfill & Environmental Manager will schedule the Environmental Specialist to collect the samples at least quarterly.
- 2) The SEM event should occur during typical meteorological conditions and should not be completed during rainfall, snowfall, when snow accumulation is greater than 2 to 4 inches, when ice has accumulated over the landfill cover, or other atypical conditions that have the potential to affect monitoring results.
- 3) The Environmental Specialist will calibrate the FID per the User's Manual. Detailed calibration procedures are outlined in **Appendix A**. The calibration form and equipment checklist provided in **Appendix B** should be completed in full.
- 4) Complete upwind and downwind readings for determining background methane concentrations as described in **Appendix A**. Complete background concentration section of calibration form provided in **Appendix B**.
- 5) The Specialist will take readings around the perimeter of the landfill. Once this "ring" is sampled, the specialist will move inwards 30 meters and sample the next "ring" at 30 meter intervals until the entire landfill surface is sampled. The SEM Route Map is provided in **Appendix D**, and includes the path the Specialist should traverse.
- 6) The Specialist will place the FID probe inlet 5-10 centimeters (2-4 inches) above the landfill surface. Continuous readings should be taken with the FID as the Specialist traverses the monitoring path.
- 7) **NOTE – NEW REQUIREMENT:** If the concentration exceeds 500 ppm above the established background concentration, it is considered a monitored exceedance. **A GPS reading is required** per 40 CFR 60.36f(c)(4)(i) to pinpoint the location of a monitored exceedance. **Specifically, latitude and longitude coordinates using an instrument with an accuracy of at least ±4 meters must be used. The coordinates must be recorded in decimal degrees with at least five decimal places.** This can be a stand-alone GPS unit, a cell phone, or an embedded feature of the FID unit – as long as it meets the accuracy requirements listed.

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- 8) **NOTE – NEW REQUIREMENT:** 40 CFR 60.34f(d) requires:
“... The owner or operator must conduct surface testing around the perimeter of the collection area and along a pattern that transverses the landfill at no more than 30-meter (~100-foot) intervals where visual observations indicate elevated concentrations of landfill gas, such as distressed vegetation and cracks or seeps in the cover ***and all cover penetrations***. Thus, the owner or operator must monitor any openings that are within an area of the landfill where waste has been placed and a gas collection system is required...”
- “Penetrations and openings” are defined as any LFG collection well or LFG collection device that completely passes through the landfill cover into waste and is located within an area of the landfill where waste has been placed and a GCCS is installed/required. Specifically, for the vaults that house the leachate and groundwater access risers at Regional Landfill, monitoring should be conducted around the outside of the vaults where they emerge from the waste mass. For vaults that are open to the air, the pipe penetrations should be monitored where they emerge from the “back” of the vault (waste mass). Vaults that are closed, or have access doors/hatches should be monitored only outside, and **not** within. Examples of what is **not** a penetration for purposes of this subpart include, but are not limited to: Survey stakes, fencing (including litter fences), flags, signage, utility posts, manholes, barriers, trees, grass, and weeds.
- 9) In addition to the required GPS reading, the Specialist should mark the location of the exceedance with a labeled pin flag, digital photograph, and other documentation necessary to physically mark the location.
- 10) In the event of monitored exceedances, verbally report the location(s) and monitored concentrations to landfill supervisor for allocation of resources to correct the exceedances. **ADDITIONAL ACTION IS REQUIRED FOR MONITORED EXCEEDANCES – SEE BELOW.** An exceedance record form (as provided in **Appendix B**) is required for each exceedance location.
- 11) Deviations from the monitoring route may occur to evaluate areas where visual observations indicate the potential for elevated concentrations of LFG, such as distressed vegetation and cracks or seeps in the cover, or where a distinctive LFG odor is observed. The Specialist should note these route deviations on the route drawing. Additionally, note any areas not monitored due to dangerous conditions or safety concerns.
- 12) Once the monitoring route has been completely traversed, complete a final calibration or check of the FID in accordance with the manufacturer’s recommendations to verify the instrument is still in calibration. If readings differ significantly from initial calibration readings, Specialist should consider re-calibration

SOP 11.9 Landfill Surface Emission Monitoring

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- and performing the SEM activities again to ensure valid readings (at Specialist's discretion).
- 13) Once the SEM event has been completed, the Specialist should compile the monitoring results and forms and prepare an "Exceedance Record" for recordkeeping purposes, re-check purposes, and for eventual submittal to the regulatory agency. These documents should be submitted to the Assistant Landfill & Environmental Superintendent.
 - 14) In the event a monitored exceedance is detected (500 ppm or greater above background concentrations) during the routine SEM event, the location must be marked and recorded. The Specialist should notify the Assistant Landfill & Environmental Superintendent to communicate monitored exceedance concentrations and locations so that the supervisor can coordinate attempts to correct the monitored exceedances. It is recommended that corrective action be completed as soon as possible (within three days) after the initial monitoring event. Corrective action may include adjustments to the GCCS at each exceedance location or final/intermediate cover maintenance (addition and/or compaction of soil). Adjustments to the GCCS may include actions such as increasing the vacuum of adjacent wells to increase gas collection in the vicinity of the exceedance, fixing leaks, or replacing hardware.
 - 15) The Specialist will follow the table and flowchart below for re-monitoring of exceedance locations. The Assistant Landfill & Environmental Manager and Landfill & Environmental Manager will manage the necessary Corrective Actions.

SOP 11.9 Landfill Surface Emission Monitoring

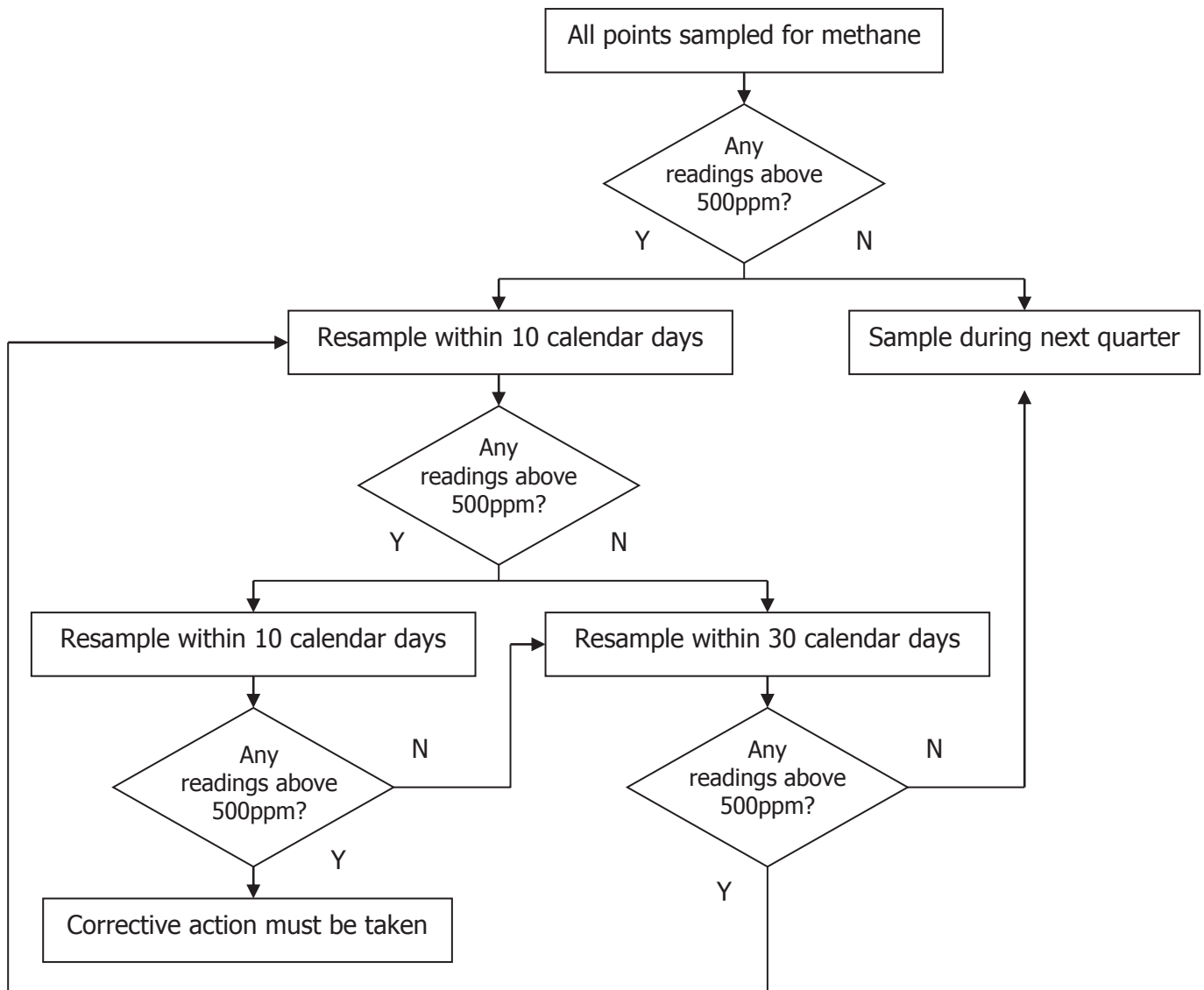
(Formerly SOP# 5.13)

Table 1. Re-monitoring Procedures

Steps	Remonitoring Event	If Remonitoring Concentrations <i>Pass</i> (the methane concentration is less than 500 ppm above background levels at exceedance location)	If Remonitoring Concentrations <i>Fail</i> (the methane concentration is 500 ppm or more above background levels at exceedance location)
A	10-day Remonitoring Completed within 10 days after the initial exceedance	To be re-monitored one (1) month from the initial exceedance. (Proceed to Step B)	A second exceedance has occurred at this location. Complete additional corrective action procedures. Location to be re-monitored in ten (10) calendar days. (Proceed to Step A1)
A1 if failed Step A	10- Day Re-Monitoring Completed within 10 days after the second exceedance	To be re-monitored in one (1) month from the initial exceedance. (Proceed to Step B)	Expansion of the GCCS required within 120 days of initial exceedance.
B	1-Month Remonitoring Completed one calendar month after the initial exceedance	No further monitoring is required until next quarterly monitoring period.	A second exceedance has occurred at this location. Complete additional corrective action procedures. Location to be re-monitored in ten (10) calendar days. (Proceed to Step B1)
B1 if failed Step B	10-Day Remonitoring for Failed 1-Month Remonitoring Completed within 10 days after the second exceedance	No further monitoring is required until next quarterly monitoring period.	Expansion of the GCCS required within 120 days of initial exceedance.

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Environmental SOPs

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6.0 RECORDS AND DOCUMENTATION

- Documentation of FID calibration and background concentrations (see example form – **Appendix B**)
- Sample data and monitoring path (monitoring path adjustments can be marked on map – **Appendix D**)
- Exceedance locations (if any) (see example form – **Appendix B**)
- Results of re-monitoring (if required) (see example form – **Appendix B**)

7.0 CONTINGENCIES

- If an exceedance is unable to be corrected within the allotted timeframe (i.e. location where monitored methane concentrations exceed 500 parts per million by volume (ppmv) above background three times in a quarter), the GCCS must be expanded within 120 days of the initial exceedance or an alternate method must be submitted to VDEQ for approval.
- As defined in 40 CFR 60.36f(c)(1), quarterly SEM is required for landfills with areas subject to GCCS requirements of NSPS. However, if a landfill, or individual phase or cell of a landfill subject to the GCCS requirements of NSPS, is permanently closed and has no monitored exceedances for three (3) consecutive quarterly SEM events, then the landfill, phase, or cell may switch from quarterly to annual SEM as described in 40 CFR 60.37f(f). Should a monitored exceedance occur during the course of conducting annual SEM, the landfill (or area) must then resume quarterly monitoring. In the event of any monitoring exceedances, additional monitoring will be required as discussed in Section 5.0, "Procedure."

