

Tampa Request For Qualifications  
Contract 27-D-00002

CITY OF TAMPA, FLORIDA

RFQ FOR

Contract 27-D-00002 Howard F. Curren Advanced Wastewater Treatment Plant (HFC AWTP)  
Renewable Natural Gas (RNG) Public-Private Partnership (P3) Owner's Advisor Services

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City of Tampa  
Contract Administration Department

Tampa Municipal Office Building  
306 E Jackson Street #280A4N Fourth Floor  
Tampa, Florida 33602

SEPTEMBER 2026

## **RFQ 27-D-00002; Howard F. Curren Advanced Wastewater Treatment Plant (HFC AWTP) Renewable Natural Gas (RNG) Public-Private Partnership (P3) Owner's Advisor Services**

Public Announcement in Compliance With Requirements of Section 287.055 Florida Statutes (Consultants' Competitive Negotiation Act) Applicable Law, Executive Orders, Rules, Regulations, and The City's Standard Procedures. Notice of Intent to Award Shall be posted, if at all, on the City's Website accessible by utilizing the website link: [www.tampagov.net/contract-administration/programs/architectural-engineering-construction-and-related-rfqs](http://www.tampagov.net/contract-administration/programs/architectural-engineering-construction-and-related-rfqs) .

The City of Tampa Wastewater Department desires to obtain Professional Engineering and Owner's Advisor services to support the development, procurement, and delivery of a Renewable Natural Gas (RNG) project at the Howard F. Curren Advanced Wastewater Treatment Plant (HFC AWTP) through a Public-Private Partnership (P3).

Background: The Howard F. Curren AWTP, owned and operated by the City of Tampa (COT), is permitted to treat 96 MGD with a Type I two-stage, high rate (pure oxygen and fine bubble aeration) activated sludge biological nitrification/denitrification domestic wastewater treatment plant. The plant currently receives approximately 60 MGD of annual average flow, with peak flows of approximately 200 MGD. Organic solids generated by the facility are stabilized by anaerobic digestion that produces approximately 600 to 800 standard cubic feet per minute (SCFM) of raw biogas.

The biogas generated by the anaerobic digestion process is currently flared. The City intends to beneficially utilize this biogas resource by developing an RNG project to convert the raw biogas to pipeline-quality RNG for delivery to a natural gas distribution system. The City intends to use a P3 delivery approach under which a private-sector partner will be responsible for designing, constructing, owning, operating, and maintaining the RNG facilities and managing the sale of RNG and associated environmental credits.

The selected Consulting Firm will:

- Develop the technical basis and preliminary design documents for the RNG project to support a request for proposals (RFP) from P3 Respondents.
- Provide technical assistance with the development of an RFP to solicit procurement of a qualified P3 partner.
- Support evaluation and selection of the P3 partner and assist with contract development and negotiations.
- Provide technical oversight and coordination during design and construction of the RNG facilities.
- Support project commissioning, startup, and transition to operations.



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Services will include, but will not be limited to, the following:

- Collect and evaluate available biogas production, quality, storage, and operating data and coordinate biogas quality testing.
- Perform site assessments and identify site, utility, environmental, noise and odor requirements, permitting, geotechnical, access, and construction constraints.
- Identify and evaluate potential RNG technologies and provide recommendations of acceptable technologies.
- Coordinate with applicable utilities and other stakeholders regarding gas quality, pressure, metering, monitoring, interconnection, and delivery requirements.
- Identify required permits and approvals and support permitting coordination.
- Develop preliminary design documents and conceptual layouts for RNG facilities, pipelines, utilities, interconnection facilities, site improvements, instrumentation, monitoring, and electrical systems.
- Develop technical requirements, performance criteria, respondent qualifications, evaluation criteria, and other technical information required for the RFP.
- Support the City during the RFP solicitation, including pre-submittal activities, site visits, attending and participating with pre-submittal meetings, responding to Requests for Information (RFI's), preparation of addendum, and procurement coordination.
- Assist with the review and evaluation RFP responses and provide recommendations regarding technical approach, performance, operations and maintenance, commercial considerations, environmental attributes, project risks, and overall value to the City.
- Support negotiations with the development and execution of an agreement with the selected P3 respondent, including review of scope, performance guarantees, payment and revenue structures, environmental credits, performance measurement and verification, warranties, insurance, security, and other key contract requirements.
- Review and coordinate the P3 partner's design submissions for compliance with the City's requirements and the P3 agreement.
- Provide technical review and oversight during construction, including review of submittals, Requests for Information (RFIs), schedules, testing, commissioning activities, and coordination between the City, P3 partner, utilities, and other stakeholders.
- Monitor project progress, quality, safety, performance, and compliance with the approved project requirements.

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- Support equipment testing, startup, commissioning, performance testing, and acceptance of the RNG facilities.
- Assist the City with operational transition, documentation, training, performance verification, and resolution of outstanding project issues.
- Provide ongoing technical, coordination, and Owner’s Advisor support throughout project delivery as requested by the City.

Estimated fee is \$500,000 – \$1,000,000.

Additional Files may be posted at <https://www.tampa.gov/contract-administration/programs/architectural-engineering-construction-and-related-rfq> .

Questions may be directed to Jim Greiner, P.E., Contract Administration, City of Tampa, (813) 274-8598, or E-Mail [jim.greiner@tampagov.net](mailto:jim.greiner@tampagov.net).

A pre-submission conference will be conducted at 3 PM Monday October 12, 2026, in the City Council Chambers 315 Kennedy Av., Tampa, FL 33602. Attendance is not mandatory.

In accordance with the Americans with Disabilities Act (“ADA”) and Section 286.26, Florida Statutes, persons with disabilities needing a reasonable accommodation to participate in this public hearing or meeting should contact the City of Tampa’s ADA Coordinator at least 48 hours prior to the proceeding. The ADA Coordinator may be contacted via phone at 813-274-3964, email at TampaADA@tampagov.net, or by submitting an ADA - Accommodations Request form available online at [tampagov.net/ADARquest](http://tampagov.net/ADARquest).

An individual or entity (“Firm”) responding to this RFQ must provide evidence of any required licenses, certificates, or registrations with its submission or within 10 days thereof in order to be considered. The City shall own all ideas, documents, plans, and materials developed as a result of this solicitation and Firm is informed same shall be subject to reuse in accordance with Section 287.055(10), Florida Statutes. Firm (i) confirms it has read and is familiar with Section 119.071(3), Florida Statutes regarding certain building plans, blueprints, schematic drawings, which depict the internal layout and structural elements of a building, facility, or other structure owned or operated by the City or other agency that are per said section exempt from Section 119.07(1), Florida Statutes and Section 24(a), Art. I of the Florida Constitution (“Exempt Plans”) and (ii) agrees Firm shall remain in compliance with same, including maintaining the exempt status of such Exempt Plans for so long as they are held by Firm or otherwise in its possession. Pursuant to Section 2-282, City of Tampa Code, during the solicitation period, including any protest or appeal,

NO CONTACT with City officers or employees is permitted from any proposer, other than as specifically stated in this solicitation. The City may cancel, withdraw, or modify this RFQ at any time and reserves the right to reject any or all responses and to waive irregularities, formalities, and informalities as it determines in the City’s best interest. The City of Tampa will not request documentation of or consider a bidder’s (proposer’s) social, political, or ideological interests when determining if the bidder (proposer) is a

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responsible vendor and will not give preference to a proposer based on the proposer's social, political, or ideological interests.

Firms should consider applicable concepts in the City's Climate Action And Equity Plan as posted at <https://www.tampa.gov/document/climate-action-and-equity-plan-122846> .

In order to apply for 5 "Ban-The-Box" bonus points, a firm must provide the documentation required pursuant to the "Ban-The-Box" ordinance listed at [City of Tampa Municode](#).

Firms desiring to provide these services to the City must submit a single electronic file in searchable PDF format, Smaller than 20MB, that includes the attached RFQ Transmittal Memorandum completed as appropriate, a Letter of Interest addressed to Brad L, Baird, P.E., Chairman, and referring to this RFQ by number, together with a Statement of Qualifications and any supplemental material allowing evaluation for further consideration (short-listing) based upon the following criteria/point system: Successful RNG Project Experience and P3/Alternative Delivery Experience (65 pts); Workload and Availability, (5 pts); Past Performance/Low amount of City Work, (5 pts); Standard Form SF330, (5 pts); "Ban-The-Box", (5pts); Planned SLBE Solicitation & Utilization, Form DMI 10, 20, & 50, (15 pts).

The PDF file must be **E-Mailed to [ContractAdministration@tampagov.net](mailto:ContractAdministration@tampagov.net) BEFORE 2 P.M., Thursday November 5, 2026.**

As a courtesy, the City will endeavor to provide an email acknowledgement usually sent within a few days after submission receipt (submissions received on the day of the deadline may not be acknowledged before the deadline or at all). It is Firm's responsibility to confirm its submission (PDF file) has been received.

## RFQ TRANSMITTAL MEMORANDUM FOR A SUBMITTAL TO THE CITY OF TAMPA

TRANSMITTAL DATE: \_\_\_\_\_

RFQ NO. & TITLE: RFQ 27-D-00002; Howard F. Curren Advanced Wastewater Treatment Plant (HFC AWTP) Renewable Natural Gas (RNG) Public-Private Partnership (P3) Owner's Advisor Services

TO: Brad L. Baird, P. E., Chairman Selection & Certification Committee (CCNA) c/o Contract Administration Department via [ContractAdministration@tampagov.net](mailto:ContractAdministration@tampagov.net) 306 East Jackson Street, 4th Floor North, Tampa, Florida 33602

SUBMITTER ("Firm") NAME:

FEDERAL TAX ID#: \_\_\_\_\_

FIRM TYPE: ☐ Corporation ☐ Limited Liability Company ☐ Individual/Sole Proprietor  
☐ Joint Venture (JV) ☐ Partnership (PN) ☐ Other:

FIRM CONTACT NAME:

EMAIL:

PHONE:

CERTIFICATIONS:

Firm is licensed, permitted, and certified as required to do business in Florida: ☐ Yes ☐ No

License/registration/certification number(s):

Per §287.133, Fla. Stat., individuals or entities (including those meeting the §287.133, Fla. Stat. definition of "affiliate") placed on the convicted vendor list ("List") following a conviction for public entity crimes may not submit a bid, proposal, or reply ("Response") on a contract to provide any goods or services to a public entity, may not submit a Response on a contract with a public entity for the repair or construction of a public building or public work, may not submit a Response for leases of real property to a public entity, and may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in

§287.017, Fla. Stat. for CATEGORY TWO for a period of 36 months from the date of placement on the List. Neither Firm nor its affiliates have been placed on the List: ☐ Yes ☐ No

Pursuant to Tampa Code Section 2-284; Bidder's Criminal History Screening Practices("Ban-The-Box"), the Firm hereby;

☐ declines incentive points and attaches no documentation ☐ applies for incentive points and attaches all the required documentation.

Firm shall comply with all applicable governmental rules & regulations, including the City's Ethics Code (Sec. 2- 522, Tampa Code). The City's Charter & Ethics Code prohibit any City employee from receiving any substantial benefit or profit out of any award or obligation entered into with the City, or from having any direct or indirect financial interest in effecting any such award or obligation. If Firm is successful, it shall ensure no City employee receives any such benefit or interest as a result of such award (See Sec.2-514(d), Tampa Code): ☐ Yes ☐ No

Firm is not in arrears and is not in default upon any obligation to the City of Tampa: ☐Yes ☐No

Firm does not use coercion for labor or services as defined in Section 787.06, F.S.

Firm agrees that if the City of Tampa determines Firm has participated in any collusive, deceptive, or fraudulent practices with regard to this submittal, in addition to any other remedy it may exercise, the City will have the right to debar Firm and deem invalid any contract let under such circumstances: ☐ Yes ☐ No

Data or material Firm asserts to be exempted from public disclosure under Chapter 119, Fla. Stat., is submitted in a separate, single electronic searchable PDF file labeled with the above RFQ number and the phrase "Confidential Material", which identifies the data/material to be protected, states the reasons the data/material is exempt from public disclosure, and the specific Florida statute allowing such exemption (if "No" or otherwise, then Firm waives any possible or claimed exemption upon submission, effective at opening): ☐ Yes ☐ No

FAILURE TO COMPLETE THE ABOVE MAY RESULT IN FIRM'S SUBMITTAL BEING DECLARED NON-RESPONSIVE

Authorized Signature :

Printed Name:

Title:

(attach proof of authority)

## ALS Environmental

2655 Park Center Dr., Suite A  
Simi Valley, CA 93065  
T +1 805 526 7161



right solutions.  
right partner.

## LABORATORY REPORT

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July 16, 2026

Caryssa Joustra, PhD  
Hazen And Sawyer, P.C.  
Suite 10001000 N. Ashley Dr  
Tampa, FL 33602

**RE: City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800**

Dear Caryssa:

Enclosed are the results of the samples submitted to our laboratory on July 2, 2026. For your reference, these analyses have been assigned our service request number P2602374.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at [www.alsglobal.com](http://www.alsglobal.com). Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

ALS | Environmental

July 16, 2026

Alice Lee  
Project Manager



Client: Hazen And Sawyer, P.C.

Service Request No: P2602374

Project: City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

## CASE NARRATIVE

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The samples were received intact under chain of custody on July 2, 2026 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

### BTU and CHONS Analysis

The results for BTU and CHONS were generated according to ASTM D 3588-98. The following analyses were performed and used to calculate the BTU and CHONS results. This method is not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.

### C2 through C6 Hydrocarbon Analysis

The samples were analyzed according to modified EPA Method TO-3 for C2 through >C6 hydrocarbons using a gas chromatograph equipped with a flame ionization detector (FID). This method is included in the laboratory's DoD-ELAP scope of accreditation; however, it is not part of the NELAP accreditation.

### Fixed Gases Analysis

The samples were analyzed for fixed gases (hydrogen, oxygen/argon, nitrogen, carbon monoxide, methane and carbon dioxide) according to modified EPA Method 3C (single injection) using a gas chromatograph equipped with a thermal conductivity detector (TCD). This method is included in the laboratory's DoD-ELAP scope of accreditation; however, it is not part of the NELAP accreditation.

### Hydrogen Sulfide Analysis

The samples were also analyzed for hydrogen sulfide per modified SCAQMD Method 307-91 and ASTM D 5504-20 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). Method ASTM D 5504-20 is included in the laboratory's NELAP scope of accreditation; however, it is not part of the DoD-ELAP accreditation. Method SCAQMD 307-91 is not included on the laboratory's NELAP or DoD-ELAP accreditation.

### Siloxanes Analysis

The tube samples were analyzed for siloxanes according to ASTM D8230-19 using an analytical system comprised of a gas chromatograph/mass spectrometer (GC/MS). This method is not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.



### Sulfur and Total Reduced Sulfur as Hydrogen Sulfide Analysis

The samples were analyzed for twenty sulfur compounds and total reduced sulfur as hydrogen sulfide (TRS as H<sub>2</sub>S) in accordance with modified SCAQMD Method 307-91 and ASTM D 5504-20 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds except for hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan. The TRS as H<sub>2</sub>S results were determined by obtaining the total response for all chromatographic peaks and quantitating the value against the initial calibration curve for hydrogen sulfide thus generating a result specified as "Total Reduced Sulfur as Hydrogen Sulfide". This method is included in the laboratory's NELAP scope of accreditation; however, it is not part of the DoD-ELAP accreditation.

### Volatile Organic Compound Analysis

The samples were also analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. The method was modified to include the use of helium as a diluent gas in place of zero-grade air for container pressurization. When necessary, analytical sample volumes were adjusted by a correction factor for containers pressurized with helium. A summary sheet has been included listing the affected samples. This method is included in the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The spike recovery of Methyl Methacrylate and trans-1,3-Dichloropropene for the Laboratory Control Sample (LCS) analyzed on July 6, 2026, was outside the Laboratory generated control criterion. The recovery exception equates to a potential high bias. However, the spike recovery of the analytes in question was within the method criteria; therefore, the data quality is not significantly affected. No further corrective action was taken.

The containers were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. For projects requiring DoD QSM 6.0 compliance canisters were cleaned to <1/2 the MRL. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

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*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*





## CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

| Agency                 | Web Site                                                                                                                                                                                                                                            | Number                          |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Alaska DEC             | <a href="https://dec.alaska.gov/spar/csp/lab-approval/list-of-approved-labs">https://dec.alaska.gov/spar/csp/lab-approval/list-of-approved-labs</a>                                                                                                 | 17-019                          |
| Arizona DHS            | <a href="http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home">http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home</a> | AZ0694                          |
| Florida DOH (NELAP)    | <a href="http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html">http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html</a>                                               | E871020                         |
| Louisiana DEQ (NELAP)  | <a href="https://internet.deq.louisiana.gov/portal/divisions/lalap/accredited-laboratories">https://internet.deq.louisiana.gov/portal/divisions/lalap/accredited-laboratories</a>                                                                   | 203013                          |
| Maine DHHS             | <a href="http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtm">http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtm</a>                                                               | CA012627                        |
| Minnesota DOH (NELAP)  | <a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>                                                                                                                                               | 006-999-456                     |
| New Jersey DEP (NELAP) | <a href="https://dep.nj.gov/dsr/oqa/certified-laboratories/">https://dep.nj.gov/dsr/oqa/certified-laboratories/</a>                                                                                                                                 | CA009                           |
| New York DOH (NELAP)   | <a href="http://www.wadsworth.org/labcert/elap/elap.html">http://www.wadsworth.org/labcert/elap/elap.html</a>                                                                                                                                       | 11221                           |
| Oklahoma DEQ (NELAP)   | <a href="http://labaccreditation.deq.ok.gov/labaccreditation/">labaccreditation.deq.ok.gov/labaccreditation/</a>                                                                                                                                    | 2207                            |
| Oregon PHD (NELAP)     | <a href="http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>                           | 4068                            |
| Pennsylvania DEP       | <a href="http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx">http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx</a>                                           | 68-03307<br>(Registration only) |
| PJLA (DoD ELAP)        | <a href="http://www.pjlabs.com/search-accredited-labs">http://www.pjlabs.com/search-accredited-labs</a>                                                                                                                                             | 65818<br>(Testing)              |
| Texas CEQ (NELAP)      | <a href="http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html</a>                                                                                                         | T104704413                      |
| Utah DOH (NELAP)       | <a href="https://uphl.utah.gov/certifications/environmental-laboratory-certification/">https://uphl.utah.gov/certifications/environmental-laboratory-certification/</a>                                                                             | CA01627                         |
| Washington DOE         | <a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>                                                                                                         | C946                            |

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at [www.alsglobal.com](http://www.alsglobal.com), or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

# ALS ENVIRONMENTAL

## DETAIL SUMMARY REPORT

Client: Hazen And Sawyer, P.C.

Service Request: P2602374

Project ID: City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

Date Received: 7/2/2026

Time Received: 09:30

| Client Sample ID                 | Lab Code     | Matrix | Date Collected | Time Collected | Container ID | Pi1 (psig) | Pf1 (psig) | ASTM D8230 - Siloxanes Tube | TO-3 Modified - C1C6+ Can | 3C Modified - Fxd Gases Can | ASTM D5504-01 - H2S Can | ASTM D 5504-20 - Sulfur Can | TO-15 Modified - VOC Cans |
|----------------------------------|--------------|--------|----------------|----------------|--------------|------------|------------|-----------------------------|---------------------------|-----------------------------|-------------------------|-----------------------------|---------------------------|
| Howard Curren Digester 7 Samples | P2602374-001 | Air    | 7/1/2026       | 10:19          |              |            |            | X                           |                           |                             |                         |                             |                           |
| Duplicate #2                     | P2602374-002 | Air    | 7/1/2026       | 11:21          |              |            |            | X                           |                           |                             |                         |                             |                           |
| Can Dup1 HC7                     | P2602374-003 | Air    | 7/1/2026       | 11:30          | SSC00667     | -0.27      | 3.60       |                             | X                         | X                           | X                       | X                           | X                         |
| Can Dup2 HC7                     | P2602374-004 | Air    | 7/1/2026       | 11:36          | SSC00677     | -0.49      | 3.42       |                             | X                         | X                           | X                       | X                           | X                         |

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|                                                                                                                                                                          |                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <u>Requested Turnaround Time in Business Days (Surcharges) please circle</u><br>1 Day (100%) 2 Day (80%) 3 Day (60%) 4 Day (40%) 5 Day (30%) 7 Day (20%) 10 Day-Standard | ALS-Project No.<br>R2602374 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|

|                                                                           |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
|---------------------------------------------------------------------------|----------------------|-------------------------------------------------|----------------|----------------------------------------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------|-----------------------------------|------------------------|-------------------|------------------------------------------------------------------|
| Company Name & Address (Reporting Information)<br><b>Hazen and Sawyer</b> |                      |                                                 |                | Project Name<br><b>Howard Curren</b>                                                         |                                        |                                                                  |                                   | ALS Contact: <b>30</b> |                   |                                                                  |
|                                                                           |                      |                                                 |                | Project Number                                                                               |                                        |                                                                  |                                   | Analysis Method        |                   |                                                                  |
| Project Manager<br><b>Caryssa Jaustra</b>                                 |                      |                                                 |                | P.O. # / Billing Information<br><b>1000 N. Ashley Dr.<br/>Suite 1000<br/>Tampa, FL 33602</b> |                                        |                                                                  |                                   |                        |                   | Comments<br>e.g. Actual Preservative or<br>specific instructions |
| Phone<br><b>(727) 687-3865</b>                                            |                      | Fax                                             |                | Sampler (Print & Sign)<br><b>Trina Halfhide</b>                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
| Email Address for Result Reporting<br><b>cjaustra@hazenandsawyer.com</b>  |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
| Client Sample ID                                                          | Laboratory ID Number | Date Collected                                  | Time Collected | Canister ID<br>(Bar code # - AC, SC, etc.)                                                   | Flow Controller ID (Bar code # - FC #) | Canister Start Pressure<br>"Hg                                   | Canister End Pressure<br>"Hg/psig | Sample Volume          |                   |                                                                  |
| <b>Howard Curren</b>                                                      |                      | <b>7/1/26</b>                                   |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
| <b>Digester 7 Sample</b>                                                  |                      | <b>9:18</b>                                     | <b>10:19</b>   |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
| <b>Duplicate #2</b>                                                       |                      | <b>10:21</b>                                    | <b>11:21</b>   | <b>mod 46943</b>                                                                             |                                        |                                                                  |                                   | <b>12.0L</b>           |                   |                                                                  |
| <b>Can Dup1 HC7</b>                                                       |                      | <b>7/1/26</b>                                   | <b>11:30</b>   | <b>SN 33181</b>                                                                              |                                        |                                                                  |                                   | <b>6.0L</b>            |                   |                                                                  |
| <b>Can Dup2 HC7</b>                                                       |                      | <b>7/1/26</b>                                   | <b>11:36</b>   | <b>SN 41857</b>                                                                              |                                        |                                                                  |                                   | <b>6.00L</b>           |                   |                                                                  |
|                                                                           |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
|                                                                           |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
|                                                                           |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
|                                                                           |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
|                                                                           |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
|                                                                           |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
|                                                                           |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
|                                                                           |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
|                                                                           |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
|                                                                           |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |
| <b>Report Tier Levels - please select</b>                                 |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   | Project Requirements (MRLs QAPP)                                 |
| Tier I - Results (Default if not specified)                               |                      | Tier III (Results + QC & Calibration Summaries) |                | Tier IV (Data Validation Package- surcharge applies)                                         |                                        | Chain of Custody Seal (Circle)<br>INTACT    BROKEN <b>ABSENT</b> |                                   |                        |                   |                                                                  |
| Retinquinshed by: (Signature) <b>[Signature]</b>                          |                      |                                                 |                | Date: <b>6/1/26</b>                                                                          | Time:                                  | Received by: (Signature) <b>[Signature]</b>                      |                                   | Date:                  | Time:             |                                                                  |
| Retinquinshed by: (Signature) <b>[Signature]</b>                          |                      |                                                 |                | Date:                                                                                        | Time:                                  | Received by: (Signature) <b>[Signature]</b>                      |                                   | Date: <b>7-2-26</b>    | Time: <b>0930</b> |                                                                  |
| Cooler / Blank Temperature °C                                             |                      |                                                 |                |                                                                                              |                                        |                                                                  |                                   |                        |                   |                                                                  |

Signature denotes acceptance of ALS Group USA, Corp. Terms and Conditions - Detailed Terms & Conditions can be reviewed at the link below:  
<https://www.alsglobal.com/ALSGroupUSACorpTC>

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\* cc thal@hide@hazenand sayyer.com

# ALS Environmental Sample Acceptance Check Form

Client: Hazen And Sawyer, P.C. Work order: P2602374  
 Project: Howard Curren  
 Sample(s) received on: 7/2/2026 Date opened: 7/2/2026 by: ADDAVID

**Note:** This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

- |    |                                                                                                               | Yes                                 | No                                  | N/A                                 |
|----|---------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 1  | Were <b>sample containers</b> properly marked with client sample ID?                                          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 2  | Did <b>sample containers</b> arrive in good condition?                                                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 3  | Were <b>chain-of-custody</b> papers used and filled out?                                                      | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| 4  | Did <b>sample container labels</b> and/or tags agree with custody papers?                                     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 5  | Was <b>sample volume</b> received adequate for analysis?                                                      | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 6  | Are samples within specified holding times?                                                                   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 7  | Was proper <b>temperature</b> (thermal preservation) of cooler at receipt adhered to?                         | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 8  | Were <b>custody seals</b> on outside of cooler/Box/Container?                                                 | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |                                     |
|    | Location of seal(s)? _____ Sealing Lid?                                                                       | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Were signature and date included?                                                                             | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Were seals intact?                                                                                            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 9  | Do containers have appropriate <b>preservation</b> , according to method/SOP or Client specified information? | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Is there a client indication that the submitted samples are <b>pH</b> preserved?                              | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Were <b>VOA vials</b> checked for presence/absence of air bubbles?                                            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Does the client/method/SOP require that the analyst check the sample pH and <u>if necessary</u> alter it?     | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 10 | <b>Tubes:</b> Are the tubes capped and intact?                                                                | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 11 | <b>Badges:</b> Are the badges properly capped and intact?                                                     | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Are dual bed badges separated and individually capped and intact?                                             | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 12 | Lab Notification: Analyst and PM were alerted of Short HT or RUSH samples?                                    | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 13 | Client Notification: Client has been notified regarding HT exceedances and/or other CoC discrepancies?        | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

| Lab Sample ID   | Container Description | Required pH * | Received pH | Adjusted pH | VOA Headspace (Presence/Absence) | Receipt / Preservation Comments |
|-----------------|-----------------------|---------------|-------------|-------------|----------------------------------|---------------------------------|
| P2602374-001.01 | Tube, Siloxane        |               |             |             |                                  |                                 |
| P2602374-002.01 | Tube, Siloxane        |               |             |             |                                  |                                 |
| P2602374-003.01 | 6.0 L Silonite Can    |               |             |             |                                  |                                 |
| P2602374-004.01 | 6.0 L Silonite Can    |               |             |             |                                  |                                 |
|                 |                       |               |             |             |                                  |                                 |
|                 |                       |               |             |             |                                  |                                 |
|                 |                       |               |             |             |                                  |                                 |
|                 |                       |               |             |             |                                  |                                 |
|                 |                       |               |             |             |                                  |                                 |
|                 |                       |               |             |             |                                  |                                 |
|                 |                       |               |             |             |                                  |                                 |
|                 |                       |               |             |             |                                  |                                 |
|                 |                       |               |             |             |                                  |                                 |
|                 |                       |               |             |             |                                  |                                 |
|                 |                       |               |             |             |                                  |                                 |

Explain any discrepancies: (include lab sample ID numbers): \_\_\_\_\_  
 Chain of Custody is missing analysis \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 Sulfur (pH>4)

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

ALS Project ID: P2602374

**Client Sample ID:** Can Dup1 HC7

ALS Sample ID: P2602374-003

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

Test Code: ASTM D3588-98

Analyst: Diana Ayala/Gilbert Gutierrez/Stephanie Reynoso

Date Collected: 7/1/2026

Sample Type: 6.0 L Silonite Canister

Date Received: 7/2/2026

Test Notes: ASTM D5504-20 Date Analyzed: 7/6/2026

Container ID: SSC00667 EPA 3C Date Analyzed: 7/8/2026

C1-C6 Date Analyzed: 7/8/2026

Initial Pressure (psig): -0.27

Final Pressure (psig): 3.60

Container Dilution Factor: 1.27

| Components       | Result<br>Volume % | Result<br>ppmV | MRL<br>ppmV | Data<br>Qualifier |
|------------------|--------------------|----------------|-------------|-------------------|
| Hydrogen         | < 0.01             | ND             | 1,300       |                   |
| Oxygen           | 0.03               | ND             | 1,300       |                   |
| Nitrogen         | 0.24               | 2,410          | 1,300       |                   |
| Carbon Monoxide  | < 0.01             | ND             | 1,300       |                   |
| Methane          | 58.19              | 582,000        | 1,300       |                   |
| Carbon Dioxide   | 40.57              | 406,000        | 1,300       |                   |
| Hydrogen Sulfide | 0.95               | 9,500          | 1.3         |                   |
| C2 as Ethane     | < 0.01             | ND             | 13          |                   |
| C3 as Propane    | < 0.01             | ND             | 13          |                   |
| C4 as n-Butane   | < 0.01             | ND             | 13          |                   |
| C5 as n-Pentane  | < 0.01             | ND             | 13          |                   |
| C6 as n-Hexane   | < 0.01             | ND             | 76          |                   |
| > C6 as n-Hexane | < 0.01             | 58             | 13          |                   |

### TOTALS

99.99

| Components | Mole % | Weight % | Data<br>Qualifier |
|------------|--------|----------|-------------------|
| Carbon     | 23.74  | 43.00    |                   |
| Hydrogen   | 56.40  | 8.57     |                   |
| Oxygen     | 19.51  | 47.08    |                   |
| Nitrogen   | 0.12   | 0.25     |                   |
| Sulfur     | 0.23   | 1.11     |                   |

|                                                       |         |         |
|-------------------------------------------------------|---------|---------|
| Specific Gravity (Air = 1)                            |         | 0.9530  |
| Specific Volume                                       | ft3/lb  | 13.75   |
| Gross Heating Value (Dry Gas @ 60 F, 14.696 psia)     | BTU/ft3 | 596.1   |
| Net Heating Value (Dry Gas @ 60 F, 14.696 psia)       | BTU/ft3 | 536.8   |
| Gross Heating Value (Water Saturated at 0.25636 psia) | BTU/ft3 | 583.7   |
| Net Heating Value (Water Saturated at 0.25636 psia)   | BTU/ft3 | 525.7   |
| Gross Heating Value (Dry Gas @ 60 F, 14.696 psia)     | BTU/lb  | 8,195.5 |
| Net Heating Value (Dry Gas @ 60 F, 14.696 psia)       | BTU/lb  | 7,381.1 |
| Compressibility Factor "Z" (60 F, 14.696 psia)        |         | 0.9967  |
| WOBBE Index                                           |         | 610.6   |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

ALS Project ID: P2602374

**Client Sample ID:** Can Dup2 HC7

ALS Sample ID: P2602374-004

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

Test Code: ASTM D3588-98

Analyst: Diana Ayala/Gilbert Gutierrez/Stephanie Reynoso

Date Collected: 7/1/2026

Sample Type: 6.0 L Silonite Canister

Date Received: 7/2/2026

Test Notes: ASTM D5504-20 Date Analyzed: 7/6/2026

Container ID: SSC00677 EPA 3C Date Analyzed: 7/8/2026

C1-C6 Date Analyzed: 7/8/2026

Initial Pressure (psig): -0.49

Final Pressure (psig): 3.42

Container Dilution Factor: 1.28

| Components       | Result<br>Volume % | Result<br>ppmV | MRL<br>ppmV | Data<br>Qualifier |
|------------------|--------------------|----------------|-------------|-------------------|
| Hydrogen         | < 0.01             | ND             | 1,300       |                   |
| Oxygen           | 0.81               | 8,150          | 1,300       |                   |
| Nitrogen         | 3.21               | 32,100         | 1,300       |                   |
| Carbon Monoxide  | < 0.01             | ND             | 1,300       |                   |
| Methane          | 56.30              | 563,000        | 1,300       |                   |
| Carbon Dioxide   | 39.06              | 391,000        | 1,300       |                   |
| Hydrogen Sulfide | 0.60               | 6,000          | 1.3         |                   |
| C2 as Ethane     | < 0.01             | ND             | 13          |                   |
| C3 as Propane    | < 0.01             | ND             | 13          |                   |
| C4 as n-Butane   | < 0.01             | ND             | 13          |                   |
| C5 as n-Pentane  | < 0.01             | ND             | 13          |                   |
| C6 as n-Hexane   | < 0.01             | ND             | 77          |                   |
| > C6 as n-Hexane | < 0.01             | 61             | 13          |                   |

### TOTALS

99.99

| Components | Mole % | Weight % | Data<br>Qualifier |
|------------|--------|----------|-------------------|
| Carbon     | 23.35  | 41.53    |                   |
| Hydrogen   | 55.42  | 8.27     |                   |
| Oxygen     | 19.52  | 46.24    |                   |
| Nitrogen   | 1.57   | 3.26     |                   |
| Sulfur     | 0.15   | 0.69     |                   |

|                                                       |         |         |
|-------------------------------------------------------|---------|---------|
| Specific Gravity (Air = 1)                            |         | 0.9528  |
| Specific Volume                                       | ft3/lb  | 13.75   |
| Gross Heating Value (Dry Gas @ 60 F, 14.696 psia)     | BTU/ft3 | 574.6   |
| Net Heating Value (Dry Gas @ 60 F, 14.696 psia)       | BTU/ft3 | 517.4   |
| Gross Heating Value (Water Saturated at 0.25636 psia) | BTU/ft3 | 562.8   |
| Net Heating Value (Water Saturated at 0.25636 psia)   | BTU/ft3 | 506.8   |
| Gross Heating Value (Dry Gas @ 60 F, 14.696 psia)     | BTU/lb  | 7,901.8 |
| Net Heating Value (Dry Gas @ 60 F, 14.696 psia)       | BTU/lb  | 7,116.0 |
| Compressibility Factor "Z" (60 F, 14.696 psia)        |         | 0.9969  |
| WOBBE Index                                           |         | 588.7   |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Can Dup1 HC7

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P2602374-003

Test Code: EPA Method 3C Modified

Instrument ID: Agilent 8890/GC38/TCD

Analyst: Diana Ayala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00667

Date Collected: 7/1/2026

Date Received: 7/2/2026

Date Analyzed: 7/8/26

Volume(s) Analyzed: 0.10 ml(s)

Initial Pressure (psig): -0.27

Final Pressure (psig): 3.60

Container Dilution Factor: 1.27

| CAS #     | Compound              | Result<br>%, v/v | MRL<br>%, v/v | Data<br>Qualifier |
|-----------|-----------------------|------------------|---------------|-------------------|
| 1333-74-0 | Hydrogen              | ND               | 0.13          |                   |
| 7782-44-7 | Oxygen*               | ND               | 0.13          |                   |
| 7727-37-9 | <b>Nitrogen</b>       | <b>0.244</b>     | 0.13          |                   |
| 630-08-0  | Carbon Monoxide       | ND               | 0.13          |                   |
| 74-82-8   | <b>Methane</b>        | <b>58.7</b>      | 0.13          |                   |
| 124-38-9  | <b>Carbon Dioxide</b> | <b>41.0</b>      | 0.13          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

\* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Can Dup2 HC7

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P2602374-004

Test Code: EPA Method 3C Modified

Instrument ID: Agilent 8890/GC38/TCD

Analyst: Diana Ayala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00677

Date Collected: 7/1/2026

Date Received: 7/2/2026

Date Analyzed: 7/8/26

Volume(s) Analyzed: 0.10 ml(s)

Initial Pressure (psig): -0.49

Final Pressure (psig): 3.42

Container Dilution Factor: 1.28

| CAS #     | Compound              | Result<br>%, v/v | MRL<br>%, v/v | Data<br>Qualifier |
|-----------|-----------------------|------------------|---------------|-------------------|
| 1333-74-0 | Hydrogen              | ND               | 0.13          |                   |
| 7782-44-7 | <b>Oxygen*</b>        | <b>0.820</b>     | 0.13          |                   |
| 7727-37-9 | <b>Nitrogen</b>       | <b>3.23</b>      | 0.13          |                   |
| 630-08-0  | Carbon Monoxide       | ND               | 0.13          |                   |
| 74-82-8   | <b>Methane</b>        | <b>56.6</b>      | 0.13          |                   |
| 124-38-9  | <b>Carbon Dioxide</b> | <b>39.3</b>      | 0.13          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

\* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260708-MB

**Test Code:** EPA Method 3C Modified

**Instrument ID:** Agilent 8890/GC38/TCD

**Analyst:** Diana Ayala

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 7/08/26

Volume(s) Analyzed: 0.10 ml(s)

| CAS #     | Compound        | Result<br>%, v/v | MRL<br>%, v/v | Data<br>Qualifier |
|-----------|-----------------|------------------|---------------|-------------------|
| 1333-74-0 | Hydrogen        | ND               | 0.10          |                   |
| 7782-44-7 | Oxygen*         | ND               | 0.10          |                   |
| 7727-37-9 | Nitrogen        | ND               | 0.10          |                   |
| 630-08-0  | Carbon Monoxide | ND               | 0.10          |                   |
| 74-82-8   | Methane         | ND               | 0.10          |                   |
| 124-38-9  | Carbon Dioxide  | ND               | 0.10          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

\* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C. ALS Project ID: P2602374  
**Client Sample ID:** Duplicate Lab Control Sample ALS Sample ID: P260708-DLCS  
**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

**Test Code:** EPA Method 3C Modified Date Collected: NA  
**Instrument ID:** Agilent 8890/GC38/TCD Date Received: NA  
**Analyst:** Diana Ayala Date Analyzed: 7/08/26  
**Sample Type:** 6.0 L Silonite Canister Volume(s) Analyzed: NA ml(s)  
**Test Notes:**

| CAS #     | Compound        | Spike Amount       | Result      |              | % Recovery |            | ALS                  | RPD | RPD | Data |
|-----------|-----------------|--------------------|-------------|--------------|------------|------------|----------------------|-----|-----|------|
|           |                 | LCS / DLCS<br>ppmV | LCS<br>ppmV | DLCS<br>ppmV | LCS        | DLCS       | Acceptance<br>Limits |     |     |      |
| 1333-74-0 | Hydrogen        | 40,100             | 43,600      | 43,700       | <b>109</b> | <b>109</b> | 96-117               | 0   | 5   |      |
| 7782-44-7 | Oxygen*         | 24,300             | 24,700      | 24,400       | <b>102</b> | <b>100</b> | 92-112               | 2   | 7   |      |
| 7727-37-9 | Nitrogen        | 49,700             | 49,400      | 48,700       | <b>99</b>  | <b>98</b>  | 89-113               | 1   | 7   |      |
| 630-08-0  | Carbon Monoxide | 50,100             | 50,700      | 50,200       | <b>101</b> | <b>100</b> | 96-113               | 1.0 | 5   |      |
| 74-82-8   | Methane         | 39,200             | 39,800      | 39,500       | <b>102</b> | <b>101</b> | 95-111               | 1.0 | 5   |      |
| 124-38-9  | Carbon Dioxide  | 50,100             | 53,200      | 53,500       | <b>106</b> | <b>107</b> | 93-112               | 0.9 | 6   |      |

\* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.  
**Client Sample ID:** Howard Curren Digester 7 Samples  
**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374  
 ALS Sample ID: P2602374-001

**Test Code:** ASTM D8230-19  
**Instrument ID:** Agilent 5973N/HP6890A/MS7  
**Analyst:** Stephanie Reynoso  
**Sample Type:** Siloxane Tube  
**Test Notes:** BC, DE

**Date Collected:** 7/1/26  
**Date Received:** 7/2/26  
**Date Analyzed:** 7/6/26  
**Desorption Volume:** 3.0 ml  
**Volume Sampled:** 12.20 Liter(s)

| CAS #                | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|----------------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6            | Trimethylsilanol                                | 2.6               | 210             | 49           | 65                            | 15           |                   |
| 107-46-0             | Hexamethyldisiloxane (L <sub>2</sub> )          | 1.6               | 130             | 42           | 46                            | 15           |                   |
| 541-05-9             | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | 0.62              | 51              | 48           | 19                            | 18           |                   |
| 107-51-7             | Octamethyltrisiloxane (L <sub>3</sub> )         | 0.69              | 56              | 45           | 20                            | 16           |                   |
| 556-67-2             | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | 21                | 1,700           | 45           | 640                           | 17           |                   |
| 141-62-8             | Decamethyltetrasiloxane (L <sub>4</sub> )       | 2.4               | 200             | 44           | 71                            | 16           |                   |
| 541-02-6             | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | 130               | 11,000          | 44           | 4,100                         | 17           |                   |
| 141-63-9             | Dodecamethylpentasiloxane (L <sub>5</sub> )     | 3.2               | 260             | 43           | 95                            | 16           |                   |
| 540-97-6             | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | 3.5               | 290             | 43           | 110                           | 16           |                   |
| <b>Total Silicon</b> |                                                 |                   |                 |              | <b>5,200</b>                  |              |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate #2

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P2602374-002

**Test Code:** ASTM D8230-19

**Instrument ID:** Agilent 5973N/HP6890A/MS7

**Analyst:** Stephanie Reynoso

**Sample Type:** Siloxane Tube

**Test Notes:** BC, DE

Date Collected: 7/1/26

Date Received: 7/2/26

Date Analyzed: 7/6/26

Desorption Volume: 3.0 ml

Volume Sampled: 12.00 Liter(s)

| CAS #                | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|----------------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6            | Trimethylsilanol                                | 1.8               | 150             | 50           | 47                            | 15           |                   |
| 107-46-0             | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.52            | ND              | 43           | ND                            | 15           |                   |
| 541-05-9             | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | < 0.58            | ND              | 49           | ND                            | 18           |                   |
| 107-51-7             | Octamethyltrisiloxane (L <sub>3</sub> )         | < 0.55            | ND              | 46           | ND                            | 16           |                   |
| 556-67-2             | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | 15                | 1,200           | 45           | 470                           | 17           |                   |
| 141-62-8             | Decamethyltetrasiloxane (L <sub>4</sub> )       | 2.2               | 180             | 45           | 65                            | 16           |                   |
| 541-02-6             | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | 120               | 10,000          | 45           | 3,900                         | 17           |                   |
| 141-63-9             | Dodecamethylpentasiloxane (L <sub>5</sub> )     | 3.0               | 250             | 44           | 92                            | 16           |                   |
| 540-97-6             | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | 3.3               | 270             | 44           | 100                           | 17           |                   |
| <b>Total Silicon</b> |                                                 |                   |                 |              | <b>4,600</b>                  |              |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260706-MB

**Test Code:** ASTM D8230-19

**Instrument ID:** Agilent 5973N/HP6890A/MS7

**Analyst:** Stephanie Reynoso

**Sample Type:** Siloxane Tube

**Test Notes:** BC, DE

Date Collected: NA

Date Received: NA

Date Analyzed: 7/6/26

Desorption Volume: 3.0 ml

Volume Sampled: NA Liter(s)

| CAS #         | Compound                                        | Result<br>µg/Tube | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>as Silicon<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Data<br>Qualifier |
|---------------|-------------------------------------------------|-------------------|-----------------------------|--------------------------|-------------------------------------------|--------------------------|-------------------|
| 1066-40-6     | Trimethylsilanol                                | < 0.60            | NA                          | NA                       | NA                                        | NA                       | NA                |
| 107-46-0      | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.52            | NA                          | NA                       | NA                                        | NA                       | NA                |
| 541-05-9      | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | < 0.58            | NA                          | NA                       | NA                                        | NA                       | NA                |
| 107-51-7      | Octamethyltrisiloxane (L <sub>3</sub> )         | < 0.55            | NA                          | NA                       | NA                                        | NA                       | NA                |
| 556-67-2      | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | < 0.54            | NA                          | NA                       | NA                                        | NA                       | NA                |
| 141-62-8      | Decamethyltetrasiloxane (L <sub>4</sub> )       | < 0.54            | NA                          | NA                       | NA                                        | NA                       | NA                |
| 541-02-6      | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | < 0.54            | NA                          | NA                       | NA                                        | NA                       | NA                |
| 141-63-9      | Dodecamethylpentasiloxane (L <sub>5</sub> )     | < 0.53            | NA                          | NA                       | NA                                        | NA                       | NA                |
| 540-97-6      | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | < 0.53            | NA                          | NA                       | NA                                        | NA                       | NA                |
| Total Silicon |                                                 |                   |                             |                          | NA                                        |                          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

NA = Not applicable.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.  
**Client Sample ID:** Duplicate Lab Control Sample  
**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374  
 ALS Sample ID: P260706-DLCS

Test Code: ASTM D8230-19  
 Instrument ID: Agilent 5973N/HP6890A/MS7  
 Analyst: Stephanie Reynoso  
 Sampling Type: Siloxane Tube  
 Test Notes:

Date Collected: NA  
 Date Received: NA  
 Date Analyzed: 7/06/26  
 Volume(s) Analyzed: NA Liter(s)

| CAS #     | Compound                      | Spike Amount | Result |       | % Recovery |      | ALS        | RPD | RPD   | Data      |
|-----------|-------------------------------|--------------|--------|-------|------------|------|------------|-----|-------|-----------|
|           |                               | LCS / DLCS   | LCS    | DLCS  | LCS        | DLCS | Acceptance |     |       |           |
|           |                               | µg/ml        | µg/ml  | µg/ml |            |      | Limits     |     | Limit | Qualifier |
| 1066-40-6 | Trimethylsilanol              | 13.7         | 11.0   | 12.3  | 80         | 90   | 70-130     | 12  | 25    |           |
| 107-46-0  | Hexamethyldisiloxane          | 15.6         | 12.4   | 14.0  | 79         | 90   | 70-130     | 13  | 25    |           |
| 541-05-9  | Hexamethylcyclotrisiloxane    | 18.0         | 13.0   | 14.9  | 72         | 83   | 70-130     | 14  | 25    |           |
| 107-51-7  | Octamethyltrisiloxane         | 15.8         | 12.0   | 13.5  | 76         | 85   | 70-130     | 11  | 25    |           |
| 556-67-2  | Octamethylcyclotetrasiloxane  | 15.7         | 11.9   | 13.3  | 76         | 85   | 70-130     | 11  | 25    |           |
| 141-62-8  | Decamethyltetrasiloxane       | 15.9         | 12.1   | 13.6  | 76         | 86   | 70-130     | 12  | 25    |           |
| 541-02-6  | Decamethylcyclopentasiloxane  | 15.0         | 11.3   | 12.8  | 75         | 85   | 70-130     | 13  | 25    |           |
| 141-63-9  | Dodecamethylpentasiloxane     | 14.8         | 10.8   | 12.8  | 73         | 86   | 70-130     | 16  | 25    |           |
| 540-97-6  | Dodecamethylcyclohexasiloxane | 12.7         | 9.07   | 11.2  | 71         | 88   | 70-130     | 21  | 25    |           |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Can Dup1 HC7

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P2602374-003

Test Code: ASTM D 5504-20

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Gilbert Gutierrez

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00667

Date Collected: 7/1/26

Time Collected: 11:30

Date Received: 7/2/26

Date Analyzed: 7/6/26

Time Analyzed: 12:10

Volume(s) Analyzed: 0.0050 ml(s)

Initial Pressure (psig): -0.27

Final Pressure (psig): 3.60

Container Dilution Factor: 1.27

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | 13,000,000      | 1,800        | 9,500,000      | 1,300       |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 3,100        | ND             | 1,300       |                   |
| 74-93-1   | Methyl Mercaptan      | 11,000          | 2,500        | 5,800          | 1,300       |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 3,200        | ND             | 1,300       |                   |
| 75-18-3   | Dimethyl Sulfide      | ND              | 3,200        | ND             | 1,300       |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 2,000        | ND             | 640         |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 4,000        | ND             | 1,300       |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 4,700        | ND             | 1,300       |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 4,000        | ND             | 1,300       |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 4,000        | ND             | 1,300       |                   |
| 110-02-1  | Thiophene             | ND              | 4,400        | ND             | 1,300       |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 4,700        | ND             | 1,300       |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 4,700        | ND             | 1,300       |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 4,700        | ND             | 1,300       |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 2,400        | ND             | 640         |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 5,100        | ND             | 1,300       |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 4,600        | ND             | 1,300       |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 5,800        | ND             | 1,300       |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 5,800        | ND             | 1,300       |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 3,200        | ND             | 640         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Can Dup2 HC7

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P2602374-004

Test Code: ASTM D 5504-20

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Gilbert Gutierrez

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00677

Date Collected: 7/1/26

Time Collected: 11:36

Date Received: 7/2/26

Date Analyzed: 7/6/26

Time Analyzed: 12:33

Volume(s) Analyzed: 0.0050 ml(s)

Initial Pressure (psig): -0.49

Final Pressure (psig): 3.42

Container Dilution Factor: 1.28

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | 8,300,000       | 1,800        | 6,000,000      | 1,300       |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 3,100        | ND             | 1,300       |                   |
| 74-93-1   | Methyl Mercaptan      | 8,200           | 2,500        | 4,100          | 1,300       |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 3,300        | ND             | 1,300       |                   |
| 75-18-3   | Dimethyl Sulfide      | ND              | 3,300        | ND             | 1,300       |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 2,000        | ND             | 640         |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 4,000        | ND             | 1,300       |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 4,700        | ND             | 1,300       |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 4,000        | ND             | 1,300       |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 4,000        | ND             | 1,300       |                   |
| 110-02-1  | Thiophene             | ND              | 4,400        | ND             | 1,300       |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 4,700        | ND             | 1,300       |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 4,700        | ND             | 1,300       |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 4,700        | ND             | 1,300       |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 2,500        | ND             | 640         |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 5,100        | ND             | 1,300       |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 4,600        | ND             | 1,300       |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 5,900        | ND             | 1,300       |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 5,900        | ND             | 1,300       |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 3,200        | ND             | 640         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800 ALS Project ID: P2602374

### Total Reduced Sulfur as Hydrogen Sulfide

Test Code: ASTM D 5504-20  
Instrument ID: Agilent 6890A/GC13/SCD  
Analyst: Gilbert Gutierrez  
Sample Type: 6.0 L Silonite Canister(s)  
Test Notes:

Date(s) Collected: 7/1/26  
Date Received: 7/2/26  
Date Analyzed: 7/6/26

| Client Sample ID | ALS Sample ID | Container          | Injection       | Time<br>Analyzed | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------------|---------------|--------------------|-----------------|------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
|                  |               | Dilution<br>Factor | Volume<br>ml(s) |                  |                             |                          |                |             |                   |
| Can Dup1 HC7     | P2602374-003  | 1.27               | 0.0050          | 12:10            | 14,000,000                  | 1,800                    | 9,700,000      | 1,300       |                   |
| Can Dup2 HC7     | P2602374-004  | 1.28               | 0.0050          | 12:33            | 8,500,000                   | 1,800                    | 6,100,000      | 1,300       |                   |
| Method Blank     | P260706-MB    | 1.00               | 1.0             | 11:04            | ND                          | 7.0                      | ND             | 5.0         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260706-MB

Test Code: ASTM D 5504-20

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Gilbert Gutierrez

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Time Collected: NA

Date Received: NA

Date Analyzed: 7/06/26

Time Analyzed: 11:04

Volume(s) Analyzed: 1.0 ml(s)

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | ND              | 7.0          | ND             | 5.0         |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 12           | ND             | 5.0         |                   |
| 74-93-1   | Methyl Mercaptan      | ND              | 9.8          | ND             | 5.0         |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 13           | ND             | 5.0         |                   |
| 75-18-3   | Dimethyl Sulfide      | ND              | 13           | ND             | 5.0         |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 7.8          | ND             | 2.5         |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 16           | ND             | 5.0         |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 18           | ND             | 5.0         |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 16           | ND             | 5.0         |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 16           | ND             | 5.0         |                   |
| 110-02-1  | Thiophene             | ND              | 17           | ND             | 5.0         |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 18           | ND             | 5.0         |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 18           | ND             | 5.0         |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 18           | ND             | 5.0         |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 9.6          | ND             | 2.5         |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 20           | ND             | 5.0         |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 18           | ND             | 5.0         |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 23           | ND             | 5.0         |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 23           | ND             | 5.0         |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 12           | ND             | 2.5         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260706-DLCS

Test Code: ASTM D 5504-20

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Gilbert Gutierrez

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 7/06/26

Volume(s) Analyzed: NA ml(s)

| CAS #     | Compound         | Spike Amount       | Result      |              | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|------------------|--------------------|-------------|--------------|------------|------|----------------------|-----|-----|------|
|           |                  | LCS / DLCS<br>ppbV | LCS<br>ppbV | DLCS<br>ppbV | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 7783-06-4 | Hydrogen Sulfide | 988                | 876         | 868          | 89         | 88   | 72-122               | 1   | 18  |      |
| 463-58-1  | Carbonyl Sulfide | 1,010              | 960         | 1,130        | 95         | 112  | 72-121               | 16  | 17  |      |
| 74-93-1   | Methyl Mercaptan | 991                | 801         | 783          | 81         | 79   | 74-127               | 3   | 18  |      |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Can Dup1 HC7

ALS Project ID: P2602374

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Sample ID: P2602374-003

Test Code: EPA TO-15 Modified

Date Collected: 7/1/26

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Date Received: 7/2/26

Analyst: Topacio Zavala

Date Analyzed: 7/6/26

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: 0.010 Liter(s)

Test Notes:

Container ID: SSC00667

Initial Pressure (psig): -0.27      Final Pressure (psig): 3.60

Canister Dilution Factor: 1.27

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND                          | 67                       | ND             | 39          |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 64                       | ND             | 13          |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 67                       | ND             | 33          |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 69                       | ND             | 9.8         |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 67                       | ND             | 26          |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 67                       | ND             | 30          |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 65                       | ND             | 17          |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 70                       | ND             | 26          |                   |
| 64-17-5   | Ethanol                                          | ND                          | 670                      | ND             | 350         |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 130                      | ND             | 78          |                   |
| 107-02-8  | Acrolein                                         | ND                          | 140                      | ND             | 60          |                   |
| 67-64-1   | Acetone                                          | ND                          | 650                      | ND             | 270         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 64                       | ND             | 11          |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 520                      | ND             | 210         |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 130                      | ND             | 61          |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 58                       | ND             | 15          |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 58                       | ND             | 17          |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 69                       | ND             | 22          |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 58                       | ND             | 7.6         |                   |
| 75-15-0   | Carbon Disulfide                                 | 5,500                       | 130                      | 1,800          | 42          |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 67                       | ND             | 17          |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 65                       | ND             | 16          |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 67                       | ND             | 19          |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 670                      | ND             | 190         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND                          | 130                      | ND             | 44          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Can Dup1 HC7

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P2602374-003

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00667

Date Collected: 7/1/26

Date Received: 7/2/26

Date Analyzed: 7/6/26

Volume(s) Analyzed: 0.010 Liter(s)

Initial Pressure (psig): -0.27 Final Pressure (psig): 3.60

Canister Dilution Factor: 1.27

| CAS #      | Compound                  | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND              | 65           | ND             | 17          |                   |
| 141-78-6   | Ethyl Acetate             | ND              | 250          | ND             | 69          |                   |
| 110-54-3   | n-Hexane                  | 2,000           | 66           | 550            | 19          |                   |
| 67-66-3    | Chloroform                | ND              | 67           | ND             | 14          |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND              | 120          | ND             | 41          |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND              | 64           | ND             | 16          |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND              | 65           | ND             | 12          |                   |
| 71-43-2    | Benzene                   | ND              | 130          | ND             | 40          |                   |
| 56-23-5    | Carbon Tetrachloride      | ND              | 65           | ND             | 10          |                   |
| 110-82-7   | Cyclohexane               | ND              | 130          | ND             | 38          |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND              | 68           | ND             | 15          |                   |
| 75-27-4    | Bromodichloromethane      | ND              | 68           | ND             | 10          |                   |
| 79-01-6    | Trichloroethene           | ND              | 67           | ND             | 12          |                   |
| 123-91-1   | 1,4-Dioxane               | ND              | 67           | ND             | 19          |                   |
| 80-62-6    | Methyl Methacrylate       | ND              | 130          | ND             | 33          |                   |
| 142-82-5   | n-Heptane                 | 420             | 66           | 100            | 16          |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND              | 67           | ND             | 15          |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND              | 130          | ND             | 33          |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND              | 63           | ND             | 14          |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND              | 70           | ND             | 13          |                   |
| 108-88-3   | Toluene                   | 660             | 69           | 180            | 18          |                   |
| 591-78-6   | 2-Hexanone                | ND              | 130          | ND             | 32          |                   |
| 124-48-1   | Dibromochloromethane      | ND              | 65           | ND             | 7.7         |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND              | 67           | ND             | 8.7         |                   |
| 123-86-4   | n-Butyl Acetate           | ND              | 130          | ND             | 28          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Can Dup1 HC7

ALS Project ID: P2602374

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Sample ID: P2602374-003

Test Code: EPA TO-15 Modified

Date Collected: 7/1/26

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Date Received: 7/2/26

Analyst: Topacio Zavala

Date Analyzed: 7/6/26

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: 0.010 Liter(s)

Test Notes:

Container ID: SSC00667

Initial Pressure (psig): -0.27      Final Pressure (psig): 3.60

Canister Dilution Factor: 1.27

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | 450             | 67           | 97             | 14          |                   |
| 127-18-4    | Tetrachloroethene           | ND              | 68           | ND             | 10          |                   |
| 108-90-7    | Chlorobenzene               | ND              | 68           | ND             | 15          |                   |
| 100-41-4    | Ethylbenzene                | 840             | 69           | 190            | 16          |                   |
| 179601-23-1 | m,p-Xylenes                 | 1,800           | 140          | 420            | 31          |                   |
| 75-25-2     | Bromoform                   | ND              | 69           | ND             | 6.7         |                   |
| 100-42-5    | Styrene                     | ND              | 67           | ND             | 16          |                   |
| 95-47-6     | o-Xylene                    | 310             | 69           | 71             | 16          |                   |
| 111-84-2    | n-Nonane                    | 720             | 67           | 140            | 13          |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 69           | ND             | 10          |                   |
| 98-82-8     | Cumene                      | ND              | 67           | ND             | 14          |                   |
| 80-56-8     | alpha-Pinene                | 380             | 140          | 69             | 24          |                   |
| 103-65-1    | n-Propylbenzene             | 73              | 66           | 15             | 13          |                   |
| 622-96-8    | 4-Ethyltoluene              | 100             | 66           | 21             | 13          |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | 120             | 69           | 24             | 14          |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 340             | 67           | 70             | 14          |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 270          | ND             | 53          |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 67           | ND             | 11          |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | 190             | 67           | 31             | 11          |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 66           | ND             | 11          |                   |
| 5989-27-5   | d-Limonene                  | 6,100           | 130          | 1,100          | 23          |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 130          | ND             | 14          |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 140          | ND             | 19          |                   |
| 91-20-3     | Naphthalene                 | ND              | 130          | ND             | 25          |                   |
| 87-68-3     | Hexachlorobutadiene         | ND              | 67           | ND             | 6.3         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Can Dup2 HC7

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P2602374-004

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00677

Date Collected: 7/1/26

Date Received: 7/2/26

Date Analyzed: 7/7/26

Volume(s) Analyzed: 0.010 Liter(s)

Initial Pressure (psig): -0.49 Final Pressure (psig): 3.42

Canister Dilution Factor: 1.28

| CAS #     | Compound                                         | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND              | 67           | ND             | 39          |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND              | 65           | ND             | 13          |                   |
| 74-87-3   | Chloromethane                                    | ND              | 68           | ND             | 33          |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND              | 69           | ND             | 9.9         |                   |
| 75-01-4   | Vinyl Chloride                                   | ND              | 68           | ND             | 27          |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND              | 68           | ND             | 31          |                   |
| 74-83-9   | Bromomethane                                     | ND              | 65           | ND             | 17          |                   |
| 75-00-3   | Chloroethane                                     | ND              | 70           | ND             | 27          |                   |
| 64-17-5   | Ethanol                                          | ND              | 670          | ND             | 360         |                   |
| 75-05-8   | Acetonitrile                                     | ND              | 130          | ND             | 79          |                   |
| 107-02-8  | Acrolein                                         | ND              | 140          | ND             | 61          |                   |
| 67-64-1   | Acetone                                          | ND              | 660          | ND             | 280         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND              | 65           | ND             | 12          |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND              | 520          | ND             | 210         |                   |
| 107-13-1  | Acrylonitrile                                    | ND              | 130          | ND             | 61          |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND              | 58           | ND             | 15          |                   |
| 75-09-2   | Methylene Chloride                               | ND              | 58           | ND             | 17          |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND              | 70           | ND             | 22          |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND              | 59           | ND             | 7.7         |                   |
| 75-15-0   | Carbon Disulfide                                 | 3,700           | 130          | 1,200          | 43          |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND              | 67           | ND             | 17          |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND              | 66           | ND             | 16          |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND              | 68           | ND             | 19          |                   |
| 108-05-4  | Vinyl Acetate                                    | ND              | 680          | ND             | 190         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND              | 130          | ND             | 44          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Can Dup2 HC7

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P2602374-004

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00677

Date Collected: 7/1/26

Date Received: 7/2/26

Date Analyzed: 7/7/26

Volume(s) Analyzed: 0.010 Liter(s)

Initial Pressure (psig): -0.49 Final Pressure (psig): 3.42

Canister Dilution Factor: 1.28

| CAS #      | Compound                  | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND              | 66           | ND             | 17          |                   |
| 141-78-6   | Ethyl Acetate             | ND              | 250          | ND             | 69          |                   |
| 110-54-3   | n-Hexane                  | 1,700           | 67           | 490            | 19          |                   |
| 67-66-3    | Chloroform                | ND              | 68           | ND             | 14          |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND              | 120          | ND             | 41          |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND              | 65           | ND             | 16          |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND              | 66           | ND             | 12          |                   |
| 71-43-2    | Benzene                   | ND              | 130          | ND             | 40          |                   |
| 56-23-5    | Carbon Tetrachloride      | ND              | 65           | ND             | 10          |                   |
| 110-82-7   | Cyclohexane               | ND              | 130          | ND             | 39          |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND              | 68           | ND             | 15          |                   |
| 75-27-4    | Bromodichloromethane      | ND              | 68           | ND             | 10          |                   |
| 79-01-6    | Trichloroethene           | ND              | 67           | ND             | 13          |                   |
| 123-91-1   | 1,4-Dioxane               | ND              | 68           | ND             | 19          |                   |
| 80-62-6    | Methyl Methacrylate       | ND              | 140          | ND             | 33          |                   |
| 142-82-5   | n-Heptane                 | 370             | 67           | 90             | 16          |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND              | 67           | ND             | 15          |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND              | 130          | ND             | 33          |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND              | 63           | ND             | 14          |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND              | 70           | ND             | 13          |                   |
| 108-88-3   | Toluene                   | 540             | 70           | 140            | 19          |                   |
| 591-78-6   | 2-Hexanone                | ND              | 130          | ND             | 33          |                   |
| 124-48-1   | Dibromochloromethane      | ND              | 66           | ND             | 7.7         |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND              | 67           | ND             | 8.7         |                   |
| 123-86-4   | n-Butyl Acetate           | ND              | 130          | ND             | 28          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Can Dup2 HC7

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P2602374-004

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00677

Date Collected: 7/1/26

Date Received: 7/2/26

Date Analyzed: 7/7/26

Volume(s) Analyzed: 0.010 Liter(s)

Initial Pressure (psig): -0.49 Final Pressure (psig): 3.42

Canister Dilution Factor: 1.28

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | 390             | 68           | 84             | 15          |                   |
| 127-18-4    | Tetrachloroethene           | ND              | 68           | ND             | 10          |                   |
| 108-90-7    | Chlorobenzene               | ND              | 68           | ND             | 15          |                   |
| 100-41-4    | Ethylbenzene                | 730             | 70           | 170            | 16          |                   |
| 179601-23-1 | m,p-Xylenes                 | 1,600           | 140          | 370            | 32          |                   |
| 75-25-2     | Bromoform                   | ND              | 70           | ND             | 6.7         |                   |
| 100-42-5    | Styrene                     | ND              | 68           | ND             | 16          |                   |
| 95-47-6     | o-Xylene                    | 270             | 69           | 62             | 16          |                   |
| 111-84-2    | n-Nonane                    | 620             | 67           | 120            | 13          |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 69           | ND             | 10          |                   |
| 98-82-8     | Cumene                      | ND              | 67           | ND             | 14          |                   |
| 80-56-8     | alpha-Pinene                | 360             | 140          | 64             | 25          |                   |
| 103-65-1    | n-Propylbenzene             | 67              | 67           | 14             | 14          |                   |
| 622-96-8    | 4-Ethyltoluene              | 96              | 67           | 19             | 14          |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | 110             | 69           | 22             | 14          |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 330             | 67           | 68             | 14          |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 280          | ND             | 53          |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 68           | ND             | 11          |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | 200             | 67           | 34             | 11          |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 67           | ND             | 11          |                   |
| 5989-27-5   | d-Limonene                  | 6,300           | 130          | 1,100          | 24          |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 140          | ND             | 14          |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 140          | ND             | 19          |                   |
| 91-20-3     | Naphthalene                 | ND              | 130          | ND             | 25          |                   |
| 87-68-3     | Hexachlorobutadiene         | ND              | 67           | ND             | 6.3         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260706-MB

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 7/6/26

Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

| CAS #     | Compound                                         | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND              | 0.53         | ND             | 0.31        |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND              | 0.51         | ND             | 0.10        |                   |
| 74-87-3   | Chloromethane                                    | ND              | 0.53         | ND             | 0.26        |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND              | 0.54         | ND             | 0.077       |                   |
| 75-01-4   | Vinyl Chloride                                   | ND              | 0.53         | ND             | 0.21        |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND              | 0.53         | ND             | 0.24        |                   |
| 74-83-9   | Bromomethane                                     | ND              | 0.51         | ND             | 0.13        |                   |
| 75-00-3   | Chloroethane                                     | ND              | 0.55         | ND             | 0.21        |                   |
| 64-17-5   | Ethanol                                          | ND              | 5.3          | ND             | 2.8         |                   |
| 75-05-8   | Acetonitrile                                     | ND              | 1.0          | ND             | 0.61        |                   |
| 107-02-8  | Acrolein                                         | ND              | 1.1          | ND             | 0.48        |                   |
| 67-64-1   | Acetone                                          | ND              | 5.1          | ND             | 2.2         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND              | 0.51         | ND             | 0.090       |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND              | 4.1          | ND             | 1.7         |                   |
| 107-13-1  | Acrylonitrile                                    | ND              | 1.0          | ND             | 0.48        |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND              | 0.46         | ND             | 0.11        |                   |
| 75-09-2   | Methylene Chloride                               | ND              | 0.46         | ND             | 0.13        |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND              | 0.55         | ND             | 0.17        |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND              | 0.46         | ND             | 0.060       |                   |
| 75-15-0   | Carbon Disulfide                                 | ND              | 1.0          | ND             | 0.33        |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND              | 0.53         | ND             | 0.13        |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND              | 0.52         | ND             | 0.13        |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND              | 0.53         | ND             | 0.15        |                   |
| 108-05-4  | Vinyl Acetate                                    | ND              | 5.3          | ND             | 1.5         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND              | 1.0          | ND             | 0.35        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260706-MB

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 7/6/26

Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

| CAS #      | Compound                  | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND              | 0.52         | ND             | 0.13        |                   |
| 141-78-6   | Ethyl Acetate             | ND              | 2.0          | ND             | 0.54        |                   |
| 110-54-3   | n-Hexane                  | ND              | 0.52         | ND             | 0.15        |                   |
| 67-66-3    | Chloroform                | ND              | 0.53         | ND             | 0.11        |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND              | 0.95         | ND             | 0.32        |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND              | 0.51         | ND             | 0.12        |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND              | 0.52         | ND             | 0.094       |                   |
| 71-43-2    | Benzene                   | ND              | 1.0          | ND             | 0.31        |                   |
| 56-23-5    | Carbon Tetrachloride      | ND              | 0.51         | ND             | 0.081       |                   |
| 110-82-7   | Cyclohexane               | ND              | 1.0          | ND             | 0.30        |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND              | 0.54         | ND             | 0.12        |                   |
| 75-27-4    | Bromodichloromethane      | ND              | 0.54         | ND             | 0.080       |                   |
| 79-01-6    | Trichloroethene           | ND              | 0.53         | ND             | 0.098       |                   |
| 123-91-1   | 1,4-Dioxane               | ND              | 0.53         | ND             | 0.15        |                   |
| 80-62-6    | Methyl Methacrylate       | ND              | 1.1          | ND             | 0.26        |                   |
| 142-82-5   | n-Heptane                 | ND              | 0.52         | ND             | 0.13        |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND              | 0.53         | ND             | 0.12        |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND              | 1.1          | ND             | 0.26        |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND              | 0.50         | ND             | 0.11        |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND              | 0.55         | ND             | 0.10        |                   |
| 108-88-3   | Toluene                   | ND              | 0.55         | ND             | 0.14        |                   |
| 591-78-6   | 2-Hexanone                | ND              | 1.0          | ND             | 0.25        |                   |
| 124-48-1   | Dibromochloromethane      | ND              | 0.52         | ND             | 0.060       |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND              | 0.53         | ND             | 0.068       |                   |
| 123-86-4   | n-Butyl Acetate           | ND              | 1.1          | ND             | 0.22        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260706-MB

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 7/6/26

Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

| CAS #       | Compound                    | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | ND                          | 0.53                     | ND             | 0.11        |                   |
| 127-18-4    | Tetrachloroethene           | ND                          | 0.54                     | ND             | 0.079       |                   |
| 108-90-7    | Chlorobenzene               | ND                          | 0.54                     | ND             | 0.12        |                   |
| 100-41-4    | Ethylbenzene                | ND                          | 0.55                     | ND             | 0.13        |                   |
| 179601-23-1 | m,p-Xylenes                 | ND                          | 1.1                      | ND             | 0.25        |                   |
| 75-25-2     | Bromoform                   | ND                          | 0.55                     | ND             | 0.053       |                   |
| 100-42-5    | Styrene                     | ND                          | 0.53                     | ND             | 0.12        |                   |
| 95-47-6     | o-Xylene                    | ND                          | 0.54                     | ND             | 0.12        |                   |
| 111-84-2    | n-Nonane                    | ND                          | 0.53                     | ND             | 0.10        |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND                          | 0.54                     | ND             | 0.079       |                   |
| 98-82-8     | Cumene                      | ND                          | 0.53                     | ND             | 0.11        |                   |
| 80-56-8     | alpha-Pinene                | ND                          | 1.1                      | ND             | 0.19        |                   |
| 103-65-1    | n-Propylbenzene             | ND                          | 0.52                     | ND             | 0.11        |                   |
| 622-96-8    | 4-Ethyltoluene              | ND                          | 0.52                     | ND             | 0.11        |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND                          | 0.54                     | ND             | 0.11        |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | ND                          | 0.53                     | ND             | 0.11        |                   |
| 100-44-7    | Benzyl Chloride             | ND                          | 2.2                      | ND             | 0.42        |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND                          | 0.53                     | ND             | 0.088       |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | ND                          | 0.53                     | ND             | 0.087       |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND                          | 0.52                     | ND             | 0.087       |                   |
| 5989-27-5   | d-Limonene                  | ND                          | 1.0                      | ND             | 0.18        |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND                          | 1.1                      | ND             | 0.11        |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND                          | 1.1                      | ND             | 0.15        |                   |
| 91-20-3     | Naphthalene                 | ND                          | 1.0                      | ND             | 0.19        |                   |
| 87-68-3     | Hexachlorobutadiene         | ND                          | 0.53                     | ND             | 0.049       |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260707-MB

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 7/7/26

Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

| CAS #     | Compound                                         | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND              | 0.53         | ND             | 0.31        |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND              | 0.51         | ND             | 0.10        |                   |
| 74-87-3   | Chloromethane                                    | ND              | 0.53         | ND             | 0.26        |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND              | 0.54         | ND             | 0.077       |                   |
| 75-01-4   | Vinyl Chloride                                   | ND              | 0.53         | ND             | 0.21        |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND              | 0.53         | ND             | 0.24        |                   |
| 74-83-9   | Bromomethane                                     | ND              | 0.51         | ND             | 0.13        |                   |
| 75-00-3   | Chloroethane                                     | ND              | 0.55         | ND             | 0.21        |                   |
| 64-17-5   | Ethanol                                          | ND              | 5.3          | ND             | 2.8         |                   |
| 75-05-8   | Acetonitrile                                     | ND              | 1.0          | ND             | 0.61        |                   |
| 107-02-8  | Acrolein                                         | ND              | 1.1          | ND             | 0.48        |                   |
| 67-64-1   | Acetone                                          | ND              | 5.1          | ND             | 2.2         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND              | 0.51         | ND             | 0.090       |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND              | 4.1          | ND             | 1.7         |                   |
| 107-13-1  | Acrylonitrile                                    | ND              | 1.0          | ND             | 0.48        |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND              | 0.46         | ND             | 0.11        |                   |
| 75-09-2   | Methylene Chloride                               | ND              | 0.46         | ND             | 0.13        |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND              | 0.55         | ND             | 0.17        |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND              | 0.46         | ND             | 0.060       |                   |
| 75-15-0   | Carbon Disulfide                                 | ND              | 1.0          | ND             | 0.33        |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND              | 0.53         | ND             | 0.13        |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND              | 0.52         | ND             | 0.13        |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND              | 0.53         | ND             | 0.15        |                   |
| 108-05-4  | Vinyl Acetate                                    | ND              | 5.3          | ND             | 1.5         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND              | 1.0          | ND             | 0.35        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260707-MB

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 7/7/26

Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

| CAS #      | Compound                  | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND              | 0.52         | ND             | 0.13        |                   |
| 141-78-6   | Ethyl Acetate             | ND              | 2.0          | ND             | 0.54        |                   |
| 110-54-3   | n-Hexane                  | ND              | 0.52         | ND             | 0.15        |                   |
| 67-66-3    | Chloroform                | ND              | 0.53         | ND             | 0.11        |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND              | 0.95         | ND             | 0.32        |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND              | 0.51         | ND             | 0.12        |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND              | 0.52         | ND             | 0.094       |                   |
| 71-43-2    | Benzene                   | ND              | 1.0          | ND             | 0.31        |                   |
| 56-23-5    | Carbon Tetrachloride      | ND              | 0.51         | ND             | 0.081       |                   |
| 110-82-7   | Cyclohexane               | ND              | 1.0          | ND             | 0.30        |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND              | 0.54         | ND             | 0.12        |                   |
| 75-27-4    | Bromodichloromethane      | ND              | 0.54         | ND             | 0.080       |                   |
| 79-01-6    | Trichloroethene           | ND              | 0.53         | ND             | 0.098       |                   |
| 123-91-1   | 1,4-Dioxane               | ND              | 0.53         | ND             | 0.15        |                   |
| 80-62-6    | Methyl Methacrylate       | ND              | 1.1          | ND             | 0.26        |                   |
| 142-82-5   | n-Heptane                 | ND              | 0.52         | ND             | 0.13        |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND              | 0.53         | ND             | 0.12        |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND              | 1.1          | ND             | 0.26        |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND              | 0.50         | ND             | 0.11        |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND              | 0.55         | ND             | 0.10        |                   |
| 108-88-3   | Toluene                   | ND              | 0.55         | ND             | 0.14        |                   |
| 591-78-6   | 2-Hexanone                | ND              | 1.0          | ND             | 0.25        |                   |
| 124-48-1   | Dibromochloromethane      | ND              | 0.52         | ND             | 0.060       |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND              | 0.53         | ND             | 0.068       |                   |
| 123-86-4   | n-Butyl Acetate           | ND              | 1.1          | ND             | 0.22        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260707-MB

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 7/7/26

Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | ND              | 0.53         | ND             | 0.11        |                   |
| 127-18-4    | Tetrachloroethene           | ND              | 0.54         | ND             | 0.079       |                   |
| 108-90-7    | Chlorobenzene               | ND              | 0.54         | ND             | 0.12        |                   |
| 100-41-4    | Ethylbenzene                | ND              | 0.55         | ND             | 0.13        |                   |
| 179601-23-1 | m,p-Xylenes                 | ND              | 1.1          | ND             | 0.25        |                   |
| 75-25-2     | Bromoform                   | ND              | 0.55         | ND             | 0.053       |                   |
| 100-42-5    | Styrene                     | ND              | 0.53         | ND             | 0.12        |                   |
| 95-47-6     | o-Xylene                    | ND              | 0.54         | ND             | 0.12        |                   |
| 111-84-2    | n-Nonane                    | ND              | 0.53         | ND             | 0.10        |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 0.54         | ND             | 0.079       |                   |
| 98-82-8     | Cumene                      | ND              | 0.53         | ND             | 0.11        |                   |
| 80-56-8     | alpha-Pinene                | ND              | 1.1          | ND             | 0.19        |                   |
| 103-65-1    | n-Propylbenzene             | ND              | 0.52         | ND             | 0.11        |                   |
| 622-96-8    | 4-Ethyltoluene              | ND              | 0.52         | ND             | 0.11        |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND              | 0.54         | ND             | 0.11        |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | ND              | 0.53         | ND             | 0.11        |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 2.2          | ND             | 0.42        |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 0.53         | ND             | 0.088       |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | ND              | 0.53         | ND             | 0.087       |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 0.52         | ND             | 0.087       |                   |
| 5989-27-5   | d-Limonene                  | ND              | 1.0          | ND             | 0.18        |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 1.1          | ND             | 0.11        |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 1.1          | ND             | 0.15        |                   |
| 91-20-3     | Naphthalene                 | ND              | 1.0          | ND             | 0.19        |                   |
| 87-68-3     | Hexachlorobutadiene         | ND              | 0.53         | ND             | 0.049       |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## SURROGATE SPIKE RECOVERY RESULTS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister(s)

Test Notes:

Date(s) Collected: 7/1/26

Date(s) Received: 7/2/26

Date(s) Analyzed: 7/6 - 7/7/26

| Client Sample ID             | ALS Sample ID | 1,2-Dichloroethane-d4 | Toluene-d8        | Bromofluorobenzene | Acceptance Limits | Data Qualifier |
|------------------------------|---------------|-----------------------|-------------------|--------------------|-------------------|----------------|
|                              |               | Percent Recovered     | Percent Recovered | Percent Recovered  |                   |                |
| Method Blank                 | P260706-MB    | 105                   | 94                | 106                | 70-130            |                |
| Method Blank                 | P260707-MB    | 106                   | 98                | 91                 | 70-130            |                |
| Lab Control Sample           | P260706-LCS   | 105                   | 93                | 105                | 70-130            |                |
| Lab Control Sample           | P260707-LCS   | 104                   | 96                | 92                 | 70-130            |                |
| Duplicate Lab Control Sample | P260706-DLCS  | 102                   | 95                | 104                | 70-130            |                |
| Duplicate Lab Control Sample | P260707-DLCS  | 105                   | 98                | 93                 | 70-130            |                |
| Can Dup1 HC7                 | P2602374-003  | 102                   | 98                | 99                 | 70-130            |                |
| Can Dup2 HC7                 | P2602374-004  | 104                   | 94                | 91                 | 70-130            |                |

Surrogate percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.



# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260706-DLCS

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

**Analyst:** Topacio Zavala

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 7/6/26

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #     | Compound                                         | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|--------------------------------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|           |                                                  | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 115-07-1  | Propene                                          | 212                 | 210          | 206           | 99         | 97   | 50-133               | 2   | 25  |      |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | 204                 | 202          | 198           | 99         | 97   | 66-122               | 2   | 25  |      |
| 74-87-3   | Chloromethane                                    | 210                 | 236          | 231           | 112        | 110  | 56-131               | 2   | 25  |      |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | 214                 | 234          | 232           | 109        | 108  | 63-120               | 0.9 | 25  |      |
| 75-01-4   | Vinyl Chloride                                   | 210                 | 226          | 221           | 108        | 105  | 57-129               | 3   | 25  |      |
| 106-99-0  | 1,3-Butadiene                                    | 212                 | 257          | 251           | 121        | 118  | 62-132               | 3   | 25  |      |
| 74-83-9   | Bromomethane                                     | 210                 | 244          | 236           | 116        | 112  | 72-120               | 4   | 25  |      |
| 75-00-3   | Chloroethane                                     | 210                 | 221          | 212           | 105        | 101  | 67-123               | 4   | 25  |      |
| 64-17-5   | Ethanol                                          | 1,050               | 1190         | 1150          | 113        | 110  | 52-120               | 3   | 25  |      |
| 75-05-8   | Acetonitrile                                     | 214                 | 225          | 220           | 105        | 103  | 50-114               | 2   | 25  |      |
| 107-02-8  | Acrolein                                         | 424                 | 488          | 472           | 115        | 111  | 63-125               | 4   | 25  |      |
| 67-64-1   | Acetone                                          | 1,050               | 1060         | 1030          | 101        | 98   | 61-120               | 3   | 25  |      |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | 208                 | 223          | 212           | 107        | 102  | 65-122               | 5   | 25  |      |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | 414                 | 510          | 498           | 123        | 120  | 59-132               | 2   | 25  |      |
| 107-13-1  | Acrylonitrile                                    | 420                 | 491          | 479           | 117        | 114  | 60-128               | 3   | 25  |      |
| 75-35-4   | 1,1-Dichloroethene                               | 210                 | 237          | 228           | 113        | 109  | 75-120               | 4   | 25  |      |
| 75-09-2   | Methylene Chloride                               | 206                 | 220          | 212           | 107        | 103  | 71-123               | 4   | 25  |      |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | 214                 | 221          | 215           | 103        | 100  | 50-118               | 3   | 25  |      |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | 212                 | 229          | 220           | 108        | 104  | 65-121               | 4   | 25  |      |
| 75-15-0   | Carbon Disulfide                                 | 430                 | 461          | 442           | 107        | 103  | 69-115               | 4   | 25  |      |
| 156-60-5  | trans-1,2-Dichloroethene                         | 218                 | 245          | 236           | 112        | 108  | 67-123               | 4   | 25  |      |
| 75-34-3   | 1,1-Dichloroethane                               | 218                 | 234          | 228           | 107        | 105  | 66-120               | 2   | 25  |      |
| 1634-04-4 | Methyl tert-Butyl Ether                          | 216                 | 248          | 241           | 115        | 112  | 65-124               | 3   | 25  |      |
| 108-05-4  | Vinyl Acetate                                    | 1,090               | 1290         | 1250          | 118        | 115  | 76-147               | 3   | 25  |      |
| 78-93-3   | 2-Butanone (MEK)                                 | 412                 | 483          | 468           | 117        | 114  | 70-125               | 3   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260706-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 7/6/26

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #      | Compound                  | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|------------|---------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|            |                           | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 156-59-2   | cis-1,2-Dichloroethene    | 214                 | 241          | 233           | 113        | 109  | 64-120               | 4   | 25  |      |
| 141-78-6   | Ethyl Acetate             | 398                 | 454          | 440           | 114        | 111  | 56-120               | 3   | 25  |      |
| 110-54-3   | n-Hexane                  | 212                 | 235          | 228           | 111        | 108  | 60-125               | 3   | 25  |      |
| 67-66-3    | Chloroform                | 216                 | 240          | 232           | 111        | 107  | 64-121               | 4   | 25  |      |
| 109-99-9   | Tetrahydrofuran (THF)     | 404                 | 463          | 446           | 115        | 110  | 67-117               | 4   | 25  |      |
| 107-06-2   | 1,2-Dichloroethane        | 204                 | 232          | 225           | 114        | 110  | 64-138               | 4   | 25  |      |
| 71-55-6    | 1,1,1-Trichloroethane     | 210                 | 231          | 227           | 110        | 108  | 67-125               | 2   | 25  |      |
| 71-43-2    | Benzene                   | 206                 | 211          | 209           | 102        | 101  | 73-128               | 1   | 25  |      |
| 56-23-5    | Carbon Tetrachloride      | 210                 | 234          | 229           | 111        | 109  | 71-134               | 2   | 25  |      |
| 110-82-7   | Cyclohexane               | 428                 | 463          | 456           | 108        | 107  | 71-118               | 0.9 | 25  |      |
| 78-87-5    | 1,2-Dichloropropane       | 214                 | 230          | 230           | 107        | 107  | 68-121               | 0   | 25  |      |
| 75-27-4    | Bromodichloromethane      | 218                 | 255          | 252           | 117        | 116  | 70-125               | 0.9 | 25  |      |
| 79-01-6    | Trichloroethene           | 214                 | 234          | 231           | 109        | 108  | 68-124               | 0.9 | 25  |      |
| 123-91-1   | 1,4-Dioxane               | 216                 | 265          | 261           | 123        | 121  | 76-127               | 2   | 25  |      |
| 80-62-6    | Methyl Methacrylate       | 428                 | 508          | 499           | 119        | 117  | 77-118               | 2   | 25  | L    |
| 142-82-5   | n-Heptane                 | 214                 | 229          | 229           | 107        | 107  | 72-121               | 0   | 25  |      |
| 10061-01-5 | cis-1,3-Dichloropropene   | 212                 | 251          | 247           | 118        | 117  | 87-137               | 0.9 | 25  |      |
| 108-10-1   | 4-Methyl-2-pentanone      | 426                 | 519          | 511           | 122        | 120  | 67-137               | 2   | 25  |      |
| 10061-02-6 | trans-1,3-Dichloropropene | 196                 | 252          | 247           | 129        | 126  | 73-127               | 2   | 25  | L    |
| 79-00-5    | 1,1,2-Trichloroethane     | 218                 | 243          | 238           | 111        | 109  | 71-119               | 2   | 25  |      |
| 108-88-3   | Toluene                   | 216                 | 226          | 227           | 105        | 105  | 64-121               | 0   | 25  |      |
| 591-78-6   | 2-Hexanone                | 424                 | 523          | 532           | 123        | 125  | 70-136               | 2   | 25  |      |
| 124-48-1   | Dibromochloromethane      | 214                 | 242          | 244           | 113        | 114  | 67-128               | 0.9 | 25  |      |
| 106-93-4   | 1,2-Dibromoethane         | 206                 | 236          | 238           | 115        | 116  | 69-129               | 0.9 | 25  |      |
| 123-86-4   | n-Butyl Acetate           | 424                 | 526          | 533           | 124        | 126  | 70-135               | 2   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

L = Laboratory control sample recovery outside the specified limits, results may be biased high.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260706-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 7/6/26

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #       | Compound                    | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-------------|-----------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|             |                             | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 111-65-9    | n-Octane                    | 214                 | 235          | 240           | 110        | 112  | 66-124               | 2   | 25  |      |
| 127-18-4    | Tetrachloroethene           | 214                 | 225          | 226           | 105        | 106  | 55-132               | 0.9 | 25  |      |
| 108-90-7    | Chlorobenzene               | 216                 | 221          | 220           | 102        | 102  | 63-124               | 0   | 25  |      |
| 100-41-4    | Ethylbenzene                | 220                 | 239          | 241           | 109        | 110  | 64-119               | 0.9 | 25  |      |
| 179601-23-1 | m,p-Xylenes                 | 432                 | 471          | 472           | 109        | 109  | 64-121               | 0   | 25  |      |
| 75-25-2     | Bromoform                   | 218                 | 273          | 273           | 125        | 125  | 63-132               | 0   | 25  |      |
| 100-42-5    | Styrene                     | 214                 | 241          | 242           | 113        | 113  | 71-125               | 0   | 25  |      |
| 95-47-6     | o-Xylene                    | 216                 | 234          | 235           | 108        | 109  | 66-122               | 0.9 | 25  |      |
| 111-84-2    | n-Nonane                    | 216                 | 241          | 243           | 112        | 113  | 65-129               | 0.9 | 25  |      |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | 218                 | 237          | 237           | 109        | 109  | 71-128               | 0   | 25  |      |
| 98-82-8     | Cumene                      | 214                 | 230          | 232           | 107        | 108  | 66-126               | 0.9 | 25  |      |
| 80-56-8     | alpha-Pinene                | 218                 | 239          | 242           | 110        | 111  | 65-129               | 0.9 | 25  |      |
| 103-65-1    | n-Propylbenzene             | 214                 | 234          | 236           | 109        | 110  | 67-126               | 0.9 | 25  |      |
| 622-96-8    | 4-Ethyltoluene              | 218                 | 243          | 244           | 111        | 112  | 67-128               | 0.9 | 25  |      |
| 108-67-8    | 1,3,5-Trimethylbenzene      | 216                 | 238          | 240           | 110        | 111  | 66-125               | 0.9 | 25  |      |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 214                 | 232          | 235           | 108        | 110  | 67-130               | 2   | 25  |      |
| 100-44-7    | Benzyl Chloride             | 428                 | 553          | 559           | 129        | 131  | 58-151               | 2   | 25  |      |
| 541-73-1    | 1,3-Dichlorobenzene         | 214                 | 229          | 231           | 107        | 108  | 57-135               | 0.9 | 25  |      |
| 106-46-7    | 1,4-Dichlorobenzene         | 216                 | 223          | 225           | 103        | 104  | 56-129               | 1   | 25  |      |
| 95-50-1     | 1,2-Dichlorobenzene         | 214                 | 228          | 229           | 107        | 107  | 57-138               | 0   | 25  |      |
| 5989-27-5   | d-Limonene                  | 210                 | 250          | 254           | 119        | 121  | 70-129               | 2   | 25  |      |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | 428                 | 514          | 512           | 120        | 120  | 63-138               | 0   | 25  |      |
| 120-82-1    | 1,2,4-Trichlorobenzene      | 438                 | 508          | 512           | 116        | 117  | 50-137               | 0.9 | 25  |      |
| 91-20-3     | Naphthalene                 | 216                 | 257          | 260           | 119        | 120  | 50-157               | 0.8 | 25  |      |
| 87-68-3     | Hexachlorobutadiene         | 214                 | 246          | 249           | 115        | 116  | 50-133               | 0.9 | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260707-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 7/7/26

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #     | Compound                                         | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|--------------------------------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|           |                                                  | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 115-07-1  | Propene                                          | 212                 | 168          | 174           | 79         | 82   | 50-133               | 4   | 25  |      |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | 204                 | 160          | 162           | 78         | 79   | 66-122               | 1   | 25  |      |
| 74-87-3   | Chloromethane                                    | 210                 | 199          | 198           | 95         | 94   | 56-131               | 1   | 25  |      |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | 214                 | 178          | 180           | 83         | 84   | 63-120               | 1   | 25  |      |
| 75-01-4   | Vinyl Chloride                                   | 210                 | 184          | 184           | 88         | 88   | 57-129               | 0   | 25  |      |
| 106-99-0  | 1,3-Butadiene                                    | 212                 | 207          | 206           | 98         | 97   | 62-132               | 1   | 25  |      |
| 74-83-9   | Bromomethane                                     | 210                 | 196          | 192           | 93         | 91   | 72-120               | 2   | 25  |      |
| 75-00-3   | Chloroethane                                     | 210                 | 184          | 181           | 88         | 86   | 67-123               | 2   | 25  |      |
| 64-17-5   | Ethanol                                          | 1,050               | 997          | 999           | 95         | 95   | 52-120               | 0   | 25  |      |
| 75-05-8   | Acetonitrile                                     | 214                 | 188          | 193           | 88         | 90   | 50-114               | 2   | 25  |      |
| 107-02-8  | Acrolein                                         | 424                 | 408          | 405           | 96         | 96   | 63-125               | 0   | 25  |      |
| 67-64-1   | Acetone                                          | 1,050               | 879          | 876           | 84         | 83   | 61-120               | 1   | 25  |      |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | 208                 | 177          | 174           | 85         | 84   | 65-122               | 1   | 25  |      |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | 414                 | 425          | 425           | 103        | 103  | 59-132               | 0   | 25  |      |
| 107-13-1  | Acrylonitrile                                    | 420                 | 411          | 407           | 98         | 97   | 60-128               | 1   | 25  |      |
| 75-35-4   | 1,1-Dichloroethene                               | 210                 | 192          | 189           | 91         | 90   | 75-120               | 1   | 25  |      |
| 75-09-2   | Methylene Chloride                               | 206                 | 180          | 179           | 87         | 87   | 71-123               | 0   | 25  |      |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | 214                 | 183          | 182           | 86         | 85   | 50-118               | 1   | 25  |      |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | 212                 | 180          | 179           | 85         | 84   | 65-121               | 1   | 25  |      |
| 75-15-0   | Carbon Disulfide                                 | 430                 | 376          | 369           | 87         | 86   | 69-115               | 1   | 25  |      |
| 156-60-5  | trans-1,2-Dichloroethene                         | 218                 | 203          | 201           | 93         | 92   | 67-123               | 1   | 25  |      |
| 75-34-3   | 1,1-Dichloroethane                               | 218                 | 194          | 192           | 89         | 88   | 66-120               | 1   | 25  |      |
| 1634-04-4 | Methyl tert-Butyl Ether                          | 216                 | 202          | 200           | 94         | 93   | 65-124               | 1   | 25  |      |
| 108-05-4  | Vinyl Acetate                                    | 1,090               | 1060         | 1030          | 97         | 94   | 76-147               | 3   | 25  |      |
| 78-93-3   | 2-Butanone (MEK)                                 | 412                 | 399          | 396           | 97         | 96   | 70-125               | 1   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260707-DLCS

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

**Analyst:** Topacio Zavala

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 7/7/26

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #      | Compound                  | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|------------|---------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|            |                           | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 156-59-2   | cis-1,2-Dichloroethene    | 214                 | 200          | 197           | 93         | 92   | 64-120               | 1   | 25  |      |
| 141-78-6   | Ethyl Acetate             | 398                 | 375          | 375           | 94         | 94   | 56-120               | 0   | 25  |      |
| 110-54-3   | n-Hexane                  | 212                 | 194          | 195           | 92         | 92   | 60-125               | 0   | 25  |      |
| 67-66-3    | Chloroform                | 216                 | 195          | 193           | 90         | 89   | 64-121               | 1   | 25  |      |
| 109-99-9   | Tetrahydrofuran (THF)     | 404                 | 378          | 374           | 94         | 93   | 67-117               | 1   | 25  |      |
| 107-06-2   | 1,2-Dichloroethane        | 204                 | 190          | 187           | 93         | 92   | 64-138               | 1   | 25  |      |
| 71-55-6    | 1,1,1-Trichloroethane     | 210                 | 186          | 182           | 89         | 87   | 67-125               | 2   | 25  |      |
| 71-43-2    | Benzene                   | 206                 | 175          | 172           | 85         | 83   | 73-128               | 2   | 25  |      |
| 56-23-5    | Carbon Tetrachloride      | 210                 | 187          | 183           | 89         | 87   | 71-134               | 2   | 25  |      |
| 110-82-7   | Cyclohexane               | 428                 | 383          | 376           | 89         | 88   | 71-118               | 1   | 25  |      |
| 78-87-5    | 1,2-Dichloropropane       | 214                 | 194          | 192           | 91         | 90   | 68-121               | 1   | 25  |      |
| 75-27-4    | Bromodichloromethane      | 218                 | 210          | 205           | 96         | 94   | 70-125               | 2   | 25  |      |
| 79-01-6    | Trichloroethene           | 214                 | 189          | 186           | 88         | 87   | 68-124               | 1   | 25  |      |
| 123-91-1   | 1,4-Dioxane               | 216                 | 219          | 213           | 101        | 99   | 76-127               | 2   | 25  |      |
| 80-62-6    | Methyl Methacrylate       | 428                 | 412          | 402           | 96         | 94   | 77-118               | 2   | 25  |      |
| 142-82-5   | n-Heptane                 | 214                 | 192          | 190           | 90         | 89   | 72-121               | 1   | 25  |      |
| 10061-01-5 | cis-1,3-Dichloropropene   | 212                 | 206          | 203           | 97         | 96   | 87-137               | 1   | 25  |      |
| 108-10-1   | 4-Methyl-2-pentanone      | 426                 | 430          | 425           | 101        | 100  | 67-137               | 1   | 25  |      |
| 10061-02-6 | trans-1,3-Dichloropropene | 196                 | 206          | 203           | 105        | 104  | 73-127               | 1   | 25  |      |
| 79-00-5    | 1,1,2-Trichloroethane     | 218                 | 196          | 194           | 90         | 89   | 71-119               | 1   | 25  |      |
| 108-88-3   | Toluene                   | 216                 | 185          | 184           | 86         | 85   | 64-121               | 1   | 25  |      |
| 591-78-6   | 2-Hexanone                | 424                 | 440          | 441           | 104        | 104  | 70-136               | 0   | 25  |      |
| 124-48-1   | Dibromochloromethane      | 214                 | 194          | 195           | 91         | 91   | 67-128               | 0   | 25  |      |
| 106-93-4   | 1,2-Dibromoethane         | 206                 | 193          | 193           | 94         | 94   | 69-129               | 0   | 25  |      |
| 123-86-4   | n-Butyl Acetate           | 424                 | 443          | 444           | 104        | 105  | 70-135               | 1   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements P1 / 41077-13G, Task 800

ALS Project ID: P2602374

ALS Sample ID: P260707-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 7/7/26

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #       | Compound                    | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-------------|-----------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|             |                             | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 111-65-9    | n-Octane                    | 214                 | 200          | 199           | 93         | 93   | 66-124               | 0   | 25  |      |
| 127-18-4    | Tetrachloroethene           | 214                 | 179          | 178           | 84         | 83   | 55-132               | 1   | 25  |      |
| 108-90-7    | Chlorobenzene               | 216                 | 177          | 177           | 82         | 82   | 63-124               | 0   | 25  |      |
| 100-41-4    | Ethylbenzene                | 220                 | 194          | 193           | 88         | 88   | 64-119               | 0   | 25  |      |
| 179601-23-1 | m,p-Xylenes                 | 432                 | 382          | 381           | 88         | 88   | 64-121               | 0   | 25  |      |
| 75-25-2     | Bromoform                   | 218                 | 216          | 215           | 99         | 99   | 63-132               | 0   | 25  |      |
| 100-42-5    | Styrene                     | 214                 | 194          | 195           | 91         | 91   | 71-125               | 0   | 25  |      |
| 95-47-6     | o-Xylene                    | 216                 | 191          | 190           | 88         | 88   | 66-122               | 0   | 25  |      |
| 111-84-2    | n-Nonane                    | 216                 | 204          | 205           | 94         | 95   | 65-129               | 1   | 25  |      |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | 218                 | 196          | 196           | 90         | 90   | 71-128               | 0   | 25  |      |
| 98-82-8     | Cumene                      | 214                 | 187          | 185           | 87         | 86   | 66-126               | 1   | 25  |      |
| 80-56-8     | alpha-Pinene                | 218                 | 194          | 194           | 89         | 89   | 65-129               | 0   | 25  |      |
| 103-65-1    | n-Propylbenzene             | 214                 | 192          | 190           | 90         | 89   | 67-126               | 1   | 25  |      |
| 622-96-8    | 4-Ethyltoluene              | 218                 | 196          | 196           | 90         | 90   | 67-128               | 0   | 25  |      |
| 108-67-8    | 1,3,5-Trimethylbenzene      | 216                 | 193          | 192           | 89         | 89   | 66-125               | 0   | 25  |      |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 214                 | 188          | 186           | 88         | 87   | 67-130               | 1   | 25  |      |
| 100-44-7    | Benzyl Chloride             | 428                 | 443          | 443           | 104        | 104  | 58-151               | 0   | 25  |      |
| 541-73-1    | 1,3-Dichlorobenzene         | 214                 | 181          | 179           | 85         | 84   | 57-135               | 1   | 25  |      |
| 106-46-7    | 1,4-Dichlorobenzene         | 216                 | 178          | 177           | 82         | 82   | 56-129               | 0   | 25  |      |
| 95-50-1     | 1,2-Dichlorobenzene         | 214                 | 181          | 181           | 85         | 85   | 57-138               | 0   | 25  |      |
| 5989-27-5   | d-Limonene                  | 210                 | 207          | 208           | 99         | 99   | 70-129               | 0   | 25  |      |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | 428                 | 406          | 406           | 95         | 95   | 63-138               | 0   | 25  |      |
| 120-82-1    | 1,2,4-Trichlorobenzene      | 438                 | 397          | 394           | 91         | 90   | 50-137               | 1   | 25  |      |
| 91-20-3     | Naphthalene                 | 216                 | 202          | 201           | 94         | 93   | 50-157               | 1   | 25  |      |
| 87-68-3     | Hexachlorobutadiene         | 214                 | 191          | 189           | 89         | 88   | 50-133               | 1   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

Hazen



# **Howard F. Curren AWTP Renewable Natural Gas Life Cycle Cost Assessment - FINAL**

March 14, 2025

## Outline

- I. Biogas Summary
- II. Renewable Natural Gas (RNG) Overview
- III. Funding Opportunities
- IV. Financial Analysis
  - Cost Estimate
  - Revenue – Market Risks
  - O&M Breakdown
  - Lifecycle NPV
  - Sensitivity Analysis
- V. Public-Private-Partnership (P3)
- VI. Conclusions and Next Steps

*Goal – Understand the overall  
RNG project value and  
Investment Tax Credit Impacts*



# Biogas Summary

## DG Production / Projection

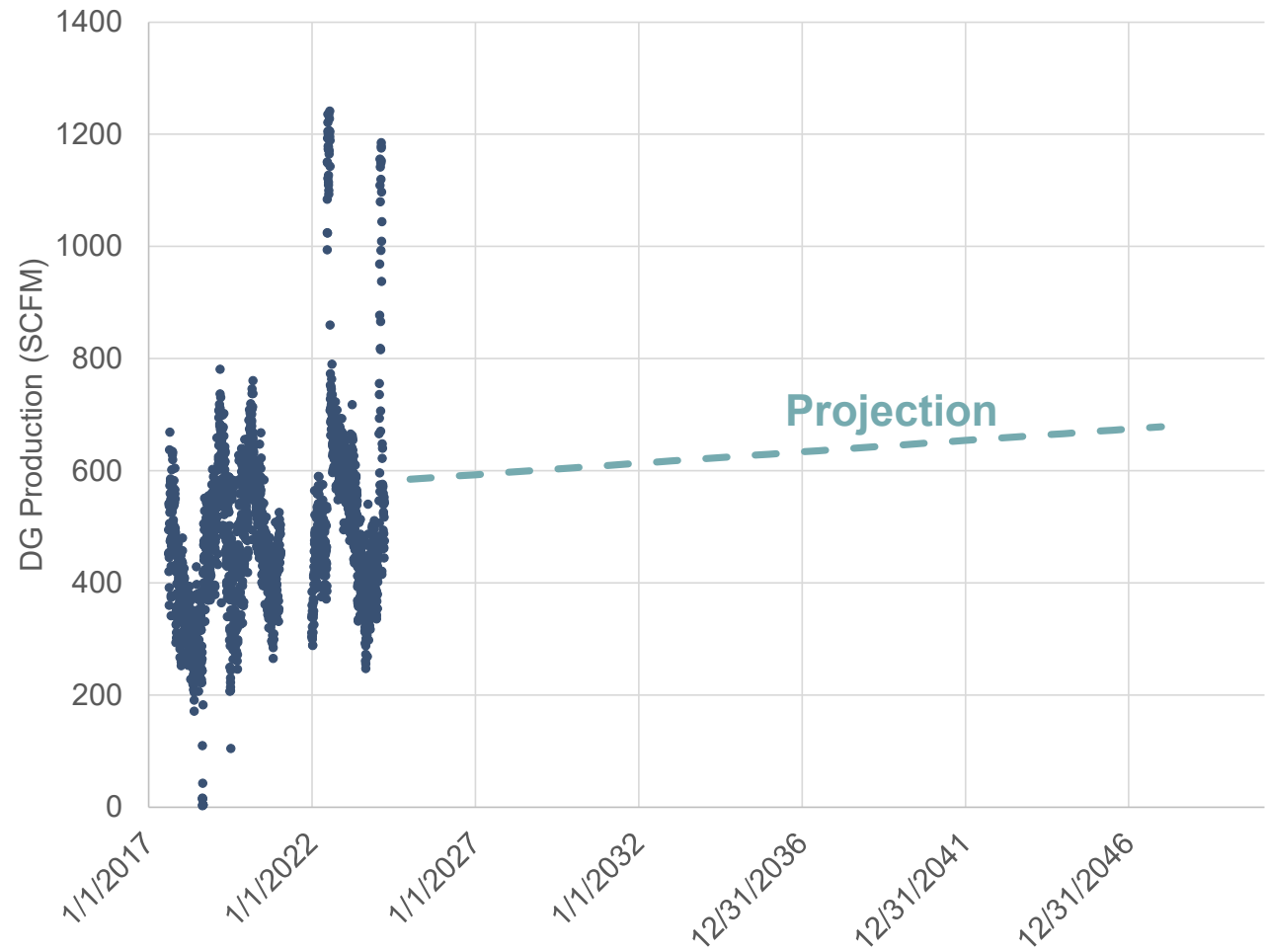
Average Measured: 486 SCFM

Modeled: 581-805 SCFM

Project horizon: 2028-2048

Average DG production of  
Digester 6: 143 SCFM

(equating to 572 SCFM for four  
digesters)



Note: Daily averages shown

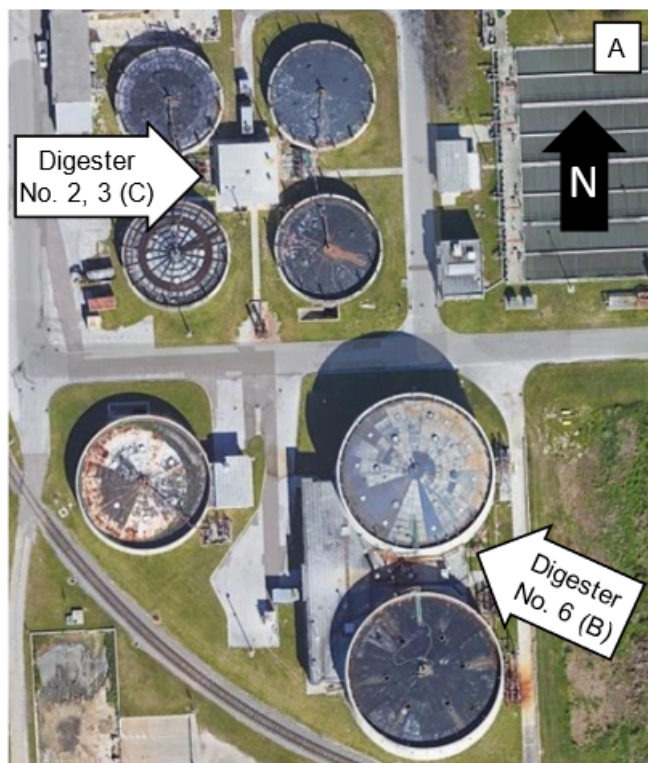
## DG Quality

| Component                           | Units               | Value 1      | Value 2      | Value 3        | Value 4      | Basis        |
|-------------------------------------|---------------------|--------------|--------------|----------------|--------------|--------------|
| Methane                             | % by Vol            | 54.7         | 55.7         | 60.9           | 41.2*        | 60           |
| Carbon dioxide                      | % by Vol            | 35.6         | 35.3         | 37.9           | 25           | 38           |
| Nitrogen                            | % by Vol            | 7.6*         | 6.1*         | 0.6            | 25.6*        | 1            |
| Oxygen                              | % by Vol            | 2.0*         | 1.6*         | 0.1            | 7.2*         | 0.4          |
| Argon                               | % by Vol            | 0.09         | 0.07         | 0.01           | ND           | ND           |
| Hydrogen                            | % by Vol            | ND           | ND           | ND             | ND           | ND           |
| (CH <sub>2</sub> ) <sub>n</sub>     | % by Vol            | ND           | 0.01         | 0.01           | ND           | ND           |
| Hydrogen sulfide (H <sub>2</sub> S) | ppmv                | <b>9,600</b> | <b>9,300</b> | <b>20,000*</b> | <b>9,600</b> | <b>9,500</b> |
| VOCs                                | µg/m <sup>3</sup>   | 7,009        | 10,485       | 4,690          | ND*          | 7,000        |
| Methyl Mercaptan                    | ppbV                | 5,200        | 14,000       | 39,000         | 26,000       | 21,000       |
| Dimethyl Sulfide                    | ppbV                | ND           | 3,700        | 4,900          | 7,300        | 5,000        |
| Carbon Disulfide                    | ppbV                | 370          | 690          | 1400           | ND           | 1,000        |
| HHV                                 | BTU/ft <sup>3</sup> | 562          | 572          | 626            | 381*         | 600          |
| Total Siloxanes                     | ppmv                | 1.04         | 0.87         | 1.09           | 1.01         | 1            |

Note: Samples collected during period from 2/4/2022 to 3/18/2022

\* Air intrusion affected these samples so these outliers were not included in the Basis

## Gas Sampling Locations



← Sample location at Digester No. 6



← Sample location at common manifold for Digester No. 2 and No. 3

# **Renewable Natural Gas (RNG)**

## **Overview**



## Biogas Testing and Pretreatment System Evaluation Summary Report

### Summary Report

*City Project No. 20-C-00001*

*Reliable Tampa Partner Project No. 22-500*

*Hazen and Sawyer Project No. 41077-13B Task 306*

March 2023

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## Executive Summary

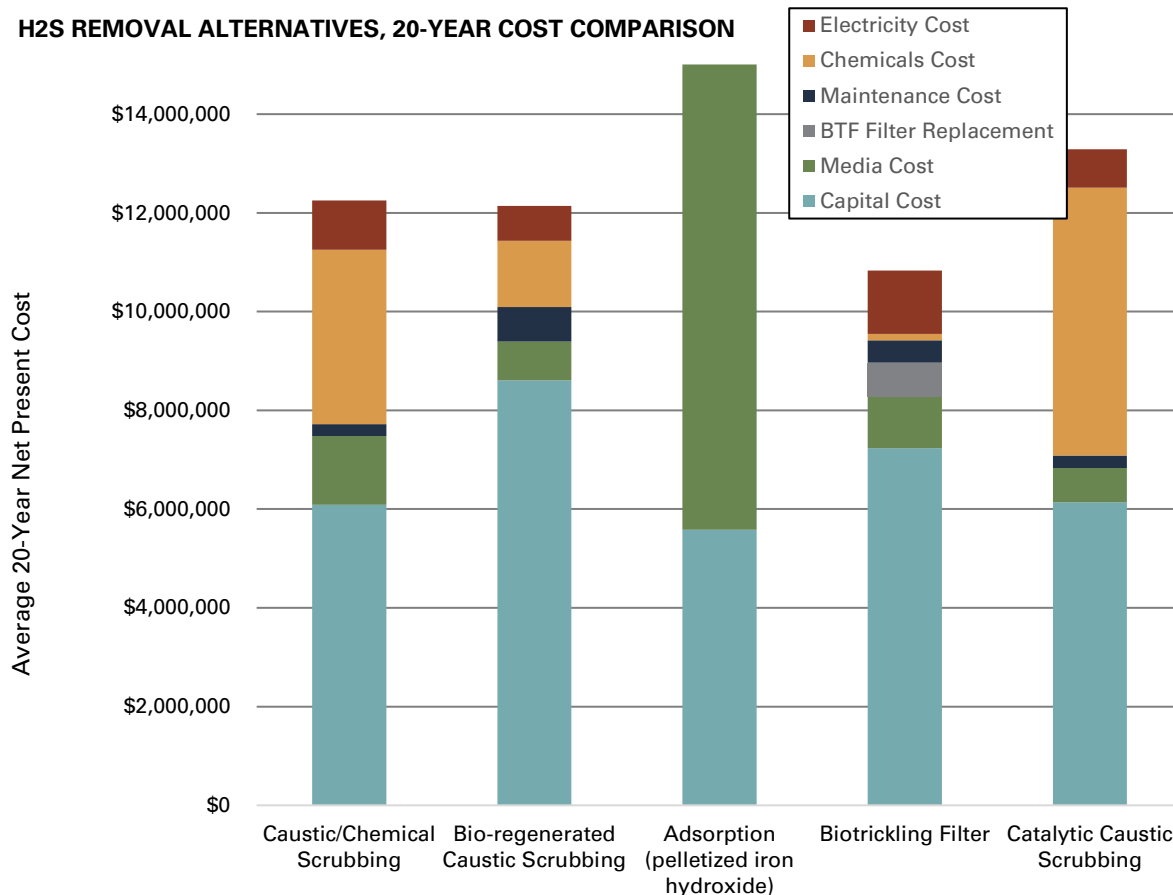
As a part of City of Tampa's Howard F. Curren Advanced Wastewater Treatment Plant (HFC AWTP) Master Plan Improvements Phase I, Hazen and Sawyer was contracted to evaluate biogas pretreatment systems for conditioning biogas produced in HFC's anaerobic digesters to a quality that is sufficient for a combined heat and power (CHP) system. Biogas pretreatment prior to a CHP system removes hydrogen sulfide ( $H_2S$ ) and siloxanes from raw biogas. It is necessary to remove these contaminants from biogas to ensure that CHP engines operate reliably and with minimal maintenance over their useful life. Moisture, VOCs, and solid particulates are also removed by a biogas pretreatment system.

It is important to limit the  $H_2S$  concentration of biogas when beneficially using it as fuel, such as for CHP, because  $H_2S$  is corrosive. Siloxanes are another biogas contaminant that impacts CHP systems. Siloxanes quickly build up within machinery as silicon dioxide, a hard, abrasive substance, if siloxanes are not removed from biogas. A biogas pretreatment system lineup consists of a system for  $H_2S$  removal followed by moisture removal and a system for siloxane removal. Systems that remove  $H_2S$  from the biogas stream were evaluated, including adsorption, caustic scrubbing, bio-caustic scrubbing, catalytic-caustic scrubbing and biological trickling filter systems. Two types of siloxane removal systems, regenerative and non-regenerative adsorption, were considered because of their level of technological maturity and prevalence within the industry. A gas chilling system is recommended for moisture removal because it is the industry standard.

Lab tests performed on gas samples from Digester No. 6 and combined samples from Digesters No. 2 and No. 3 during February and March of 2022 indicated that there are very high concentrations of  $H_2S$  in HFC AWTP's digesters and biogas. The average biogas  $H_2S$  concentration is approximately 9,500 parts per million by volume (ppmv). The manufacturer-specified  $H_2S$  concentration limit for a CHP system is generally 50-150 ppmv. There are many pretreatment alternatives for  $H_2S$  removal including: adsorption vessels (i.e., iron sponge), caustic scrubbers, catalytically-regenerated caustic scrubbers, biologically-regenerated caustic scrubbers, and biological trickling filters (BTFs). Due to the high  $H_2S$  concentration, a two-stage system with a BTF system followed by an  $H_2S$  adsorption vessel is recommended.

The BTF system with three 32' tall towers is recommended for bulk removal of  $H_2S$ , from 9,500 ppmv down to 150 ppmv because BTF was found to have the lowest 20-year net present cost and does not use harsh chemicals. One 10' diameter adsorption vessels with 16' of pelletized iron hydroxide media is recommended for the "polisher", which removes residual  $H_2S$ .

For comparison purposes, capital costs (including equipment, preliminary construction costs, and debt service at 3.5%), media costs, chemical costs, expected significant parts replacement (like BTF filter media), maintenance, energy costs, and cost inflation rates were used to calculate 20-year net present costs (at a 0 % discount rate, based on the City's preference for business case evaluations) for each  $H_2S$  removal alternative (**Figure E-1**).