8.0 DOCUMENT APPROVAL AND HISTORY

Revision	Date	Reason for Revision
0	11/7/03	Initial release
1	7/29/04	Removed corrective action request form. Changed position title to Special Waste Manager. Added Title V Permit to Reference List.
2	2/8/06	Minor procedural changes



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3	3/7/07	Reassigned Special Waste Manager responsibilities to the Assistant Landfill & Environmental Manager
4	7/14/10	Changed compliance coordinator to specialist and added Environmental Manager for Special Waste Manager
5	11/10/19	Updated personnel titles. Changed logo. Grammar and flow changes.
6	7/24/2020	Updated based on NSPS Subpart Cf Regulations. Added additional details for FID calibration and example forms. Added Contingencies section.

SOP REVIEWED FOR TECHNICAL ACCURACY BY

Revision	Printed Name	Date
6		

APPROVED BY

Facility/Department	Approval Signature	Date
Management Representative		

Appendix A. Calibration Procedures

FID CALIBRATION PROCEDURES

PURPOSE

Calibration procedures should be completed prior to and after SEM events to check that the monitoring equipment is in proper working order and to prevent skewed monitoring results. There are three steps in the calibration procedure that should occur at each monitoring event or each day of a monitoring event (whichever is less). These include: the initial calibration of the monitoring equipment; sampling upwind and downwind background readings; and, end of day or event calibration checks. The specifics of these three activities are discussed in the following subsections.

INITIAL EQUIPMENT CALIBRATION

The surface emissions monitoring equipment should be calibrated at the beginning of the day or the SEM event, whichever is more frequent, and prior to collecting upwind and downwind background readings. Calibration should be conducted in accordance with the manufacturer's instructions and with EPA Method 21. A copy of Method 21 is included for reference in Appendix C.

The initial equipment calibration should be conducted as follows:

1. Assemble equipment as it will be used for the SEM route and start-up instrument (Flame Ionization Detection (FID) equipment). Let the instrument warm-up for approximately 30 minutes (or as required by the manufacturer's instructions). The pump must be on and the equipment must be ignited throughout the warm-up period.
2. Introduce the zero calibration gas and take reading. Record results on the calibration record form (example in Appendix B).
3. Introduce the 500 parts per million (ppm) calibration gas and take reading. Record the results on the calibration record form.
4. Calculate the sensitivity of the detector by filling in the table on the calibration record form.
5. Repeat steps 2 through 4 two additional times, making a total of three measurements alternating between the zero air calibration gas and the methane calibration gas.
6. Calculate the "calibration precision" as shown on the calibration record form. The calibration precision should be equal to or less than 10 percent of the calibration gas value. Calibration precision is determined by calculating the average algebraic difference between the meter readings and the known value. Divide the average by the known calibration value and multiply by 100 to express the calibration precision as a percentage.
7. Next, calculate the response time. Introduce the zero gas into the instrument sample probe, when the meter reading has stabilized, quickly switch to the methane calibration gas. After switching, measure the time required to attain 90 percent of the final stable reading (final column in the table on the calibration record form).
8. Repeat step 7 two additional times, making a total of three measurements. Average the three measurements for the instrument's response time. The instrument response time should be equal to 30 seconds or less.
9. If calibration and response times are within the acceptable tolerances described above, then proceed to collecting the upwind and downwind background readings. If calibration of the equipment is not within the acceptable tolerances, then verify calibration gases are not expired

(refer to expiration date on gas bottle) and restart calibration procedures beginning with Step 1. If after repeating the entire calibration process the calibration and response times are still not within acceptable tolerances, call the FID manufacturer (or rental company) for instrument troubleshooting guidance.

UPWIND AND DOWNWIND READINGS

Upwind and downwind readings will be collected after the initial equipment calibration and prior to beginning the SEM route.

Upwind and downwind background readings will be conducted as described below:

1. Move upwind of the landfill area to be monitored, a minimum of 100 feet away from the edge of waste.
2. With the calibrated monitoring equipment, collect and record a reading. Record location description and reading in “Background Concentration Checks” section of the calibration record form.
3. Move downwind of the landfill area to be monitored, a minimum of 100 feet away from the edge of waste.
4. With the calibrated monitoring equipment, collect and record a reading. Record location description and reading in “Background Concentration Checks” section of the calibration record form.

These readings must be completed prior to beginning the SEM route and will serve as the background reading that will be compared to the SEM readings for compliance demonstration. Because NSPS requires locations to be recorded where the monitored surface methane concentration is 500 ppm or greater above background concentrations, the technician should add (even if a negative value) the number 500 to the monitored background concentration to determine the actual threshold value for what constitutes an exceedance. For example, a background reading of 20 ppm would mean a monitored surface methane concentration of 520 ppm is required to qualify as an exceedance. Additional upwind and downwind readings may be taken at landfill phase breaks or if topography warrants additional testing.

FINAL CALIBRATION CHECK

After the monitoring route is completed, the FID/VOC detector is required to undergo a final calibration check in accordance with the manufacturer’s recommendations to verify the equipment did not experience a calibration shift during the monitoring. The final calibration check should be conducted as follows:

1. Introduce the zero calibration gas and take reading. Record results in the “Post-Monitoring Calibration Check” section on the calibration record form (example in Appendix B).
2. Introduce the 500 parts per million (ppm) calibration gas and take reading. Record results in the “Post-Monitoring Calibration Check” section on the calibration record form.
3. If readings differ significantly from initial calibration readings, technician should consider re-calibration and performing the SEM activities again to ensure valid readings (at technician’s discretion).

Appendix B. Example Forms and Checklists

NSPS Surface Emissions Monitoring - Equipment Checklist

To be completed by technician prior to monitoring event.

Date: _____

Site Name: _____

Field Technician(s): _____

Monitoring Event Scheduled to be Completed:

- _____ Initial Monitoring
- _____ 10-Day Recheck
- _____ 1-Month Recheck
- _____ Other

Required Equipment:

- _____ FID/VOC Detector
 - Make: _____
 - Model: _____
 - S/N: _____
- _____ Zero Air Calibration Gas
 - Manufacturer: _____
 - Lot #: _____
 - Expiration Date: _____
- _____ Span Calibration Gas
 - Concentration: _____
 - Manufacturer: _____
 - Lot #: _____
 - Expiration Date: _____
- _____ Safety Equipment (as applicable for site)
 - _____ Safety Vest
 - _____ 3 Gas Meter
 - _____ Hard Hat
 - _____ Safety Glasses
- _____ Pin Flags
- _____ Permanent Marker
- _____ SEM Route Map
- _____ Camera (as applicable)
- _____ GPS Locator (as applicable)

Comments Regarding Condition of Equipment:

Technician Signature: _____

Date: _____

SURFACE EMISSION MONITORING CALIBRATION AND RESPONSE TIME DETERMINATION

Landfill Name: _____

Date: _____ Field Technician(s): _____

WEATHER OBSERVATIONS

Wind Speed: _____ mph Wind Direction (from): _____ Barometric Pressure: _____

Air Temperature: _____ deg. F General Weather Conditions: _____

CALIBRATION INFORMATION

Instrument Make: _____ Model: _____ Serial No: _____

Pre-monitoring Calibration Check

Procedure: Calibrate the instrument. Make a total of three measurements by alternating zero air and the calibration gas. Record the readings and calculate the average algebraic difference between the instrument reading and the calibration gas as a percentage. The calibration percentage must be less than or equal to 10% of the calibration gas value.

Note: Time to reach 90% of Cal Gas Reading should be measured after switching from Zero Air to Calibration Gas. Response Time is calculated as the average of the three measurements.

Instrument ID: _____ Cal Gas Concentration: _____ ppm

Measurement No.	Time	Zero Air Reading (ppm)	Cal Gas Reading (ppm)	Cal Gas Conc. - Cal Gas Reading (ppm)	90% of Cal Gas Reading (ppm)	Time to reach 90% Cal Gas Reading (sec.)
1						
2						
3						
Average:						

Calibration Precision = Avg. Difference/Cal Gas Conc. X 100%

= _____ / _____ X 100 = _____ %

Response time: _____ sec
(must be less than 30 sec.)

FID Fuel Cell (hydrogen) Pressure (if shown)

Initial: _____ psig

Final: _____ psig

Post-Monitoring Calibration Check

Zero Air Reading: _____ ppm

Cal Gas Reading: _____ ppm

BACKGROUND CONCENTRATION CHECKS

Upwind Location Description: _____ Reading: _____ ppm

Downwind Location Description: _____ Reading: _____ ppm

Calculated Average Background Concentration: _____ ppm

NOTES:

Exceedance Record

(Complete form for EACH unique exceedance location)

Landfill Name: _____

Initial Exceedance **Exceedance #:** _____

Measurement: _____ ppm **Technician:** _____

Date: _____ **Time:** _____ AM PM

Location: _____

GPS Lat./Long. Coords. (to 5 decimal places): _____

Corrective Action: _____

Re-monitoring (within 10 calendar days of initial exceedance):

Measurement: _____ ppm **Technician:** _____

Date: _____ **Time:** _____ AM PM

If 10-day remonitoring shows that exceedance has not been corrected, an additional corrective action shall be performed and location re-monitored within 10 calendar days. If no exceedance is found, then location shall be re-monitored within one month of initial exceedance.

Corrective Action (if required): _____

Re-monitoring (within 10 calendar days of second exceedance – if necessary):

Measurement: _____ ppm **Technician:** _____

Date: _____ **Time:** _____ AM PM

If 10-day re-monitoring shows that exceedance has not been corrected, an additional corrective action shall be performed and location re-monitored within 10 calendar days.

Corrective Action (if required): _____

One-Month Re-monitoring:

Measurement: _____ ppm **Technician:** _____

Date: _____ **Time:** _____ AM PM

If one-month re-monitoring shows that exceedance has not been corrected an additional corrective action shall be performed and location re-monitored within 10 calendar days. If the exceedance is the third exceedance monitored at this location within the quarterly monitoring period, see Section 6.2 for Surface Emission Remediation Actions. No further remonitoring of this location is required until remedy is complete. If monitoring shows no exceedance, no further re-monitoring is required, resume normal quarterly surface emissions monitoring schedule

Corrective Action/Remedy (if required): _____

Remonitoring (within 10 calendar days of second exceedance – if necessary):

(Required if second exceedance is found during one-month remonitoring)

Measurement: _____ ppm **Technician:** _____

Date: _____ **Time:** _____ AM PM

If this re-monitoring shows that exceedance has not been corrected, the exceedance is the third exceedance monitored at this location within the quarterly monitoring period. See Section 6.2 for Surface Emission Remediation Actions. No further re-monitoring of this location is required until remedy is complete. If monitoring shows no exceedance, no further re-monitoring is required, resume normal quarterly surface emissions monitoring schedule.

Remedy (if required): _____

Appendix C. USEPA Method 21 (for Reference)

While we have taken steps to ensure the accuracy of this Internet version of the document, it is not the official version. Please refer to the official version in the FR publication, which appears on the Government Printing Office's eCFR website:

(http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr60_main_02.tpl)

Method 21 - Determination of Volatile Organic Compound Leaks

1.0 Scope and Application

1.1 Analytes.

Analyte	CAS No.
Volatile Organic Compounds (VOC)	No CAS number assigned.

1.2 Scope. This method is applicable for the determination of VOC leaks from process equipment. These sources include, but are not limited to, valves, flanges and other connections, pumps and compressors, pressure relief devices, process drains, open-ended valves, pump and compressor seal system degassing vents, accumulator vessel vents, agitator seals, and access door seals.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

2.0 Summary of Method

2.1 A portable instrument is used to detect VOC leaks from individual sources. The instrument detector type is not specified, but it must meet the specifications and performance criteria contained in Section 6.0. A leak definition concentration based on a reference compound is specified in each applicable regulation. This method is intended to locate and classify leaks only, and is not to be used as a direct measure of mass emission rate from individual sources.

3.0 Definitions

3.1 *Calibration gas* means the VOC compound used to adjust the instrument meter reading to a known value. The calibration gas is usually the reference compound at a known concentration approximately equal to the leak definition concentration.

3.2 *Calibration precision* means the degree of agreement between measurements of the same known value, expressed as the relative percentage of the average difference between the meter readings and the known concentration to the known concentration.

3.3 *Leak definition concentration* means the local VOC concentration at the surface of a leak source that indicates that a VOC emission (leak) is present. The leak definition is an instrument meter reading based on a reference compound.

3.4 *No detectable emission* means a local VOC concentration at the surface of a leak source, adjusted for local VOC ambient concentration, that is less than 2.5 percent of the specified leak definition concentration. that indicates that a VOC emission (leak) is not present.

3.5 *Reference compound* means the VOC species selected as the instrument calibration basis for specification of the leak definition concentration. (For example, if a leak definition concentration is 10,000 ppm as methane, then any source emission that results in a local concentration that yields a meter reading of 10,000 on an instrument meter calibrated with methane would be classified as a leak. In this example, the leak definition concentration is 10,000 ppm and the reference compound is methane.)

3.6 *Response factor* means the ratio of the known concentration of a VOC compound to the observed meter reading when measured using an instrument calibrated with the reference compound specified in the applicable regulation.

3.7 *Response time* means the time interval from a step change in VOC concentration at the input of the sampling system to the time at which 90 percent of the corresponding final value is reached as displayed on the instrument readout meter.

4.0 *Interferences[Reserved]*

5.0 *Safety*

5.1 *Disclaimer.* This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 *Hazardous Pollutants.* Several of the compounds, leaks of which may be determined by this method, may be irritating or corrosive to tissues (*e.g.*, heptane) or may be toxic (*e.g.*, benzene, methyl alcohol). Nearly all are fire hazards. Compounds in emissions should be determined through familiarity with the source. Appropriate precautions can be found in reference documents, such as reference No. 4 in Section 16.0.

6.0 *Equipment and Supplies*

A VOC monitoring instrument meeting the following specifications is required:

6.1 The VOC instrument detector shall respond to the compounds being processed. Detector types that may meet this requirement include, but are not limited to, catalytic oxidation, flame ionization, infrared absorption, and photoionization.

6.2 The instrument shall be capable of measuring the leak definition concentration specified in the regulation.

6.3 The scale of the instrument meter shall be readable to ± 2.5 percent of the specified leak definition concentration.

6.4 The instrument shall be equipped with an electrically driven pump to ensure that a sample is provided to the detector at a constant flow rate. The nominal sample flow rate, as measured at the sample probe tip, shall be 0.10 to 3.0 l/min (0.004 to 0.1 ft³/min) when the probe is fitted with a glass wool plug or filter that may be used to prevent plugging of the instrument.

6.5 The instrument shall be equipped with a probe or probe extension or sampling not to exceed 6.4 mm (1/4in) in outside diameter, with a single end opening for admission of sample.

6.6 The instrument shall be intrinsically safe for operation in explosive atmospheres as defined by the National Electrical Code by the National Fire Prevention Association or other applicable regulatory code for operation in any explosive atmospheres that may be encountered in its use. The instrument shall, at a minimum, be intrinsically safe for Class 1, Division 1 conditions, and/or Class 2, Division 1 conditions, as appropriate, as defined by the example code. The instrument shall not be operated with any safety device, such as an exhaust flame arrestor, removed.

7.0 Reagents and Standards

7.1 Two gas mixtures are required for instrument calibration and performance evaluation:

7.1.1 Zero Gas. Air, less than 10 parts per million by volume (ppmv) VOC.

7.1.2 Calibration Gas. For each organic species that is to be measured during individual source surveys, obtain or prepare a known standard in air at a concentration approximately equal to the applicable leak definition specified in the regulation.

7.2 Cylinder Gases. If cylinder calibration gas mixtures are used, they must be analyzed and certified by the manufacturer to be within 2 percent accuracy, and a shelf life must be specified. Cylinder standards must be either reanalyzed or replaced at the end of the specified shelf life.

7.3 Prepared Gases. Calibration gases may be prepared by the user according to any accepted gaseous preparation procedure that will yield a mixture accurate to within 2 percent. Prepared standards must be replaced each day of use unless it is demonstrated that degradation does not occur during storage.

7.4 Mixtures with non-Reference Compound Gases. Calibrations may be performed using a compound other than the reference compound. In this case, a conversion factor must be determined for the alternative compound such that the resulting meter readings during source surveys can be converted to reference compound results.

8.0 Sample Collection, Preservation, Storage, and Transport

8.1 Instrument Performance Evaluation. Assemble and start up the instrument according to the manufacturer's instructions for recommended warm-up period and preliminary adjustments.

8.1.1 Response Factor. A response factor must be determined for each compound that is to be measured, either by testing or from reference sources. The response factor tests are required before placing the analyzer into service, but do not have to be repeated at subsequent intervals.

8.1.1.1 Calibrate the instrument with the reference compound as specified in the applicable regulation. Introduce the calibration gas mixture to the analyzer and record the observed meter reading. Introduce zero gas until a stable reading is obtained. Make a total of three measurements by alternating between the calibration gas and zero gas. Calculate the response factor for each repetition and the average response factor.

8.1.1.2 The instrument response factors for each of the individual VOC to be measured shall be less than 10 unless otherwise specified in the applicable regulation. When no instrument is available that meets this specification when calibrated with the reference VOC specified in the applicable regulation, the available instrument may be calibrated with one of the VOC to be measured, or any other VOC, so long as the instrument then has a response factor of less than 10 for each of the individual VOC to be measured.

8.1.1.3 Alternatively, if response factors have been published for the compounds of interest for the instrument or detector type, the response factor determination is not required, and existing results may be referenced. Examples of published response factors for flame ionization and catalytic oxidation detectors are included in References 1–3 of Section 17.0.

8.1.2 Calibration Precision. The calibration precision test must be completed prior to placing the analyzer into service and at subsequent 3-month intervals or at the next use, whichever is later.

8.1.2.1 Make a total of three measurements by alternately using zero gas and the specified calibration gas. Record the meter readings. Calculate the average algebraic difference between the meter readings and the known value. Divide this average difference by the known calibration value and multiply by 100 to express the resulting calibration precision as a percentage.

8.1.2.2 The calibration precision shall be equal to or less than 10 percent of the calibration gas value.

8.1.3 Response Time. The response time test is required before placing the instrument into service. If a modification to the sample pumping system or flow configuration is made that would change the response time, a new test is required before further use.

8.1.3.1 Introduce zero gas into the instrument sample probe. When the meter reading has stabilized, switch quickly to the specified calibration gas. After switching, measure the time required to attain 90 percent of the final stable reading. Perform this test sequence three times and record the results. Calculate the average response time.

8.1.3.2 The instrument response time shall be equal to or less than 30 seconds. The instrument pump, dilution probe (if any), sample probe, and probe filter that will be used during testing shall all be in place during the response time determination.

8.2 Instrument Calibration. Calibrate the VOC monitoring instrument according to Section 10.0.

8.3 Individual Source Surveys.

8.3.1 Type I—Leak Definition Based on Concentration. Place the probe inlet at the surface of the component interface where leakage could occur. Move the probe along the interface periphery while observing the instrument readout. If an increased meter reading is observed, slowly sample the interface where leakage is indicated until the maximum meter reading is obtained. Leave the probe inlet at this maximum reading location for approximately two times the instrument response time. If the maximum observed meter reading is greater than the leak definition in the applicable regulation, record and report the results as specified in the regulation reporting requirements. Examples of the application of this general technique to specific equipment types are:

8.3.1.1 Valves. The most common source of leaks from valves is the seal between the stem and housing. Place the probe at the interface where the stem exits the packing gland and sample the stem circumference. Also, place the probe at the interface of the packing gland take-up flange seat and sample

the periphery. In addition, survey valve housings of multipart assembly at the surface of all interfaces where a leak could occur.

8.3.1.2 Flanges and Other Connections. For welded flanges, place the probe at the outer edge of the flange-gasket interface and sample the circumference of the flange. Sample other types of nonpermanent joints (such as threaded connections) with a similar traverse.

8.3.1.3 Pumps and Compressors. Conduct a circumferential traverse at the outer surface of the pump or compressor shaft and seal interface. If the source is a rotating shaft, position the probe inlet within 1 cm of the shaft-seal interface for the survey. If the housing configuration prevents a complete traverse of the shaft periphery, sample all accessible portions. Sample all other joints on the pump or compressor housing where leakage could occur.

8.3.1.4 Pressure Relief Devices. The configuration of most pressure relief devices prevents sampling at the sealing seat interface. For those devices equipped with an enclosed extension, or horn, place the probe inlet at approximately the center of the exhaust area to the atmosphere.

8.3.1.5 Process Drains. For open drains, place the probe inlet at approximately the center of the area open to the atmosphere. For covered drains, place the probe at the surface of the cover interface and conduct a peripheral traverse.

8.3.1.6 Open-ended Lines or Valves. Place the probe inlet at approximately the center of the opening to the atmosphere.

8.3.1.7 Seal System Degassing Vents and Accumulator Vents. Place the probe inlet at approximately the center of the opening to the atmosphere.

8.3.1.8 Access door seals. Place the probe inlet at the surface of the door seal interface and conduct a peripheral traverse.

8.3.2 Type II—"No Detectable Emission". Determine the local ambient VOC concentration around the source by moving the probe randomly upwind and downwind at a distance of one to two meters from the source. If an interference exists with this determination due to a nearby emission or leak, the local ambient concentration may be determined at distances closer to the source, but in no case shall the distance be less than 25 centimeters. Then move the probe inlet to the surface of the source and determine the concentration as outlined in Section 8.3.1. The difference between these concentrations determines whether there are no detectable emissions. Record and report the results as specified by the regulation. For those cases where the regulation requires a specific device installation, or that specified vents be ducted or piped to a control device, the existence of these conditions shall be visually confirmed. When the regulation also requires that no detectable emissions exist, visual observations and sampling surveys are required. Examples of this technique are:

8.3.2.1 Pump or Compressor Seals. If applicable, determine the type of shaft seal. Perform a survey of the local area ambient VOC concentration and determine if detectable emissions exist as described in Section 8.3.2.

8.3.2.2 Seal System Degassing Vents, Accumulator Vessel Vents, Pressure Relief Devices. If applicable, observe whether or not the applicable ducting or piping exists. Also, determine if any sources exist in the ducting or piping where emissions could occur upstream of the control device. If the required ducting or piping exists and there are no sources where the emissions could be vented to the atmosphere upstream of

the control device, then it is presumed that no detectable emissions are present. If there are sources in the ducting or piping where emissions could be vented or sources where leaks could occur, the sampling surveys described in Section 8.3.2 shall be used to determine if detectable emissions exist.

8.3.3 Alternative Screening Procedure.

8.3.3.1 A screening procedure based on the formation of bubbles in a soap solution that is sprayed on a potential leak source may be used for those sources that do not have continuously moving parts, that do not have surface temperatures greater than the boiling point or less than the freezing point of the soap solution, that do not have open areas to the atmosphere that the soap solution cannot bridge, or that do not exhibit evidence of liquid leakage. Sources that have these conditions present must be surveyed using the instrument technique of Section 8.3.1 or 8.3.2.

8.3.3.2 Spray a soap solution over all potential leak sources. The soap solution may be a commercially available leak detection solution or may be prepared using concentrated detergent and water. A pressure sprayer or squeeze bottle may be used to dispense the solution. Observe the potential leak sites to determine if any bubbles are formed. If no bubbles are observed, the source is presumed to have no detectable emissions or leaks as applicable. If any bubbles are observed, the instrument techniques of Section 8.3.1 or 8.3.2 shall be used to determine if a leak exists, or if the source has detectable emissions, as applicable.

9.0 Quality Control

Section	Quality control measure	Effect
8.1.2	Instrument calibration precision check	Ensure precision and accuracy, respectively, of instrument response to standard.
10.0	Instrument calibration	

10.0 Calibration and Standardization

10.1 Calibrate the VOC monitoring instrument as follows. After the appropriate warm-up period and zero internal calibration procedure, introduce the calibration gas into the instrument sample probe. Adjust the instrument meter readout to correspond to the calibration gas value.

Note: If the meter readout cannot be adjusted to the proper value, a malfunction of the analyzer is indicated and corrective actions are necessary before use.