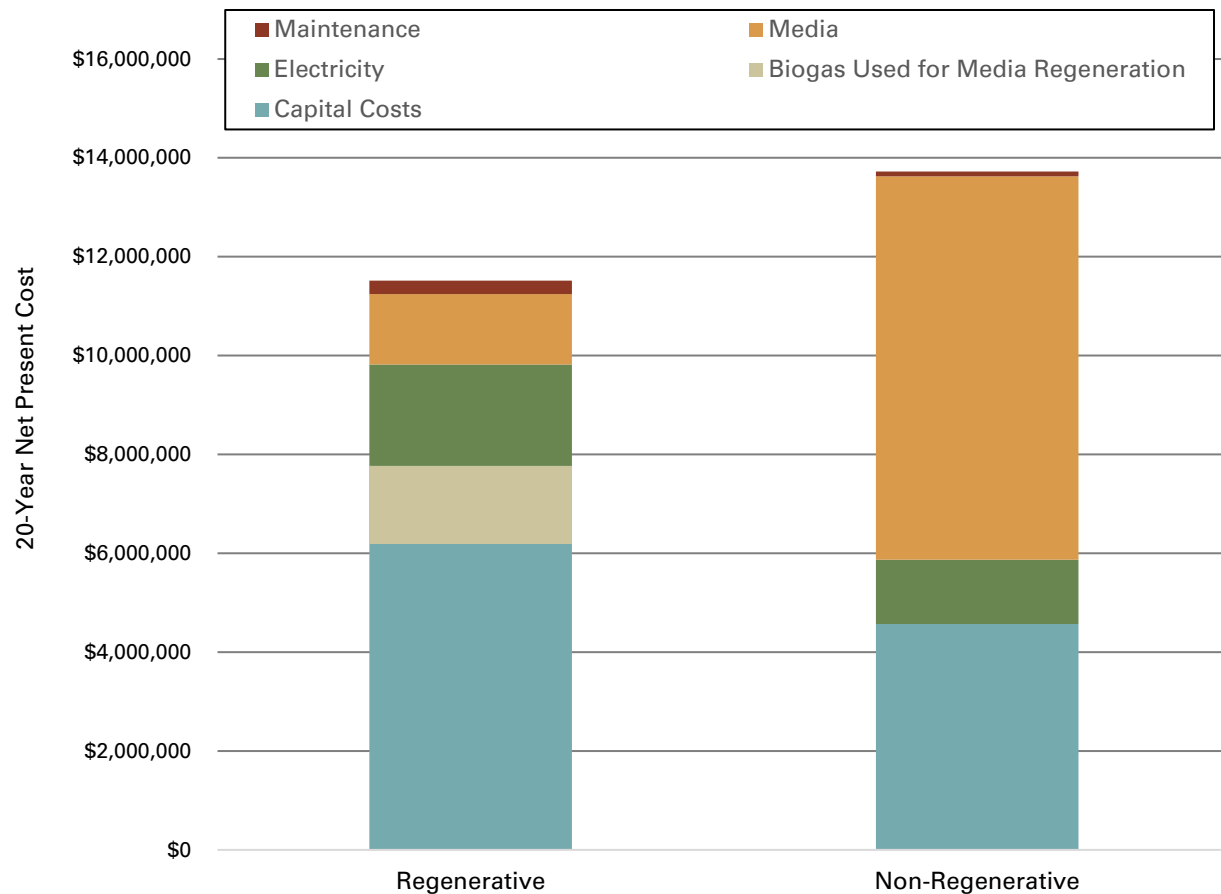
**Figure E-1: Financial Comparison of H<sub>2</sub>S Removal Alternatives**

**Note:** Capital Cost shown in figure includes equipment, preliminary construction costs, and debt service at 3.5%.

Lab tests performed on gas samples from Digester No. 6 and combined samples from Digesters No. 2 and No. 3 during March of 2022 indicated that the average concentration of siloxanes in biogas is approximately 17.5 milligrams per cubic meter (mg/m<sup>3</sup>), which should be reduced to 5 mg/m<sup>3</sup> or less for reciprocating internal combustion engines. The 20-year net present cost of a regenerative siloxane removal system with activated carbon polisher was found to be approximately \$2.2 million less than that of a fully non-regenerative system, and a regenerative system would require substantially less operator time for media replacements. For these reasons, a regenerative system is recommended for siloxane removal. The recommended system consists of a dual-vessel, regenerative adsorption system rated for 1,000 standard cubic feet per minute (SCFM), followed by one non-regenerative activated carbon polisher vessel with 8' diameter and 12' of bed depth.

The 20-year net present costs, including capital costs (including equipment, preliminary construction costs, and debt service), media costs, media regeneration costs, energy costs, and maintenance, were calculated to compare the two siloxane removal alternatives (**Figure E-2**). Financial analyses were performed under the assumptions of a 3.5% bond rate,

0% discount rate, and 2.3% inflation rate. Operating labor expenses are excluded because the cost differential between the alternatives is assumed to be insignificant.



**Figure E-2: Financial Comparison of Siloxane Removal System Alternatives**

**Note:** Capital Cost shown in figure includes equipment, preliminary construction costs, and debt service at 3.5%.

## 1. Introduction

The Howard F. Curren Advanced Wastewater Treatment Plant (HFC AWTP) is permitted to treat 96 mgd of raw sewage with a Type I two-stage, high rate (pure oxygen and conventional fine bubble aeration) activated sludge biological process. This plant is operated to reduce the Total Nitrogen (TN) in the effluent to advanced standards, using biological treatment for nitrification and filtration for denitrification, and to discharge high-level disinfected and dechlorinated effluent to Tampa Bay. Residuals generated by this facility are anaerobically digested and dewatered for land application as a Class B residual. Currently, annual average daily flows are approximately 60 mgd and peak flows are approximately 200 mgd.

The rehabilitation to the HFC AWTP will consist of the implementation of improvements identified in the Facility Master Plan Capital Improvement Project List for Fiscal Years 0-5 to maintain system reliability, increase operating efficiency, and meet current and future regulatory requirements.

This report summarizes biogas testing results and assesses the pretreatment requirements for the utilization of biogas in Combined-Heat-and-Power (CHP) internal combustion engines as part of the Biogas Use and Digestion System Improvements described under Amendment No. 2.

### 1.1 Background

Prior to March 2017, biogas produced by the anaerobic digesters was utilized as a fuel for a combined heat and power (CHP) system using reciprocating internal combustion engines (RICE) to offset the plant's energy demands, and heat recovered from the engine jacket cooling system provided heat to the digesters. As part of the City of Tampa's Howard F. Curren Advanced Wastewater Treatment Plant (HFC AWTP) Master Plan Improvements Phase I, new CHP engine generators with a new multi-stage biogas pretreatment system were proposed as part of the Biogas Use and Digestion System Improvements.

Biogas contaminants, like hydrogen sulfide ( $H_2S$ ) and siloxanes, can wreak havoc on a RICE, or other equipment.  $H_2S$  forms sulfuric acid when combusted, which is highly corrosive and will eat away at engine components. Additionally, sulfur dioxide ( $SO_2$ ), a regulated pollutant, is produced from the combustion of  $H_2S$ . Siloxanes from the biogas melt during combustion and build up in the engine as a hard, sand-like substance. Limiting concentrations of  $H_2S$  and siloxanes in biogas fuel to a CHP system is essential to limit maintenance costs.

As a part of City of Tampa's HFC AWTP Master Plan Improvements Phase I, Hazen and Sawyer performed biogas testing to determine the quality of biogas that is produced by HFC AWTP's mesophilic anaerobic digesters. Concentrations of contaminants, as measured by biogas testing, and measured/expected biogas production control the pretreatment system's design. Using the biogas test results, academic literature searches, manufacturer costs and consumables estimates, and industry experience,  $H_2S$  and siloxane pretreatment alternatives were evaluated. For  $H_2S$  removal, Adsorption (e.g., pelletized iron hydroxide, iron sponge, etc.), Caustic Scrubbing, Bio-Caustic Scrubbing, and Biological Trickling Filter (BTF) systems were evaluated. For siloxane removal Regenerative and Non-regenerative Fixed-Bed systems were assessed. These technologies have the most well-established industry track record for  $H_2S$  and siloxane

removal applications. Moisture is also removed during pretreatment, via a gas chilling system prior to siloxane removal, but alternatives were not evaluated because gas chilling is the unrivaled industry standard for moisture removal.

## 1.2 Objectives

The objectives of Task 306 of the HFC AWTP Master Plant Improvements Phase I were to:

- Test biogas to determine its quality as a fuel source, including the energy density and levels of contaminants in the gas
- Recommend a biogas pretreatment system lineup that conditions biogas for use in an internal combustion Combined-Heat-and-Power (CHP) system
  - Evaluate hydrogen sulfide (H<sub>2</sub>S) removal systems
  - Evaluate siloxane removal systems

The Biogas Testing and Pretreatment System Evaluation Summary Report documents the following:

- Biogas testing results
- General design requirements
- Evaluation of biogas pretreatment alternatives
- Recommendations for biogas pretreatment to meet CHP requirements
- Detailed design efforts and operational considerations for each recommendation

## 2. General Design Requirements

### 2.1 Summary of Biogas Testing Results

Biogas tests were performed on samples taken from different locations and on different dates. Tests measured concentrations of contaminants, including H<sub>2</sub>S, siloxanes, and volatile organic compounds (VOCs), and other biogas properties, like methane concentration, heating value, density, etc.

Hazen collected biogas samples from Digester No. 6 and from the common manifold between Digesters No. 2 and No. 3 on multiple occasions (**Figure 2-1**). These samples were submitted to ALS Environmental's analytical lab for gas chromatography (GC), gas chromatography – mass spectrometry (GC-MS), and ASTM D 3588 – BTU testing. The results of these lab analyses are shown in **Table 2-1** and **Table 2-2** on the following pages. Full test results, including original reports, are given in **Appendix G: Biogas Test Results** and **Appendix H: Biogas Test Results – Siloxanes**.

During a site visit on August 31<sup>st</sup>, 2021, a third-party vendor used a digital hand-held analyzer to test biogas from the common manifold between Digesters No. 2 and No. 3, and from Digester No. 6. The digital test measured H<sub>2</sub>S levels of 8,016 parts per million (ppmv) at Digesters No. 2 & 3 and 6,210 ppmv at Digester No. 6. These measurements from the third-party vendor provide additional data points that support the lab findings of high H<sub>2</sub>S levels.

**Table 2-1: Lab Results Summary: Major Constituents and H<sub>2</sub>S**

| Component                       | Units               | Digester<br>No. 2 & 3 | Digester 6 |          |          |
|---------------------------------|---------------------|-----------------------|------------|----------|----------|
|                                 |                     | 02/04/22              | 02/04/22   | 03/10/22 | 03/18/22 |
| Methane                         | % by Vol            | 54.70                 | 55.70      | 60.90    | 41.20    |
| Carbon Dioxide                  | % by Vol            | 35.60                 | 35.30      | 37.90    | 25       |
| Nitrogen                        | % by Vol            | 7.56                  | 6.11       | 0.56     | 25.60    |
| Oxygen                          | % by Vol            | 1.97                  | 1.61       | 0.13     | 7.22     |
| Argon                           | % by Vol            | 0.09                  | 0.07       | 0.01     |          |
| Hydrogen                        | % by Vol            | 0.00                  | 0.00       | 0.00     | ND       |
| (CH <sub>2</sub> ) <sub>n</sub> | % by Vol            | 0.00                  | 0.01       | 0.01     |          |
| Hydrogen Sulfide                | ppmv                | 9,600                 | 9,300      | 20,000*  | 9,600    |
| VOCs**                          | µg/m <sup>3</sup>   | 3699                  | 4485       | 2980     | ND       |
| Methyl Mercaptan                | ppbV                | 5,200                 | 14,000     | 39,000   | 26,000   |
| Dimethyl Sulfide                | ppbV                | ND                    | 3,700      | 4,900    | 7,300    |
| Carbon Disulfide                | µg/m <sup>3</sup>   | 370                   | 690        | 1400     | ND       |
| High Heating Value (Dry)        | BTU/ft <sup>3</sup> | 562.4                 | 572.7      | 626.00   | 381.8    |
| Low Heating Value (Dry)         | BTU/ft <sup>3</sup> | 506.6                 | 515.9      | 563.90   | 423.9    |

**Notes:**

ND stands for “not detected”.

Blanks indicated not tested.

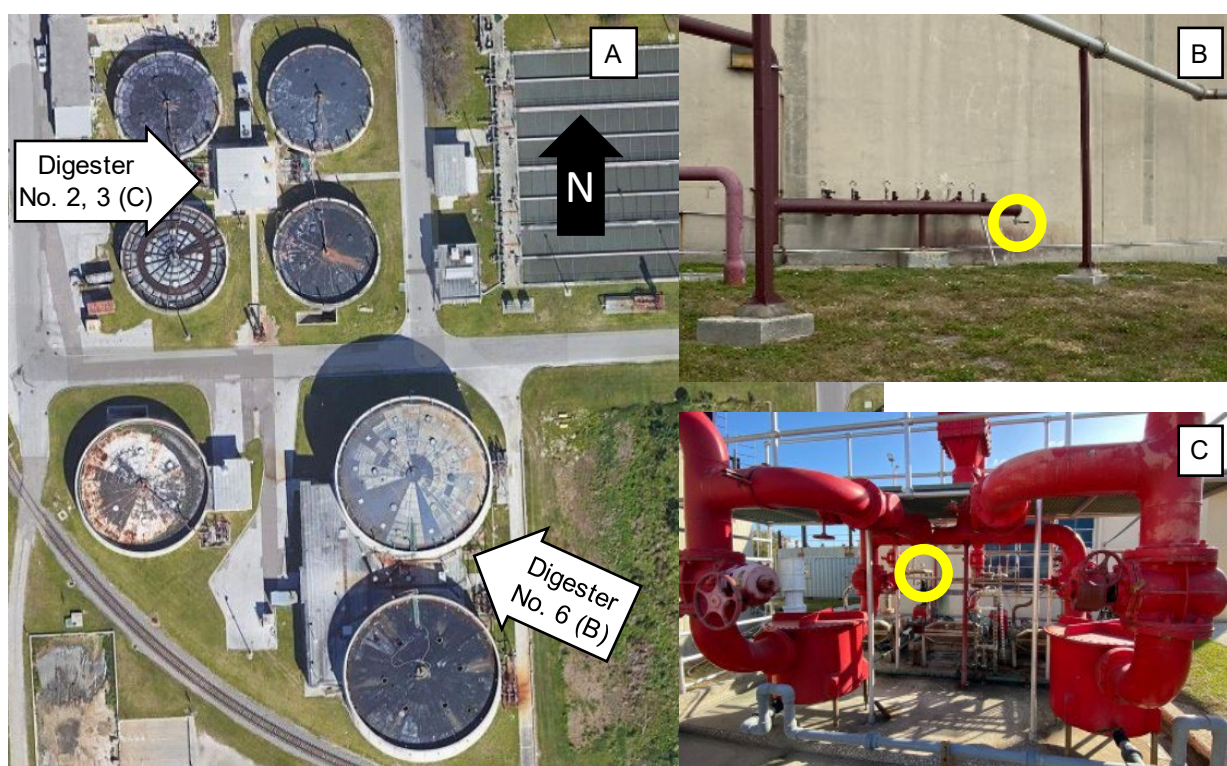
\*Per the case narrative provided for Sample Digester 6 #2 (P P2201098), “the reporting limits have been elevated in the sample because chromatogram indicated the presence of non-target background components. Therefore, the sample was diluted in order to prevent damage to the instrument and to achieve optimal resolution of the target analytes. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.”

\*\*For purposes of summarizing test results, contaminants are counted as a VOC if they are on the EPA’s Substance Registry Services list of volatile organic compounds.



**Table 2-2: Lab Results Summary: Siloxanes**

| Component                    | Units                    | Digester No. 2 & 3 |         | Digester 6 |          |
|------------------------------|--------------------------|--------------------|---------|------------|----------|
|                              |                          | 03/10/22           | 3/18/22 | 03/10/22   | 03/18/22 |
| Siloxanes                    | $\mu\text{g}/\text{m}^3$ | 22,707             | 13,670  | 17,076     | 16,041   |
| Siloxanes                    | ppmv                     | 1.04               | 0.87    | 1.09       | 1.01     |
| Siloxanes (as Total Silicon) | $\mu\text{g}/\text{m}^3$ | 6,100              | 5,100   | 6,300      | 5,900    |



**Figure 2-1: Digester Biogas Sampling Locations**

**Notes:**

- (A) General sampling location,
- (B) sample location at Digester No. 6,
- (C) sample location at common manifold for Digester No. 2 and No. 3

## 2.2 Biogas Treatment Requirements

### 2.2.1 Biogas Volume

Historical data from biogas meters located at the waste gas burners was collected and used to establish an understanding of average biogas production. The gas meters were installed in each waste gas burner around February 2017, with consistent data collection beginning in September 2017. The measured biogas data was lower than the expected production, which was calculated based on digester loadings and volatile solids destruction. The average measured biogas production is 445 standard cubic feet per minute (SCFM), which was calculated from the historical biogas meter data over three consecutive years, from January 2018 to December 2020. The low biogas production may be caused by shortfalls in the existing system's performance and should be resolved with the planned digester improvements. Therefore, biogas production was estimated using accepted gas production rates based on empirical data compiled by the Water Environment Federation (WEF). Biogas production was estimated to be between 581 SCFM and 805 SCFM, depending on parameters used in the calculation. Biogas production of 600 SCFM was used as the basis for H<sub>2</sub>S and siloxanes loadings, which drive annual media and consumables usage of pretreatment systems. This production rate is greater than the historically measured biogas production but at the lower bound of the modeled/calculated biogas production.

### 2.2.2 Biogas Concentrations

Based on the findings of the biogas testing results, the H<sub>2</sub>S concentration of raw biogas produced at HFC AWTP is approximately 9,500 ppmv, the siloxanes concentration is 17.5 milligrams per cubic meter (mg/m<sup>3</sup>), and the volatile organic compounds (VOCs) concentration is 4 mg/m<sup>3</sup>.

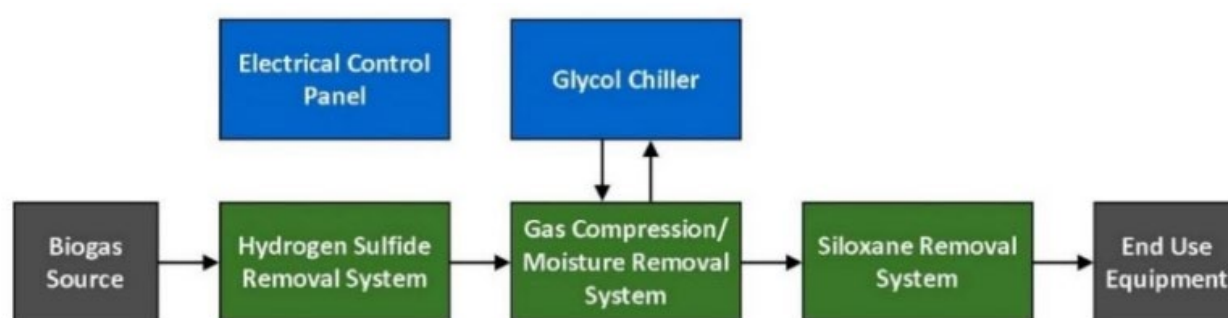
While CHP engines have a H<sub>2</sub>S tolerance between 50-150 ppmv, a design outlet concentration of H<sub>2</sub>S of 10 ppmv is recommended because H<sub>2</sub>S impacts the downstream siloxane removal system. Limiting the concentration of H<sub>2</sub>S increases the lifespan of siloxane removal media. An adsorption system "polisher" is recommended after any bulk pretreatment systems that aren't designed to reach 10 ppmv H<sub>2</sub>S. This standardizes comparison among pretreatment systems with differing H<sub>2</sub>S removal efficiencies. The achievable outlet H<sub>2</sub>S concentration for a given "bulk" H<sub>2</sub>S removal system was used as the inlet concentration to a "polishing" adsorption system.

A design siloxanes concentration of 5 mg/m<sup>3</sup> out of the biogas pretreatment system is recommended. While a design outlet concentration of VOCs from the pretreatment system is not set, inlet concentration of VOCs was considered during evaluation of alternatives because VOCs compete with siloxanes for adsorption and impact the lifespan of siloxane removal system media.

## 2.3 Treatment Process Description

**Figure 2-2** illustrates the order of biogas conditioning systems. The daily H<sub>2</sub>S load was calculated to be approximately 0.375 ton/day, which prompted evaluation of H<sub>2</sub>S removal systems to include larger-scale systems that excel at bulk removal of H<sub>2</sub>S. The Hydrogen Sulfide Removal system box shown on the figure

encompasses a two-part H<sub>2</sub>S removal system of bulk treatment followed by polishing, except for the case of H<sub>2</sub>S adsorption only, where H<sub>2</sub>S adsorption acts as both bulk treatment and polisher. The Siloxane Removal System is downstream of H<sub>2</sub>S and moisture removal because siloxane adsorbs most readily in dry media and H<sub>2</sub>S competes for adsorption. During the evaluations herein, costs associated with the gas compression and moisture removal system were lumped in with the Siloxane Removal Systems because dry gas is necessary for the function of the Siloxane Removal system. There are also particulate filters, not shown in the diagram, at multiple stages of the biogas conditioning system which remove solid particles and moisture droplets from the biogas stream.



**Figure 2-2: General Configuration of Biogas Conditioning System**

## 2.4 Redundancy

No redundancy is incorporated into the biogas pretreatment systems in order to keep capital costs low. Biogas would need to be flared during maintenance activities on the biogas pretreatment system components.

### 3. Biogas Pretreatment Alternatives

Five types of H<sub>2</sub>S removal systems and two types of siloxane removal systems were evaluated in this study. These systems were considered based on technology maturity and their prevalence within the industry.

#### H<sub>2</sub>S Removal:

- Adsorption (e.g., iron sponge, pelletized iron hydroxide, etc.)
- Caustic scrubbing
- Bio-caustic scrubbing
- Catalytic-caustic scrubbing
- Biological trickling filter (BTF)

#### Siloxane Removal:

- Regenerative fixed-bed system
- Non-regenerative fixed-bed system

In-situ chemical-based treatments for H<sub>2</sub>S removal, such as adding iron salts to the liquid stream in the wastewater collection system, headworks, or just prior to the digesters, were not evaluated in detail because the City advised iron salts are not the preferred H<sub>2</sub>S removal alternative due to concerns about the chemical handling required. The City currently uses Bioxide® for odor control in the wastewater collection system and prefers to continue use of Bioxide® rather than switch to iron salts for odor control and H<sub>2</sub>S removal. However, in-situ iron addition could be an option in the future if the City decides to reevaluate the use of Bioxide® for odor control. Iron salts, such as ferric chloride, ferric sulfate, ferrous chloride, etc., added to the liquid stream remove H<sub>2</sub>S by reacting to form insoluble compounds, which fall out of solution. Reduction in the H<sub>2</sub>S concentration of the liquid stream, and thus sludge, results in a proportional decrease in digester biogas H<sub>2</sub>S concentration. In-situ iron addition, at the plant or at points in the collection system, reduces odor, corrosion, and H<sub>2</sub>S, and has been documented to improve Sludge Volume Index (SVI) control, plant effluent phosphorus reduction, sludge thickening, and struvite control at Miami-Dade County's South District and Central District Wastewater Treatment Plants, Palm Beach County's Southern Region Water Reclamation Facility, and other facilities throughout the country. Disadvantages of in-situ iron addition may include fouling of magnetic flow meters and less effective management of mercaptans, and organic sulfides compared to Bioxide®. Some capital investment would be required to establish in-situ iron addition, but the annual cost of iron addition is typically less than Bioxide® to control the equivalent amount of H<sub>2</sub>S. A more detailed study would be required to evaluate the potential benefits and risks of switching from Bioxide® to in-situ iron addition, and operational costs are subject to fluctuations of the market price of iron. However, recent studies have estimated that the cost of iron salts are up to a third of the cost of Bioxide® when compared to control the same amount of H<sub>2</sub>S.

## 3.1 H<sub>2</sub>S Removal Alternatives

### 3.1.1 Scavenger / Adsorption

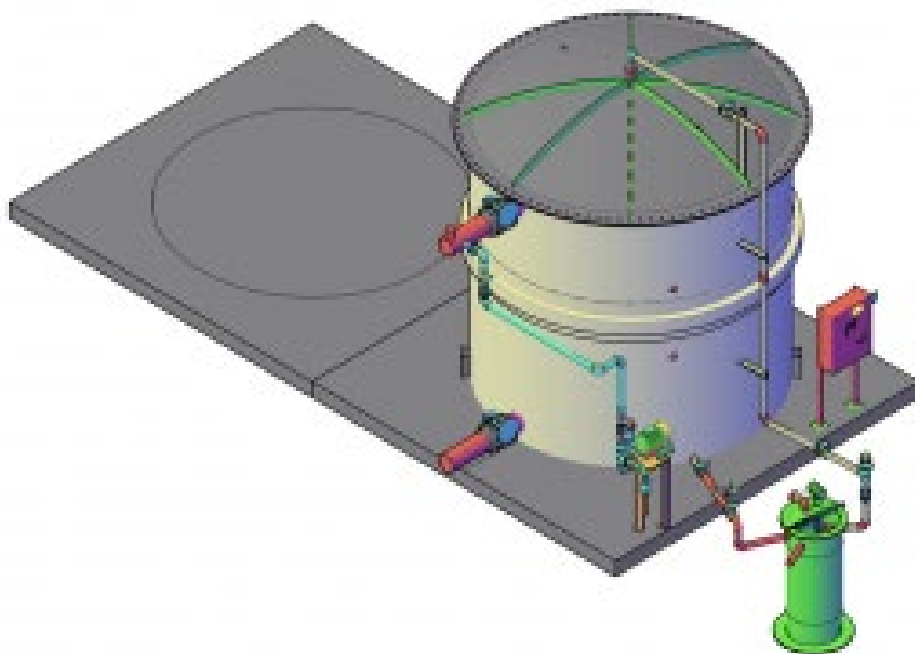
H<sub>2</sub>S adsorption systems operate by passing saturated biogas (~100% Relative Humidity) through vessels filled with media, such as iron sponge (iron oxide impregnated wood chips), iron oxide pellets, or some other proprietary material. The scavenging media cleans the gas by chemically adsorbing H<sub>2</sub>S onto the media's surface. The media is spent when its surface becomes saturated and can no longer remove sufficient H<sub>2</sub>S, at which point the media must be replaced. Replacement of the media can be difficult and time-intensive, depending on the system and its media. Also, the replacement process can be dangerous. Replacing media can require working in enclosed spaces, and the media exothermically reacts with oxygen which can be hazardous if uncontrolled. Inert-based media, like pelletized iron hydroxide, may reduce the combustion risk. For these reasons, and the cost of replacement media, adsorption is typically reserved for low H<sub>2</sub>S load (not more than 0.2 ton/day) applications. Adsorption systems are also used downstream of other H<sub>2</sub>S removal systems to purify the biogas to a higher standard, in which case they are referred to as a "polisher". Most types of adsorption media, including iron sponge, can be landfill disposed, but some types may qualify as hazardous waste.

#### Summary of typical maintenance items for scavenger/adsorption systems:

- Online H<sub>2</sub>S sensors, monitoring and calibration (required for any type of H<sub>2</sub>S removal system)
- H<sub>2</sub>S Media Changeout (typically annually, but may vary depending on the results of online H<sub>2</sub>S monitoring)
  - Isolate vessel from the gas stream by closing/opening appropriate bypass and isolation valves
  - Thoroughly vent vessel and flood with water for 1 hour
  - Use crane to remove top man-way cover
  - Rake and vacuum media from top of vessel with "Super Sucker" vacuum truck
  - Open bottom man-way and continue removing media
  - Spread spent media in a layer less than 8" thick on a heat resistant surface, like a concrete pad, to allow it to cool and dry
  - Dispose of media in a Class 2 landfill or other permitted disposal method
  - Use pressure washer to flush drain manifold
  - Close bottom man-way and load vessel from top man-way with super sacks of fresh media, held by crane
  - Replace top man-way cover and close/open appropriate bypass and isolation valves to bring vessel back online



Figure 3-1 shows an example of an adsorption system.



**Figure 3-1: Adsorption System (MV Seer)**

### 3.1.2 Caustic Scrubbing

Caustic solution serves as both the solvent that removes  $H_2S$  from biogas and the reagent that chemically reacts with the  $H_2S$ . Biogas is blown through a tall tower of recirculating aqueous solution that contains caustic ( $NaOH$ ).  $H_2S$  dissolves into this solution, while methane and other immiscible components of the biogas remain in the gas phase and exit the tower. Caustic is continuously consumed during the process because it reacts with  $H_2S$ , forming sodium hydrosulfide. The process produces a discharge side-stream containing sodium hydrosulfide ( $NaHS$ ) as well as sodium carbonates ( $Na_2CO_3$ ) from inadvertent reaction of caustic with  $CO_2$  in the biogas.

#### Summary of typical maintenance items:

- Annually
  - Clean the demister
    - ♦ Isolate scrubbing system and flush with  $N_2$  gas
    - ♦ Aerate system with compressed air

- ♦ Open lid of scrubber vessel
- ♦ Remove demister and clean with pressure washer
- ♦ Replace demister and fasten lid
- ♦ Flush with N<sub>2</sub> gas
- ♦ Open valves slowly to bring system back online

Figure 3-2 shows an example of a caustic scrubbing system.

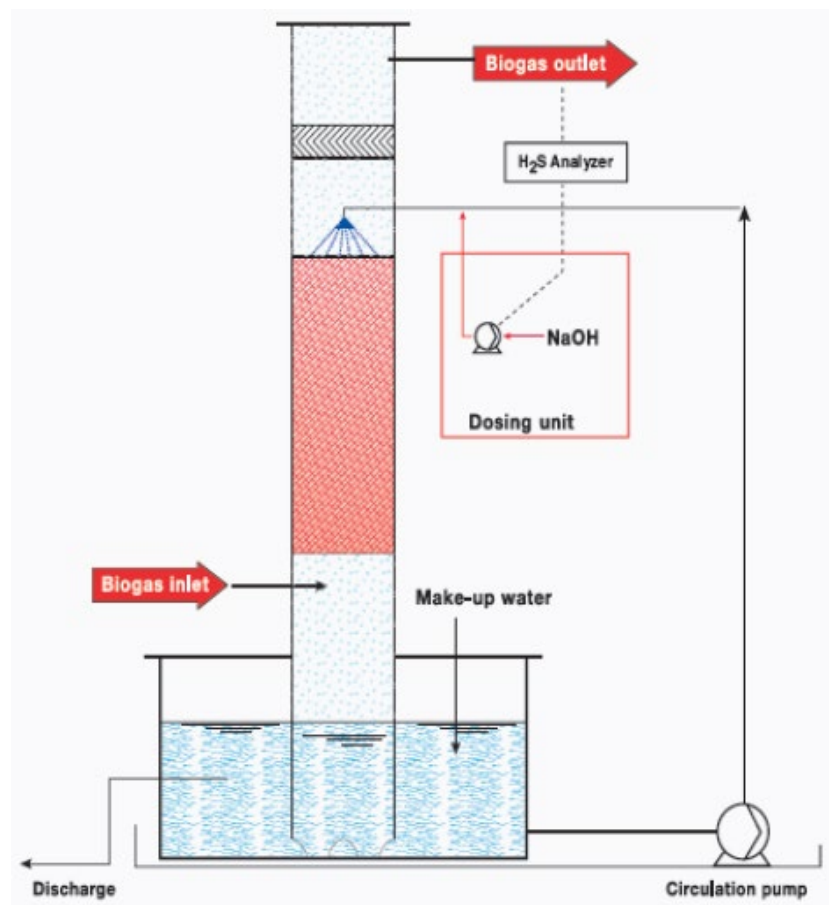


Figure 3-2: Caustic Scrubbing System (DMT)

### 3.1.3 Bio-Caustic Scrubbing

Operates according to same general principles as Caustic Scrubbing discussed above, in Section 2.2, except it requires significantly less caustic because some caustic is biologically regenerated in a bioreactor. Caustic solution flows countercurrent to biogas, dissolving  $H_2S$  (along with  $CO_2$ ) into solution. In solution,  $H_2S$  reacts with the caustic to form sodium hydrosulfide ( $NaHS$ ). Rather than being discharged at this point, the solution containing  $NaHS$  flows to an aerobic bioreactor, where  $NaHS$  is oxidized by bacteria to regenerate the caustic ( $NaOH$ ) and form insoluble elemental sulfur ( $S$ ). Elemental sulfur is filtered out. A small portion of the  $H_2S$  is oxidized to sulfates ( $Na_2SO_4$  and  $H_2SO_4$ ), which are discharged as a side-stream. The bacteria's sole purpose is to regenerate the caustic and reduce the amount needed. Therefore, the system's effectiveness at removing  $H_2S$  is independent of the health of the bacterial colonies. Nutrients are dosed into the bioreactor to maintain optimal conditions for the bacteria and caustic is supplied as it is consumed.

The elemental sulfur that is produced can be land applied as a fertilizer or disposed of by landfill.

#### Summary of typical maintenance items:

- Monthly
  - Check inside Bio Reactor to make sure that liquid is bubbling properly
  - Every 3 months, check caustic dosing pump components and clean the suction and discharge valves
- Annual
  - Check liquid distribution
    - ♦ Drain and insert the scrubber tower
    - ♦ Open man-way at top of tower and observe how water flows through distribution plates to ensure that there is not any damage and flow patterns are normal
  - Clean collection basin
    - ♦ Remove buildup of solids and clean residues with pressure washer
  - Clean settling tank
    - ♦ Remove buildup of solids and clean residues with pressure washer
  - Replace sulfur-sludge-pump housing lubricant
  - Clean demister

Figure 3-3 shows an example of a bio-caustic scrubbing system.





**Figure 3-3: Bio-Caustic Scrubbing System (DMT)**

### 3.1.4 Catalytic-Caustic Scrubbing

Catalytic Caustic Scrubbing is similar to Bio-Caustic Scrubbing. Catalytic-Caustic Scrubbing removes  $H_2S$  with the same general method as Caustic Scrubbing, but it uses significantly less caustic. The caustic in a Catalytic-Caustic Scrubbing system is regenerated by oxidation with air in the presence of a catalyst solution, which is proprietary. The primary biproduct of Catalytic-Caustic Scrubbing is elemental sulfur (S). Elemental sulfur is filtered out from the solution, and it can be land applied as a fertilizer or landfill disposed.

#### Summary of typical maintenance items:

- Daily
  - Check filter media roll
  - Check sulfur bin and empty if needed
  - Sample specific gravity of solution

- Sample quality of sulfur
- Dose biocide 3x per week
- Weekly
  - pH/ORP sensor cleaning and calibration
  - Oxidation blower aftercooler cleaning
- Monthly
  - Clean or replace oxidation blower inlet filter
  - Send liquid samples to lab for analysis
- Semi-annually
  - Clean out absorber and oxidation vessels
    - ♦ Open manway and power wash the inside wall and bottom sump cone
  - Clean out demister
  - Clean out sulfur filter

**Figure 3-4** shows an example of catalytic-caustic scrubbing system.



**Figure 3-4: Catalytic-Caustic Scrubbing System (SULFCAT)**

### 3.1.5 Biological Trickling Filter

Biological Trickling Filter (BTF) is the only  $H_2S$  removal alternative evaluated in this study that relies entirely on bacteria. No chemicals, like caustic or catalysts, are needed. Depending on the water source, some nutrient addition (N-P-K fertilizer) may be needed. Air is injected into biogas to supply oxygen and the gas mixture flows through towers filled with inorganic media that houses aerobic bacteria. The air that is introduced during the process dilutes the biogas's methane content and, thus, its heating value. The bacteria oxidize  $H_2S$ , producing biomass, elemental sulfur (S), and sulfates ( $Na_2SO_4$  and  $H_2SO_4$ ). Water that is circulated through the towers is maintained at approximately 90°F. A low pH side stream of discharge is produced, which contains elemental sulfur, sulfates, and sulfuric acid. Review of literature and experience with other WWTP's have shown that BTFs can have problems with clogging as elemental sulfur fouls the filters, so it is critical that the filters are cleaned routinely (twice a year).

#### Summary of typical maintenance items:

- Semi-annual
  - Use in-situ air-sparging system to cleanse biomass and built-up elemental sulfur from filter media
    - ♦ Only one tower can be brought offline and cleaned at a time
    - ♦ Tower that is taken offline is filled with water and air compressor is connected to in-situ cleansing system for 1-4 days
    - ♦ Tower must be brought back online for 1-4 weeks to reacclimate before procedure can be repeated on next tower
- 5-10 years
  - Replacement of biotrickling filter media because the media will degrade over time

**Figure 3-5** shows an example of a BTF system.



**Figure 3-5: BTF System (Biorem)**

## 3.2 Siloxane Removal Alternatives

Siloxanes are a family of man-made, silica based compounds that are common additives used in cosmetics, hygiene, and other consumer products. Siloxanes make their way into wastewater and eventually into biogas that is produced in anaerobic digesters. When gaseous siloxanes are combusted, they solidify as silica dioxide (sand) on engine surfaces and valves. It is important to remove siloxanes from biogas to protect CHP engines from damage and maximize long-term engine reliability.

There are less alternatives available for the removal of siloxane than for  $H_2S$ . The two predominant alternatives are non-regenerative and regenerative adsorption, both which work by adsorption of siloxane to media. Siloxane adsorption systems require that the biogas be mostly free of  $H_2S$  to extend their media's lifespan, so they are generally downstream of an  $H_2S$  removal system. Additionally, adsorption of siloxanes occurs in dry activated carbon, so usually there is a biogas drying system ahead of the siloxane removal system.

### 3.2.1 Non-Regenerative

Prior to entering a vessel of dry, adsorptive media, such as activated carbon, biogas passes through a chiller. The main purpose of the chiller is to remove water from the biogas; the chilling also causes a small amount

of siloxanes to condense out of the gas. After the chiller, the biogas flows through a vessel (or multiple vessels) filled with activated carbon media. activated carbon physically adsorbs siloxanes from the biogas to micropores in the media. The media continues to remove siloxanes from biogas until it becomes fully saturated with siloxanes. The siloxane concentration of outlet biogas is a function of the length of the vessel's media bed that has not yet been saturated with siloxanes. The media's lifespan can be roughly estimated using biogas test results and flow rate, along with the adsorptive capacity of the media. However, periodic sampling and analysis of biogas effluent is necessary to develop an accurate schedule for media changeouts.

Once the activated carbon media hits its breakthrough point, or the point at which most of the media has become saturated and the allowable outlet concentration of siloxanes is reached, the vessel's media is replaced. The media of non-regenerative systems is "single-use". The spent media may be landfill disposed.

### **Summary of typical maintenance items:**

- Activated carbon media replacement
  - Vessel is isolated by closing appropriate isolation valves
  - Open vent valve and purge vessel with nitrogen gas
  - Remove top man-way cover
  - Vacuum out the spent carbon media with a vacuum truck
  - Using crane to hoist super-sacks of media above man-way, refill the vessel with fresh activated carbon media
- Fill vessel with nitrogen and purge from vent three times before returning isolation valves to their operating positions to bring the vessel back online

**Figure 3-6** shows an example of a non-regenerative siloxane removal system.





**Figure 3-6: Non-Regenerative Siloxane Removal System (Unison)**

### 3.2.2 Regenerative

Just as with the non-regenerative system, biogas passes through a chilling system before it flows to the regenerative siloxane removal system. The main purpose of chilling is to remove water from the biogas; the chilling also causes a small amount of siloxanes to condense out of the gas. Regenerative systems clean biogas by physically adsorbing siloxanes and other contaminants to the surface of their media. Unlike a non-regenerative system, the media of a regenerative system is reused many times before it needs to be replaced. Regenerative siloxane removal systems operate as a pair of vessels, where the vessels alternate between adsorbing siloxanes and regenerating their media. While one vessel is actively adsorbing siloxanes from biogas, the other vessel uses thermal swing adsorption to regenerate its media. Thermal swing adsorption regenerates the media by blowing hot air over siloxane-saturated media. The heat breaks siloxanes away from the media, and siloxanes and other contaminants are stripped away with the exhaust air. The desorbed mixture of hot air and siloxanes is combined with a small amount of biogas (35-50 SCFM) and flared to the atmosphere in an enclosed flare. Regenerative systems' media lasts much longer than that of a non-regenerative system, but there is a limit to how many times the media can be regenerated. The media of regenerative systems lasts approximately 18-24 months, depending on the characteristics of the biogas. There are more regular operations and maintenance (O&M) necessary with a regenerative system

than a non-regenerative system because of the additional components that operate and control the temperature swing adsorption process, but there are substantial time-savings from replacing media less often.