11.0 Analytical Procedures[Reserved]

12.0 Data Analyses and Calculations[Reserved]

13.0 Method Performance[Reserved]

14.0 Pollution Prevention[Reserved]

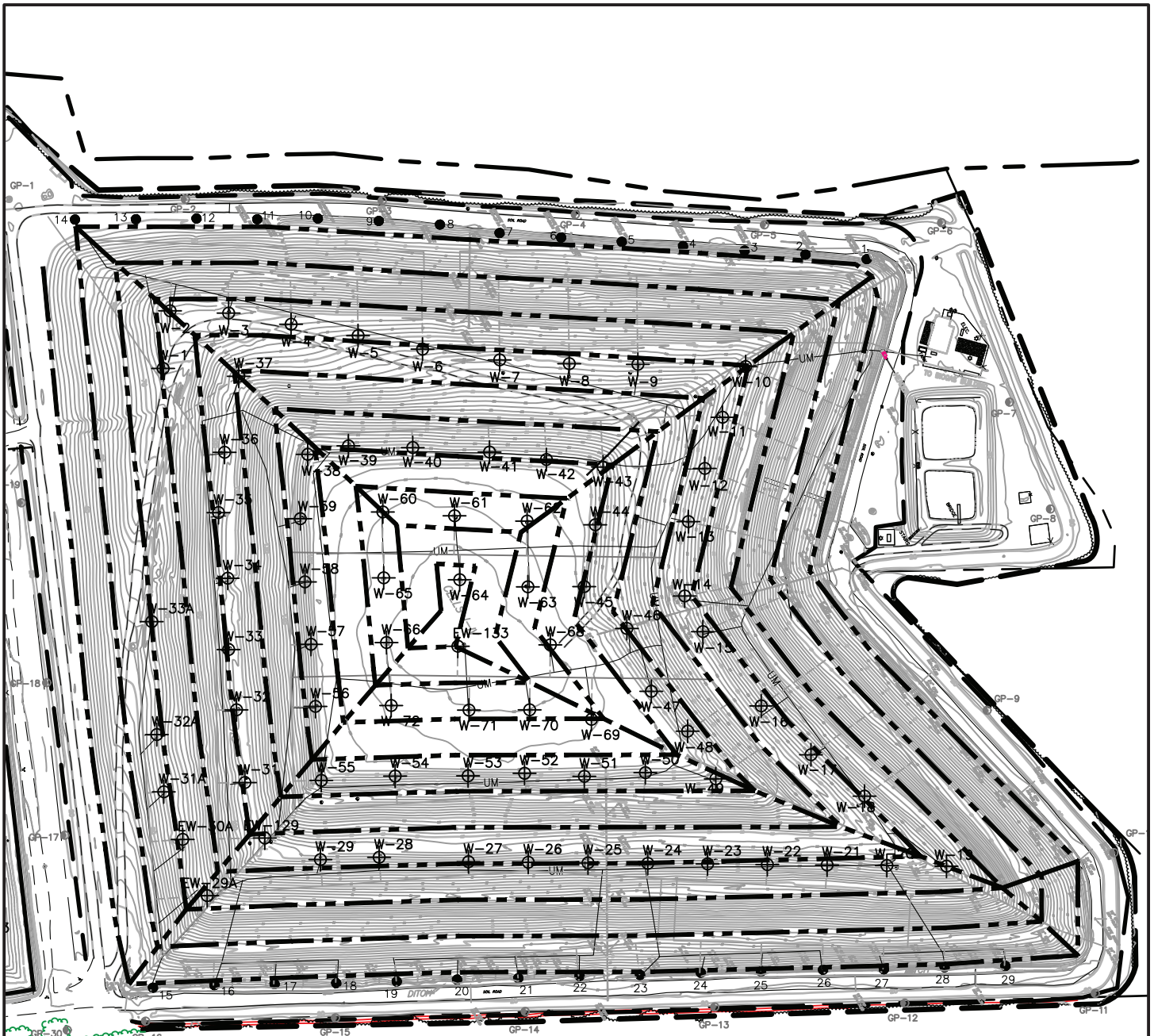
15.0 Waste Management[Reserved]

16.0 References

1. Dubose, D.A., and G.E. Harris. Response Factors of VOC Analyzers at a Meter Reading of 10,000 ppmv for Selected Organic Compounds. U.S. Environmental Protection Agency, Research Triangle Park, NC. Publication No. EPA 600/2-81051. September 1981.
2. Brown, G.E., *et al.* Response Factors of VOC Analyzers Calibrated with Methane for Selected Organic Compounds. U.S. Environmental Protection Agency, Research Triangle Park, NC. Publication No. EPA 600/2-81-022. May 1981.
3. DuBose, D.A. *et al.* Response of Portable VOC Analyzers to Chemical Mixtures. U.S. Environmental Protection Agency, Research Triangle Park, NC. Publication No. EPA 600/2-81-110. September 1981.
4. Handbook of Hazardous Materials: Fire, Safety, Health. Alliance of American Insurers. Schaumburg, IL. 1983.

17.0 Tables, Diagrams, Flowcharts, and Validation Data[Reserved]

Appendix D. SEM Monitoring Route



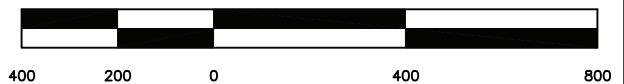
**CELLS I-IV
(100 ACRES)**

LEGEND

- | | | | |
|-------|------------------------------|-----|-------------------------------------|
| W-57 | EXISTING GAS WELL | --- | PROPOSED SEM PATH |
| GP-9 | EXISTING PERIMETER GAS PROBE | --- | EXISTING HDPE HEADER (SIZE VARIES) |
| ● | EXISTING LEACHATE MANHOLE | --- | EXISTING HDPE LATERAL (SIZE VARIES) |
| GP-54 | PROPOSED PERIMETER GAS PROBE | | |



SCALE IN FEET

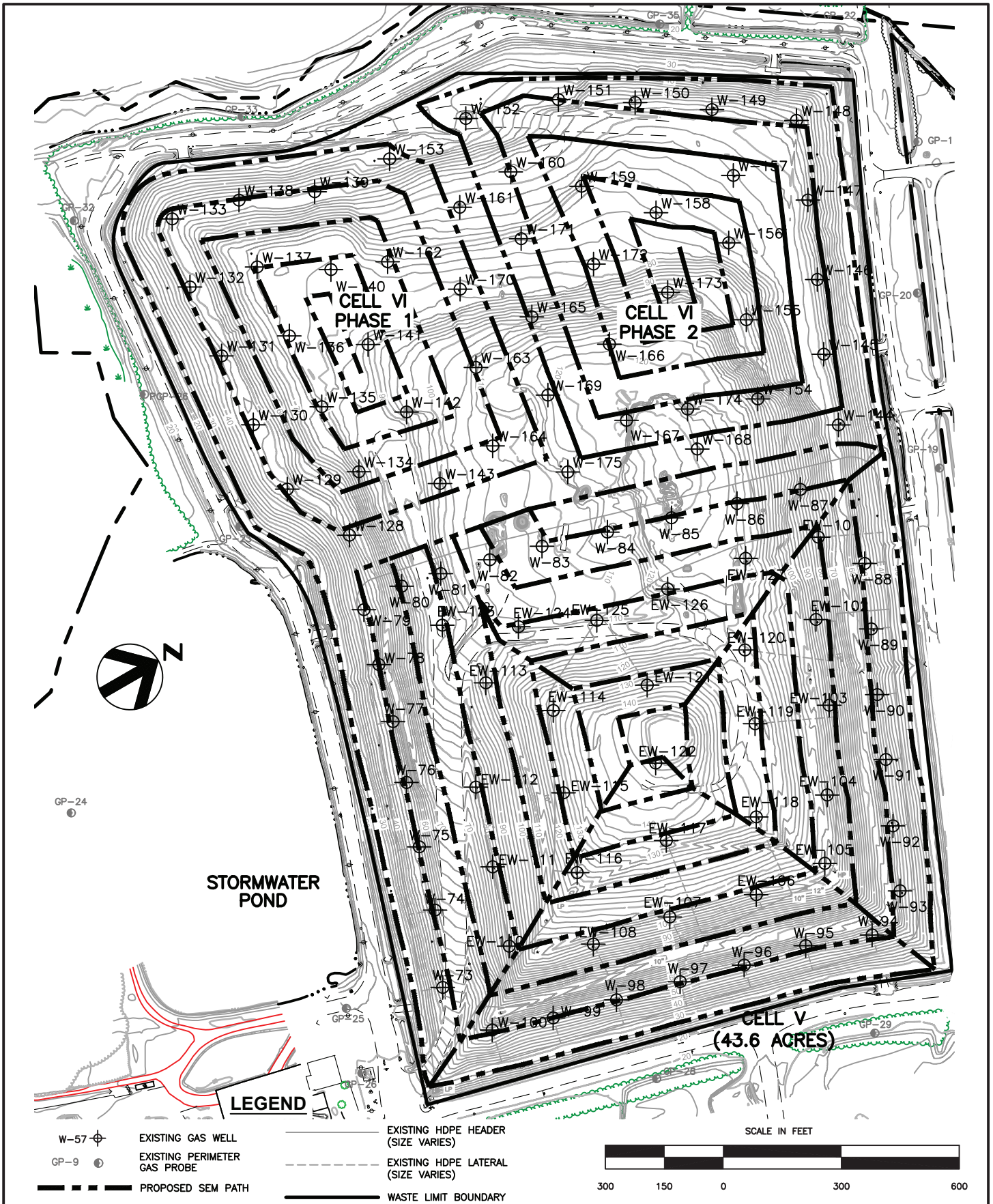


PROJECT TITLE
**SOUTHEASTERN PUBLIC SERVICE AUTHORITY
 REGIONAL LANDFILL, SUFFOLK, VA**

SHEET TITLE
**CELLS I TO IV
 SURFACE EMISSIONS MONITORING PLAN**



PROJECT NUMBER
 10233974
 PROJECT MANAGER
 A. WHITE, PG
 DESIGNED BY
 K. SINGH
 DATE
 JULY 2020



PROJECT TITLE
**SOUTHEASTERN PUBLIC SERVICE AUTHORITY
 REGIONAL LANDFILL, SUFFOLK, VA**

SHEET TITLE
**CELLS V & VI
 SURFACE EMISSIONS MONITORING PLAN**

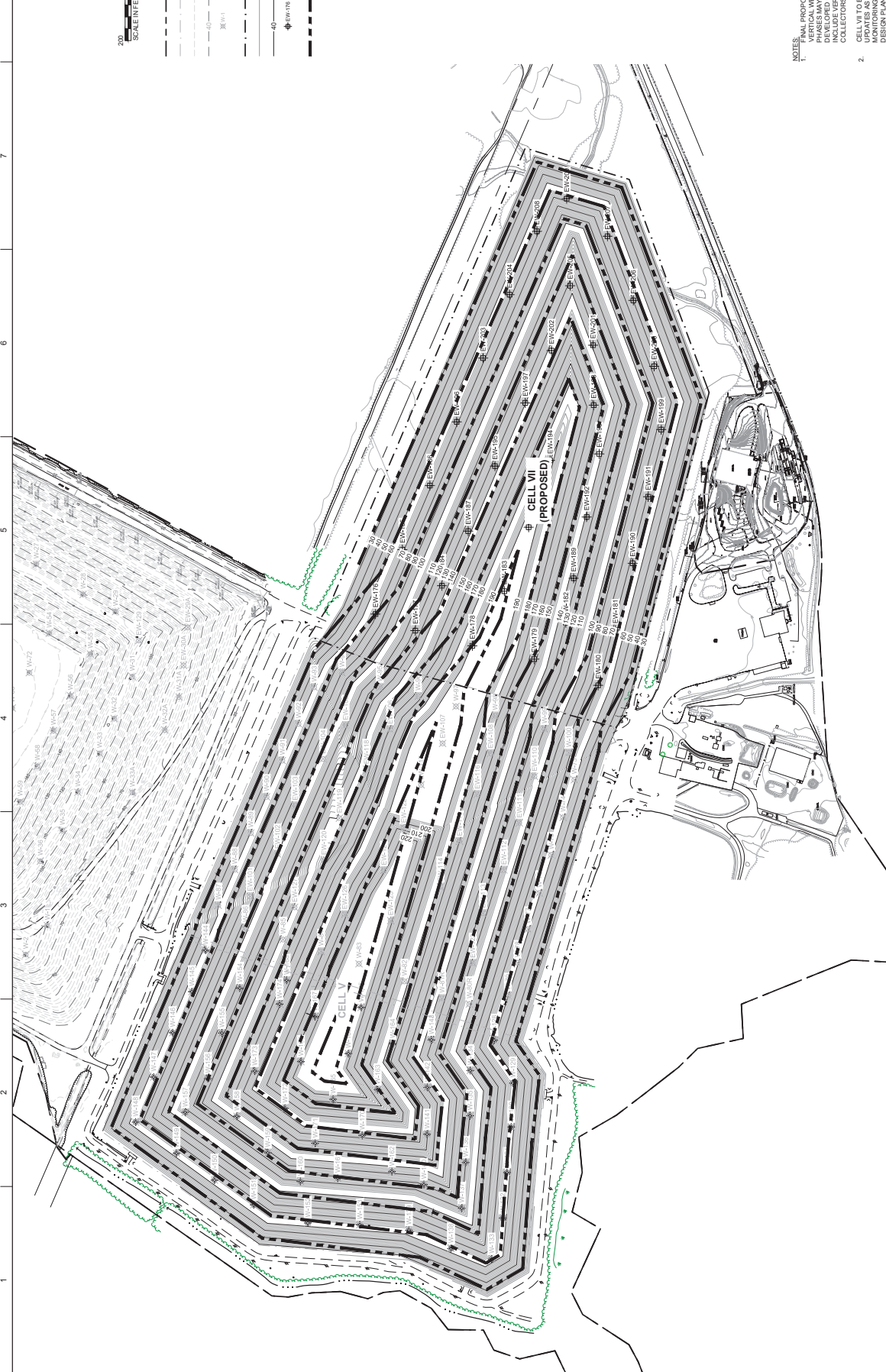


PROJECT NUMBER
 10233974

PROJECT MANAGER
 A. WHITE, PG

DESIGNED BY
 K. SINGH

DATE
 JULY 2020



LEGEND

- PROPERTY BOUNDARY
- EXISTING PHASE LIMITS
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING LANDFILL GAS EXTRACTION WELL
- PROPOSED PHASE LIMITS
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED LANDFILL GAS EXTRACTION WELL
- PROPOSED SURFACE EMISSIONS MONITORING PATH

SCALE IN FEET

0 200 400

NOTE:

- FINAL PROPOSED GRADES AND FINAL GCOS VERTICAL WELLS SHOWN. INTERIM GCOS VERTICAL WELLS SHOWN. INTERIM PHASES MAY DEVELOPE OVER TIME. INTERIM PHASES MAY INCLUDE VERTICAL AND/OR HORIZONTAL COLLECTIONS.
- CELL VII TO BE ADDED TO SEM SOP IN FUTURE DESIGN PHASE. MONITORING ROUTE SHOWN FOR GCOS DESIGN PLAN CONCEPT.

PROPOSED CELL VII SURFACE EMISSIONS MONITORING PATH

SPSA WASTE SOLUTIONS

SOUTHEASTERN PUBLIC SERVICE AUTHORITY REGIONAL LANDFILL LANDFILL GAS EXPANSION SUFFOLK, VIRGINIA

PROJECT NUMBER 1028957

DESIGNED BY C. WILLIAMS, EIT
 DRAWN BY J. RAYMOND
 CHECKED BY J. MILLER, P.E.

FILENAME 00C-01.dwg
 SCALE 1" = 200'

SHEET 00C-01

ISSUE	DATE	DESCRIPTION

HDR



249 Central Park Avenue, Suite 201
Virginia Beach, VA 23462-3099
757.222.1500

hdrinc.com

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EXHIBIT E
REPORTING OBLIGATIONS: 40 C.F.R. 98 SUBPART HH

EPA Greenhouse Gas Reporting Rule (40 CFR Part 98) Responsibility Allocation Matrix

Owner Responsibilities	Gasco Responsibilities	Gasco Due Date/ Frequency	Gasco Cure Period
General			
Development and regular update of the EPA Greenhouse Gas Monitoring Plan (GHG Plan). The GHG Plan will outline current requirements, positions of responsibility, procedures and methods of data collection, calibration requirements, recordkeeping and reporting requirements. ¹	Operation and monitoring of the landfill gas collection and control system (GCCS) and landfill gas to energy (LFGTE) facility(ies) in accordance with the GHG Plan in order that calibrated monitoring, data gathering and reporting can be accomplished per the applicable 40 CFR Part 98 requirements.		
	Gasco will be required to calibrate all LFG monitoring devices in accordance with the requirements outlined in the GHG Plan and Subpart 98	See calibration requirements in GHG Plan. Proof of calibration required to be submitted annually to Owner by January	15 Days

¹ It is not the intention of this responsibility matrix to contain all the information found in the GHG Plan. The matrix presents an overview of the responsibilities and attempts to allocate these responsibilities in general terms. The most current GHG Plan and the most current applicable regulations will govern.

Owner Responsibilities	Gasco Responsibilities	Gasco Due Date/ Frequency	Gasco Cure Period
		15 th of each calendar year.	
<p>Owner will be responsible for annual GHG reporting utilizing the EPA E-GGRT online portal. Reporting will include Subpart HH and Subpart C requirements, calculations, certifications. Owner will designate a Responsible Official per the EPA reporting requirements. Owner can share submittals and calculation/documentation at Gasco request.</p>		Due March 15 of each calendar year.	
<u>Subpart HH</u>			
<p>Owner will be responsible for the following information:</p> <ul style="list-style-type: none"> Recording the receipt of waste (in tons) Maintaining weight scale calibration Surface area of the landfill containing waste Cover type Surface area containing GCCS Average waste depth of area with GCCS Cover type for areas within the landfill that have GCCS 	<p>Gasco will be responsible for the following information:</p> <ul style="list-style-type: none"> Recording weekly landfill gas flow rate measurements before any treatment device Recording weekly measurements of methane concentration Recording weekly measurements of temperature and pressure Maintaining gas flow and gas composition meter equipment calibration Recording annual operating hours of the flare 	<p>Gasco shall provide information to Owner by the 25th of each calendar month. Annual operating information required for previous calendar year by January 15.</p>	72 Hours

Owner Responsibilities	Gasco Responsibilities	Gasco Due Date/ Frequency	Gasco Cure Period
	Recording annual operating hours of the gas collection and control system Descriptions of the gas collection system (manufacture, capacity, number of wells)		
Subpart C²			
	Gasco will be responsible for the following information: Annual mass or volume throughput or fuel usage through the engine generators (GEN-1 through GEN-4). Annual mass or volume of throughput or fuel usage sent to Solenis (direct use transmission pipeline) Annual mass or volume of throughput or fuel usage for renewable natural gas plant (both LFG and natural gas, if applicable)	Gasco shall provide information to Owner by the 25 th of each calendar month. Annual operating information required for previous calendar year by January 15.	72 Hours

² Applicability of Subpart C and specific requirements will be updated upon decommissioning of the current facilities and construction of the new RNG Facility and subsequent modification of the Owner's Title V permit. As stated, GHG Plan will be updated to reflect current conditions.

EXHIBIT F-1

GASCO INSURANCE REQUIREMENTS

Gasco Insurance Requirements

General Liability	
Each Occurrence:	\$1,000,000
General Aggregate:	\$2,000,000
Automotive Liability	
Combined Single Limit:	\$1,000,000
Workers Compensation:	Per Statute
Boiler & Machinery:	Replacement Cost
Excess Umbrella Liability	
Each Occurrence:	\$20,000,000
General Aggregate:	\$20,000,000
Environmental Liability	
Each Occurrence:	\$10,000,000
General Aggregate:	\$10,000,000

Owner Insurance Requirements

General Liability	
Each Occurrence:	\$1,000,000
General Aggregate:	\$2,000,000
Automotive Liability	
Combined Single Limit:	\$1,000,000
Workers Compensation and Employer's Liability:	Per Statute
Excess Umbrella Liability	
Each Occurrence:	\$10,000,000
General Aggregate:	\$10,000,000
Pollution Liability:	\$5,000,000

EXHIBIT F-2

GASCO CONTRACTOR INSURANCE REQUIREMENTS

Gasco Insurance Requirements

General Liability

Each Occurrence: \$1,000,000

General Aggregate: \$2,000,000

Automotive Liability

Combined Single Limit: \$1,000,000

Workers Compensation:

Per Statute

EXHIBIT G-1
GASCO DISCLOSURE

None.

EXHIBIT G-2 OWNER DISCLOSURE

Owner makes the following disclosures to qualify the representations and warranties set forth in Section 3.2 of the Agreement:

Owner is party to that certain Host Community and Good Neighbor Agreement with the City of Suffolk (“Suffolk”) dated as of May 23, 2016 (as amended) (the “Host Agreement”), which provides, among other things, for the long-term disposal capacity of the Landfill for the benefit of Owner and its member communities. Section 2.2 of the Host Agreement provides that Owner is the sole operator of the Landfill. However, also pursuant to Section 2.2, Owner may transfer ownership of all or any portion of the Property, including the Landfill (as such terms are defined in the Host Agreement), and/or delegate or assign its rights and obligations to operate the Landfill or any operations related to the Landfill, only with the written approval of Suffolk, which approval shall not be unreasonably withheld. On June 14, 2021, Suffolk waived its right to approve this Agreement.

On March 21, 2017, a Notice of Violation was received by Owner from the Virginia Department of Environmental Quality (“DEQ”) regarding Solid Waste Permit No. 417 for exceeding 30 cm of leachate storage on liner systems for Cell V and Cell VI above the regulatory requirements. This observation was self-reported to DEQ by Owner. Owner entered into a “Order of Consent” with DEQ to correct the issue and prevent future occurrences. In December of 2020, DEQ determined that the Order of Consent had been met and provided a confirmation letter that no further action was required.

On May 24, 2017, a Deficiency Letter was received by Owner from DEQ regarding Solid Waste Permit No. 417 for exposed waste. Notification was provided to DEQ as to what steps were taken to address the Deficiency within the 20-day period allowed and no further action was required by DEQ.

Since August 7, 2014, the Hampton Roads Sanitation District issued to Owner five (5) violations, either administrative or technical, and one (1) administrative deficiency notice, all of which were resolved.

From time to time, Owner receives communications, correspondence and in some cases, threats of litigation, from residents who live in the vicinity of the Landfill alleging, among other things, that odors from the Landfill are impacting their health and/or property.

Owner has had recent discussions with DEQ concerning wellhead readings and other data collection matters relating to the Title V semi-annual report, which has the potential of resulting in a warning letter, notice of violation or other enforcement action.