**Figure 3-7** shows an example of a “twin-tower” regenerative siloxane removal system.



**Figure 3-7: “Twin-Tower” Regenerative Siloxane Removal System (Unison)**

## Summary of typical maintenance items:

- Daily
  - Manually open or cycle pre-filter condensate drain to remove all liquid from the housing
  - Crack the after-filter depressurization valve to make sure there isn’t any condensate
- Weekly
  - Check differential pressure readings for Pre & After Filter Elements, Blower Intake Filter, and Blower Outlet Pressure Gauge and compare with previous readings to determine maintenance needs

- Check Heater Temperature Gauges and compare with the HMI reading to determine if thermocouple or gauge is malfunctioning
- Check the positive displacement blower's oil level and add oil if needed
- Check intake filters and clean or replace if necessary
- Monthly
  - Collect inlet and outlet biogas samples and have them analyzed for H<sub>2</sub>S, siloxane, and VOC content
  - Check heater's current (amp) draw
  - Inspect blower drive belt for wear, damage, and tension
  - Change the blower's drive belt
- Yearly
  - Test process and solenoid valves for proper functioning
  - Check pressure transmitters, resistance temperature detectors, and thermocouples
  - Recalibrate or replace pressure relief valves
  - Leak test all valves and connections
  - Replace pre- and after-filter heating elements
- Proprietary media replacement (18-24 months)
  - Vessel is isolated by closing appropriate isolation valves
  - Open vent valve and purge vessel with nitrogen gas
  - Remove top man-way cover
  - Vacuum out the spent carbon media with a vacuum truck
  - Using crane to hoist super-sacks of media above man-way, refill the vessel with fresh media
  - Fill vessel with nitrogen and purge from vent three times before returning isolation valves to their operating positions to bring the vessel back online



## 4. Evaluations and Recommendations

### 4.1 H<sub>2</sub>S Removal System

Vendors for each type of pretreatment system were contacted to obtain estimates for any consumable inputs to their system, H<sub>2</sub>S removal efficiencies, electricity demands, system foot prints, any chemical and/or media costs, and capital/equipment costs. Also, review of academic research and industry experience helped contextualize the pros and cons of each type of system.

Removal efficiency of the bulk removal system impacts the lifespan of the polisher's media. A third-party biogas conditioning vendor (Unison) proposed a polisher system to reduce H<sub>2</sub>S from 200 to 10 ppmv for an estimated media life of 365 days (**Appendix B**, Unison Proposal). This vendor's proposal for a polisher system, including costs to replace media, was used to standardize comparison among bulk H<sub>2</sub>S removal systems. The polishing system media's lifespan was assumed to scale inversely with the bulk H<sub>2</sub>S removal system's attainable outlet H<sub>2</sub>S concentration. For example, if a system were to outlet biogas at 500 ppmv H<sub>2</sub>S to the polishing system, the polisher media's lifespan would be shorter than 365 days. A summary of the bulk pretreatment system's outlet concentrations and resultant downstream polisher's lifespan is given in **Table 4-1**.

**Table 4-1: Bulk H<sub>2</sub>S Removal Systems Performance**

| Technology                  | Vendor    | Outlet H <sub>2</sub> S Concentration | Polisher Media Lifespan |
|-----------------------------|-----------|---------------------------------------|-------------------------|
| Caustic Scrubbing           | DMT       | 200 ppmv                              | 365 days                |
| Bio-Caustic Scrubbing       | DMT       | 200 ppmv                              | 365 days                |
| Adsorption                  | Unison    | NA                                    | NA                      |
| BTF                         | Biorem    | 150 ppmv                              | 490 days                |
| Catalytic Caustic Scrubbing | Greenlane | 150 ppmv                              | 490 days                |
|                             | SULFCAT   | 50 ppmv                               | 1460 days               |

#### 4.1.1 Evaluation of Alternatives

A summary of qualitative information synthesized about each type of system is given in **Table 4-2**.

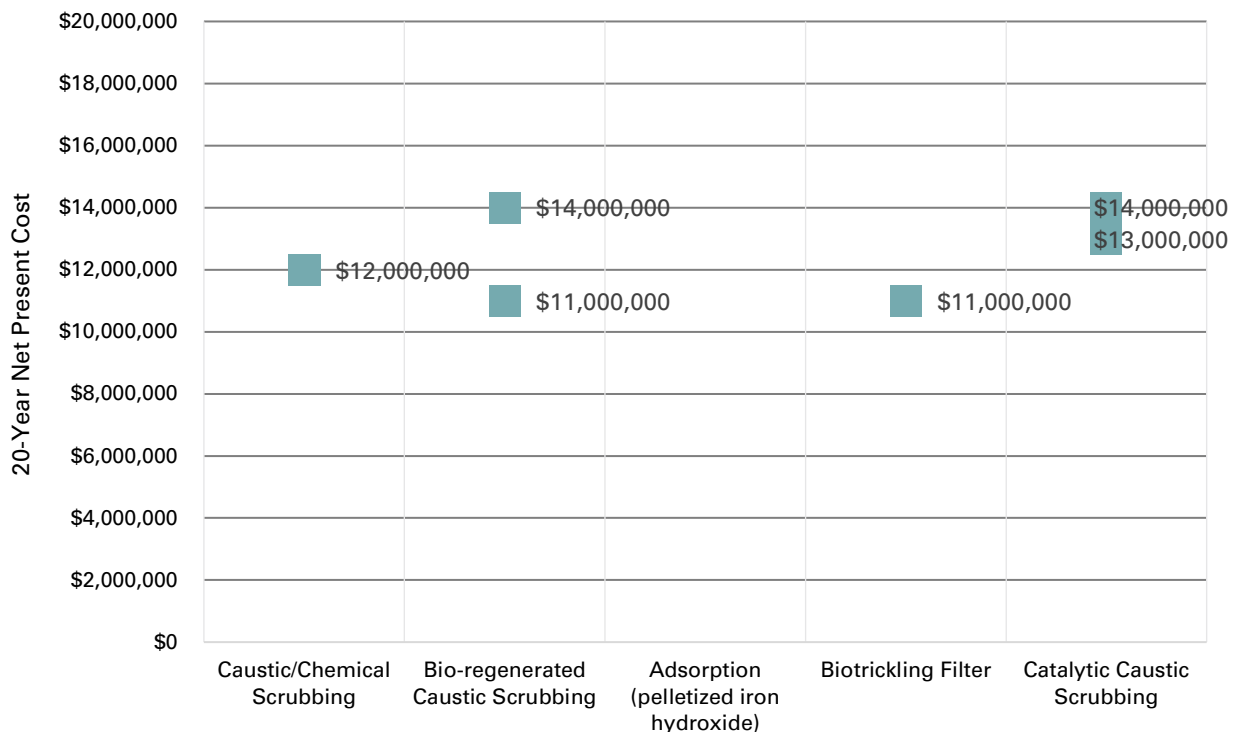
**Table 4-2: Summary of H<sub>2</sub>S Pretreatment Alternatives**

| Technology                         | Vendors                               | Chemical Inputs             | Sensitivity to H <sub>2</sub> S Fluctuations | Potential Operational Challenges                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------|---------------------------------------|-----------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Caustic Scrubbing</b>           | DMT                                   | Caustic                     | Low                                          | <ul style="list-style-type: none"> <li>High chemical demands</li> <li>Chemical consumption scales with H<sub>2</sub>S load</li> <li>Dealing with hazardous chemicals</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Bio-Caustic Scrubbing</b>       | DMT, Varec (Thiopaq)                  | Caustic, Nutrients          | Low                                          | <ul style="list-style-type: none"> <li>Potential for bioreactor malfunctioning, leading to higher caustic demand than expected</li> <li>Chemical consumption scales with H<sub>2</sub>S load, but to a lesser extent than for Caustic Scrubbing</li> <li>Dealing with hazardous chemicals</li> </ul>                                                                                                                                                                                                                                                                                                  |
| <b>Adsorption</b>                  | Unison Solutions, Granite Fuel        | None                        | Low                                          | <ul style="list-style-type: none"> <li>Frequent maintenance to replace media material</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>BTF</b>                         | Biorem, BiogasClean                   | Nutrients                   | Moderate                                     | <ul style="list-style-type: none"> <li>Removal efficiency dependent on biological system</li> <li>System biology responds to H<sub>2</sub>S fluctuations, but lags significant changes</li> <li>Semi-annual washing of media is necessary to prevent filter media from clogging and performing poorly</li> <li>Washing is multi-step process, with towers being taken offline one at a time and given time to reacclimate before the next one is cleaned</li> <li>Potential for fluctuations in biofilter's removal efficiency makes downstream polisher media's lifespan highly uncertain</li> </ul> |
| <b>Catalytic Caustic Scrubbing</b> | Greenlane, Unison Solutions (SULFCAT) | Caustic, Catalytic Solution | Low                                          | <ul style="list-style-type: none"> <li>Dealing with hazardous chemicals</li> <li>Need for proprietary catalyst, which has a high unit cost</li> <li>Chemical consumption scales with H<sub>2</sub>S load, but to a lesser extent than for Caustic Scrubbing</li> </ul>                                                                                                                                                                                                                                                                                                                                |

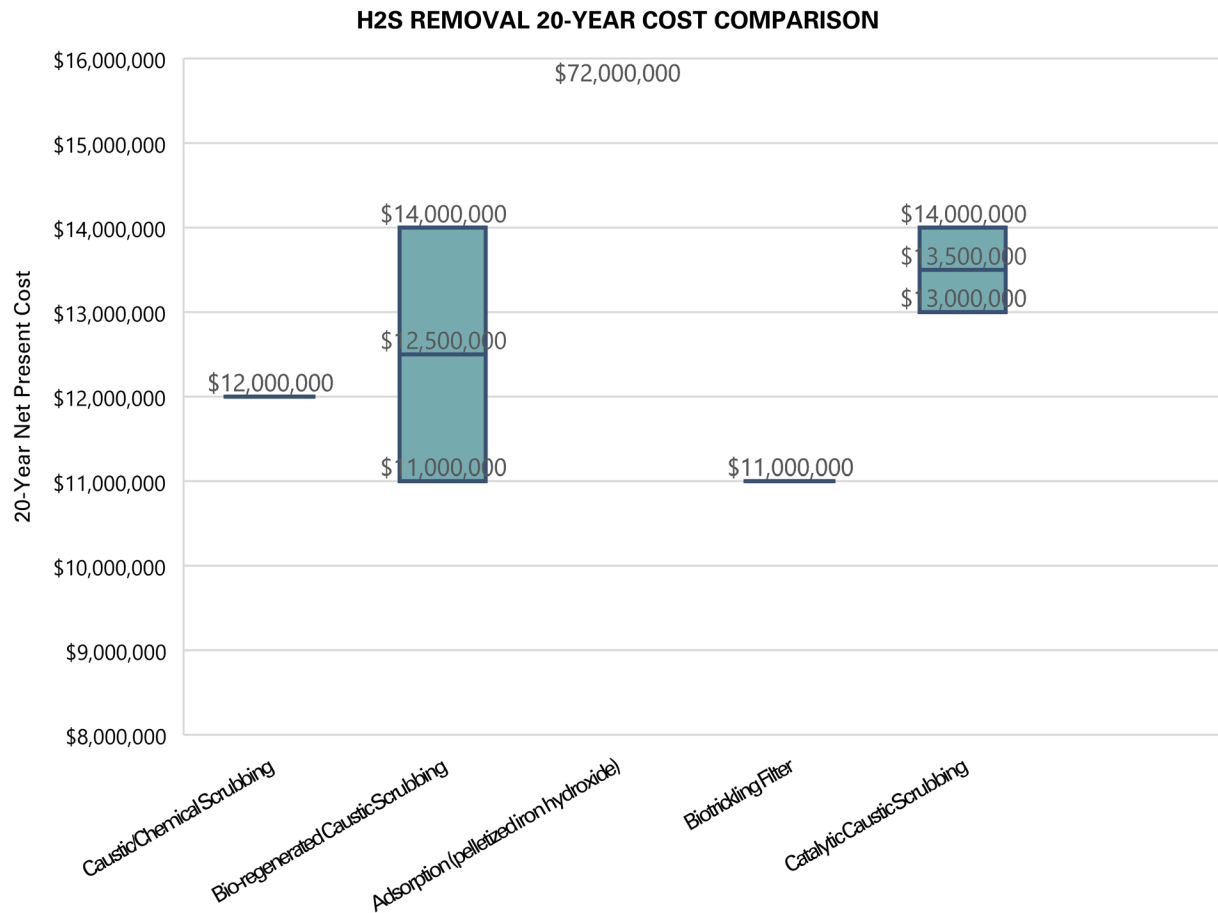
A 20-year, feasibility-level financial analysis was performed for each vendor's system to compare the costs of each alternative, taking into account the annual polisher media replacement costs, annual chemical costs, annual electricity costs, maintenance costs, and capital costs. It was assumed that the capital costs would be financed at a bond rate of 3.5% and that the discount rate (time-value of money) is 0%. Costs of non-potable or effluent water required by pretreatment alternatives and costs associated with treatment of sidestreams were assumed to be negligible. All annual costs were escalated at the Federal Reserve's long-term target inflation rate of 2.3%.

**Figure 4-1** compares the 20-year net present costs of H<sub>2</sub>S pretreatment alternatives, accounting for media replacement costs, chemical costs, energy costs, maintenance costs, capital costs, and debt service costs. For pretreatment technologies where more than one vendor provided estimates, the figure also shows the scatter in 20-year net present cost from vendor to vendor. The scatter helps provide an idea of the uncertainty in equipment costs, depending on final vendor selection. The alternative by vendor with the lowest 20-year net present cost was Biorem's Biotrickling Filter (**Appendix D**, Biorem Biogas Sweetening System Proposal). **Figure 4-2** shows that when vendor quotes are averaged by alternative, the lowest cost alternative is still BTF.

## H<sub>2</sub>S REMOVAL TECHNOLOGY, 20-YEAR NET PRESENT COST COMPARISON

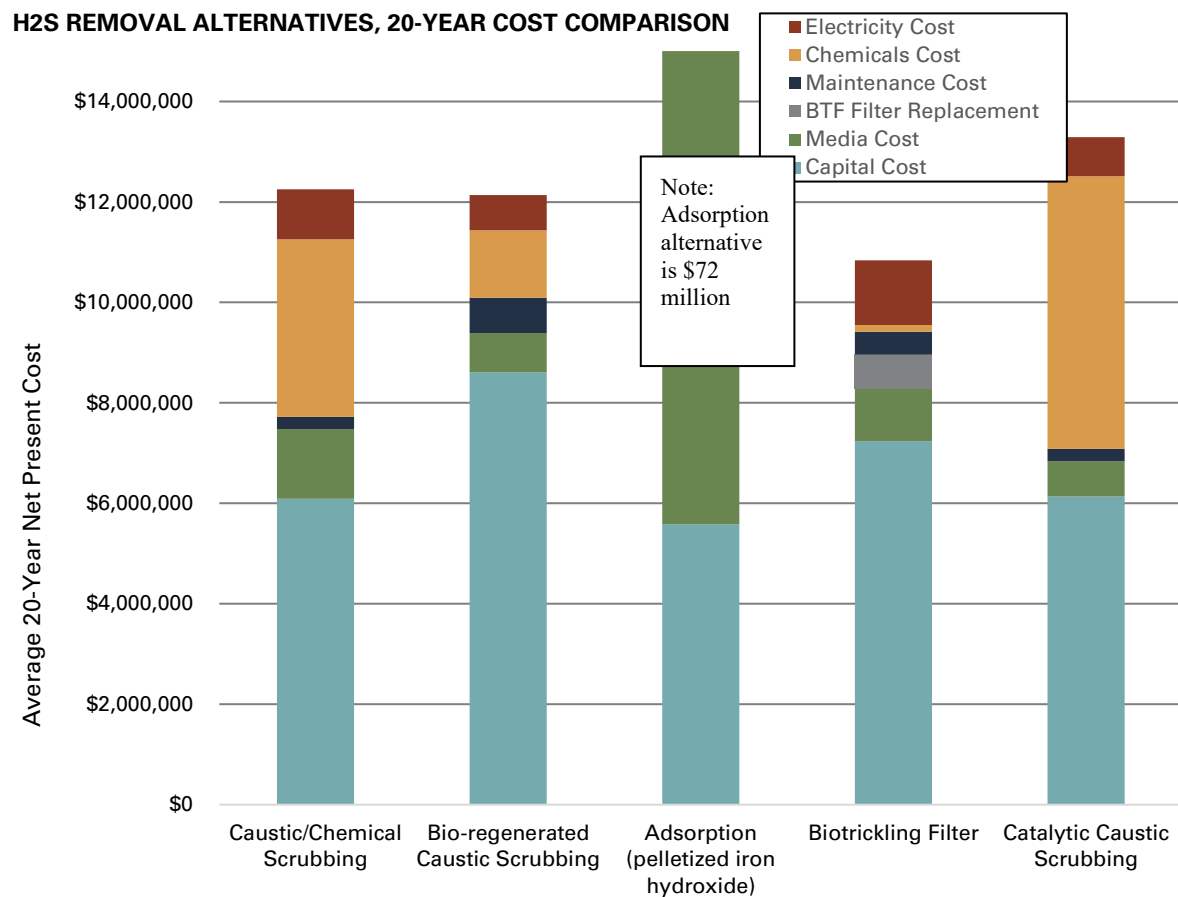


**Figure 4-1: Financial Comparison of H<sub>2</sub>S Pretreatment Alternatives and Vendors**



**Figure 4-2: Financial Comparison of H<sub>2</sub>S Pretreatment Alternatives**

The BTF alternative has the lowest annual costs, as illustrated by **Figure 4-3**, which can be attributed to its low chemical demands

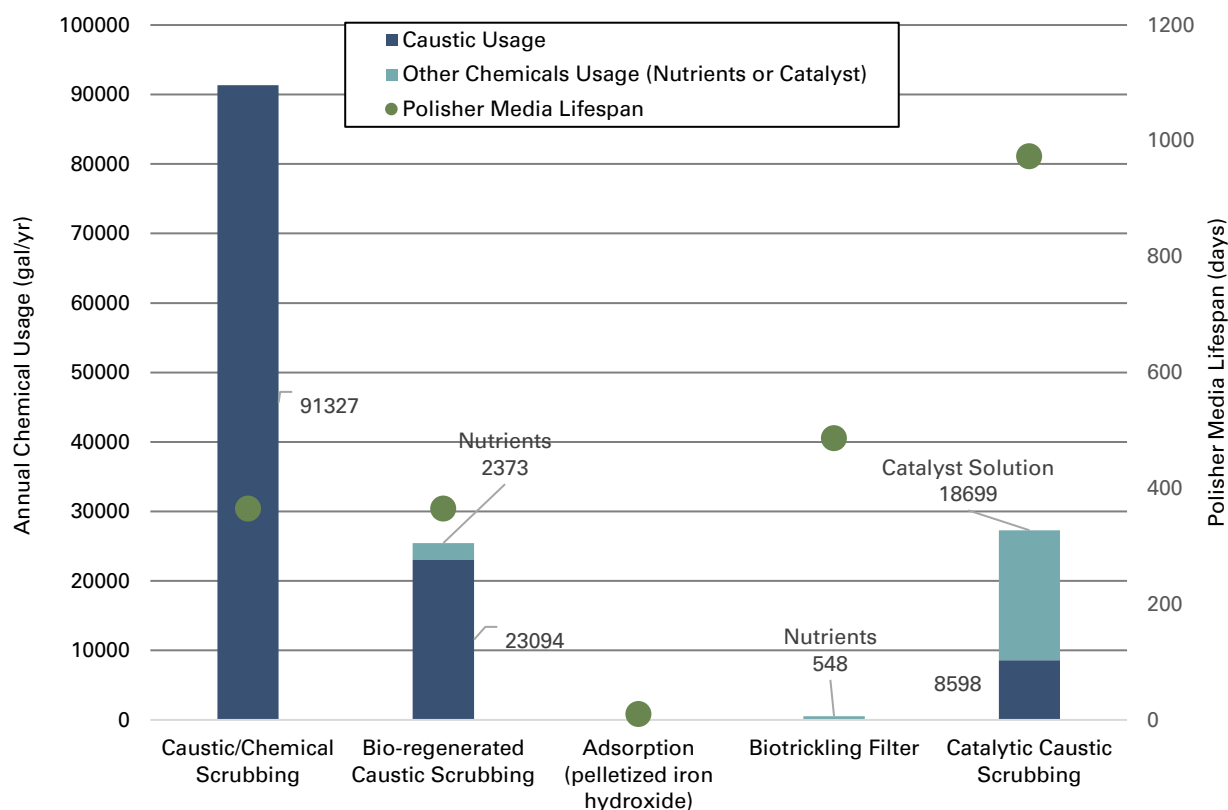


**Figure 4-3: Breakdown of Vendor-Averaged 20-year Costs for H<sub>2</sub>S Removal Alternatives**

**Note:** Capital Cost shown in figure includes equipment, preliminary construction costs, and debt service at 3.5%.

**Figure 4-4** shows that the BTF process requires the least chemicals of the financially competitive H<sub>2</sub>S pretreatment alternatives (Bio-Caustic Scrubbing, Catalytic-Caustic Scrubbing, Caustic Scrubbing, and BTF). The BTF process doesn't use caustic or any oxidant, and a relatively small amount of nutrient solution is the only chemical needed. Bio-Caustic scrubbing uses the next lowest amount of chemicals at 23,000 gal/year and 2,400 gal/year, for caustic and nutrients, respectively.

## COMPARISON OF H<sub>2</sub>S PRETREATMENT ALTERNATIVES' CONSUMABLES



**Figure 4-4: Comparison of Chemical Consumables and Estimated Polisher Lifespan by H<sub>2</sub>S Pretreatment Alternative**

### 4.1.2 Recommendation

The Biological Trickling Filter (BTF) system is recommended for bulk removal of H<sub>2</sub>S from biogas because it has the lowest overall cost, relative to the other systems evaluated, and its balance of chemical demands and qualitative, operational characteristics make it the preferred solution. BTF is the only alternative that does not use chemicals to treat H<sub>2</sub>S, which means that its annual costs do not scale linearly with H<sub>2</sub>S load. If the H<sub>2</sub>S load were to increase over time, due to increased biogas flow, for instance, the biological system would grow and respond. Chemicals, such as caustic solution, can be hazardous to plant operators and add

to operational demands. Additionally, high chemical demand has an environmental impact, which is avoided with the BTF alternative. The preliminary capital cost estimate for the recommended pretreatment system, including construction, contractor, and engineering costs, is outlined in **Appendix C H<sub>2</sub>S and Siloxane Removal Cost Estimation**.

It is recommended that the specific polishing system and its media is chosen with attention to safety and operational characteristics because exchanging the spent media of adsorption systems can be hazardous. Adsorption systems that use inert/ceramic-based medias, like iron hydroxide pellets, Sulphur-Rite, SulfaTreat, Sulfa-Bind, Soxsia, and Media-G2, are recommended as they are safer and easier to change-out than traditional, less expensive medias that use wood chips (iron sponge). Moreover, the cost differences between polishing systems should be insignificant at the low H<sub>2</sub>S load downstream of the bulk pretreatment system.

#### **4.1.2.1 Detailed Design Efforts**

The recommended Biological Trickling Filter (BTF) + Polisher system consists of three 12' diameter, 32' tall towers filled with layers of synthetic media. The three towers are in parallel with each other to achieve the desired H<sub>2</sub>S removal efficiency. The three towers are sufficient to treat 600 SCFM of biogas at 9,500 ppmv H<sub>2</sub>S and output treated biogas to the polisher at an annual average of 150 ppmv H<sub>2</sub>S. It is recommended that the design accommodate expansion, with space reserved for a fourth BTF tower. A fourth tower may be built if biogas flow increases substantially with the planned construction of digesters, and it is determined that four towers are needed to support the increased H<sub>2</sub>S load. The H<sub>2</sub>S removal system will also include three 5 HP recirculation pumps rated for 85 GPM at 100 ft head, one winterization system with electric heater, heat exchanger, and space heaters, one nutrient addition system, air addition manifold for cleaning media, three waterboxes with flow controls, control panel, and one H<sub>2</sub>S polishing (adsorption) vessel. The fixed-bed H<sub>2</sub>S adsorption vessel is 10' diameter and has 16' bed depth of media. The polishing system receives biogas from the biotrickling filter system at 150 ppmv and outlets biogas at 10 ppmv.

The BTF system will use 4,500 gallons of water per day. The water can be potable, reuse, or effluent water at 6-8 pH, but the chlorine content must be less than 2 mg/l. It was assumed that a nutrient dosing system will be used to add industrial N-P-K fertilizer to the water to achieve desired nutrient concentrations. Low pH discharge water from the BTF containing sulfuric acid will need to be piped to the plant drain or headworks for treatment.

#### **4.1.2.2 Operational Considerations**

In general, the BTF system is low maintenance; under normal, expected operations, the primary maintenance item is cleaning the media twice per year. It is highly recommended that the filters are cleaned on a regular basis, according to the manufacturer's procedures, because there can be issues with biological filters' media clogging. To clean the media, one tower is taken offline at a time, such that at least two towers are always online and removing H<sub>2</sub>S. One tower at a time is filled with water and supplied with compressed air, which cleanses elemental sulfur buildup from the filter's media. This can take between 1-4 days, depending on the specific vendor's recommendations. After cleansing is finished, the tower that was taken



offline needs to be reacclimated for 1-4 weeks before the next one is cleaned to ensure that at least two of the three towers are always performing effectively. Under current H<sub>2</sub>S loading expectations, if less than two of the biological filter towers were working, the effluent gas's heightened H<sub>2</sub>S load would exhaust the polisher's media faster than the 365 days that was estimated.

The exhaustion time of the polishing system's media was estimated to be approximately 365 days, based on biogas influent at 150 ppmv H<sub>2</sub>S. The procedure for replacement of polisher media will vary depending on the vendor. As shown in **Figure 4-5**, Unison's UNI-H<sub>2</sub>S procedure involves vaccuming spent media from the man-way holes at the top and bottom of the vessel; super-sacks of new media are held over the top man-way hole with a crane to refill the vessel. Water is used throughout the process to keep spent media cool as it exothermically reacts with oxygen in the air. Spent media needs to be spread into a layer no more than 8" thick on a concrete pad or in a heat resistant vessel to allow its exothermic reaction to complete before it may be hauled. Tools and equipment required for changeout include a vaccum truck with 6000 cfm at 27" Hg positive displacement pump, a crane, a H<sub>2</sub>S detector, cooling water, and a concrete pad or large heat resistance container.



**Figure 4-5: Left, exhausted media being removed from H<sub>2</sub>S polisher. Right, vessel being filled with new media. (Unison Solutions)**

## 4.2 Siloxane Removal System

Vendors for the two types of siloxane removal system were contacted to collect information about the systems, including electricity consumption, biogas consumption, media costs, equipment costs, and breakthrough time. Equipment is anticipated to have a 20-year useful life. Capital and annual operational costs associated with gas compression and moisture removal (chiller) were included in the siloxane removal system evaluation because dried biogas is necessary for the function of the siloxane removal systems.



Preliminary capital costs including construction costs, contingencies, and fees were estimated. The estimated capital costs for the two systems are summarized in **Table 4-3 (Appendix C, H2S and Siloxane Removal Cost Estimation)**. The capital cost of the regenerative siloxane removal system is greater than that of the non-regenerative system primarily because there are more components and equipment involved. For example, the regenerative system includes a thermal swing adsorption system, consisting of blowers, heaters, actuated valves, enclosed flare, sensors, and controls that the non-regenerative system does not. Additionally, the regenerative system includes a smaller polishing vessel downstream of it. There is not a significant construction or site work cost differential between the two systems.

**Table 4-3: Siloxane Removal Systems Capital Cost**

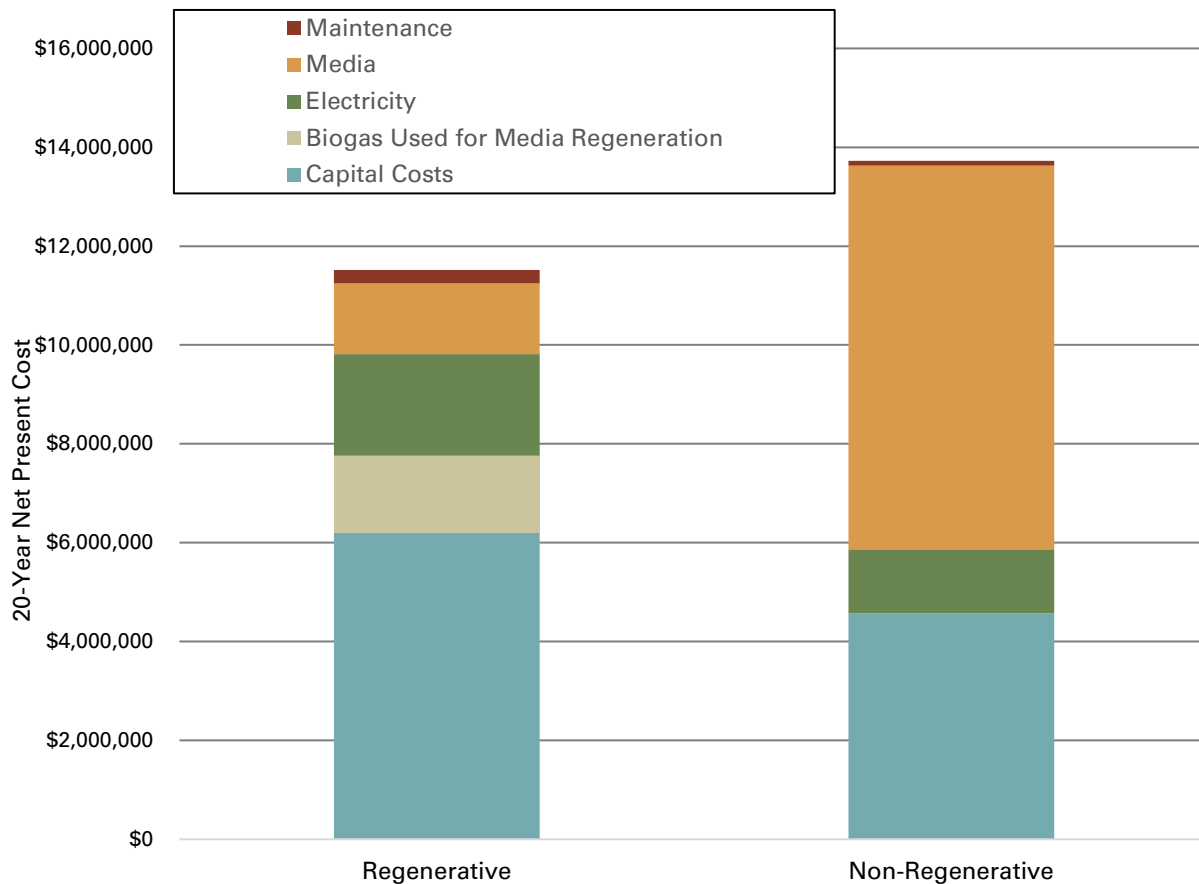
| Regenerative | Non-Regenerative |
|--------------|------------------|
| \$4,443,000  | \$3,246,000      |

## 4.2.1 Evaluation of Alternatives

The cost-benefit analysis of regenerative versus non-regenerative siloxane removal systems is heavily driven by the frequency that a non-regenerative system's activated carbon media would need to be replaced and the cost of media. An in-depth profile of HFC AWTP's biogas constituents was used to estimate the media's breakthrough time. Because activated carbon cannot selectively adsorb siloxane, it also adsorbs other compounds, like VOCs. These compounds all compete for adsorption, so the adsorption rate of each compound was taken into account to more accurately estimate the breakthrough time of the media. The breakthrough time was estimated to be 155 days for two fixed-bed vessels that are 8' diameter by 12' long (**Appendix B, Unison Proposal**). In contrast, a regenerative system composed of two vessels, each filled with 10,000 lbs of media, is anticipated to need its media changed every 18-24 months (**Appendix E, Emails regarding Regenerative Media**). The regenerative system also has a non-regenerative activated carbon vessel downstream of it to serve as a polisher. The regenerative vessels are designed to remove 95% of siloxanes and 80-90% of VOCs (**Appendix F, Emails Regarding Regenerative System Performance**), and the downstream polisher removes the rest. The polisher's media was estimated to need replacement every 18-24 months, as well.

The 20-year cost of media is much lower for the regenerative system. A regenerative system's other costs, however, are higher than those of a non-regenerative system. The capital/equipment costs are higher for a regenerative system because more equipment is necessary to desorb contaminants from its media, and there is an enclosed flare to burn off the purged gases. Regenerative systems consume more electricity than non-regenerative systems because the desorption system uses electric heating and blowers for hot air circulation. Also, for regenerative systems, there is a significant amount of lost revenue resulting from the slipstream of biogas that fuels the enclosed flare. Lost energy revenue was calculated by assuming biogas is used to fuel a CHP system, where the revenue comes from offsetting purchased electricity at \$0.06/kWh. A comparison of the breakdown of 20-year net present costs, including equipment costs, preliminary

construction costs, media costs, media regeneration costs, and energy costs, is shown in **Figure 4-6**. As shown in the figure, it was found that the net 20-year net present cost of a regenerative system is lower than that of a regenerative system by approximately \$2.2 million.



**Figure 4-6: Breakdown of 20-year Net Present Costs for Siloxane Removal Alternatives**

**Note:** Capital Cost shown in figure includes equipment, preliminary construction costs, and debt service at 3.5%.

## 4.2.2 Recommendation

A two-part system consisting of regenerative siloxane removal followed by non-regenerative polisher is recommended because it was found to have a substantially lower 20-year net present cost than the non-regenerative system, and the expected operator maintenance is lower because the media needs to be replaced much less frequently. Reduction in media replacement frequency also saves on any associated subcontracting costs for heavy machinery and operators.

The recommended regenerative siloxane removal system consists of gas compression and moisture removal, glycol chilling, regenerative siloxane reduction, an enclosed flare, and one activated carbon polishing vessel.

#### **4.2.2.1 Detailed Design Efforts**

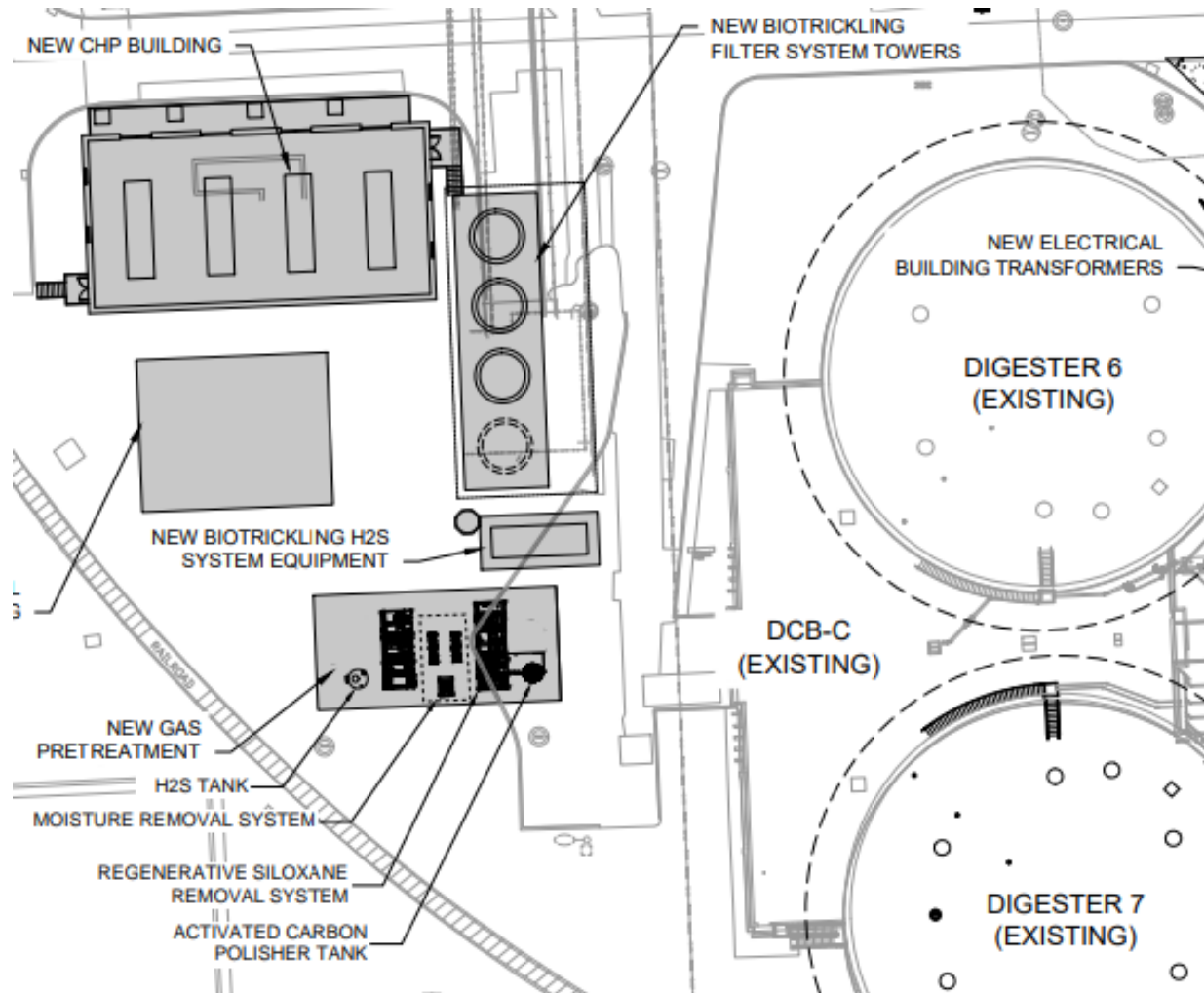
The gas compression and moisture removal system includes an inlet moisture and particulate filter that removes 99% of particulates and moisture droplets that are bigger than 3 microns, a positive displacement gas blower rated for 600 scfm, a 50 hp VFD controlled electric motor, a forced air to gas heat exchanger (plate/fin) with VFD controlled motor, a gas to glycol fin/tube core heat exchanger, a modulating valve that allows for gas recirculation, and a skid base to support the equipment.

The glycol chiller supplies cold glycol to the glycol fin/tube core heat exchanger in the moisture removal system. Its system consists of a refrigeration system with two independent R410a refrigeration circuits each sized for 50% capacity, two compressors each sized for 50% capacity, EC motor driven condenser fans, air cooled condensers, 316L stainless steel evaporators, a glycol circulation pump, dual glycol circulation pumps, steel support structures, and an industrial control panel.

The two regenerative siloxane removal vessels each hold 10,000 lbs of proprietary media. The desorption systems, which intermittently purge contaminants from the regenerative vessels' media, include a positive displacement blower, electric heater, and silicon-controlled rectifier. Desorbed gas is burned with a slipstream of biogas in the enclosed flare. The enclosed flare is a 3.75 mmBtu/hr waste gas Thermal Oxidizer. The activated carbon polishing vessel is 8' diameter with 12' of bed depth.

In addition to system components given in Sections 4.1.1 and 4.2.1, a gas conditioning control system will be needed, including UL Type 4 enclosure, thermal management (if necessary), power distribution, surge suppression, motor control, programmable logic controller, lcd display, and transformer.

**Figure 4-7** shows a preliminary footprint of biological trickling filter equipment for H<sub>2</sub>S removal and biogas conditioning equipment, which included compression, moisture removal, and regenerative siloxane removal. This preliminary footprint was developed for purposes of evaluating alternatives and is subject to change as the project progresses.



**Figure 4-7: Footprint of Biological Trickling Filter Equipment and Biogas Conditioning Equipment (including Compression, Moisture Removal and Regenerative Siloxane Removal) Relative to Digesters**

## 4.2.2.2 Operational Considerations

Biogas into and out of the siloxane removal systems will need to be periodically sampled and tested to determine if the adsorptive media has reached its breakthrough point, where siloxanes are not completely removed. Alternatively, CHP system engine oil may be tested for siloxanes to determine if siloxanes have made it past the pretreatment system and into the downstream engine that runs on the biogas. The latter method would be a lagging indicator of the media breakthrough point. Monitoring engine oil siloxane content may be a sufficient way of monitoring system performance, in this case, because the biogas siloxane level is low to moderate, and the regenerative system adsorption gradually diminishes.

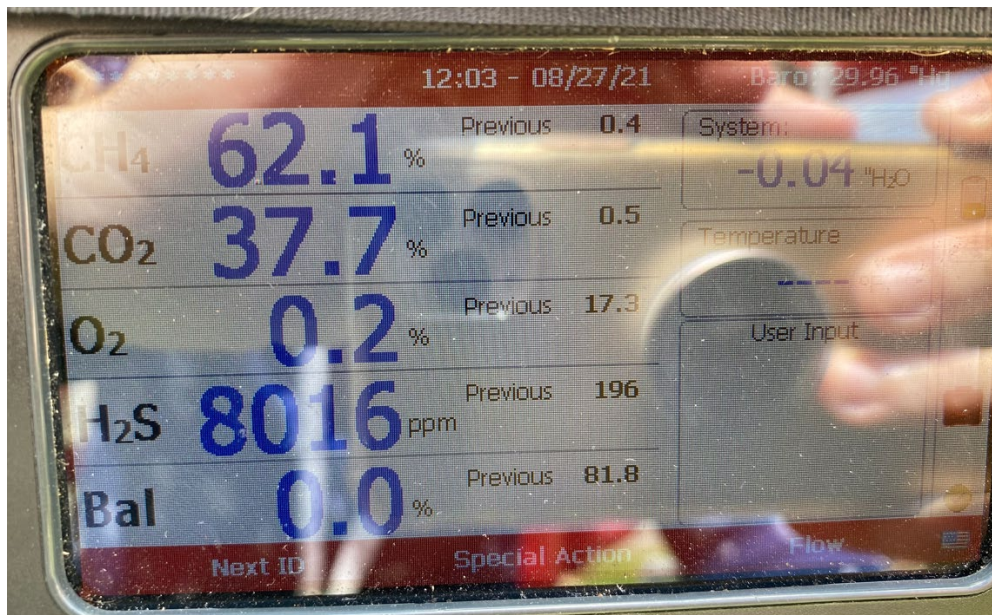
The City may consider an on-line siloxane monitoring system; however, these systems are costly and require additional maintenance and calibrations. In contrast, online H<sub>2</sub>S monitoring is recommended, so sampling for H<sub>2</sub>S is unnecessary.

## Appendix A: Biogas Handheld Tests (8/27/2021)





**Digester No. 6**



**Common Manifold Between Digester No. 2 & Digester No. 3**



## Appendix B: Unison Proposal





*Leaders in Biogas Technology*

**BUDGET PROPOSAL  
GAS CONDITIONING SYSTEM**

Date: May 16, 2022

Expires: Budgetary

Anthony Baxley

Reliable Tampa Partners – Wharton Smith

Proposal Number: PX-222-3615.1

Project Name: Tampa AWTP

Unison Solutions, Inc. is pleased to provide this **BUDGET** proposal for a Gas Conditioning System for the Tampa Bay Project. This **BUDGET** proposal includes all the CAD design services, technician labor, fabrication, and materials to construct a Gas Conditioning System.

Thank you for giving Unison Solutions the opportunity to provide you with the enclosed proposal. If you have questions or require additional information, please contact me at your convenience.

Sincerely,

Eric Wilgenbusch

Unison Solutions, Inc.

Phone: 563-585-0967

Cell: 563-543-0559

[Eric.wilgenbusch@unisonsolutions.com](mailto:Eric.wilgenbusch@unisonsolutions.com)

## **UNISON SOLUTIONS, INC. CERTIFICATIONS**

- ASME Certification Number (U-Stamp) - 37,381
- ASME Certification Number (R-Stamp) - R7415
- UL Certification Number - 20110405-E255550

## **EQUIPMENT/SUB-SYSTEMS**

### **HYDROGEN SULFIDE REMOVAL SYSTEM**

- Hydrogen Sulfide Removal Media Vessel
- Work Platform and Ladder
- Initial Charge of H<sub>2</sub>S Removal Media

### **GAS COMPRESSION/MOISTURE REMOVAL SYSTEM**

- Gas Blower Inlet Moisture/Particulate Filter
- Gas Blowers
- Dual Core Heat Exchanger
- Gas Recirculation
- Skid Base

### **GLYCOL CHILLER**

- Glycol Chiller
- Initial fill of Propylene Glycol/Water Mixture

### **SILOXANE REMOVAL SYSTEM**

- Option 1
  - Siloxane Removal Media Vessels
  - Work Platform and Ladder
  - Initial charge of Siloxane Removal Media
  - Siloxane Removal Final Particulate Filter
- Option 2
  - Regenerative Siloxane Reduction System
  - Siloxane Polishing Media Vessels
  - Work Platform and Ladder
  - Initial charge of Media
  - Siloxane Removal Final Particulate Filter

### **CONTROL SYSTEM**

- Gas Conditioning System Control Panel
- Transformer

**DESIGN CONDITIONS****SITE INFORMATION**

|                               |           |
|-------------------------------|-----------|
| - Minimum Ambient Temperature | 40°F      |
| - Maximum Ambient Temperature | 100°F     |
| - Site Elevation              | <50' AMSL |

**SYSTEM REQUIREMENTS**

|               |          |
|---------------|----------|
| - Base Flow   | 600 scfm |
| - Add on Flow | 800 scfm |

**INLET GAS CONDITIONS**

|                                              |              |
|----------------------------------------------|--------------|
| - Minimum Inlet Gas Pressure                 | 8"WC         |
| - Maximum Inlet Gas Pressure                 | 10"WC        |
| - Minimum Inlet Gas Temperature              | 90°F         |
| - Maximum Inlet Gas Temperature              | 100°F        |
| - Relative Humidity                          | 100%         |
| - Methane (CH <sub>4</sub> )                 | 50-60%       |
| - Carbon Dioxide (CO <sub>2</sub> )          | 40-50%       |
| - Nitrogen (N <sub>2</sub> )                 | trace        |
| - Oxygen (O <sub>2</sub> )                   | trace        |
| - Hydrogen Sulfide (H <sub>2</sub> S)        | < 200ppmv    |
| - Siloxanes (L2, L3, L4, L5, D3, D4, D5, D6) | per gas test |
| - Volatile Organic Compounds                 | per gas test |

**DISCHARGE GAS CONDITIONS**

|                             |                          |
|-----------------------------|--------------------------|
| - Discharge Gas Pressure    | 5.0 psig                 |
| - Discharge Gas Temperature | 80°F                     |
| - Dew Point Temperature     | 40°F                     |
| - Maximum Hydrogen Sulfide  | 10 ppmv                  |
| - Maximum Siloxane          | 100 ppbv                 |
| - Particulate Removal       | 99% removal of >3 micron |

**SITE REQUIREMENTS****ELECTRICAL CLASSIFICATION**

- NEC Class I, Division 1 Group D Areas
  - Hydrogen Sulfide Removal System
  - Gas Compression/Moisture Removal System
  - Siloxane Removal System
- Unclassified Electrical Areas
  - Glycol Chiller
  - Gas Conditioning System Control Panel
  - Transformer

**EQUIPMENT MOUNTING**

- Skid Mounted
  - Gas Compression/Moisture Removal System
- Standalone
  - Hydrogen Sulfide Removal System
  - Glycol Chiller
  - Siloxane Removal System
  - Gas Conditioning System Control Panel
  - Transformer

**EQUIPMENT/SUB-SYSTEM DETAILS****HYDROGEN SULFIDE REMOVAL SYSTEM**

- Hydrogen Sulfide Removal Media Vessel(s)
  - Media Vessels
    - Option A: (1) 10'Ø x 16' Straight Side rated for 600scfm
    - Option B: (2) 10'Ø x 16' Straight Side rated for 800scfm
    - Option C: (2) 12'Ø x 17' Straight Side rated for 800scfm
  - Rated for 5psig pressure and 1psig vacuum
  - Materials of construction shall be 304L stainless steel
  - 150# ANSI B16.5 side inlet and outlet connections
  - Flanged and dished top and bottom heads
  - Vessels shall be free-standing on four 304L stainless steel legs
  - Vessels equipped with a top manway
  - Vessels equipped with a side manway
  - Internal supports and grating for media

- Pressure/Vacuum relief valves included
- Two top vents with stainless steel ball valves
- Bottom manual condensate drain with stainless steel ball valves
- Parallel piping and valves between Hydrogen Sulfide Removal Vessels will be provided.
- Work Platform and Ladder
  - Work platform shall be welded carbon steel construction with satin black powder coat finish
  - Ladder shall be aluminum construction
- Initial Charge of Media
  - The initial charge of pelletized iron hydroxide media for each Hydrogen Sulfide Removal Media Vessel will be provided.
  - Media to be loaded into Hydrogen Sulfide Removal Vessels by INSTALLATION CONTRACTOR

#### GAS COMPRESSION/MOISTURE REMOVAL SYSTEM

- Gas Blower Inlet Moisture/Particulate Filter
  - Mounted upstream of the Gas Blower(s)
  - 99% removal of 3micron and larger particulates and liquid droplets
  - Materials of construction shall be 304L stainless steel
  - 150# ANSI B16.5 side inlet and outlet connections
  - Cleanable polypropylene structured mesh element
  - Differential pressure gauge across the filter element
  - Float operated gauge for liquid level indication
  - Level switches above the condensate drains for control and to warn of failure
  - Bottom drain with strainer, condensate pump, check valve, manual bypass and piping
- Gas Blower(s)
  - Rotary Lobe Positive Displacement Blower(s)
  - Belt driven 480V/3Ph/60Hz EXP electric motor
    - Option D: (1) 30HP Motor rated for 600scfm
    - Option E: (2) 40HP Motor rated for 800scfm
  - Motor speed will be controlled by a VFD
  - Cast iron casing
  - Inlet and discharge flex connectors
  - Inlet and discharge isolation valves
  - Discharge silencer
  - Discharge check valve
  - Discharge pressure safety valve
  - Belt guard

- Dual Core Heat Exchanger

- Stage 1 - Gas to gas plate/fin core
  - Materials of constructions shall be aluminum plate and fins
- Stage 2 - Gas to glycol fin/tube core
  - Materials of construction shall be aluminum fins on 304L stainless steel tubes
- Mounted in single 304 stainless steel housing
- 150# ANSI B16.5 inlet and outlet connections
- All condensation generated during cooling will be removed inside the heat exchanger housing
- Level switch mounted on the housing to warn of drain failure
- RTD mounted on the housing to verify the coldest temperature that the gas reaches
- Bottom drain with strainer, float drain, manual bypass and piping

- Gas Recirculation

- Modulating Valve shall be provided to allow excess gas to flow from the discharge of the system back to the inlet. This valve shall be controlled by monitoring the delivery pressure of the system.
  - Butterfly valves shall be lug style, iron body with stainless steel disc and stem and FKM seat.
  - Type 7 explosion proof actuator
  - 120V weatherproof

- Skid Base

- Welded carbon steel construction with satin black powder coat finish
- All components mounted, piped and wired on skid base
- 24V and 120V electrical components wired to one of two junction boxes on edge of skid
- INSTALLATION CONTRACTOR to provide conduit and wiring to 480V components
- Conduit shall be rigid aluminum
- Condensate drains piped to edge of the skid base. Drains to be routed to floor drain by INSTALLATION CONTRACTOR.

## GLYCOL CHILLER

- Glycol Chiller (same for Options D &E)
  - Sized for the process heat load
  - Suitable for outdoor installation
  - Refrigeration System
    - Two independent refrigeration circuits sized for 50% capacity each
    - Two compressors sized for 50% capacity each
    - Chiller capacity: 25% to 100% of rated capacity
    - EC motor driven condenser fans
    - Aluminum micro-channel air cooled condensers
    - 316L stainless steel evaporators
    - R410a refrigerant. R-410a is an HFC refrigerant with 0 ODP
    - Refrigeration circuit has sealed core filter drier, liquid line solenoid valve, liquid line shut-off valve, and sight glass/moisture indicator
    - Electronic expansion valve, one per refrigeration circuit
    - Glycol Chiller shall be factory tested and shipped with complete refrigerant charge
  - Glycol Circulation
    - Dual glycol circulation pumps sized for 100% capacity
    - Stainless steel end suction centrifugal pumps
    - TEFC Pump Motors
    - Pump isolation valves on inlet and outlet
    - Pump discharge check valves
    - Glycol reservoir is a 304 stainless steel closed tank
    - Glycol piping is copper with anti-corrosion coating
    - Armaflex insulation
    - Glycol Chiller to utilize propylene glycol/water mix
    - Initial fill of Propylene glycol will be provided
  - Support Structure
    - G90 galvanized steel member frame
    - Powder-coated aluminum cover panels
    - All components mounted, piped, and wired on skid
  - Glycol Chiller Control Panel
    - UL Type 4
    - UL 508A Listed Industrial Control Panel
    - Painted carbon steel
    - 480V/3Ph/60Hz feed will be required
    - 480V disconnect
    - Microprocessor based controller with full text LCD display
    - 480VAC to 24VAC transformer

## SILOXANE REMOVAL SYSTEM

- Fixed Bed Media System
  - Media Vessels
    - Option F: (2) 6'Ø x 8' Straight Side Vessel rated for 600scfm
    - Option G: (2) 8'Ø x 12' Straight Side Vessel rated for 800scfm
  - Materials of construction shall be 304L stainless steel
  - 150# ANSI B16.5 inlet and outlet connections
  - Flanged and dished top and bottom heads
  - Vessels shall be free-standing on four 304L stainless steel legs
  - Elliptical access nozzle on top of each vessel
  - Internal septas for even gas distribution through media
  - Pressure relief valves included
  - Bottom manual condensate drain with stainless steel ball valves
  - Test/purge ports with ball valves on the inlet and outlet of each Siloxane Removal Media Vessel
  - Lead/Lag piping and valves between Siloxane Removal Media Vessels will be provided
- Work Platform and Ladder
  - Work Platform shall be welded carbon steel construction with satin black powder coat finish
  - Ladder shall be aluminum construction
- Initial charge of Siloxane Removal Media
  - The initial charge of siloxane removal media for each Siloxane Removal Media Vessel will be provided.
  - The media shall be specifically engineered for removal of siloxanes and similar contaminants from landfill and digester gas sources.
  - Siloxane media to be loaded into the Siloxane Removal Media Vessels by the INSTALLATION CONTRACTOR.
  - Initial charge of media consists of 15, 1,100-pound super sacks of media per vessel for a total of 33,000 pounds of media
- Siloxane Removal Final Particulate Filter
  - Mounted downstream of the Siloxane Removal Vessels
  - 99% removal of 3micron and larger particulates and liquid droplets
  - Materials of construction shall be 304L stainless steel
  - 150# ANSI B16.5 side inlet and outlet connections
  - Cleanable polypropylene structured mesh element
  - Differential pressure gauge across the filter element
  - Float operated gauge for liquid level indication
  - Bottom drain on vessel with manual ball valve



- Option 2 – Regenerative Siloxane Reduction System
  - Siloxane Reduction Vessels with processing piping manifolds rated for up to 1,000scfm, Vessels are Skid mounted
  - Regeneration System included PD Blower, Electric Heater, Silicon Controlled Rectifier
  - Polishing Vessels
    - Option H: (1) 8'Ø x 12' Straight Side Vessel
    - Option I: (2) 8'Ø x 12' Straight Side Vessels

## CONTROL SYSTEM

- Gas Conditioning System Control Panel
  - Enclosure
    - UL Type 4
    - UL 508A Listed Industrial Control Panel
    - Painted carbon steel
    - Indoor location
  - Thermal Management (*as necessary*)
    - Rated for installation in ambient temperatures from 40°F to 104°F
  - Power Distribution
    - Fused Disconnect
    - 480V/3Ph/60Hz feed required
    - 35kA Short Circuit Current Rating
    - Over current and branch circuit protection via fuses
    - 480VAC field wiring to terminate at the component or terminal strips inside control panel
  - Surge Suppression
    - 480VAC Transient Voltage Surge Suppressor
    - 120VAC Surge Filter
  - Motor Control
    - Option D: (1) 30HP Motor
    - Option E: (2) 40 HP Motor
    - (1) ½ Hp rated Motor Starter Overload for Condensate Pump
  - Programmable Logic Controller
    - Allen Bradley
    - Compact Logix PLC and I/O
    - Native Allen Bradley Ethernet IP data network
  - Human Machine Interface
    - Proface PFXGP4601TAD
    - TFT Color LCD Display
    - 12" diagonal
    - 800 x 600 pixels
  - Transformer
    - 3 kVA
    - 480VAC to 120VAC
    - NEMA 3R; Painted carbon steel
  - Instrument wiring to terminate at terminal strips inside Control Panel

## INSTRUMENTATION

- All instrumentation provided will be designed for gas service and rated for use in a NEC Class I, Division 1 Group D area.
- Hydrogen Sulfide Removal System Instrumentation
  - Inlet Pressure Transmitter
- Gas Compression/Moisture Removal System Instrumentation
  - Inlet Pressure Transmitter
  - Level Switches at each Condensate Drain
  - Level Indicators at each Condensate Drain
  - RTD's (3 Wire-100Ω) at each Temperature Change Point
  - RTD (3 Wire-100Ω) to Monitor Glycol Temperature
  - Bi-metal Thermometers at each Temperature Change Point
  - Gas Blower Header Discharge Pressure Transmitter
- Siloxane Removal System Instrumentation
  - Delivery Pressure Transmitter

## PIPING

- Pipe will be SA-312 TP304/304L Weld Pipe, minimum Schedule 10S. Threaded pipe shall be minimum Schedule 40S.
- Flange connections will be ANSI B16.5, SA-182 F304/304L Class 150.
- Pipe welding will follow ASME B31.3 Process Piping. Welded pipe will be visually inspected and pressure tested.
- Gaskets will be 1/16" nitrile bound non-asbestos ring gaskets.

## VALVES

- Ball Valves
  - Stainless steel with PTFE or RTFE seat.
  - Valves will be full port.
- Butterfly Valves
  - Lug style iron body with stainless steel disc and stem and FKM seat.
- Check Valves
  - Will be one of 2 styles; ball or dual-door.
    - Ball check valves shall be stainless steel with RTFE ball.
    - Dual-door check valves shall be wafer style body, material shall be aluminum and/or stainless steel with an FKM seat.
- Globe Valves
  - Stainless steel with PTFE packing

## FASTENERS

- Fasteners shall be ASTM F593 304 Stainless Steel

**SUBMITTALS**

- Quantity: (3) copies of 3 ring binders and (1) electronic copy
- Shop Drawings and Product Data will be provided in sufficient detail to confirm compliance with the requirements for the project. Shop Drawings and Product Data will be provided in a complete submittal package.
- Shop Drawings
  - Installation drawings and specifically prepared technical data, including design capacities will be provided.
  - Specifically prepared wiring diagrams unless standard wiring diagrams are submitted with product data will be provided.
  - Written description of operation will be provided.
- Product Data
  - Catalog cuts and product specifications for each product specified will be provided.
  - Standard wiring diagrams unless wiring diagrams are specifically prepared and submitted with Shop Drawings will be provided.

**FACTORY TESTING**

- The Compression/Moisture Removal System will be tested on ambient air at Unison's facility.
- Media removal vessels will be hydrotested prior to shipment and will not be included in the Factory Testing.
- The CUSTOMER can witness the testing and Unison will inform the customer (2) weeks prior to anticipated testing date so customer can make travel arrangements.
- Leak Detection will utilize a Fluke ii900 Sonic Industrial Imager

**OPERATION & MAINTENANCE MANUALS**

- Quantity: (3) copies of 3 ring binders and (1) electronic copy
- After shipment, the Gas Conditioning System will be provided with a specifically prepared Operation & Maintenance Manual. The information provided includes a system overview, operator interface, start-up/shut down procedures, communications, alarms procedures, maintenance overview, mechanical component spec sheets and electrical component spec sheets.

**MAINTENANCE**

| Maintenance                                         |                    |                    |                         |
|-----------------------------------------------------|--------------------|--------------------|-------------------------|
|                                                     | Option A – 600scfm | Option B – 800scfm | Option C – 800scfm      |
| H2S Removal Vessel Size                             | (1) 10'Ø x 16'SS   | (2) 10' x 16'SS    | (2) x 12'Ø x 17'SS      |
| H2S Removal Media (lbs/vessel)                      | 37,400             | 37,400             | 55,000                  |
| Days to media exhaustion/vessel<br>(200ppmv of H2S) | 363                | 272                | 401                     |
| Media & Foam Pad/Vessel - Cost                      | \$54,000.00        | \$54,000.00        | \$80,000.0              |
|                                                     | Option F – 600scfm | Option G – 800scfm | Option H&I – 800scfm    |
| Siloxane Removal Vessel Size                        | (2) 6'Ø x 8'SS     | (2) 8'Ø x 12'SS    | (1) or (2) 8'x12'SS     |
| Siloxane Removal Media (lbs/system)                 | 13,200             | 33,000             | 11,00 or 22,000         |
| Days to break through for system                    | 83                 | 155                | TBD*                    |
| Media per system – Cost                             | \$52,000.00        | \$132,000.00       | \$44,000 or \$88,000.00 |

- SS refers to vessel straight side

- H2S media life assumes 100% saturated gas, at a minimum of 90°F, with no free moisture

- labor for change out, disposal and shipping of media not included, cost is subject to change without notice

\*No media life is included for polishing vessels downstream of the regenerative siloxane reduction system

**ELECTRICAL PARASITIC**

| Estimated Electrical Parasitic      |                    |       |                    |       |                      |      |
|-------------------------------------|--------------------|-------|--------------------|-------|----------------------|------|
|                                     | Option D – 600scfm |       | Option E - 800scfm |       | Option H&I - 800scfm |      |
|                                     | HP                 | kW    | HP                 | kW    |                      | kW   |
| Blower                              | 30                 | 33.2  | 40 HP              | 43.1  |                      |      |
| Condensate Pump                     | ½                  | 1.1   | ½                  | 1.1   |                      |      |
| Chiller                             |                    | 62.4  |                    | 62.4  |                      |      |
| Controls & Aux Equip                |                    | 6.2   |                    | 6.2   |                      |      |
| Regenerative Siloxane System Blower |                    |       |                    |       | 20                   | 22.4 |
| Regenerative Siloxane Heater        |                    |       |                    |       |                      | 75   |
| Total                               |                    | 102.9 |                    | 112.8 |                      | 97.4 |

- kW values are calculated using motor amperage data from Table 50.1 of UL 508A

**DELIVERY SCHEDULE**

- Submittals delivered **4 to 6** weeks after order acceptance
- Equipment delivery is subject to confirmation at the time of order placement and/or submittal approval

**PRICING SUMMARY**

- Price includes all labor and expenses associated with the fabrication of the system.
- Prices do not reflect any taxes that may be applicable and are valid for 30 days.
- Price is FCA; Factory, Dubuque, IA 52002, per Incoterms 2010. Shipping costs not included, see estimate below
- Price does not include Start-up and Commissioning. Costs are shown below
- Prices are in US Dollars
- Media Escalation: Media pricing is directly influenced by US imposed tariffs. Unison may adjust pricing for the media provided should there be future tariffs assigned to this product.

**BUDGET Hydrogen Sulfide Removal System**

|                                                           |              |
|-----------------------------------------------------------|--------------|
| Option A: Rated for 600scfm (1) 10'Ø x 16'SS Vessel ..... | \$275,000.00 |
| Option B: Rated for 800scfm (2) 10'Ø x 16'SS Vessels..... | \$576,250.00 |
| Option C: Rated for 800scfm (2) 12'Ø x 16'SS Vessels..... | \$671,450.00 |

**BUDGET Gas Compression/Moisture Removal System**

|                                   |              |
|-----------------------------------|--------------|
| Option D: Rated for 600scfm ..... | \$592,350.00 |
| Option E: Rated for 800scfm.....  | \$640,000.00 |

**BUDGET Siloxane Removal System**

|                                                                              |                |
|------------------------------------------------------------------------------|----------------|
| - Option F: Rated for 600scfm (2) 6'Ø x 8' Vessels .....                     | \$235,300.00   |
| - Option G: Rated for 800scfm (2) 8'Ø x 12' Vessels.....                     | \$382,000.00   |
| - Option H: Regenerative (1) Polishing Vessel .....                          | \$920,000.00   |
| - Option I: Regenerative (2) Polishing Vessels .....                         | \$1,100,000.00 |
| - Regenerative Siloxane Reduction System rated up to 1,000scfm               |                |
| - Polishing vessel(s) are 8'Ø x 8' straight side                             |                |
| - Regenerative system pricing does not include thermal oxidizer if necessary |                |

Shipping **ESTIMATE** to Tampa, FL .....To be determined

Start-up and Commissioning Services **ESTIMATE** ..... \$15,500.00

Price includes Four (4) consecutive, 8-hour days, for one Unison Technician onsite with travel and expenses included. Additional days may be necessary to complete start-up and commissioning, they will be billed to the Buyer/Owner/End User at the cost of \$2,000 per day, per technician, plus travel & expenses.

**PAYMENT SCHEDULE**

- 30% upon order acceptance
- 30% at midpoint of construction
- 30% upon equipment delivery
- 10% upon site acceptance not to exceed 180 days from shipment
- Net 30 days on all payments
- Payment by Credit Card is NOT accepted (for equipment)

**PROVIDED BY OTHERS**

- VPN connection for remote access to Unison supplied equipment for troubleshooting and remote assistance.

**PRICE DOES NOT INCLUDE**

- Shipping of equipment to jobsite, in equipment pricing
- Start-up and commissioning services, in equipment pricing
- Wind or seismic calculations for all equipment
- Any maintenance work after start-up
- H<sub>2</sub>S or Siloxane removal media after initial fill
- Performance guarantee or service/maintenance contract
- Any gas testing or analyses
- Bonds of any kind
- Liquidated & Actual Damages are the sole financial responsibility of purchasing contractor
- Permitting for the installation of the equipment or air permits
- Freeze protection; including insulation and/or heat trace and heat trace power
- Pipe stands for field piping
- Anchor bolts
- Compliance with the American Iron & Steel Act, as Gas Conditioning equipment is exempt
- Thermal Oxidizer for Regenerative Siloxane Reduction System

**ASSUMPTIONS****VESSELS & MEDIA**

- H<sub>2</sub>S and VOC's present in the gas will foul Siloxane media, additional gas testing will be necessary to finalize all vessel and media requirements, budget pricing is dependent on gas data given at the time of the proposal.
- Any assumption of media life that has been given is an estimate; additional gas testing will be required at the Buyer/Owner/End Users expense.
- Vessel sizes are estimates only, gas testing will be necessary to finalize all vessel sizing.
- Media Escalation: Media pricing is directly influenced by US imposed tariffs. Unison may adjust pricing for the media provided should there be future tariffs assigned to this product.
- Thermal Oxidizer may be necessary for Regenerative Siloxane Reduction System, but is not included in the scope of supply.

## MECHANICAL

- Flare is supplied by OTHERS
- If an existing flare is being used, it is assumed this flare is in good working order, with all safety and control equipment.
- Foundations and/or maintenance pads are designed by OTHERS to properly support the equipment.
- Gas conditioning/compression system may have heat rejection associated with cooling of the biogas/oil systems. Buyer/Owner/End Users are responsible for verifying heat load and providing proper ventilation if the unit is installed indoors.
- Factory Testing is done for Compression/Moisture Removal Systems only. It is assumed that all equipment required, but not supplied by Unison, for Factory Testing will be supplied to Unison Solutions testing. This includes, but is not limited to motors, blowers, chillers, VFDs/motor starters, and control panels. Shipping expenses involved with supplying this equipment to Unison will be paid by others.

## ELECTRICAL

- 480V/3Ph/60Hz is available
- No historical data acquisition is included in this proposal

## **INSTALLATION CONTRACTOR RESPONSIBILITIES**

- Installation responsibilities are broken out below into three categories to outline the work; these responsibilities by no means fall on any single contractor or individual. It is the responsibility of the Buyer/Owner/End User to ensure all these conditions are adhered to, as necessary. It is responsibility of the Buyer/Owner/End User to install all equipment in compliance with local and national codes applicable to the installation site.

## BUYER/OWNER/END USER RESPONSIBILITIES

- All foundations and/or maintenance pads as necessary for equipment
- Provide and seal all roof and building penetrations as necessary
- Provide all anchor bolts, temporary lift equipment, power, labor, and all other incidentals required for proper installation of the equipment shown on the drawings that will be provided by Unison Solutions, Inc.
- All rigging and setting of equipment at job site
- Proper storage of the equipment and media prior to installation
- Provide installation of Equipment/Sub-systems per the Unison Solutions Installation Guide
- Load initial charge of Hydrogen Sulfide Media and Siloxane Media into the vessel(s)

## MECHANICAL CONTRACTOR RESPONSIBILITIES

- Provide all field piping between the Equipment/Sub-systems, including but not limited to:
  - Hydrogen Sulfide Removal System
  - Gas Compression/Moisture Removal System

- Glycol Chiller
- Siloxane Removal System
- Provide pipe supports as necessary. Piping shall be self-supporting, and not supported off of the Unison supplied equipment.
- Install all field located or shipped loose devices
- Provide all Heat Trace and/or Insulation as necessary to provide proper freeze protection as defined by Unison Solutions.

#### ELECTRICAL CONTRACTOR RESPONSIBILITIES

- Provide 480V/3Ph/60Hz feed to the Gas Conditioning System Control Panel and Glycol Chiller.
- Provide all field wiring and conduits between the Equipment/Sub-systems to the Gas Conditioning Control Panel and associated equipment. This includes but not limited to:
  - Hydrogen Sulfide Removal System
  - Gas Compression/Moisture Removal System
  - Glycol Chiller
  - Siloxane Removal System
  - Gas Conditioning System Control Panel
  - Transformer
- Provide local disconnects as necessary
- Provide all Hazardous location conduits & wiring systems per Article 500 of the NEC
- Provide conduit seals entering and/or leaving the Class I, Division 1 Electrical Area. Conduit seals will need to be filled during Start-up and Commissioning after verification of field wiring by Unison's Start-up Technician. Conduit seals are to be filled prior to the introduction of gas to the equipment.
- Provide heat trace power from local lighting panel, as necessary.

#### **WARRANTY**

- Unison Solutions, Inc. will warrant all workmanship and materials in conformance with the attached Warranty Statement. Warranty is valid for **18** months from the time the equipment is ready to ship from Unison's factory or **12** months from the date of startup, whichever occurs first.
- This proposal is for product design and equipment manufacturing only and does not include any site or consultative engineering services expressed or implied.
- Unison Solutions, Inc. will not release the PLC program for this system. This is considered proprietary and the intellectual property of Unison Solutions, Inc.





## **WARRANTY STATEMENT**

Unison Solutions, Inc. (Unison) is committed to providing quality products and services to its customers. As a demonstration of this commitment, Unison offers the following warranty on its products.

**Grant of Warranty:** Unison provides this warranty for its equipment under the terms and conditions which are detailed herein. This warranty is granted to the person, corporation, organization, or legal entity (Owner), which owns the equipment on date of start-up. This warranty applies to the owner during the warranty period, and is not transferable.

**Warranty Coverage:** Equipment that is determined by Unison to have malfunctioned during the warranty period under normal use solely as a result of defects in manufacturing workmanship or materials shall be repaired or replaced at Unison's option. Unison's liability under this warranty to the Owner shall be limited to Unison's decision to repair or replace, at its factory or in the field, items deemed defective after inspection at the factory or in the field.

**Warranty Exclusions:** All equipment, parts and work not manufactured or performed by Unison carry their own manufacturer's warranty and are not covered by this warranty. Unison's warranty does not override, extend, displace or limit those warranties. Unison's only obligation regarding equipment, parts and work manufactured or performed by others shall be to assign to the Owner whatever warranty Unison receives from the original manufacturer. Unison does not warrant its products from malfunction or failure due to shipping or storage damage, deterioration due to exposure to the elements, vandalism, accidents, power disturbances, or acts of nature or God. This warranty does not cover damage due to misapplication, abuse, neglect, misuse, improper installation, or lack of proper service and/or maintenance, nor does it cover normal wear and tear. This warranty does not apply to modifications not specifically authorized in writing by Unison or to parts and labor for repairs not made by Unison or an authorized warranty service provider. This warranty does not cover incidental or consequential damages or expenses incurred by the Owner or any other party resulting from the order, and/or use of its equipment, whether arising from breach of warranty, non-conformity to order specifications, delay in delivery, or any loss sustained by the Owner. No agent or employee of Unison has any authority to make verbal representations or warranties of any goods manufactured and sold by Unison without the written authorization signed by an authorized officer of Unison. Unison warrants the equipment designed and fabricated to perform in accordance with the specifications as stated in the proposal for the equipment and while the equipment is properly operated within the site specific design limits for that equipment. Any alterations or repair of Unison's equipment by personnel other than those directly employed by, or authorized by Unison shall void the warranty unless otherwise stated under specific written guidelines issued by Unison to the Owner. This warranty does not cover corrosion or premature wear or failure of components resulting from the effects caused by siloxanes, hydrogen sulfide or volatile organic compounds in excess of the design limits. All media must be purchased through Unison Solutions or approved in writing by Unison Solutions during warranty period. Media purchased through alternate sources and not approved in writing by Unison shall void the warranty. The design limit is based on site specific gas data provided by the Owner prior to the proposal for the equipment. Owner shall be responsible for all maintenance services, including, but not limited to, lubricating and cleaning the equipment, inspecting and replacing expendable parts (i.e., gas separation membranes), media replacement, making minor adjustments and performing operating checks, all in accordance with the procedures outlined in Unison's maintenance literature. Unison does not warrant the future availability of expendable maintenance items.

**Warranty Period:** This Unison warranty is valid for 18 months from the time the equipment is shipped from Unison's factory or 12 months from the date of startup, whichever occurs first.

**Repairs During Warranty Period:** All warranty claim requests must be initiated in writing for processing and tracking purposes. Written authorization shall be issued to the Owner upon claim approval and/or field inspection. When field service is deemed necessary in order to determine a warranty claim, the costs associated with travel, lodging, etc. shall be the responsibility of the Owner except under prior agreement for a field inspection. This warranty does not include reimbursement of any costs for shipping the equipment or parts to Unison or an authorized service establishment, or for labor and/or materials required for removal or reinstallation of equipment or parts in connection with a warranty repair. This warranty covers only those repairs that have been conducted by Unison or by a Unison authorized warranty service provider, or by someone specifically authorized by Unison to perform a particular repair or service activity. All component parts replaced under the terms of this warranty shall become the property of Unison.

**UNISON ASSUMES NO OTHER WARRANTY FOR ITS EQUIPMENT, EITHER EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR NONINFRINGEMENT, OR LIABILITY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGE.**

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## Appendix C: H<sub>2</sub>S and Siloxane Removal Cost Estimation

# Howard F. Curren AWTP Master Plan Improvements Design Amendment No. 2

Contract No. 20-C-00001



## Task 306 Biogas Pre-Treatment System Evaluation Siloxane Removal Cost Estimation

Prepared by Reliable Tampa Partners

Issued August 15, 2022



**RELIABLE**  
**TAMPA PARTNERS**  
THE HOMETOWN TEAM

## PRELIMINARY COST ESTIMATION

| Description                              | Option 1<br>Biological Tricking Filter | Option A<br>Non-Regenerative<br>Siloxane | Option B<br>Regenerative<br>Siloxane |
|------------------------------------------|----------------------------------------|------------------------------------------|--------------------------------------|
| <b>General Conditions</b>                | \$ 366,820.80                          | \$ 231,289.50                            | \$ 316,849.50                        |
| <b>Cost of Construction</b>              | \$ 3,056,840.00                        | \$ 1,927,412.50                          | \$ 2,640,412.50                      |
| <b>Site &amp; Civil</b>                  | \$ 75,240.00                           | \$ 35,887.50                             | \$ 35,887.50                         |
| Site Preparation and Maintenance         | \$ 36,600.00                           | \$ 17,062.50                             | \$ 17,062.50                         |
| Site Restoration                         | \$ 38,640.00                           | \$ 18,825.00                             | \$ 18,825.00                         |
| <b>Gas Pretreatment - Biological H2S</b> | \$ 2,981,600.00                        | \$ -                                     | \$ -                                 |
| Earthwork                                | \$ 195,400.00                          | \$ -                                     | \$ -                                 |
| Fine Grade                               | \$ 24,400.00                           | \$ -                                     | \$ -                                 |
| Termite Treatment                        | \$ 2,500.00                            | \$ -                                     | \$ -                                 |
| Pile Installation                        | \$ 58,500.00                           | \$ -                                     | \$ -                                 |
| Pile Mobilization                        | \$ 50,000.00                           | \$ -                                     | \$ -                                 |
| PDA Testing                              | \$ 60,000.00                           | \$ -                                     | \$ -                                 |
| Concrete                                 | \$ 351,200.00                          | \$ -                                     | \$ -                                 |
| Finishes                                 | \$ 10,000.00                           | \$ -                                     | \$ -                                 |
| Specialties                              | \$ 50,000.00                           | \$ -                                     | \$ -                                 |
| Electrical                               | \$ 200,000.00                          | \$ -                                     | \$ -                                 |
| Process Interconnections                 | \$ 250,000.00                          | \$ -                                     | \$ -                                 |
| Process Gas and Liquid Equipment         | \$ 1,925,000.00                        | \$ -                                     | \$ -                                 |
| Biogas Sweetening System                 | \$ 1,750,000.00                        | \$ -                                     | \$ -                                 |
| Vessel Installation                      | \$ 150,000.00                          | \$ -                                     | \$ -                                 |
| Start-Up & Commissioning                 | \$ 25,000.00                           | \$ -                                     | \$ -                                 |
| <b>Gas Pretreatment - Siloxane</b>       | \$ -                                   | \$ 1,891,525.00                          | \$ 2,604,525.00                      |
| Earthwork                                | \$ -                                   | \$ 13,875.00                             | \$ 13,875.00                         |
| Concrete                                 | \$ -                                   | \$ 152,800.00                            | \$ 152,800.00                        |
| Specialties                              | \$ -                                   | \$ 35,000.00                             | \$ 35,000.00                         |
| Electrical                               | \$ -                                   | \$ 100,000.00                            | \$ 100,000.00                        |
| Process Interconnections                 | \$ -                                   | \$ 150,000.00                            | \$ 150,000.00                        |
| Process Gas and Liquid Equipment         | \$ -                                   | \$ 1,439,850.00                          | \$ 2,152,850.00                      |
| Siloxane Removal System                  |                                        |                                          |                                      |
| H2S Removal                              |                                        |                                          |                                      |
| A - 600 SCFM (1) 10' by 16' Vessel       | \$ -                                   | \$ 275,000.00                            | \$ 275,000.00                        |
| Gas Compression/Moisture Removal         |                                        |                                          |                                      |
| D - 600 SCFM                             | \$ -                                   | \$ 592,350.00                            | \$ 592,350.00                        |
| Siloxane Removal                         |                                        |                                          |                                      |
| G - 800 SCFM (2) 8' by 12' Vessels       | \$ -                                   | \$ 382,000.00                            | \$ -                                 |
| H - Regenerative (1) Polishing Vessel    | \$ -                                   | \$ -                                     | \$ 920,000.00                        |
| Regenerative System Enclosed Flare       | \$ -                                   | \$ -                                     | \$ 175,000.00                        |
| Start-Up and Commissioning Services      | \$ -                                   | \$ 15,500.00                             | \$ 15,500.00                         |
| Equipment Installation                   | \$ -                                   | \$ 150,000.00                            | \$ 150,000.00                        |
| Start-Up & Commissioning                 | \$ -                                   | \$ 25,000.00                             | \$ 25,000.00                         |
| <b>Firm's Contingency (25%)</b>          | \$ 855,915.20                          | \$ 539,675.50                            | \$ 739,315.50                        |
| <b>Design-Build Fee (7%)</b>             | \$ 299,570.32                          | \$ 188,886.43                            | \$ 258,760.43                        |
| <b>Owner's Contingency (10%)</b>         | \$ 427,957.60                          | \$ 269,837.75                            | \$ 369,657.75                        |
| <b>Allowances</b>                        | \$ 10,000.00                           | \$ 10,000.00                             | \$ 10,000.00                         |
| <b>Bonds &amp; Insurance (2.5%)</b>      | \$ 125,427.60                          | \$ 79,177.54                             | \$ 108,374.89                        |
| <b>Total</b>                             | \$ 5,142,531.52                        | \$ 3,246,279.22                          | \$ 4,443,370.57                      |

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## Appendix D: Biorem Proposal

# Budgetary Proposal

Project Name: HFC Design A2 Digestion and DARS

BIOREM#: 22-5037

Revision: 0

Date: May 13, 2022

Represented By:

 TSC-JACOBS

Austin Moore

☎ 813-300-7415

✉ [austin@tscjacobs.com](mailto:austin@tscjacobs.com)

Sales Manager:

Mike Harman

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✉ [mharman@biorem.biz](mailto:mharman@biorem.biz)



# BIOREM



## LEADING INNOVATION IN BIO-ENGINEERED AIR CONTROL TECHNOLOGIES



Founded in 1991, BIOREM® is a global clean technology engineering company with one objective: engineer, design, manufacture and distribute the most innovative and effective biological-based emissions abatement technologies in the world.