**EXHIBIT H
FORM OF PERIODIC STATEMENTS**

The form of the periodic statement shall be in an Excel spreadsheet and includes the following information by month:

GASCO Royalty Payment Calculation by Month

Cash Receipts (GAAP)
Sale of Gas
Sale of Electric
Sale of RNG
Sale of RECS
Sale of RINs
Total Cash Receipts

Royalty Due SPSA by Month

MMBTUs Flared (Transition Period)
Sale of Gas (30%)
Sale of Electric (20%)
Sale of RNG
Sale of RECS
Sale of RINs
Monthly Flare Payment (\$0.25)
Interest for late Payment
Total Royalty Due SPSA
ACH Amount

RECs available for sale by Month

BALANCE from Prior Year
Plus: RECs Generated
Less: RECs Sold
RECs Remaining

RINs available for sale by Month

BALANCE from Prior Year
Plus: RINs Generated
Less: RINs Sold
RINs Remaining

Summary of Revenues (Full Accrual Method)

Gross Revenues by Month:
Sale of Gas
Sale of Electric
Sale of RNG
Sale of RECS
Sale of RINs

**EXHIBIT H - CONTINUED
FORM OF PERIODIC STATEMENTS**

Performance Metrics by Month

Wellfield

System Vacuum, inches H2O
Vacuum setpoint, inches H2O
Volume of Recovered Landfill Gas, SCF
Average flow rate of Recovered Landfill Gas, SCFM

Cells I - IV

CH4%:
CO2%:
O2%:
Bal%:
Vacuum, inches H2O:

Cells V - VI

CH4%:
CO2%:
O2%:
Bal%:
Vacuum, inches H2O:

RNG Facilities

Volume of Recovered Landfill Gas to RNG Facilities, SCF
Average flow rate of Recovered Landfill Gas to RNG Facilities, SCFM
Volume of RNG injected into pipeline, SCF
Total operational hours in month, hours
Volume of tailgas disposed of, SCF
Volume of off-spec RNG disposed of, SCF

Power Facility

Volume of Recovered Landfill Gas to engines, SCF
Average flow rate of Recovered Landfill Gas to engines, SCFM
Generator-1 Hours:
Generator-2 Hours:
Generator-3 Hours:
Generator-4 Hours:
Total Generation (KW/MW):
Downtime of conditioning equipment, hours
Total electrical usage of compression/conditioning system, kW-hrs

LFG Pipeline (Transition Period)

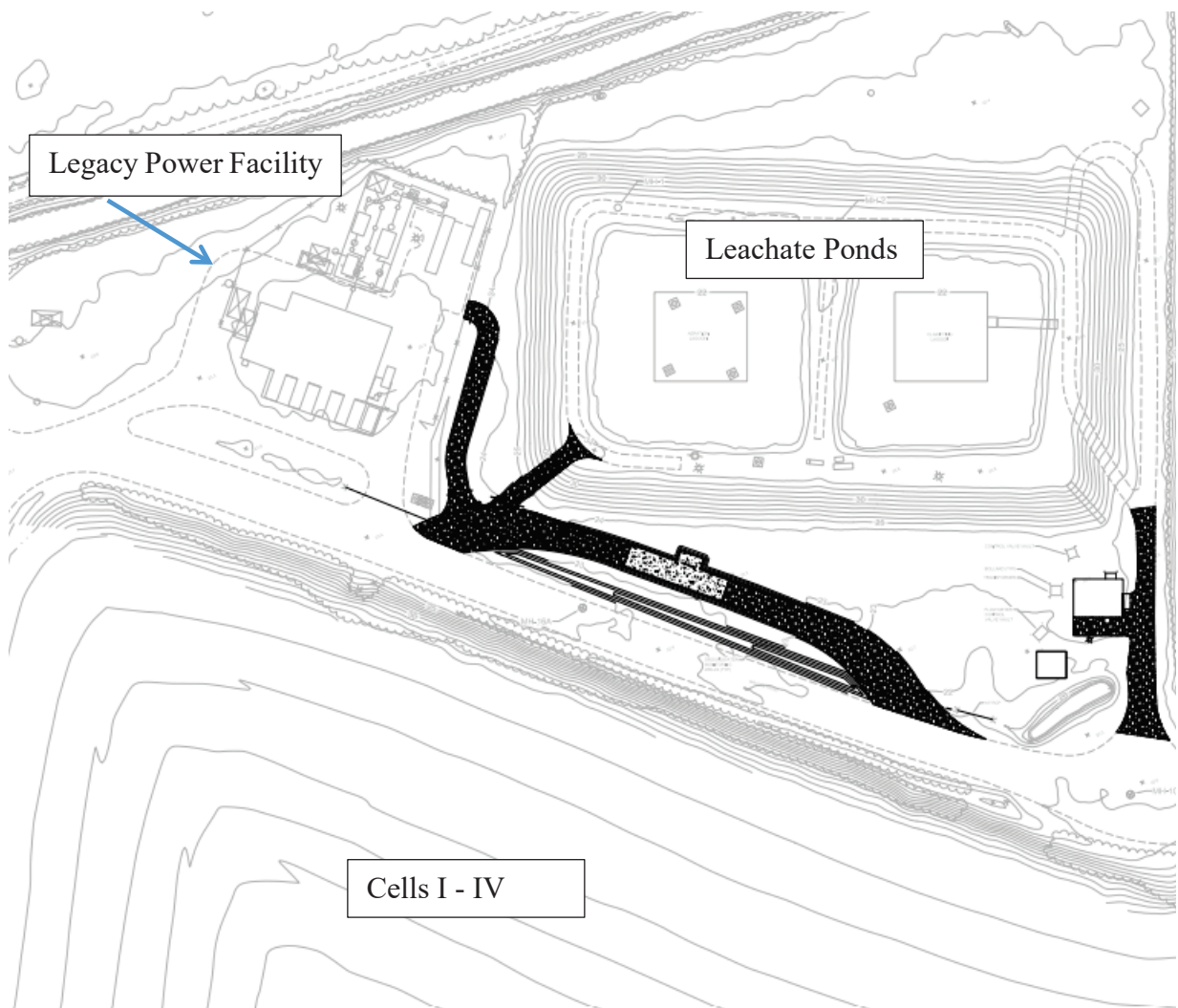
Volume of Recovered Landfill Gas to Solenis, SCF
Average flow rate of Recovered Landfill Gas to Solenis, SCFM

Blower/Flare Station

Volume of Recovered Landfill Gas to flare, SCF
Average flow rate of Recovered Landfill Gas to flare, SCFM

EXHIBIT I LEGACY POWER FACILITIES

The Legacy Power Facilities include a single building housing the powerhouse with four CAT 3516 engines for a total production capacity of 3.2MW, electrical switchgear, maintenance shop, parts storeroom and office spaces. The site also contains various outdoor skid-mounted equipment, including but not limited to, engine radiators, power transformers, various blowers, gas treatment systems and the landfill's flare along with some containers for additional parts/equipment storage. In addition to electrical power production, the facility also has the capability to supply a nearby industrial facility with low-pressure, dehydrated landfill gas using a booster blower and chiller skid via an existing underground pipeline that will remain in place.



Source: HDR Engineering, Phase 2 – Leachate Loadout and Pump Station, Site and Grading Plan

EXHIBIT J RNG FACILITIES

As part of the site's redevelopment, the Legacy Power Facilities will be decommissioned with most of the equipment being removed, upgraded or replaced. The existing flare and underground piping will be retained with the existing building being reconditioned to house the electrical switchgear, maintenance shop, parts storeroom and office spaces for the RNG processing plant.

The RNG Facilities will convert the raw Landfill Gas collected from the Designated Landfill Cells via the Collection System into pipeline quality gas (at least 94% methane) through a series of compression, filtration, dewatering and processing systems that remove particulate, moisture, carbon dioxide, volatile organic compounds (VOCs), sulfur, oxygen, and other trace components. Waste gas is controlled in a thermal oxidizer with off-spec gas being destroyed in a backup flare.

A new building will be constructed onsite mainly to house the required compressors and related equipment with various skid-mounted hardware being installed outdoors, including but not limited to, electrical transformers, gas-purification skids, compressor oil coolers, chillers, thermal oxidizer and off-spec flare.

The RNG Facilities will be constructed, operated and maintained in accordance with Exhibit C-2 GASCO's Permit to Construct and Operate a RNG Facility, in addition to other terms and conditions of the Agreement.

**EXHIBIT K
AMENDED AND RESTATED ESCROW AGREEMENT**

[Attached]

AMENDED AND RESTATED ESCROW AGREEMENT

THIS AMENDED AND RESTATED ESCROW AGREEMENT (this “Escrow Agreement”) is entered into as of December 15, 2021 (the “Effective Date”), by and among TD Bank, a national banking association (the “Bank” or “Escrow Agent”), Southeastern Public Service Authority of Virginia, a public body politic and corporate of the Commonwealth of Virginia (“Owner”), and MAS Suffolk RNG, LLC (formerly Suffolk Energy Partners, LLC), a Delaware limited liability company (“Gasco”) (each individually a “Party” and, collectively, the “Parties”).

Background

A. Owner and Gasco entered into that certain Landfill Gas Rights, Easement and Lease Agreement, dated as of January 21, 2011, as amended and restated by that certain Amended and Restated Landfill Gas Rights, Easement and Lease Agreement dated of even date herewith (as further amended, modified or supplemented from time to time, the “Landfill Gas Agreement”). Capitalized terms used and not otherwise defined herein shall have the meanings assigned to them in the Landfill Gas Agreement.

B. The Parties previously entered into that certain Escrow Agreement, dated as of April 21, 2011 (the “2011 Escrow Agreement”). This Escrow Agreement amends, restates and replaces in its entirety the 2011 Escrow Agreement.

C. Pursuant to Section 7.7 of the Landfill Gas Agreement, Gasco is required to fund an Escrow Reserve, initially in the amount of \$150,000.00. In addition, pursuant to Section 8.2(c) of the Landfill Gas Agreement, Gasco is required to post \$250,000.00 in escrow as Performance Security (the “Performance Security Reserve”). The Escrow Reserve and the Performance Security Reserve are to be held by the Escrow Agent to satisfy certain liabilities and obligations of Gasco under the terms of the Landfill Gas Agreement.

D. Owner and Gasco desire that the Bank act as escrow agent, and the Bank is willing to act in such a capacity.

NOW THEREFORE, in consideration of mutual covenants of the Parties contained herein, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

Terms and Conditions

1. Appointment of Escrow Agent. Owner and Gasco hereby designate and appoint the Bank to serve as the “Escrow Agent”, and Escrow Agent accepts the appointment to act as Escrow Agent, in accordance with the terms and conditions of this Escrow Agreement.

2. Establishment of Escrow Account.

(a) In accordance with the provisions of Section 7.7 of the Landfill Gas Agreement, within ten (10) Business Days following the Effective Date, Gasco shall fund the

Escrow Reserve in the amount of \$150,000.00. In accordance with the provisions of Section 8.2 of the Landfill Gas Agreement, prior to commencing the construction or installation of the RNG Facilities, Gasco shall fund the Performance Security Reserve in the amount of \$250,000.00. The Escrow Reserve and the Performance Security Reserve shall be funded by depositing funds with Escrow Agent in accordance with the wire instructions attached hereto as Exhibit A, which funds shall be held in escrow in an interest-bearing account maintained at Gasco's expense titled "Mas Suffolk RNG, LLC – Owner Escrow Account" (the "Escrow Account") and held and distributed by the Escrow Agent pursuant to the terms and conditions of this Escrow Agreement. The Escrow Reserve and the Performance Security Reserve may be jointly held in the Escrow Account.

(b) Gasco shall maintain on deposit with the Escrow Agent at least the following amounts:

(i) with respect to the Escrow Reserve, (A) \$150,000.00 for all periods on or prior to the Operative Date; provided, if Gasco is then in default under the Landfill Gas Agreement on the Operative Date, Gasco shall maintain such amount in the Escrow Reserve until such default is cured in accordance with the Landfill Gas Agreement, and (B) \$100,000.00 for all periods after the Operative Date; provided, if Gasco is then in default under the Landfill Gas Agreement on the Operative Date, the Escrow Reserve may be reduced to \$100,000.00 only following Gasco's cure of such default in accordance with the Landfill Gas Agreement; and

(ii) with respect to the Performance Security Reserve, \$250,000.00 for all periods on or prior to the Operative Date; provided, if Gasco is then in default under the Landfill Gas Agreement on the Operative Date, Gasco shall maintain such amount in the Performance Security Reserve until such default is cured in accordance with the Landfill Gas Agreement.

The applicable aggregate amount required to be maintained in the Escrow Account at any given time under this Section 2 is referred to in this Escrow Agreement as the "Required Reserve Amount".

(c) Interest accrued on the Escrow Account funds and amounts on deposit in the Escrow Account in excess of the Required Reserve Amount shall be released to Gasco by the 15th day of each month by the Escrow Agent for so long as the Escrow Account remains in existence.

(d) Funds on deposit in the Escrow Account shall constitute Gasco's funds, except to the extent of such funds as to which Owner properly executes and delivers to Escrow Agent the Deposit Instruction (as defined below). Gasco shall not lien, encumber, pledge or grant a security interest in or to the Escrow Account. Subject to the foregoing provisions of this Section 2, funds on deposit in the Escrow Account will be held in the Escrow Account pending the receipt by the Escrow Agent of a Deposit Instruction (as defined below) or Release Instruction (as defined below), as applicable, and the respective attachments thereto, and distributed in accordance with Sections 3(a) or (b), as applicable, for so long as this Escrow Agreement remains in effect, as provided in Section 6.