As a leader in emissions abatement, our engineering teams have installed more than 1,200 projects worldwide. We specialize in tackling the exceptionally difficult problems of odour, volatile organic compounds (VOCs), and hazardous air pollutants, then engineering innovative solutions for the lowest life cycle cost of any technology.

BIOREM offers a lifetime commitment that our engineered systems will solve your air emissions and odour control problems. At the core of our business strategy is to be your trusted partner.

This means you can rely on BIOREM for any project, any size, anywhere and be certain you have the best available technology and support to solve your most difficult challenges.

### **Engineering the Difference**

Superior physical, chemical and biological solutions that effectively and reliably control air emissions require advanced engineering knowledge and expertise. This is why all BIOREM teams are multidisciplinary units comprising biological, chemical, environmental and mechanical engineers and scientists.



## Biogas Sweetening System

The Biogas Sweetening System is an aerobic biotrickling filter designed in a forced-draft, up flow configuration. Biogas enters the base of the tower and then passes up through the specially selected media. This high porosity media provides an ideal environment for the establishment of acidophilic bacterial colonies. As the biogas comes in contact with the biofilm, hydrogen sulfide is solubilized into the moisture layer and subsequently oxidized by the microbes. The media and biofilm are kept adequately moistened by way of counter-current recirculation water. Elemental Sulfur and sulfate ions are formed as process by-products and are discharged with the recirculation water blowdown.

Air is injected to maintain the required oxygen concentration in the gas, at an approximate concentration of 1.5%. The system is designed to limit the residual oxygen in the treated gas stream. BIOREM's Biogas Sweetening System also features an in-situ media cleaning system. Requiring only water and compressed air, the cleaning system allows the removal of elemental sulfur deposits from the biotrickling filter media without removing the media and with minimal downtime.

Unlike other odor control systems that feature activated carbon or other adsorption medias, BIOREM's biotrickling filters do not require media change outs. The only O&M costs for the life of the system is water, electricity and nutrients. A BIOREM system guarantees long term operation, and peace of mind.



## Revision History

| Number | Description                | Date         | Author |
|--------|----------------------------|--------------|--------|
| 0      | Initial budgetary proposal | May 13, 2022 | MH     |
|        |                            |              |        |
|        |                            |              |        |
|        |                            |              |        |
|        |                            |              |        |
|        |                            |              |        |
|        |                            |              |        |

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## Project Details

**Table 1 - Inlet Gas Quality**

| Process Parameter                      | Value                         |
|----------------------------------------|-------------------------------|
| Flow Rate                              | 600 SCFM                      |
| Temperature                            | 50 - 100 °F                   |
| Relative Humidity                      | Saturated                     |
| Pressure                               | 0 - 30 inWC gauge             |
| Oxygen Concentration                   | <0.5% (Air addition required) |
| Average H <sub>2</sub> S Concentration | 9500 ppm                      |

**Table 2: Overall System Configuration and Common Utilities**

| Design Parameter            | Value                            |
|-----------------------------|----------------------------------|
| System Configuration        |                                  |
| Estimated Water Consumption | 4,500 GPD                        |
| Electrical Supply Required  | 460V / 3PH / 60Hz, XX amp supply |

**Table 3: Client Water Quality Requirements**

| Design Parameter         | Value                       |
|--------------------------|-----------------------------|
| pH                       | 5 - 8                       |
| Total Suspended Solids   | <20 mg/L                    |
| Hardness                 | <100 mg/L                   |
| Biological Oxygen Demand | <30 mg/L                    |
| Total Nitrogen           | <30 mg/L                    |
| Total Phosphorus         | <30 mg/L                    |
| Free Chlorine            | <5 mg/L                     |
| Turbidity                | <25 NTU                     |
| Recommended Source       | Potable or treated effluent |

**Table 4: Biotrickling Filter Vessel Design**

| Design Parameter                     | Value                         |
|--------------------------------------|-------------------------------|
| Number of Vessels                    | 3                             |
| Vessel Dimensions                    | 12 ft diameter : 32 ft height |
| Vessel Empty Weight                  | 20,000 lbs each               |
| Vessel Operating Weight              | 50,000 lbs each               |
| Vessel Weight When Filled with Water | 225,000 lbs each              |
| Water Recirculation Rate             | 85 gpm each vessel            |
| Drain Water pH                       | 1 - 3                         |

## System Performance

- A. When loaded up to the design flow and average H<sub>2</sub>S concentration, the biotrickling filter system will achieve outlet levels below **150 ppm** when averaged daily.

## Warranties

- A. The Manufacturer warrants that the biotrickling filter media will not degrade or decompose for a period of 10 years from the date of Substantial Completion, provided that the system is operated in accordance with the Manufacturer's printed Operation and Maintenance Manuals.
- B. All mechanical components will be warranted free of manufacturing defects for a period of 12 months from Substantial Completion, or 18 months of shipment, whichever occurs first.

## Scope of Supply

- (3) Biotrickling filter vessel with integral recirculation sump, media support flooring, exterior insulation, mist eliminator, ladder/platform assembly and all required access hatches and nozzles. Material of construction to be UV and H<sub>2</sub>S resistant FRP.
- Synthetic biotrickling filter media, provided in bags approximately 10 cubic feet in size.
- (1) ISO Containers, Aluminum construction, to house recirculation systems, heat exchangers, air addition blowers and accessories, nutrient addition system (nutrient tank and mixer located outside), and nutrient storage.
- (6) High performance double offset butterfly valves for gas isolation at the vessel inlet. Valves meet the requirements given in ANSI/CSA B149.6-15 for biogas service.
- (3) 316 stainless steel combination pressure relief valve and flame arrestor on vessel roof. Pressure relief valve meets the requirements given in ANSI/CSA B149.6-15. Includes weather cover to prevent ice formation.
- (3) 5 HP recirculation pump rated for 85 GPM at 100 ft head with a TEXP motor.
- (1) Schedule 80 PVC manifold with spiral spray nozzles for optimized coverage of BTF media.

8. (1) Schedule 80 PVC air addition manifold for agitating media during the cleaning process.
9. (1) Control Panel:
  - i. NEMA 4X 316 stainless steel floor mount enclosure sized to suit during design.
  - ii. (1) Door interlocked fused disconnect.
  - iii. (1) VFD for air addition blower.
  - iv. (3) Motor starter for recirculation pumps.
  - v. (1) 120 VAC control transformer complete with primary and secondary fusing.
  - vi. (1) 24 VDC power supply.
  - vii. (1) Allen Bradley CompactLogix PLC with I/O modules as required
  - viii. (1) Allen Bradley or Maple Systems color touchscreen HMI.
  - ix. Lot terminal strips for field connections such as instrumentation and dry contacts to SCADA. Motors direct wire to starters/VFDs.
  - x. Requires analog input **by others** proportional to downstream oxygen content for air addition control.

Note: O<sub>2</sub> analyzer requires unclassified, well-ventilated indoor location for installation.
10. (3) Waterbox:
  - i. NEMA 4X 316 stainless steel pre-plumbed floor mount enclosure.
  - ii. (1) Flow indicator/switch, on recirculation line (local read).
  - iii. (1) Variable area rotameter, on blowdown line (local read).
  - iv. (1) Solenoid valve, on makeup line.
  - v. (1) Pressure indicator, on water supply line (local read).
  - vi. Lot fluid control valves and strainers.
11. (1) Nutrient addition system consisting of:
  - i. (1) Nutrient solution storage vessel.
  - ii. (1) Metering pump.
  - iii. (1) Year supply of dry nutrients (XX bags of BIOREM proprietary nutrient blend).
12. Instrumentation and fluid control valves external to waterbox:
  - i. (2) Thermal mass flow indicating transmitters, on biogas and air addition lines.
  - ii. (3) Level transmitter (differential pressure principle), in the biotrickling filter sump.
  - iii. (3) Static pressure indicating transmitter, in the biotrickling filter vessel.
  - iv. (3) Gas differential pressure indicators, across media bed (local read).

- v. (1) Temperature indicator, on inlet piping to system (local read).
  - vi. (2) Pressure indicators, on inlet and outlet sides of the recirculation pump (local read).
  - vii. Lot fluid control valves and strainers.
13. Winterization system:
- i. (1) XX kW heat exchanger for recirculation line, wetted material of construction to be Hastelloy. Includes hot water supply solenoid valve and recirculation water temperature transmitter for heat exchanger control. Requires supply of closed hot water loop **by others**.
  - ii. (1) Space heater for control panel.
  - iii. (1) Space heater for waterbox.
14. Engineering Submittal packages.
15. Operation and Maintenance manuals.
16. Field services will consist of the following:
- i. (1) Trip of 5 days for system commissioning and operator training.
  - ii. (1) Trip of 5 days for performance testing.

Note: The control panel and waterbox are not rated for use in a hazardous classified location. They must be installed in an unclassified location as defined by NFPA 70 and NFPA 820.

## Contractor Scope of Supply

Unless specified previously in this document, the following items listed are to be supplied by the Contractor and are not in the Manufacturer's Scope of Supply.

1. Provide all equipment offloading, temporary storage and placement.
2. Provide labor, materials and equipment for the installation and assembly of all BIOREM supplied equipment and instrumentation. Supply and install all other materials or equipment required for a complete operational system.
3. Site preparation and clearing of materials.
4. Design and supply an appropriately sized reinforced concrete slab to handle full load of applicable vessels, fans, control panels and waterboxes. Provide collection and analysis of any geotechnical data as required.
5. Design, supply and install appropriately sized anchor bolts for all equipment including vessels, fans, control panels and waterboxes.
6. Supply and install all required protective coatings or paint such as UV paint for piping or concrete paint.
7. Supply and install all external water piping and drain piping to and from vessels, waterboxes and other fluid equipment including heat tracing, insulation, piping supports, drainage traps where necessary and / or UV protective paint. If winterizing system, contractor to insulate differential pressure gauge enclosures.
8. Supply and install all hardware, supports, guide wires, gaskets, expansion joints and connectors needed for a complete and operational system.
9. Supply make-up water at a minimum pressure of 40 psi. Water analysis for hardness or other parameters as necessary.
10. Provide main electrical service and system field wiring outside the main biotrickling filter control panel. All electrical requirements for heat tracing and equipment not specifically provided by BIOREM to be provided by others.
11. Media onsite storage and installation. The Contractor shall be required to remove vessel access covers, install and distribute media evenly across the vessel, assemble media irrigation system and reinstall covers.
12. Provide balancing, and system functional, hydrostatic, vibration and performance testing to be conducted by OTHERS as may be specified.

## Quotation

| Item                                                  | Price               |
|-------------------------------------------------------|---------------------|
| <b>Biogas Sweetening System</b><br>Delivery: Ex Works | <b>\$ 1,750,000</b> |

|                     |                                                                                                                |
|---------------------|----------------------------------------------------------------------------------------------------------------|
| Commissioning       | Included                                                                                                       |
| Performance Testing | Included                                                                                                       |
| Submittal Schedule  | 4 - 6 weeks after acknowledgement of order and confirmation from BIOREM's Project Manager                      |
| Delivery Schedule   | 12 - 14 weeks after approved submittals                                                                        |
| Payment Terms       | 10% upon approvals, 80% upon delivery, 10% upon system commissioning                                           |
| Price               | All prices in US Dollars, applicable taxes are extra, prices are guaranteed for 90 days from date of quotation |





## Terms and Conditions

**Pricing:** Unless otherwise specified in writing by BIOREM, price does not include any taxes, excises, duties, tariffs or other governmental charges which BIOREM may be required to pay or collect under existing or future law with respect to the sale, transportation, delivery, storage, installation or use of any of the equipment sold by BIOREM.

**Cancellation:** Unless otherwise agreed in writing by the parties, the Buyer may not cancel the Order, except upon written notice and payment to Seller of an amount covering all costs incurred under the Order, all costs which arose out of the cancellation, and a cancellation fee of 50% of the Order Price. Materials received and Goods manufactured in part or whole under the Order prior to the time of cancellation shall be retained by and shall be property of the seller. When calculating the cancellation related costs, payments made by buyer to seller prior to cancellation shall be taken into account.

**Limitation of liability:** Seller's liability to the price allocable to the goods determined defective, and in no event will seller's cumulative liability be in excess of the total sales order price, whether arising under warranty, contract, negligence, strict liability, indemnification, or any other cause or combination of causes whatsoever. Seller will not be liable for any special, indirect, incidental, or consequential damages or indemnification, or any other cause or combination of causes whatsoever. This limitation shall apply notwithstanding any failure of essential purpose of any limited remedy. Buyer's remedies are specifically limited to the repair or replacement of the goods and is exclusive of all other remedies. Should these remedies be found inadequate or to have failed their essential purpose for any reason whatsoever, buyer agrees that return of the full sales order price to it by seller shall prevent remedies from failing their essential purpose and shall be considered by buyer as a fair and adequate remedy.

### EXPERIENCE MATTERS

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## Appendix E: Emails Regarding Regenerative Media

## Behr, Adam

---

**From:** Eric Wilgenbusch <Eric.Wilgenbusch@unisonsolutions.com>  
**Sent:** Wednesday, March 30, 2022 5:53 PM  
**To:** Behr, Adam  
**Cc:** Chuck Hlavach (chuck@envirosalesofflorida.com); Keddy, Elizabeth; Anthony Baxley; Lisk, Bryan R.  
**Subject:** RE: Tampa AWTP

Adam,

Yes the Regenerative Siloxane Reduction System (RSRS) media will need to be replaced, it depends on the H<sub>2</sub>S, Siloxane, & VOC concentrations. Average media replacement at a WWTP has been approximately 18-24 months. Each RSRS vessel (x2) holds about 10,000lbs of media, price is approximately \$2.10lb.

The polishing vessels media cost is for both vessels operated as a system, just under \$54k vessel. Each system uses a unique media.

Please let me know if you have any further questions.

**Eric Wilgenbusch**



*An Employee-Owned Company*

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---

**From:** Behr, Adam <ABehr@hazenandsawyer.com>  
**Sent:** Wednesday, March 30, 2022 2:40 PM  
**To:** Eric Wilgenbusch <Eric.Wilgenbusch@unisonsolutions.com>  
**Cc:** Chuck Hlavach (chuck@envirosalesofflorida.com) <chuck@envirosalesofflorida.com>; Keddy, Elizabeth <EKeddy@hazenandsawyer.com>; Anthony Baxley <abaxley@whartonsmith.com>; Lisk, Bryan R. <blisk@hazenandsawyer.com>  
**Subject:** RE: Tampa AWTP

[Caution External Email]

Thanks so much Eric.

Does the regenerative media ever have to be replaced? Or is it just the media of the #1 polisher vessel downstream that would need to be replaced periodically? And does media cost \$107,250 per vessel, or per system (#2 vessels)? Just want to make sure I'm not overlooking anything.

Thanks,

**Adam Behr, EIT**

**Assistant Engineer | Hazen and Sawyer**

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---

**From:** Eric Wilgenbusch <[Eric.Wilgenbusch@unisonsolutions.com](mailto:Eric.Wilgenbusch@unisonsolutions.com)>

**Sent:** Tuesday, March 29, 2022 5:51 PM

**To:** Behr, Adam <[ABehr@hazenandsawyer.com](mailto:ABehr@hazenandsawyer.com)>

**Cc:** Chuck Hlavach ([chuck@envirosalesofflorida.com](mailto:chuck@envirosalesofflorida.com)) <[chuck@envirosalesofflorida.com](mailto:chuck@envirosalesofflorida.com)>

**Subject:** Tampa AWTP

**Caution!** *External email – think before you click*

Adam,

Attached is the proposal I sent to Reliable Tampa Partners, which included the Regenerative Siloxane Removal System. We have a partnership between Willexa and Unison for the Regenerative Siloxane Removal Systems.

Per our conversation I think our Regenerative H2S Removal system has many benefits over the biological H2S Removal Systems like BIOREM. Our system captures the H2S in a liquid, then we filter it out with a filter press, leaving a dry sulfur cake. It's a very neat and clean design.

We have utilized biological H2S removal systems in the past and questions always surround maintenance and downtime. Recently at a paper mill we witnessed the maintenance involved in a biological H2S removal system. The packing material was being replaced because filled with elemental sulfur, see attached video. The plant has 10,000ppmv of H2S, very close to the Tampa H2S concentration. If the system is down for maintenance, the media in the H2S polishing system we be used up in as little as 8 days/vessel. Possibly damaging downstream equipment, and reducing Siloxane Removal media capacity. There is also a concern with biological system being able to respond to spikes in H2S content, and varying flow rates.

Please let me know if you would like to discuss further. We could possibly do a lunch and learn if you are interested.

Thanks,

**Eric Wilgenbusch**



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## Appendix F: Emails Regarding Regenerative System Performance



## Behr, Adam

---

**From:** Vince Higgins <Vince.Higgins@willexaenergy.com>  
**Sent:** Monday, April 4, 2022 2:13 PM  
**To:** Behr, Adam  
**Cc:** Lisk, Bryan R.; Keddy, Elizabeth  
**Subject:** RE: Siloxane Removal for Tampa WWTP Project (Hazen and Sawyer)

Adam,

Both answers are driven by the amount and type of VOCs in the gas.

Typically in digester gas the VOCs are less than 100 mg/m3.

The puts the media life closer to the 24 month mark. If all other factors of the gas remain as listed below.

At these levels expect a 80 – 90 % reduction of VOC and 95% or greater of Siloxanes.

Vince

---

**From:** Behr, Adam <ABehr@hazenandsawyer.com>  
**Sent:** Monday, April 4, 2022 1:05 PM  
**To:** Vince Higgins <Vince.Higgins@willexaenergy.com>  
**Cc:** Lisk, Bryan R. <blisk@hazenandsawyer.com>; Keddy, Elizabeth <EKeddy@hazenandsawyer.com>  
**Subject:** RE: Siloxane Removal for Tampa WWTP Project (Hazen and Sawyer)

And to tag along to that last question, do we know the approximate removal efficiency of the regenerative vessels? (for the sake of figuring out how often the downstream polisher's AC media would need to be replaced)

Thanks again, Vince.

**Adam Behr, EIT**

**Assistant Engineer | Hazen and Sawyer**  
4011 Westchase Blvd. Raleigh, NC 27607  
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[abehr@hazenandsawyer.com](mailto:abehr@hazenandsawyer.com) | [hazenandsawyer.com](http://hazenandsawyer.com)

---

**From:** Behr, Adam  
**Sent:** Monday, April 4, 2022 12:30 PM  
**To:** Vince Higgins <[Vince.Higgins@willexaenergy.com](mailto:Vince.Higgins@willexaenergy.com)>  
**Cc:** Lisk, Bryan R. <[blisk@hazenandsawyer.com](mailto:blisk@hazenandsawyer.com)>; Keddy, Elizabeth <[EKeddy@hazenandsawyer.com](mailto:EKeddy@hazenandsawyer.com)>  
**Subject:** RE: Siloxane Removal for Tampa WWTP Project (Hazen and Sawyer)

Hi Vince,

Is it possible to more accurately estimate the lifespan of the regenerative media (like with biogas VOCs and siloxanes test results)? Or is the 18-24 months estimate independent of biogas characteristics?

Thanks,

**Adam Behr, EIT**

---

**From:** Vince Higgins <[Vince.Higgins@willexaenergy.com](mailto:Vince.Higgins@willexaenergy.com)>

**Sent:** Tuesday, March 22, 2022 1:24 AM

**To:** Behr, Adam <[ABehr@hazenandsawyer.com](mailto:ABehr@hazenandsawyer.com)>

**Cc:** Lisk, Bryan R. <[blisk@hazenandsawyer.com](mailto:blisk@hazenandsawyer.com)>; Keddy, Elizabeth <[EKeddy@hazenandsawyer.com](mailto:EKeddy@hazenandsawyer.com)>

**Subject:** RE: Siloxane Removal for Tampa WWTP Project (Hazen and Sawyer)

**Caution!** *External email – think before you click*

Adam,

Thanks for reaching out. Here is some information for you.

1. Assumptions

- Gas pressure will be at least 5 PSIG.
- Gas temperature will be between 80 – 100 F.
- Gas dew point will be between 40 – 50 F.
- Non-Methane Organic Compounds (NMOs) will be less than 50 mg/m<sup>3</sup> for the fixed bed. Can be much higher for the regenerative system.
- H<sub>2</sub>S will be below 20 ppm.

2. Fixed Bed

- Twin Tower system with a Lead/Lag piping skid.
- Vessels and piping are 304 SS.
- Valves are resilient seat with SS trim and carbon steel body.
- Piping is 6".
- Vessels are shipped loose for installation in the field.
- Media is shipped loose for installation in the field.
- Beds are sized for minimum of 180 days for the lead vessel. Based upon less than 50 mg/m<sup>3</sup> total NMOs.
- Pre-filter and after filter shipped loose for installation in the field.
- Piping spools between vessels and the piping skid are shipped loose for installation in the field.
- Rough budgetary cost - \$375,000
- Replacement media cost - \$25,000 every 6 months.

3. Regenerative system

- Twin tower system with fully automated regeneration package.
- Vessels, piping, controls and filters are all skid mounted.
- Valves are high performance butterfly with air actuation and limit switches.
- Blower is a centrifugal with a 15 HP motor. Blower will run 15 hours a day.
- Heater is a 60 KW electric heater. Heater will run 10 hours a day averaging 30 KW over the 10 hours.
- Filters are skid mounted.
- Piping is 6".

- Control is via Allen Bradley CompacLogix PLC with PanelView HMI. Control panel is skid mounted.
- High Voltage panel ships loose for installation in a clean, dry, cool non-hazardous location.
- Can handle NMOCs at a level of 10 times higher than fixed bed.
- Media life 18 – 24 months.
- Rough budgetary cost - \$600,000.
- Replacement media cost - \$20,000.
- Rough budgetary cost of enclosed flare for regeneration gas - \$150,000.
- Flare will use 35 – 50 SCFM of digester gas for fuel and will run 18 hours a day.

Have a review and we can set up a time for call to discuss further details.

Vince

**Vince Higgins**

Owner, Willexa Energy

704-650-8415




---

**From:** Behr, Adam <[ABehr@hazenandsawyer.com](mailto:ABehr@hazenandsawyer.com)>

**Sent:** Tuesday, March 15, 2022 4:06 PM

**To:** Vince Higgins <[Vince.Higgins@willexaenergy.com](mailto:Vince.Higgins@willexaenergy.com)>

**Cc:** Lisk, Bryan R. <[blisk@hazenandsawyer.com](mailto:blisk@hazenandsawyer.com)>; Keddy, Elizabeth <[EKeddy@hazenandsawyer.com](mailto:EKeddy@hazenandsawyer.com)>

**Subject:** Siloxane Removal for Tampa WWTP Project (Hazen and Sawyer)

Hi Vince, Brad Huxter at Greenlane gave me your info.

We are working on a project for City of Tampa's wastewater treatment plant, where combined heat and power generators will be fueled with biogas from sludge digesters.

Currently, we are assessing the alternatives for H<sub>2</sub>S and siloxane removal. Brad said you do siloxane removal systems? Do you do both fixed bed and regenerative?

Could you provide rough estimates of the costs (capital and media) for systems to treat 800 SCFM of biogas with 1.5 ppm of siloxane?

Thanks!

**Adam Behr, EIT**

**Assistant Engineer | Hazen and Sawyer**

4011 Westchase Blvd. Raleigh, NC 27607

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[abehr@hazenandsawyer.com](mailto:abehr@hazenandsawyer.com) | [hazenandsawyer.com](http://hazenandsawyer.com)

## Appendix G: Biogas Test Results

| Component                              | Units    | Digester 2/3<br>(02/04/2022) | Digester 6<br>(02/04/2022) | Digester 6<br>(03/10/2022) | Digester 6<br>(03/18/2022) |
|----------------------------------------|----------|------------------------------|----------------------------|----------------------------|----------------------------|
| Methane                                | % by Vol | 54.7                         | 55.7                       | 60.9                       | 41.2                       |
| Carbon dioxide                         | % by Vol | 35.6                         | 35.3                       | 37.9                       | 25                         |
| Nitrogen                               | % by Vol | 7.56                         | 6.11                       | 0.56                       | 25.6                       |
| Oxygen                                 | % by Vol | 1.97                         | 1.61                       | 0.13                       | 7.22                       |
| Argon                                  | % by Vol | 0.09                         | 0.07                       | 0.01                       |                            |
| Hydrogen                               | % by Vol | 0                            | 0                          | 0                          | ND                         |
| (CH2)n                                 | % by Vol | 0                            | 0.01                       | 0.01                       |                            |
| 1,1,1-Trichloroethane                  | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,1,2,2-Tetrachloroethane              | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,1,2-Trichloroethane                  | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,1,2-Trichlorotrifluoroethane         | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,1-Dichloroethane                     | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,1-Dichloroethene                     | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,2,4-Trichlorobenzene                 | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,2,4-Trimethylbenzene                 | UG/M3    | 79                           | 96                         | 620                        | ND                         |
| 1,2-Dibromo 3-Chloropropane            | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,2-Dibromoethane                      | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,2-Dichlorobenzene                    | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,2-Dichloroethane                     | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,2-Dichloroethane-d4                  | %        | 89                           | 85                         | 98                         | 108                        |
| 1,2-Dichloropropane                    | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,3,5-Trimethylbenzene                 | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,3-Butadiene                          | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,3-Dichlorobenzene                    | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 1,4-Dichlorobenzene                    | UG/M3    | 280                          | 350                        | 510                        | ND                         |
| 1,4-Dioxane                            | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 2,5-Dimethylthiophene                  | ppbV     | ND                           | ND                         | ND                         | ND                         |
| 2-Butanone (MEK)                       | UG/M3    | ND                           | 200                        | ND                         | ND                         |
| 2-Ethylthiophene                       | ppbV     | ND                           | ND                         | ND                         | ND                         |
| 2-Hexanone                             | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 2-Propanol (Isopropyl Alcohol)         | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 3-Chloro-1-propene (Allyl Chloride)    | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 3-Methyl Thiophene                     | ppbV     | ND                           | ND                         | ND                         | ND                         |
| 4-Bromofluorobenzene                   | %        | 104                          | 104                        | 96                         | 92                         |
| 4-Ethyltoluene                         | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| 4-Methyl-2-pentanone                   | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| Acetone                                | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| Acetonitrile                           | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| Acrolein                               | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| Acrylonitrile                          | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| alpha-Pinene                           | UG/M3    | 340                          | 370                        | 720                        | ND                         |
| Benzene                                | UG/M3    | ND                           | ND                         | ND                         | ND                         |
| Benzyl Chloride                        | UG/M3    | ND                           | ND                         | ND                         | ND                         |

|                              |       |    |         |         |          |         |
|------------------------------|-------|----|---------|---------|----------|---------|
| Bromodichloromethane         | UG/M3 | ND |         | 92      | ND       | ND      |
| Bromoform                    | UG/M3 | ND | ND      | ND      |          | ND      |
| Bromomethane                 | UG/M3 | ND | ND      | ND      |          | ND      |
| Carbon Disulfide             | UG/M3 |    | 370     | 690     | 1400     | ND      |
| Carbon Disulfide             | ppbV  | ND | ND      | ND      |          | ND      |
| Carbon Tetrachloride         | UG/M3 | ND | ND      | ND      |          | ND      |
| Carbonyl Sulfide             | ppbV  | ND | ND      | ND      |          | ND      |
| Chlorobenzene                | UG/M3 | ND | ND      | ND      |          | ND      |
| Chloroethane                 | UG/M3 | ND | ND      | ND      |          | ND      |
| Chloroform                   | UG/M3 | ND | ND      | ND      |          | ND      |
| Chloromethane                | UG/M3 | ND | ND      | ND      |          | ND      |
| cis-1,2-Dichloroethene       | UG/M3 | ND | ND      | ND      |          | ND      |
| cis-1,3-Dichloropropene      | UG/M3 | ND | ND      | ND      |          | ND      |
| Cumene                       | UG/M3 | ND | ND      | ND      |          | ND      |
| Cyclohexane                  | UG/M3 | ND | ND      | ND      |          | ND      |
| Dibromochloromethane         | UG/M3 | ND |         | 87      | ND       | ND      |
| Dichlorodifluoromethane (CFC | UG/M3 | ND | ND      | ND      |          | ND      |
| Dichloromethane (Methylene C | UG/M3 | ND | ND      | ND      |          | ND      |
| Diethyl Disulfide            | ppbV  | ND | ND      | ND      |          | ND      |
| Diethyl Sulfide              | ppbV  | ND | ND      | ND      |          | ND      |
| Dimethyl Disulfide           | ppbV  | ND | ND      | ND      |          | ND      |
| Dimethyl Sulfide             | ppbV  | ND |         | 3700    | 4900     | 7300    |
| d-Limonene                   | UG/M3 |    | 2600    | 5000    | ND       | ND      |
| Ethanol                      | UG/M3 | ND | ND      | ND      |          | ND      |
| Ethyl Acetate                | UG/M3 | ND | ND      | ND      |          | ND      |
| Ethyl Mercaptan              | ppbV  | ND | ND      |         | 2200     | ND      |
| Ethyl Methyl Sulfide         | ppbV  | ND | ND      | ND      |          | ND      |
| Ethylbenzene                 | UG/M3 |    | 550     | 610     | 650      | ND      |
| Hexachlorobutadiene          | UG/M3 | ND | ND      | ND      |          | ND      |
| Hexane                       | UG/M3 |    | 300     | 340     | ND       | ND      |
| Hydrogen Sulfide             | ppbV  |    | 9600000 | 9300000 | 20000000 | 9600000 |
| Isobutyl Mercaptan           | ppbV  | ND | ND      | ND      |          | ND      |
| Isopropyl Mercaptan          | ppbV  | ND | ND      | ND      |          | ND      |
| m,p-Xylenes                  | UG/M3 |    | 1000    | 1200    | 1200     | ND      |
| Methyl Mercaptan             | ppbV  |    | 5200    | 14000   | 39000    | 26000   |
| Methyl Methacrylate          | UG/M3 | ND | ND      | ND      |          | ND      |
| Methyl tert-Butyl Ether      | UG/M3 | ND | ND      | ND      |          | ND      |
| Naphthalene                  | UG/M3 | ND | ND      | ND      |          | ND      |
| n-Butyl Acetate              | UG/M3 | ND | ND      | ND      |          | ND      |
| n-Butyl Mercaptan            | ppbV  | ND | ND      | ND      |          | ND      |
| n-Heptane                    | UG/M3 |    | 160     | 170     | ND       | ND      |
| n-Nonane                     | UG/M3 |    | 430     | 450     | ND       | ND      |
| n-Octane                     | UG/M3 |    | 290     | 290     | ND       | ND      |
| n-Propyl Mercaptan           | ppbV  | ND | ND      | ND      |          | ND      |
| n-Propylbenzene              | UG/M3 | ND | ND      | ND      |          | ND      |
| o-Xylene                     | UG/M3 |    | 310     | 370     | ND       | ND      |
| Propene                      | UG/M3 |    | 130     | ND      |          | ND      |

|                           |       |    |     |     |     |     |
|---------------------------|-------|----|-----|-----|-----|-----|
| Styrene                   | UG/M3 | ND | ND  | ND  | ND  |     |
| Tert-Butyl mercaptan      | ppbV  | ND | ND  | ND  | ND  |     |
| Tetrachloroethene         | UG/M3 |    | 170 | 230 | ND  | ND  |
| Tetrahydrofuran (THF)     | UG/M3 | ND | ND  | ND  | ND  |     |
| Tetrahydrothiophene       | ppbV  | ND | ND  | ND  | ND  |     |
| Thiophene                 | ppbV  | ND | ND  | ND  | ND  |     |
| Toluene                   | UG/M3 |    | 370 | 630 | 990 | ND  |
| Toluene-d8                | %     |    | 101 | 100 | 106 | 106 |
| trans-1,2-Dichloroethene  | UG/M3 | ND | ND  | ND  | ND  |     |
| trans-1,3-Dichloropropene | UG/M3 | ND | ND  | ND  | ND  |     |
| Trichloroethene           | UG/M3 | ND | ND  | ND  | ND  |     |
| Trichlorofluoromethane    | UG/M3 | ND | ND  | ND  | ND  |     |
| Vinyl Acetate             | UG/M3 | ND | ND  | ND  | ND  |     |
| Vinyl Chloride            | UG/M3 | ND | ND  | ND  | ND  |     |



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## LABORATORY REPORT

February 18, 2022

Caryssa Joustra, PhD  
Hazen and Sawyer, P.C.  
1000 N. Ashley Dr., Suite 1000  
Tampa, FL 33602

**RE: City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13**

Dear Caryssa:

Enclosed are the results of the samples submitted to our laboratory on February 7, 2022. The samples were sent out for partial analysis to AtmAA, Inc. Please find their report (Lab #; 20422-3, -4) attached. For your reference, these analyses have been assigned our service request number P2200535.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at [www.alsglobal.com](http://www.alsglobal.com). Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

**ALS | Environmental**

  
By Sue Anderson at 5:59 pm, Feb 18, 2022

For Nicole Bryson  
Laboratory Director





2655 Park Center Dr., Suite A  
Simi Valley, CA 93065  
T: +1 805 526 7161  
[www.alsglobal.com](http://www.alsglobal.com)

Client: Hazen and Sawyer, P.C. Service Request No: P2200535  
Project: City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

## CASE NARRATIVE

The samples were received intact under chain of custody on February 7, 2022 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

### Sulfur Analysis

The samples were analyzed for twenty sulfur compounds per ASTM D 5504-12 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan. This method is included on the laboratory's NELAP scope of accreditation, however it is not part of the DoD-ELAP accreditation.

### Volatile Organic Compound Analysis

The samples were also analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. The method was modified to include the use of helium as a diluent gas in place of zero-grade air for container pressurization. When necessary, analytical sample volumes were adjusted by a correction factor for containers pressurized with helium. A summary sheet has been included listing the affected samples. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The upper control criteria were exceeded for benzyl chloride, 1,2-dibromo-3-chloropropane and 1,2,4-trichlorobenzene in the Continuing Calibration Verification (CCV) analyzed on February 10, 2022. Since the apparent problem equates to a potential high bias and the field samples analyzed in this sequence did not contain the analytes in question, the data quality has not been affected. No corrective action was required.

The containers were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. For projects requiring DoD QSM 5.3 compliance canisters were cleaned to  $<1/2$  the MRL. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

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*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*



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CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

| Agency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Web Site                                                                                                                                                                                                                                            | Number                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Alaska DEC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <a href="http://dec.alaska.gov/eh/lab.aspx">http://dec.alaska.gov/eh/lab.aspx</a>                                                                                                                                                                   | 17-019                  |
| Arizona DHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <a href="http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home">http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home</a> | AZ0694                  |
| Florida DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <a href="http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html">http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html</a>                                               | E871020                 |
| Louisiana DEQ (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>                                                                                                                         | 05071                   |
| Maine DHHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <a href="http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml">http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml</a>                                                             | 2018027                 |
| Minnesota DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>                                                                                                                                               | 1776326                 |
| New Jersey DEP (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>                                                                                                                                                 | CA009                   |
| New York DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <a href="http://www.wadsworth.org/labcert/elap/elap.html">http://www.wadsworth.org/labcert/elap/elap.html</a>                                                                                                                                       | 11221                   |
| Oregon PHD (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <a href="http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>                           | 4068-008                |
| Pennsylvania DEP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx">http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx</a>                                           | 68-03307 (Registration) |
| PJLA (DoD ELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <a href="http://www.pjlab.com/search-accredited-labs">http://www.pjlab.com/search-accredited-labs</a>                                                                                                                                               | 65818 (Testing)         |
| Texas CEQ (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <a href="http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html</a>                                                                                                         | T104704413-19-10        |
| Utah DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="http://health.utah.gov/lab/lab_cert_env">http://health.utah.gov/lab/lab_cert_env</a>                                                                                                                                                       | CA016272019-10          |
| Washington DOE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>                                                                                                         | C946                    |
| <p>Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at <a href="http://www.alsglobal.com">www.alsglobal.com</a>, or at the accreditation body's website.</p> <p>Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.</p> |                                                                                                                                                                                                                                                     |                         |

# ALS ENVIRONMENTAL

## DETAIL SUMMARY REPORT

Client: Hazen And Sawyer, P.C.