3. Operation of the Escrow Account. The funds on deposit in the Escrow Account will be held and disbursed by the Escrow Agent as follows:

(a) In the event that Gasco fails to pay all or a portion of any Payment (as such term is defined in Section 7.1 of the Landfill Gas Agreement) or any other amounts due or payable to Owner under the Landfill Gas Agreement, and such amounts remain unpaid following applicable cure period(s) thereunder, Owner may prepare and deliver to the Escrow Agent during regular business hours (with a copy to Gasco) a written instruction, substantially in the form of Exhibit B attached hereto (“Deposit Instruction”), which Deposit Instruction shall set forth the following: (i) the amount that the Escrow Agent shall release and disburse to Owner from the Escrow Account (which shall be equal to the amount of any Payment or other amounts that remain past due or payable to Owner after the expiration of the applicable cure period(s)); and (ii) a certification made by the Executive Director or Deputy Executive Director of Owner that all the applicable cure period(s) have expired pursuant to the terms and conditions set forth in the Landfill Gas Agreement, and the amount set forth in the Deposit Instruction represents the unpaid Payment or other amounts due and payable to Owner in accordance with the terms and conditions of the Landfill Gas Agreement. The Deposit Instruction shall include a copy of the written notice (and proof of delivery) delivered to Gasco notifying Gasco of its default of any Payment due under the Landfill Gas Agreement. Upon Owner’s delivery of the Deposit Instruction, the Escrow Agent shall immediately wire to Owner such portion of the funds on deposit in the Escrow Account, without any consent of Gasco or other person required.

(b) Not less than five (5) business days nor more than ten (10) business days following written certification made by the managing member, member or authorized officer of Gasco to Escrow Agent (with a copy to Owner), substantially in the form attached hereto as Exhibit C (the “Release Instruction”), that (i) the Operative Date has been achieved in accordance with the Landfill Gas Agreement and (ii) Gasco is not in default under the Landfill Gas Agreement, the Escrow Agent shall (A) disburse to Gasco such funds, if any, held in the Escrow Reserve, in excess of \$100,000.00, and (B) disburse to Gasco any remaining funds held in the Performance Security Reserve, in each case, in accordance with the wire instructions attached hereto as Exhibit D; provided, that prior to the release of such funds, Owner has not delivered to the Escrow Agent written notice (with a copy to Gasco) of Owner’s good faith objection to such release of funds.

(c) Promptly following the disbursement to Owner of funds pursuant to a Deposit Instruction under Section 3(a) or any other time during the term of this Escrow Agreement that the funds on deposit in the Escrow Account are reduced below the then-applicable Required Reserve Amount, and in any such event within five (5) business days thereafter, Gasco shall deposit into the Escrow Account such funds as are necessary to restore and fully-fund the Required Reserve Amount.

(d) After the end of each month that this Escrow Agreement remains in effect, the Escrow Agent shall deliver to both Gasco and Owner a monthly statement of the Escrow Account, including, without limitation, the amount of funds on deposit in and transactions involving the Escrow Account during the prior month.

(e) Escrow Agent may rely on and be protected in acting in accordance with this Escrow Agreement upon any Deposit Instruction or Release Instruction delivered in compliance with this Escrow Agreement.

4. Duties of Escrow Agent.

(a) The Escrow Agent will be liable as a depository only with its duties being only those specifically provided in this Escrow Agreement. The Escrow Agent will not be liable for any mistake of fact or error in judgment, or for any acts or failure to act of any kind taken in good faith and believed by it to be authorized or within the rights or powers conferred by this Escrow Agreement, unless there be shown willful misconduct or gross negligence or violation of applicable banking laws.

(b) The Escrow Agent will not be responsible for the sufficiency or accuracy of the form, execution or validity of the documents or items deposited hereunder, nor for any description of property or other matter noted therein. The Escrow Agent will not be liable for default by any other Party hereto because of such Party's failure to perform, will have no responsibility to seek performance by any such Party, and will not be liable for the outlawing of any rights under any statutes of limitation in respect to any documents or items deposited.

(c) The Escrow Agent will not be liable in any respect on account of identity, authority or rights of persons executing or delivering, or purporting to execute or deliver, any document or item for or on behalf of Owner or Gasco, and may rely absolutely and be fully protected in acting upon any such item, document or other writing reasonably believed by it to be authentic in performing its duties hereunder. The Escrow Agent may, as a condition to the disbursement of money or property, require from the payee or recipient a receipt therefor, and, upon final payment or distribution, require a release from any liability arising out of its execution or performance of this Escrow Agreement.

(d) The Escrow Agent will be indemnified and held harmless by Owner and Gasco from and against all costs, damages, liabilities and out of pocket expenses that the Escrow Agent may reasonably incur or sustain in connection with or arising out of any dispute in connection with this Escrow Agreement, including, but not limited to, any costs, damages, liabilities and expenses that may be incurred as a result of claims or actions by third parties, but excluding costs, damages, liabilities and expenses that result from or related to the Escrow Agent's willful misconduct, gross negligence or violation of applicable banking laws. The Escrow Agent will be entitled to consult with and engage the services of legal counsel of its choice with respect to any controversy pertaining to this Escrow Agreement, and it shall incur no liability and shall be fully protected in acting in accordance with the advice or opinion of such counsel, provided it has exercised due care in the selection of such counsel. The Escrow Agent will be entitled to reimbursement for the reasonable costs and expenses of such legal counsel incurred in connection with any such controversy. Any amounts owed to the Escrow Agent pursuant to this Section 4(d) will be split equally by Owner and Gasco. The indemnification provided to the Escrow Agent in this section shall survive termination of this Escrow Agreement.

(e) The Escrow Agent may resign or be removed, at any time, for any reason whatsoever, upon giving five (5) business days' written notice to all Parties hereto at their

respective addresses, as set forth herein; provided that a replacement escrow agent has been appointed by Gasco and accepted as of such date. Upon appointment of, and acceptance by, a successor Escrow Agent, Escrow Agent shall deliver to the successor Escrow Agent any and all funds then on deposit in the Escrow Account, whereupon the Escrow Agent's duties and obligations under this Escrow Agreement will cease and terminate. Except as otherwise expressly provided in this Escrow Agreement, the Escrow Agent will not transfer any funds on deposit in the Escrow Account to any person or entity other than a replacement escrow agent approved by Gasco. If no successor escrow agent has been designated by Gasco, the resigning or removed Escrow Agent may petition any court of competent jurisdiction for the appointment of a successor escrow agent. Additionally, if Gasco has not designated a successor escrow agent, the resigning or removed Escrow Agent may pay into any court of competent jurisdiction all monies and property then on deposit with Escrow Agent under this Escrow Agreement.

(f) In accepting any funds, securities or documents delivered hereunder, the Parties acknowledge that, in the event of disagreement between or among Parties to this Escrow Agreement, or any other persons resulting in adverse claims and demands being made in connection with or for any papers, money or property involved herein, or affected hereby, the Escrow Agent reserves the right to refuse to comply with any demand, and in so refusing to make any delivery, may hold all money, securities and property in its possession, and all papers in connection with or concerning the Escrow Account, until a mutual agreement, in writing, has been reached among all of Parties, or until delivery is made to a court in any interpleader action, or until as otherwise authorized by final judgment or decree.

(g) This Escrow Agreement contains all of the terms for the duties and obligations undertaken and agreed upon by the Escrow Agent. Although this Escrow Agreement contains references to sections of the Landfill Gas Agreement that may be relevant in ascertaining the various rights and obligations of Owner and Gasco as those rights and obligations exist between such Parties, the Escrow Agent is not a party to or bound by the Landfill Gas Agreement or any other agreement between Owner and Gasco and shall not be imputed with knowledge of the terms or purposes of the Landfill Gas Agreement or any other agreement. The Escrow Agent's duties will be determined solely by reference to this Escrow Agreement. Furthermore, in the event that the terms and provisions of this Escrow Agreement conflict and/or are inconsistent with the terms and provisions set forth in the Landfill Gas Agreement with respect to the Escrow Agent's obligations and duties, the terms and provisions of this Escrow Agreement will prevail.

5. Escrow Agent's Fees. Without limitation of Section 4(d) of this Escrow Agreement, the Escrow Agent's fee for its services under this Escrow Agreement shall be Four Thousand and No/100 Dollars (\$4,000), all of which will be paid by Gasco.

6. Termination. This Escrow Agreement will terminate upon termination of the Landfill Gas Agreement, which shall be confirmed by delivery to Escrow Agent of a written certification of termination by Gasco (with a copy to Owner). Any such termination will be effective on the date specified in such certificate, which shall not be sooner than three (3) business days following delivery of such certification or if not specified, then on the date notified in writing by Owner and Gasco to Escrow Agent. Contemporaneously with the termination of this Escrow Agreement, Escrow Agent shall disburse to Gasco all funds then held on deposit in the Escrow Account that are not otherwise then subject to distribution to Owner pursuant to a valid Deposit

Instruction; provided that prior to the date specified for termination of this Escrow Agreement, Owner has not delivered to the Escrow Agent written notice (with a copy to Gasco) of Owner's good faith objection to such termination and release of funds from the Escrow Account. In such event, Escrow Agent shall not release such funds until Escrow Agent receives a further written certification of termination from Gasco (with a copy to Owner) as to which Owner has not so objected during the three (3) business day period following receipt of such certification.

7. Amendment. This Escrow Agreement may be amended or modified only with the written consent of Owner, Gasco, and the Escrow Agent, except that the Escrow Agent's consent will not be required unless such amendment or modification would expand the obligations of the Escrow Agent. If written consent of the Escrow Agent to an amendment or modification this Escrow Agreement is not required, Owner and Gasco will notify the Escrow Agent of the amendment or modification and deliver a copy thereof to Escrow Agent.

8. Notices. Any notice or other communication under this Escrow Agreement must be in writing and will be considered given when delivered personally or by nationally-recognized overnight courier (including Federal Express or United Parcel Service) to the Parties at the following addresses (or at such other address as a party may specify by notice to the others):

To Owner: Southeastern Public Service Authority of Virginia
723 Woodlake Drive
Chesapeake, Virginia 23320
Attn: Executive Director

With a copy to (which shall not constitute notice): Willcox & Savage, P.C.
440 Monticello Avenue
Suite 2200
Norfolk, Virginia 23510
Attn: Brett A. Spain

With a copy to (which shall not constitute notice): Williams Mullen
8350 Broad Street
Suite 1600
Tysons, VA 22102
Attn: Bradley J. Nowak

To Gasco: MAS Suffolk RNG, LLC
c/o MAS Energy, LLC
3340 Peachtree Road NE, Suite 170
Atlanta, Georgia 30326
Attn: Michael Hall

With a copy to: Milam Howard Nicandri & Gillam, P.A.
14 East Bay Street
Jacksonville, Florida 32202
Attn: G. Alan Howard

9. Governing Law. This Escrow Agreement will be governed by and construed in accordance with the laws of the State of Delaware without regard to its conflict of law principles.

10. Authorization. Each of the Parties acknowledges that it has the full power and authority to execute and deliver this Escrow Agreement and to perform in accordance herewith and that the execution, delivery and performance of this Escrow Agreement by such Party, and the consummation of the transactions contemplated hereby, have been duly and validly authorized by such Party.

11. Successors and Assigns. All of the covenants, promises, and agreements contained in this Escrow Agreement will be binding upon, and inure to the benefit of, the Parties hereto and their respective successors and permitted assigns, whether so expressed or not; except that the Parties hereto may not assign their respective obligations hereunder without the prior consent of the other Parties.

12. Headings. Any headings preceding the text of the several paragraphs hereof will be solely for the convenience of reference and will not constitute a part of this Escrow Agreement, nor will they affect its meaning, construction or effect.


13. Multiple Counterparts; Electronic Transaction. This Escrow Agreement may be executed in one or more counterparts, each of which must be regarded for all purposes as an original, and such counterparts will constitute but one and the same instrument. In addition, the transaction described in this Escrow Agreement may be conducted and related documents may be stored by any electronic means. Copies, facsimiles, electronic files and other reproductions of original executed documents will be deemed to be authentic and valid counterparts of such original documents for all purposes, including the filing of any claim, action suit in the appropriate court of law.

SIGNATURE PAGE FOLLOWS

IN WITNESS WHEREOF, the Parties hereto, intending to be legally bound, have executed and delivered this Amended and Restated Escrow Agreement as of the Effective Date.

OWNER:

**SOUTHEASTERN PUBLIC SERVICE
AUTHORITY OF VIRGINIA,**
a political subdivision of the Commonwealth of
Virginia

By: 
Name: Liesl R. DeVary
Title: Executive Director

GASCO:

MAS SUFFOLK RNG, LLC, a Delaware
limited liability company

By: _____
Name: Michael Hall
Title: Manager

ESCROW AGENT:

TD BANK, National Association

By: _____
Name: _____
Title: _____

IN WITNESS WHEREOF, the Parties hereto, intending to be legally bound, have executed and delivered this Amended and Restated Escrow Agreement as of the Effective Date.

OWNER:

**SOUTHEASTERN PUBLIC SERVICE
AUTHORITY OF VIRGINIA,**
a political subdivision of the Commonwealth of
Virginia

By: _____
Name: Liesl DeVary
Title: Executive Director

GASCO:

MAS SUFFOLK RNG, LLC, a Delaware
limited liability company

By: Michael Hall
Name: Michael Hall
Title: Manager

ESCROW AGENT:

TD BANK, National Association

By: _____
Name: _____
Title: _____

IN WITNESS WHEREOF, the Parties hereto, intending to be legally bound, have executed and delivered this Amended and Restated Escrow Agreement as of the Effective Date.

OWNER:

**SOUTHEASTERN PUBLIC SERVICE
AUTHORITY OF VIRGINIA,**
a political subdivision of the Commonwealth of
Virginia

By: _____
Name: Liesl DeVary
Title: Executive Director

GASCO:

MAS SUFFOLK RNG, LLC, a Delaware
limited liability company

By: _____
Name: Michael Hall
Title: Manager

ESCROW AGENT:

TD BANK, National Association

By: Kelly Beras
Name: Kelly Beras
Title: Vice President

EXHIBIT A
ESCROW AGENT'S WIRE INSTRUCTIONS

EXHIBIT A
ESCROW AGENT'S WIRE INSTRUCTIONS

TD Bank, National Association
1006 Astoria Blvd
Cherry Hill, NJ 08034
ABA # 011600033
Account Name: TD Bank Wealth Management
Account Number: 60157930
Attn: Kelly Bekas
Reference : SPSA and SEP Escrow

EXHIBIT B
DEPOSIT INSTRUCTION

Southeastern Public Service Authority of Virginia, a public body politic and corporate of the Commonwealth of Virginia (“Owner”), and MAS Suffolk RNG, LLC, a Delaware limited liability company (“Gasco”), are parties to that certain Amended and Restated Escrow Agreement dated as of December 15, 2021 (as amended, restated or supplemented from time to time, the “Escrow Agreement”), with TD Bank, a national banking association, as Escrow Agent.

In accordance with the terms of the Escrow Agreement, Owner hereby instructs the Escrow Agent to release and distribute a portion of the funds held in the Escrow Account to Owner, as follows:

To: _____
Amount: \$[_____]
ABA#: [_____]
Account Name: [_____]
Account #: [_____]
Instructions: [_____]

The undersigned, being the [Executive Director/Deputy Executive Director] of Owner hereby certifies to Escrow Agent and Gasco that any and all applicable cure period(s) have expired in connection with Gasco’s failure to pay all or a portion of any Payment (as such term is defined in the Landfill Gas Agreement) or other amount due or payable to Owner under the Landfill Gas Agreement in the amount set forth above and as provided in that certain written notice of such default delivered by Owner to Gasco, dated _____, 20 __, a copy of such notice of default being attached hereto (together with proof of delivery) and being made pursuant to the terms and conditions of the Landfill Gas Agreement and the Escrow Agreement.

All capitalized terms used in this Deposit Instruction that are not otherwise defined herein will have the meanings ascribed to the terms in the Escrow Agreement.

Dated: _____, 20 __.

SOUTHEASTERN PUBLIC SERVICE
AUTHORITY OF VIRGINIA, a public body
politic and corporate of the commonwealth of
Virginia

By: _____
Name: _____
Title: _____

cc: MAS Suffolk RNG, LLC
c/o MAS Energy, LLC
3340 Peachtree Road NE, Suite 170
Atlanta, Georgia 30326
Attn: Michael Hall

EXHIBIT C
RELEASE INSTRUCTION

Southeastern Public Service Authority of Virginia, a public body politic and corporate of the Commonwealth of Virginia (“Owner”), and MAS Suffolk RNG, LLC, a Delaware limited liability company (“Gasco”), are parties to that certain Amended and Restated Escrow Agreement dated as of December 15, 2021 (as amended, restated or supplemented from time to time, the “Escrow Agreement”), with TD Bank, a national banking association, as Escrow Agent.

In accordance with the terms of the Escrow Agreement, Gasco hereby instructs the Escrow Agent to release and distribute a portion of the funds held in the Escrow Account to Gasco, as follows:

To: _____
Amount: \$[_____]
ABA#: [_____]
Account Name: [_____]
Account #: [_____]
Instructions: [_____]

The undersigned, being the [Managing Member/Member/Officer] of Gasco hereby certifies to Escrow Agent and Owner that (i) the Operative Date has been achieved in accordance with the Landfill Gas Agreement, and (ii) Gasco is not in default under the Landfill Gas Agreement.

All capitalized terms used in this Release Instruction that are not otherwise defined herein will have the meanings ascribed to the terms in the Escrow Agreement.

Dated: _____, 20____.

MAS Suffolk RNG, LLC, a Delaware limited liability company

By: _____
Name: _____
Title: _____

cc: Southeastern Public Service Authority of Virginia
723 Woodlake Drive
Chesapeake, Virginia 23320
Attn: Liesl DeVary, Executive Director

EXHIBIT D
GASCO'S WIRE INSTRUCTIONS

INCOMING DOMESTIC

1. Beneficiary Bank Name – BancorpSouth
2. Beneficiary Bank ABA Number – 084201278
3. Beneficiary Bank Location – Tupelo, MS
4. Beneficiary Account Number - 79234563
5. Beneficiary Customer Name – MAS Countryside RNG, LLC

EXHIBIT L
COLLECTION SYSTEM MONITORING
REQUIREMENTS

The Independent Consultant's contract shall include the following requirements, at a minimum:

Data Acquisition

The Independent Consultant shall use an instrument for well readings in the Collection System that meets all applicable Laws including, but not limited to, calibration requirements.

Data Handling

The Independent Consultant shall be required to upload all data to a database owned and maintained by the Independent Consultant. Owner and its consulting engineer shall be provided full access, at all times, to such database and all data, reports and documentation posted therein. Each day's monitoring data shall be uploaded to the database within 24 hours of collection using encryption. Encrypted data files from the monitoring instrument or data recorders shall not be sorted, edited, or otherwise modified before uploading to the database. All data and reports are the property of Owner and will be relinquished to Owner upon request and, in any event upon expiration or termination of the Agreement. The Independent Contractor shall cooperate with Owner and/or its consulting engineer and provide such information or documentation as either party may reasonably request.

Electronic Data

Electronic data shall be obtained, maintained and transmitted in a manner that that preserves data integrity, including the use of encryption where possible.

Preservation of Raw Data Files

Data files from Collection System monitoring shall be downloaded from the gas monitoring instrument and then uploaded directly to the Independent Consultant's database. **Raw data files from monitoring equipment shall not be altered in any way.** If there are known errors in the data, they are to be edited within the database so that there is a record of the change and documentation of the reason for the edit(s). Because the database has this feature, there is no reason to view, sort, or modify the raw data file in any way before uploading it to the system. **Failure to follow this directive shall be cause for termination of the Independent Consultant's contract.**

Data Upload

Wellfield monitoring data shall be uploaded to the Independent Consultant's database within 24 hours of monitoring. If a monitoring event spans multiple days, each day's data shall be uploaded within 24 hours of collection (resulting in multiple uploads).

Loss of Data

If data from certain wells is corrupted, lost, or is unusable, the wells for which data are lost shall be remonitored immediately. If all or substantially all data from a monitoring event is corrupted,lost, or is unusable, the Independent Consultant will immediately remonitor the entire wellfield.

Independent Consultant Certification

On every wellhead report, including wellhead readings spreadsheets, delivered or submitted to Owner and/or its consulting engineer, the Independent Consultant shall include the following certification signed by an employee of the Independent Consultant who has been directly responsible for gathering and evaluating the information included in such report:

Certification

I, _____ (*name*), hereby certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

By: _____

Name: _____

Date: _____

EXHIBIT M
INDEMNIFICATION SIDE
LETTER
[ATTACHED]



December 2, 2021

MAS Suffolk RNG, LLC
c/o MAS Energy, LLC
3340 Peachtree Road NE, Suite 170
Atlanta, Georgia 30326
Attn: Michael Hall

Dear Mr. Hall:

Reference is made to that certain Landfill Gas Rights, Easement and Lease Agreement, dated as of January 21, 2011, as amended (the "GRA"), between the Southeastern Public Service Authority of Virginia ("SPSA") and MAS Suffolk RNG, LLC (f/k/a Suffolk Energy Partners, LLC) ("Gasco"). Capitalized terms used but not defined herein shall have the meanings ascribed to such terms in the GRA.

The purpose of this letter agreement is to confirm our understanding relative to (i) Gasco's indemnity obligation of SPSA under Section 11.1 of the GRA relating to Gasco's landfill gas wellhead monitoring, testing, reporting and other related activities or events, including without limitation Gasco's failure to properly record and report certain wellhead data for certain months in 2021 (the "Wellhead Matter"), and (ii) Gasco's obligation to reimburse SPSA for 50% of SPSA's costs and expenses incurred in connection with the negotiation and preparation of the proposed amendment and restatement of the GRA (the "Amendment Expenses"), including without limitation, the costs and expenses of SPSA's outside attorneys and consulting engineer.

By this letter agreement, Gasco (a) confirms and agrees that the Wellhead Matter is, and shall be, an indemnifiable claim under Section 11.1 of the GRA and Gasco will indemnify SPSA fully and completely for any and all Losses incurred by SPSA in connection therewith, (b) waives any defense based on a failure by SPSA to have provided an indemnity notice relative to the Wellhead Matter pursuant to Section 11.3 of the GRA, and (c) agrees to promptly (and in any event, within thirty (30) days following written notice from SPSA) reimburse SPSA for all Losses incurred by SPSA relating to or otherwise resulting from or associated with the Wellhead Matter, including without limitation, attorneys fees, court costs, and experts' fees (e.g., consulting engineers) incurred by SPSA and any penalties or other amounts assessed by any Governmental Authority. Further, Gasco agrees to promptly (and in any event, within thirty (30) days following written notice from SPSA) reimburse SPSA for 50% of all remaining Amendment Expenses.

Gasco acknowledges and agrees that its obligations hereunder are not contingent or conditioned on any event and the failure of SPSA's Board of Directors to approve the proposed amendment and restatement to the GRA shall not affect, in any way, Gasco's obligations hereunder. Gasco acknowledges and agrees that this letter agreement serves to confirm the understanding of the parties as to the matters described herein and that nothing in this letter agreement shall be deemed to waive, modify or replace any provision of the GRA in any manner or to any degree, or any rights, obligations or defenses of Gasco (other than Gasco's waiver in

Thanks, we'll take it from here.

Southeastern Public Service Authority (SPSA)
Administrative Office
723 Woodlake Drive, Chesapeake, VA 23320

SPSA.com
(757) 420-4700

paragraph 3 above) or SPSA under the GRA, and that all terms and conditions of the GRA shall continue in effect in all respects unless otherwise agreed in writing by the parties.

This letter agreement shall be governed by the laws of the Commonwealth of Virginia. This letter agreement may be executed in counterparts, each of which shall be deemed an original but all of which together shall constitute one and the same instrument.

If the foregoing conforms to your understanding of our agreement, please sign one copy of this letter where indicated below and return it to me.

Sincerely,

**Southeastern Public Service Authority
of Virginia**

By: 
Liesl R. DeVary, Executive Director

Accepted and Agreed to:

MAS Suffolk RNG, LLC

By: 
Name: Michael Hall
Title: Manager

December 6, 2021