Service Request: P2200535

Project ID: City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

Date Received: 2/7/2022

Time Received: 09:00

| Client Sample ID | Lab Code     | Matrix | Date Collected | Time Collected | Container ID | Pi1 (psig) | Pfi1 (psig) | ASTM D 5504-12 - Sulfur Can | TO-15 Modified - VOC Cans | ASTM D3588 - Sub-Out to AAC |
|------------------|--------------|--------|----------------|----------------|--------------|------------|-------------|-----------------------------|---------------------------|-----------------------------|
| Digester 6 #1    | P2200535-001 | Air    | 2/4/2022       | 09:21          | SSC00137     | -1.66      | 3.61        | X                           | X                         | X                           |
| Digester 2/3 #1  | P2200535-002 | Air    | 2/4/2022       | 09:43          | SSC00282     | -0.01      | 3.53        | X                           | X                         | X                           |



**ALS ENVIRONMENTAL**  
**Sample Volume Correction for Helium Pressurization**  
**for SCAN Analysis**

| <u>Sample ID</u> | <u>P0</u> | <u>Pi</u> | <u>Pf</u> | <u>Sample<br/>Volume (L)</u> | <u>Adjusted<br/>Volume (L)</u> |
|------------------|-----------|-----------|-----------|------------------------------|--------------------------------|
| P2200535-001     | -8.4      | -1.66     | 3.61      | 0.015                        | 0.0185                         |
| P2200535-002     | -8.4      | -0.01     | 3.53      | 0.015                        | 0.0180                         |



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# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-001

Test Code: ASTM D 5504-12

Instrument ID: Agilent 7890A/GC22/SCD

Analyst: Gilbert Gutierrez

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00137

Date Collected: 2/4/22

Time Collected: 09:21

Date Received: 2/7/22

Date Analyzed: 2/8/22

Time Analyzed: 09:45

Volume(s) Analyzed: 0.0040 ml(s)

Container Dilution Factor: 2.72

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | 13,000,000      | 4,700        | 9,300,000      | 3,400       |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 8,300        | ND             | 3,400       |                   |
| 74-93-1   | Methyl Mercaptan      | 28,000          | 6,700        | 14,000         | 3,400       |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 8,600        | ND             | 3,400       |                   |
| 75-18-3   | Dimethyl Sulfide      | 9,500           | 8,600        | 3,700          | 3,400       |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 5,300        | ND             | 1,700       |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 11,000       | ND             | 3,400       |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 13,000       | ND             | 3,400       |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 11,000       | ND             | 3,400       |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 11,000       | ND             | 3,400       |                   |
| 110-02-1  | Thiophene             | ND              | 12,000       | ND             | 3,400       |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 13,000       | ND             | 3,400       |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 13,000       | ND             | 3,400       |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 13,000       | ND             | 3,400       |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 6,500        | ND             | 1,700       |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 14,000       | ND             | 3,400       |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 12,000       | ND             | 3,400       |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 16,000       | ND             | 3,400       |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 16,000       | ND             | 3,400       |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 8,500        | ND             | 1,700       |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 2/3 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-002

Test Code: ASTM D 5504-12

Instrument ID: Agilent 7890A/GC22/SCD

Analyst: Gilbert Gutierrez

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00282

Date Collected: 2/4/22

Time Collected: 09:43

Date Received: 2/7/22

Date Analyzed: 2/8/22

Time Analyzed: 10:19

Volume(s) Analyzed: 0.0040 ml(s)

Container Dilution Factor: 2.17

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | 13,000,000      | 3,800        | 9,600,000      | 2,700       |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 6,700        | ND             | 2,700       |                   |
| 74-93-1   | Methyl Mercaptan      | 10,000          | 5,300        | 5,200          | 2,700       |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 6,900        | ND             | 2,700       |                   |
| 75-18-3   | Dimethyl Sulfide      | ND              | 6,900        | ND             | 2,700       |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 4,200        | ND             | 1,400       |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 8,400        | ND             | 2,700       |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 10,000       | ND             | 2,700       |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 8,400        | ND             | 2,700       |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 8,400        | ND             | 2,700       |                   |
| 110-02-1  | Thiophene             | ND              | 9,300        | ND             | 2,700       |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 10,000       | ND             | 2,700       |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 10,000       | ND             | 2,700       |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 10,000       | ND             | 2,700       |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 5,200        | ND             | 1,400       |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 11,000       | ND             | 2,700       |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 9,800        | ND             | 2,700       |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 12,000       | ND             | 2,700       |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 12,000       | ND             | 2,700       |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 6,800        | ND             | 1,400       |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P220208-MB

Test Code: ASTM D 5504-12

Instrument ID: Agilent 7890A/GC22/SCD

Analyst: Gilbert Gutierrez

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Time Collected: NA

Date Received: NA

Date Analyzed: 2/08/22

Time Analyzed: 07:55

Volume(s) Analyzed: 1.0 ml(s)

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | ND              | 7.0          | ND             | 5.0         |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 12           | ND             | 5.0         |                   |
| 74-93-1   | Methyl Mercaptan      | ND              | 9.8          | ND             | 5.0         |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 13           | ND             | 5.0         |                   |
| 75-18-3   | Dimethyl Sulfide      | ND              | 13           | ND             | 5.0         |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 7.8          | ND             | 2.5         |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 16           | ND             | 5.0         |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 18           | ND             | 5.0         |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 16           | ND             | 5.0         |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 16           | ND             | 5.0         |                   |
| 110-02-1  | Thiophene             | ND              | 17           | ND             | 5.0         |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 18           | ND             | 5.0         |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 18           | ND             | 5.0         |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 18           | ND             | 5.0         |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 9.6          | ND             | 2.5         |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 20           | ND             | 5.0         |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 18           | ND             | 5.0         |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 23           | ND             | 5.0         |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 23           | ND             | 5.0         |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 12           | ND             | 2.5         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

ALS Project ID: P2200535

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Sample ID: P220208-DLCS

Test Code: ASTM D 5504-12

Date Collected: NA

Instrument ID: Agilent 7890A/GC22/SCD

Date Received: NA

Analyst: Gilbert Gutierrez

Date Analyzed: 2/08/22

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: NA ml(s)

Test Notes:

| CAS #     | Compound         | Spike Amount       | Result      |              | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|------------------|--------------------|-------------|--------------|------------|------|----------------------|-----|-----|------|
|           |                  | LCS / DLCS<br>ppbV | LCS<br>ppbV | DLCS<br>ppbV | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 7783-06-4 | Hydrogen Sulfide | 989                | 868         | 875          | 88         | 88   | 72-122               | 0   | 18  |      |
| 463-58-1  | Carbonyl Sulfide | 1,050              | 873         | 906          | 83         | 86   | 72-121               | 4   | 17  |      |
| 74-93-1   | Methyl Mercaptan | 1,050              | 943         | 960          | 90         | 91   | 74-127               | 1   | 18  |      |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-001

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00137

Date Collected: 2/4/22

Date Received: 2/7/22

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.0185 Liter(s)

Canister Dilution Factor: 2.72

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND                          | 76                       | ND             | 44          |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 78                       | ND             | 16          |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 75                       | ND             | 36          |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 79                       | ND             | 11          |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 76                       | ND             | 30          |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 76                       | ND             | 35          |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 75                       | ND             | 19          |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 75                       | ND             | 28          |                   |
| 64-17-5   | Ethanol                                          | ND                          | 740                      | ND             | 390         |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 150                      | ND             | 88          |                   |
| 107-02-8  | Acrolein                                         | ND                          | 150                      | ND             | 64          |                   |
| 67-64-1   | Acetone                                          | ND                          | 760                      | ND             | 320         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 76                       | ND             | 14          |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 150                      | ND             | 60          |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 150                      | ND             | 68          |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 79                       | ND             | 20          |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 76                       | ND             | 22          |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 78                       | ND             | 25          |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 79                       | ND             | 10          |                   |
| 75-15-0   | Carbon Disulfide                                 | 690                         | 160                      | 220            | 52          |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 78                       | ND             | 20          |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 78                       | ND             | 19          |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 78                       | ND             | 22          |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 740                      | ND             | 210         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | 200                         | 150                      | 67             | 50          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-001

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00137

Date Collected: 2/4/22

Date Received: 2/7/22

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.0185 Liter(s)

Canister Dilution Factor: 2.72

| CAS #      | Compound                  | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND                          | 76                       | ND             | 19          |                   |
| 141-78-6   | Ethyl Acetate             | ND                          | 310                      | ND             | 86          |                   |
| 110-54-3   | n-Hexane                  | 340                         | 78                       | 96             | 22          |                   |
| 67-66-3    | Chloroform                | ND                          | 79                       | ND             | 16          |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND                          | 150                      | ND             | 50          |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND                          | 78                       | ND             | 19          |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND                          | 76                       | ND             | 14          |                   |
| 71-43-2    | Benzene                   | ND                          | 74                       | ND             | 23          |                   |
| 56-23-5    | Carbon Tetrachloride      | ND                          | 74                       | ND             | 12          |                   |
| 110-82-7   | Cyclohexane               | ND                          | 160                      | ND             | 47          |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND                          | 74                       | ND             | 16          |                   |
| 75-27-4    | Bromodichloromethane      | 92                          | 78                       | 14             | 12          |                   |
| 79-01-6    | Trichloroethene           | ND                          | 76                       | ND             | 14          |                   |
| 123-91-1   | 1,4-Dioxane               | ND                          | 76                       | ND             | 21          |                   |
| 80-62-6    | Methyl Methacrylate       | ND                          | 160                      | ND             | 40          |                   |
| 142-82-5   | n-Heptane                 | 170                         | 78                       | 41             | 19          |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND                          | 74                       | ND             | 16          |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND                          | 160                      | ND             | 39          |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND                          | 75                       | ND             | 17          |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND                          | 76                       | ND             | 14          |                   |
| 108-88-3   | Toluene                   | 630                         | 76                       | 170            | 20          |                   |
| 591-78-6   | 2-Hexanone                | ND                          | 160                      | ND             | 39          |                   |
| 124-48-1   | Dibromochloromethane      | 87                          | 78                       | 10             | 9.2         |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND                          | 76                       | ND             | 10          |                   |
| 123-86-4   | n-Butyl Acetate           | ND                          | 160                      | ND             | 34          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-001

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00137

Date Collected: 2/4/22

Date Received: 2/7/22

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.0185 Liter(s)

Canister Dilution Factor: 2.72

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | 290             | 78           | 63             | 17          |                   |
| 127-18-4    | Tetrachloroethene           | 230             | 76           | 34             | 11          |                   |
| 108-90-7    | Chlorobenzene               | ND              | 76           | ND             | 17          |                   |
| 100-41-4    | Ethylbenzene                | 610             | 76           | 140            | 18          |                   |
| 179601-23-1 | m,p-Xylenes                 | 1,200           | 160          | 290            | 37          |                   |
| 75-25-2     | Bromoform                   | ND              | 76           | ND             | 7.4         |                   |
| 100-42-5    | Styrene                     | ND              | 74           | ND             | 17          |                   |
| 95-47-6     | o-Xylene                    | 370             | 76           | 86             | 18          |                   |
| 111-84-2    | n-Nonane                    | 450             | 76           | 86             | 15          |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 76           | ND             | 11          |                   |
| 98-82-8     | Cumene                      | ND              | 76           | ND             | 16          |                   |
| 80-56-8     | alpha-Pinene                | 370             | 79           | 67             | 14          |                   |
| 103-65-1    | n-Propylbenzene             | ND              | 78           | ND             | 16          |                   |
| 622-96-8    | 4-Ethyltoluene              | ND              | 78           | ND             | 16          |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND              | 76           | ND             | 16          |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 96              | 76           | 19             | 16          |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 160          | ND             | 31          |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 76           | ND             | 13          |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | 350             | 76           | 58             | 13          |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 78           | ND             | 13          |                   |
| 5989-27-5   | d-Limonene                  | 5,000           | 74           | 890            | 13          |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 150          | ND             | 15          |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 160          | ND             | 22          |                   |
| 91-20-3     | Naphthalene                 | ND              | 76           | ND             | 15          |                   |
| 87-68-3     | Hexachlorobutadiene         | ND              | 76           | ND             | 7.2         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 2/3 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-002

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00282

Date Collected: 2/4/22

Date Received: 2/7/22

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.018 Liter(s)

Canister Dilution Factor: 2.17

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | 130                         | 63                       | 78             | 36          |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 64                       | ND             | 13          |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 61                       | ND             | 30          |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 65                       | ND             | 9.3         |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 63                       | ND             | 25          |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 63                       | ND             | 28          |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 61                       | ND             | 16          |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 61                       | ND             | 23          |                   |
| 64-17-5   | Ethanol                                          | ND                          | 600                      | ND             | 320         |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 120                      | ND             | 72          |                   |
| 107-02-8  | Acrolein                                         | ND                          | 120                      | ND             | 53          |                   |
| 67-64-1   | Acetone                                          | ND                          | 630                      | ND             | 260         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 63                       | ND             | 11          |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 120                      | ND             | 49          |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 120                      | ND             | 56          |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 65                       | ND             | 16          |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 63                       | ND             | 18          |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 64                       | ND             | 20          |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 65                       | ND             | 8.5         |                   |
| 75-15-0   | Carbon Disulfide                                 | 370                         | 130                      | 120            | 43          |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 64                       | ND             | 16          |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 64                       | ND             | 16          |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 64                       | ND             | 18          |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 600                      | ND             | 170         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND                          | 120                      | ND             | 41          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 2/3 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-002

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00282

Date Collected: 2/4/22

Date Received: 2/7/22

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.018 Liter(s)

Canister Dilution Factor: 2.17

| CAS #      | Compound                  | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND                          | 63                       | ND             | 16          |                   |
| 141-78-6   | Ethyl Acetate             | ND                          | 250                      | ND             | 70          |                   |
| 110-54-3   | n-Hexane                  | 300                         | 64                       | 85             | 18          |                   |
| 67-66-3    | Chloroform                | ND                          | 65                       | ND             | 13          |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND                          | 120                      | ND             | 41          |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND                          | 64                       | ND             | 16          |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND                          | 63                       | ND             | 11          |                   |
| 71-43-2    | Benzene                   | ND                          | 60                       | ND             | 19          |                   |
| 56-23-5    | Carbon Tetrachloride      | ND                          | 60                       | ND             | 9.6         |                   |
| 110-82-7   | Cyclohexane               | ND                          | 130                      | ND             | 39          |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND                          | 60                       | ND             | 13          |                   |
| 75-27-4    | Bromodichloromethane      | ND                          | 64                       | ND             | 9.5         |                   |
| 79-01-6    | Trichloroethene           | ND                          | 63                       | ND             | 12          |                   |
| 123-91-1   | 1,4-Dioxane               | ND                          | 63                       | ND             | 17          |                   |
| 80-62-6    | Methyl Methacrylate       | ND                          | 130                      | ND             | 32          |                   |
| 142-82-5   | n-Heptane                 | 160                         | 64                       | 40             | 16          |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND                          | 60                       | ND             | 13          |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND                          | 130                      | ND             | 32          |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND                          | 61                       | ND             | 14          |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND                          | 63                       | ND             | 11          |                   |
| 108-88-3   | Toluene                   | 370                         | 63                       | 99             | 17          |                   |
| 591-78-6   | 2-Hexanone                | ND                          | 130                      | ND             | 32          |                   |
| 124-48-1   | Dibromochloromethane      | ND                          | 64                       | ND             | 7.5         |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND                          | 63                       | ND             | 8.2         |                   |
| 123-86-4   | n-Butyl Acetate           | ND                          | 130                      | ND             | 28          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 2/3 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-002

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00282

Date Collected: 2/4/22

Date Received: 2/7/22

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.018 Liter(s)

Canister Dilution Factor: 2.17

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | 290             | 64           | 63             | 14          |                   |
| 127-18-4    | Tetrachloroethene           | 170             | 63           | 26             | 9.2         |                   |
| 108-90-7    | Chlorobenzene               | ND              | 63           | ND             | 14          |                   |
| 100-41-4    | Ethylbenzene                | 550             | 63           | 130            | 14          |                   |
| 179601-23-1 | m,p-Xylenes                 | 1,000           | 130          | 240            | 31          |                   |
| 75-25-2     | Bromoform                   | ND              | 63           | ND             | 6.1         |                   |
| 100-42-5    | Styrene                     | ND              | 60           | ND             | 14          |                   |
| 95-47-6     | o-Xylene                    | 310             | 63           | 72             | 14          |                   |
| 111-84-2    | n-Nonane                    | 430             | 63           | 82             | 12          |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 63           | ND             | 9.1         |                   |
| 98-82-8     | Cumene                      | ND              | 63           | ND             | 13          |                   |
| 80-56-8     | alpha-Pinene                | 340             | 65           | 61             | 12          |                   |
| 103-65-1    | n-Propylbenzene             | ND              | 64           | ND             | 13          |                   |
| 622-96-8    | 4-Ethyltoluene              | ND              | 64           | ND             | 13          |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND              | 63           | ND             | 13          |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 79              | 63           | 16             | 13          |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 130          | ND             | 26          |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 63           | ND             | 10          |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | 280             | 63           | 47             | 10          |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 64           | ND             | 11          |                   |
| 5989-27-5   | d-Limonene                  | 2,600           | 60           | 470            | 11          |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 120          | ND             | 12          |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 130          | ND             | 18          |                   |
| 91-20-3     | Naphthalene                 | ND              | 63           | ND             | 12          |                   |
| 87-68-3     | Hexachlorobutadiene         | ND              | 63           | ND             | 5.9         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P220210-MB

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

**Analyst:** Wida Ang

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 2/10/22

Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND                          | 0.52                     | ND             | 0.30        |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 0.53                     | ND             | 0.11        |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 0.51                     | ND             | 0.25        |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 0.54                     | ND             | 0.077       |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 0.52                     | ND             | 0.20        |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 0.52                     | ND             | 0.24        |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 0.51                     | ND             | 0.13        |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 0.51                     | ND             | 0.19        |                   |
| 64-17-5   | Ethanol                                          | ND                          | 5.0                      | ND             | 2.7         |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 1.0                      | ND             | 0.60        |                   |
| 107-02-8  | Acrolein                                         | ND                          | 1.0                      | ND             | 0.44        |                   |
| 67-64-1   | Acetone                                          | ND                          | 5.2                      | ND             | 2.2         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 0.52                     | ND             | 0.093       |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 1.0                      | ND             | 0.41        |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 1.0                      | ND             | 0.46        |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 0.54                     | ND             | 0.14        |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 0.52                     | ND             | 0.15        |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 0.53                     | ND             | 0.17        |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 0.54                     | ND             | 0.070       |                   |
| 75-15-0   | Carbon Disulfide                                 | ND                          | 1.1                      | ND             | 0.35        |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 0.53                     | ND             | 0.13        |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 0.53                     | ND             | 0.13        |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 0.53                     | ND             | 0.15        |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 5.0                      | ND             | 1.4         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND                          | 1.0                      | ND             | 0.34        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

ALS Project ID: P2200535

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Sample ID: P220210-MB

**Test Code:** EPA TO-15 Modified

Date Collected: NA

**Instrument ID:** Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Date Received: NA

**Analyst:** Wida Ang

Date Analyzed: 2/10/22

**Sample Type:** 6.0 L Silonite Canister

Volume(s) Analyzed: 1.00 Liter(s)

**Test Notes:**

Canister Dilution Factor: 1.00

| CAS #      | Compound                  | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND              | 0.52         | ND             | 0.13        |                   |
| 141-78-6   | Ethyl Acetate             | ND              | 2.1          | ND             | 0.58        |                   |
| 110-54-3   | n-Hexane                  | ND              | 0.53         | ND             | 0.15        |                   |
| 67-66-3    | Chloroform                | ND              | 0.54         | ND             | 0.11        |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND              | 1.0          | ND             | 0.34        |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND              | 0.53         | ND             | 0.13        |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND              | 0.52         | ND             | 0.095       |                   |
| 71-43-2    | Benzene                   | ND              | 0.50         | ND             | 0.16        |                   |
| 56-23-5    | Carbon Tetrachloride      | ND              | 0.50         | ND             | 0.080       |                   |
| 110-82-7   | Cyclohexane               | ND              | 1.1          | ND             | 0.32        |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND              | 0.50         | ND             | 0.11        |                   |
| 75-27-4    | Bromodichloromethane      | ND              | 0.53         | ND             | 0.079       |                   |
| 79-01-6    | Trichloroethene           | ND              | 0.52         | ND             | 0.097       |                   |
| 123-91-1   | 1,4-Dioxane               | ND              | 0.52         | ND             | 0.14        |                   |
| 80-62-6    | Methyl Methacrylate       | ND              | 1.1          | ND             | 0.27        |                   |
| 142-82-5   | n-Heptane                 | ND              | 0.53         | ND             | 0.13        |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND              | 0.50         | ND             | 0.11        |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND              | 1.1          | ND             | 0.27        |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND              | 0.51         | ND             | 0.11        |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND              | 0.52         | ND             | 0.095       |                   |
| 108-88-3   | Toluene                   | ND              | 0.52         | ND             | 0.14        |                   |
| 591-78-6   | 2-Hexanone                | ND              | 1.1          | ND             | 0.27        |                   |
| 124-48-1   | Dibromochloromethane      | ND              | 0.53         | ND             | 0.062       |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND              | 0.52         | ND             | 0.068       |                   |
| 123-86-4   | n-Butyl Acetate           | ND              | 1.1          | ND             | 0.23        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

ALS Project ID: P2200535

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Sample ID: P220210-MB

**Test Code:** EPA TO-15 Modified

Date Collected: NA

**Instrument ID:** Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Date Received: NA

**Analyst:** Wida Ang

Date Analyzed: 2/10/22

**Sample Type:** 6.0 L Silonite Canister

Volume(s) Analyzed: 1.00 Liter(s)

**Test Notes:**

Canister Dilution Factor: 1.00

| CAS #       | Compound                    | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | ND                          | 0.53                     | ND             | 0.11        |                   |
| 127-18-4    | Tetrachloroethene           | ND                          | 0.52                     | ND             | 0.077       |                   |
| 108-90-7    | Chlorobenzene               | ND                          | 0.52                     | ND             | 0.11        |                   |
| 100-41-4    | Ethylbenzene                | ND                          | 0.52                     | ND             | 0.12        |                   |
| 179601-23-1 | m,p-Xylenes                 | ND                          | 1.1                      | ND             | 0.25        |                   |
| 75-25-2     | Bromoform                   | ND                          | 0.52                     | ND             | 0.050       |                   |
| 100-42-5    | Styrene                     | ND                          | 0.50                     | ND             | 0.12        |                   |
| 95-47-6     | o-Xylene                    | ND                          | 0.52                     | ND             | 0.12        |                   |
| 111-84-2    | n-Nonane                    | ND                          | 0.52                     | ND             | 0.099       |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND                          | 0.52                     | ND             | 0.076       |                   |
| 98-82-8     | Cumene                      | ND                          | 0.52                     | ND             | 0.11        |                   |
| 80-56-8     | alpha-Pinene                | ND                          | 0.54                     | ND             | 0.097       |                   |
| 103-65-1    | n-Propylbenzene             | ND                          | 0.53                     | ND             | 0.11        |                   |
| 622-96-8    | 4-Ethyltoluene              | ND                          | 0.53                     | ND             | 0.11        |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND                          | 0.52                     | ND             | 0.11        |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | ND                          | 0.52                     | ND             | 0.11        |                   |
| 100-44-7    | Benzyl Chloride             | ND                          | 1.1                      | ND             | 0.21        |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND                          | 0.52                     | ND             | 0.087       |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | ND                          | 0.52                     | ND             | 0.087       |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND                          | 0.53                     | ND             | 0.088       |                   |
| 5989-27-5   | d-Limonene                  | ND                          | 0.50                     | ND             | 0.090       |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND                          | 1.0                      | ND             | 0.10        |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND                          | 1.1                      | ND             | 0.15        |                   |
| 91-20-3     | Naphthalene                 | ND                          | 0.52                     | ND             | 0.099       |                   |
| 87-68-3     | Hexachlorobutadiene         | ND                          | 0.52                     | ND             | 0.049       |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## SURROGATE SPIKE RECOVERY RESULTS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister(s)

Test Notes:

Date(s) Collected: 2/4/22

Date(s) Received: 2/7/22

Date(s) Analyzed: 2/10/22

| Client Sample ID             | ALS Sample ID | 1,2-Dichloroethane-d4 | Toluene-d8        | Bromofluorobenzene | Acceptance Limits | Data Qualifier |
|------------------------------|---------------|-----------------------|-------------------|--------------------|-------------------|----------------|
|                              |               | Percent Recovered     | Percent Recovered | Percent Recovered  |                   |                |
| Method Blank                 | P220210-MB    | 95                    | 98                | 100                | 70-130            |                |
| Lab Control Sample           | P220210-LCS   | 93                    | 97                | 102                | 70-130            |                |
| Duplicate Lab Control Sample | P220210-DLCS  | 94                    | 98                | 101                | 70-130            |                |
| Digester 6 #1                | P2200535-001  | 85                    | 100               | 104                | 70-130            |                |
| Digester 2/3 #1              | P2200535-002  | 89                    | 101               | 104                | 70-130            |                |

Surrogate percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P220210-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #     | Compound                                         | Spike Amount                    | Result                   |                           | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|--------------------------------------------------|---------------------------------|--------------------------|---------------------------|------------|------|----------------------|-----|-----|------|
|           |                                                  | LCS / DLCS<br>µg/m <sup>3</sup> | LCS<br>µg/m <sup>3</sup> | DLCS<br>µg/m <sup>3</sup> | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 115-07-1  | Propene                                          | 206                             | 207                      | 218                       | 100        | 106  | 56-128               | 6   | 25  |      |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | 208                             | 187                      | 190                       | 90         | 91   | 71-112               | 1   | 25  |      |
| 74-87-3   | Chloromethane                                    | 206                             | 178                      | 181                       | 86         | 88   | 53-126               | 2   | 25  |      |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | 208                             | 201                      | 203                       | 97         | 98   | 62-121               | 1   | 25  |      |
| 75-01-4   | Vinyl Chloride                                   | 208                             | 188                      | 191                       | 90         | 92   | 63-123               | 2   | 25  |      |
| 106-99-0  | 1,3-Butadiene                                    | 206                             | 200                      | 203                       | 97         | 99   | 63-135               | 2   | 25  |      |
| 74-83-9   | Bromomethane                                     | 206                             | 187                      | 194                       | 91         | 94   | 71-112               | 3   | 25  |      |
| 75-00-3   | Chloroethane                                     | 206                             | 188                      | 195                       | 91         | 95   | 66-117               | 4   | 25  |      |
| 64-17-5   | Ethanol                                          | 832                             | 779                      | 808                       | 94         | 97   | 57-117               | 3   | 25  |      |
| 75-05-8   | Acetonitrile                                     | 202                             | 157                      | 162                       | 78         | 80   | 59-131               | 3   | 25  |      |
| 107-02-8  | Acrolein                                         | 416                             | 409                      | 421                       | 98         | 101  | 71-123               | 3   | 25  |      |
| 67-64-1   | Acetone                                          | 1,020                           | 926                      | 940                       | 91         | 92   | 60-117               | 1   | 25  |      |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | 202                             | 182                      | 188                       | 90         | 93   | 71-114               | 3   | 25  |      |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | 400                             | 309                      | 313                       | 77         | 78   | 61-124               | 1   | 25  |      |
| 107-13-1  | Acrylonitrile                                    | 402                             | 361                      | 369                       | 90         | 92   | 65-130               | 2   | 25  |      |
| 75-35-4   | 1,1-Dichloroethene                               | 210                             | 194                      | 201                       | 92         | 96   | 74-114               | 4   | 25  |      |
| 75-09-2   | Methylene Chloride                               | 208                             | 192                      | 195                       | 92         | 94   | 75-112               | 2   | 25  |      |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | 204                             | 174                      | 177                       | 85         | 87   | 57-127               | 2   | 25  |      |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | 216                             | 195                      | 201                       | 90         | 93   | 73-114               | 3   | 25  |      |
| 75-15-0   | Carbon Disulfide                                 | 414                             | 402                      | 410                       | 97         | 99   | 70-113               | 2   | 25  |      |
| 156-60-5  | trans-1,2-Dichloroethene                         | 208                             | 190                      | 194                       | 91         | 93   | 76-119               | 2   | 25  |      |
| 75-34-3   | 1,1-Dichloroethane                               | 214                             | 194                      | 198                       | 91         | 93   | 70-114               | 2   | 25  |      |
| 1634-04-4 | Methyl tert-Butyl Ether                          | 206                             | 201                      | 205                       | 98         | 100  | 72-118               | 2   | 25  |      |
| 108-05-4  | Vinyl Acetate                                    | 942                             | 1090                     | 1100                      | 116        | 117  | 56-137               | 0.9 | 25  |      |
| 78-93-3   | 2-Butanone (MEK)                                 | 408                             | 391                      | 397                       | 96         | 97   | 74-121               | 1   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P220210-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #      | Compound                  | Spike Amount                    | Result                   |                           | % Recovery |      | ALS                  | RPD | RPD | Data |
|------------|---------------------------|---------------------------------|--------------------------|---------------------------|------------|------|----------------------|-----|-----|------|
|            |                           | LCS / DLCS<br>µg/m <sup>3</sup> | LCS<br>µg/m <sup>3</sup> | DLCS<br>µg/m <sup>3</sup> | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 156-59-2   | cis-1,2-Dichloroethene    | 206                             | 188                      | 191                       | 91         | 93   | 73-117               | 2   | 25  |      |
| 141-78-6   | Ethyl Acetate             | 580                             | 549                      | 555                       | 95         | 96   | 59-161               | 1   | 25  |      |
| 110-54-3   | n-Hexane                  | 208                             | 207                      | 209                       | 100        | 100  | 55-130               | 0   | 25  |      |
| 67-66-3    | Chloroform                | 210                             | 201                      | 204                       | 96         | 97   | 71-114               | 1   | 25  |      |
| 109-99-9   | Tetrahydrofuran (THF)     | 404                             | 403                      | 408                       | 100        | 101  | 73-114               | 1   | 25  |      |
| 107-06-2   | 1,2-Dichloroethane        | 210                             | 183                      | 185                       | 87         | 88   | 71-119               | 1   | 25  |      |
| 71-55-6    | 1,1,1-Trichloroethane     | 208                             | 197                      | 199                       | 95         | 96   | 73-119               | 1   | 25  |      |
| 71-43-2    | Benzene                   | 208                             | 207                      | 208                       | 100        | 100  | 72-113               | 0   | 25  |      |
| 56-23-5    | Carbon Tetrachloride      | 202                             | 197                      | 200                       | 98         | 99   | 67-123               | 1   | 25  |      |
| 110-82-7   | Cyclohexane               | 412                             | 460                      | 459                       | 112        | 111  | 70-119               | 0.9 | 25  |      |
| 78-87-5    | 1,2-Dichloropropane       | 206                             | 203                      | 204                       | 99         | 99   | 70-118               | 0   | 25  |      |
| 75-27-4    | Bromodichloromethane      | 208                             | 213                      | 216                       | 102        | 104  | 74-119               | 2   | 25  |      |
| 79-01-6    | Trichloroethene           | 204                             | 216                      | 218                       | 106        | 107  | 74-115               | 0.9 | 25  |      |
| 123-91-1   | 1,4-Dioxane               | 206                             | 205                      | 207                       | 100        | 100  | 77-124               | 0   | 25  |      |
| 80-62-6    | Methyl Methacrylate       | 410                             | 449                      | 456                       | 110        | 111  | 78-126               | 0.9 | 25  |      |
| 142-82-5   | n-Heptane                 | 206                             | 218                      | 218                       | 106        | 106  | 70-119               | 0   | 25  |      |
| 10061-01-5 | cis-1,3-Dichloropropene   | 208                             | 215                      | 217                       | 103        | 104  | 81-126               | 1   | 25  |      |
| 108-10-1   | 4-Methyl-2-pentanone      | 412                             | 440                      | 440                       | 107        | 107  | 73-129               | 0   | 25  |      |
| 10061-02-6 | trans-1,3-Dichloropropene | 200                             | 200                      | 202                       | 100        | 101  | 80-127               | 1   | 25  |      |
| 79-00-5    | 1,1,2-Trichloroethane     | 208                             | 209                      | 210                       | 100        | 101  | 78-117               | 1   | 25  |      |
| 108-88-3   | Toluene                   | 206                             | 200                      | 207                       | 97         | 100  | 70-118               | 3   | 25  |      |
| 591-78-6   | 2-Hexanone                | 406                             | 358                      | 367                       | 88         | 90   | 74-132               | 2   | 25  |      |
| 124-48-1   | Dibromochloromethane      | 210                             | 204                      | 212                       | 97         | 101  | 69-137               | 4   | 25  |      |
| 106-93-4   | 1,2-Dibromoethane         | 208                             | 189                      | 196                       | 91         | 94   | 76-128               | 3   | 25  |      |
| 123-86-4   | n-Butyl Acetate           | 406                             | 371                      | 378                       | 91         | 93   | 75-134               | 2   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P220210-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

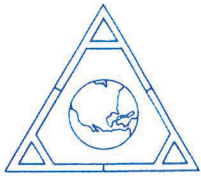
Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #       | Compound                    | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-------------|-----------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|             |                             | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 111-65-9    | n-Octane                    | 208                 | 207          | 213           | 100        | 102  | 68-120               | 2   | 25  |      |
| 127-18-4    | Tetrachloroethene           | 212                 | 206          | 212           | 97         | 100  | 63-130               | 3   | 25  |      |
| 108-90-7    | Chlorobenzene               | 206                 | 210          | 215           | 102        | 104  | 70-118               | 2   | 25  |      |
| 100-41-4    | Ethylbenzene                | 206                 | 212          | 217           | 103        | 105  | 71-123               | 2   | 25  |      |
| 179601-23-1 | m,p-Xylenes                 | 416                 | 441          | 452           | 106        | 109  | 67-127               | 3   | 25  |      |
| 75-25-2     | Bromoform                   | 210                 | 193          | 200           | 92         | 95   | 65-149               | 3   | 25  |      |
| 100-42-5    | Styrene                     | 202                 | 205          | 210           | 101        | 104  | 76-132               | 3   | 25  |      |
| 95-47-6     | o-Xylene                    | 208                 | 223          | 227           | 107        | 109  | 69-124               | 2   | 25  |      |
| 111-84-2    | n-Nonane                    | 208                 | 205          | 208           | 99         | 100  | 64-127               | 1   | 25  |      |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | 208                 | 229          | 235           | 110        | 113  | 69-128               | 3   | 25  |      |
| 98-82-8     | Cumene                      | 206                 | 218          | 223           | 106        | 108  | 69-125               | 2   | 25  |      |
| 80-56-8     | alpha-Pinene                | 210                 | 244          | 250           | 116        | 119  | 68-129               | 3   | 25  |      |
| 103-65-1    | n-Propylbenzene             | 208                 | 220          | 225           | 106        | 108  | 70-127               | 2   | 25  |      |
| 622-96-8    | 4-Ethyltoluene              | 208                 | 221          | 227           | 106        | 109  | 69-127               | 3   | 25  |      |
| 108-67-8    | 1,3,5-Trimethylbenzene      | 208                 | 227          | 232           | 109        | 112  | 66-129               | 3   | 25  |      |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 206                 | 245          | 248           | 119        | 120  | 63-142               | 0.8 | 25  |      |
| 100-44-7    | Benzyl Chloride             | 416                 | 448          | 460           | 108        | 111  | 73-145               | 3   | 25  |      |
| 541-73-1    | 1,3-Dichlorobenzene         | 208                 | 225          | 230           | 108        | 111  | 67-136               | 3   | 25  |      |
| 106-46-7    | 1,4-Dichlorobenzene         | 210                 | 192          | 197           | 91         | 94   | 63-134               | 3   | 25  |      |
| 95-50-1     | 1,2-Dichlorobenzene         | 210                 | 237          | 240           | 113        | 114  | 64-139               | 0.9 | 25  |      |
| 5989-27-5   | d-Limonene                  | 206                 | 255          | 259           | 124        | 126  | 63-137               | 2   | 25  |      |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | 404                 | 459          | 469           | 114        | 116  | 72-145               | 2   | 25  |      |
| 120-82-1    | 1,2,4-Trichlorobenzene      | 420                 | 398          | 404           | 95         | 96   | 62-154               | 1   | 25  |      |
| 91-20-3     | Naphthalene                 | 210                 | 144          | 147           | 69         | 70   | 62-156               | 1   | 25  |      |
| 87-68-3     | Hexachlorobutadiene         | 212                 | 214          | 218           | 101        | 103  | 55-142               | 2   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.



AtmAA Inc.

23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250

specialized air assessment laboratory  
atmaa.com

February 18, 2022

LTR/1914/22

Nicole Bryson  
ALS Environmental  
2655 Park Center Drive, Suite A  
Simi Valley, CA 93065

RE: City of Tampa HFC AWTP Master Plan Improvements /  
P2200535

Dear Nicole:

Please find enclosed the laboratory analysis report, quality assurance summary, and the chain of custody form for two SUMMA canister samples received from City of Tampa HFC AWTP P2200535 received February 11, 2022.

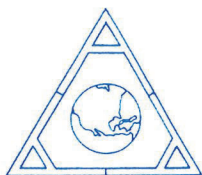
The SUMMA canister samples were analyzed for ASTM 3588 BTU as requested on the chain of custody form.

Sincerely,

AtmAA, Inc.

Brian W. Fung  
Laboratory Director



**LABORATORY ANALYSIS REPORT**

## Speciated Hydrocarbons Analysis in SUMMA Canister Sample

Report Date: February 18, 2022  
Client: ALS Environmental  
Project Name: City of Tampa HFC AWTP Master Plan Improvements  
Project No.: P2200535  
Date Received: February 11, 2022  
Date Analyzed: February 11, 2022

**ANALYSIS DESCRIPTION**

Hydrocarbon Speciation analysis was performed by flame ionization detection/gas chromatography (FID/GC), modified EPA-18. Hydrogen sulfide measured by gas chromatography with sulfur chemiluminescence detector (SCD).

|                          |                          |                              |
|--------------------------|--------------------------|------------------------------|
| AtmAA Lab No.:           | 20422-3                  | 20422-3                      |
| Sample ID:               | Digester 6 #1            | Digester 6 #1                |
|                          | P2200535-001             | P2200535-001                 |
| <u>Component</u>         | <u>(ppmv, component)</u> | <u>(% by vol, component)</u> |
| Methane                  | 558000                   | 55.80                        |
| Ethene                   | <0.60                    | <0.01                        |
| Acetylene                | <0.60                    | <0.01                        |
| Ethane                   | <0.60                    | <0.01                        |
| Hydrogen sulfide         | 15600                    | 1.56                         |
| non-methane hydrocarbons |                          |                              |
| analysis by carbon       |                          |                              |
| <u>number grouping</u>   |                          |                              |
| C3 as Propane            | <0.10                    | <0.01                        |
| C4 as n-Butane           | 3.27                     | <0.01                        |
| C5 as n-Pentane          | 3.51                     | <0.01                        |
| C6 as n-Hexane           | 4.67                     | <0.01                        |
| >C6 as n-Hexane          | 48.2                     | <0.01                        |

|       |                     |                       |
|-------|---------------------|-----------------------|
|       | (ppmvC, as methane) | (% by vol, component) |
| TNMHC | 596                 | <0.01                 |

TNMHC - total non-methane hydrocarbons as ppmvC, as methane.  
Actual analysis results are reported on a "wet" basis.

Brian W. Fung  
Laboratory Director

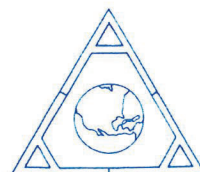
# QUALITY ASSURANCE SUMMARY

(Repeat Analyses)

Project Name: City of Tampa HFC AWTP Master Plan Improvements  
 Project No.: P2200535  
 Date Received: February 11, 2022  
 Date Analyzed: February 11, 2022

| Component                                                   | Sample ID     | Repeat Analysis |        | Mean Conc. | % Diff. From Mean |
|-------------------------------------------------------------|---------------|-----------------|--------|------------|-------------------|
|                                                             |               | Run #1          | Run #2 |            |                   |
| (Conc. in ppmv, component)                                  |               |                 |        |            |                   |
| Methane                                                     | Digester 6 #1 | 557000          | 559000 | 558000     | 0.18              |
| Ethene                                                      | Digester 6 #1 | <0.60           | <0.60  | <0.60      | ---               |
| Acetylene                                                   | Digester 6 #1 | <0.60           | <0.60  | <0.60      | ---               |
| Ethane                                                      | Digester 6 #1 | <0.60           | <0.60  | <0.60      | ---               |
| non-methane hydrocarbons analysis by carbon number grouping |               |                 |        |            |                   |
| C3                                                          | Digester 6 #1 | <0.10           | <0.10  | <0.10      | ---               |
| C4                                                          | Digester 6 #1 | 3.24            | 3.29   | 3.27       | 0.77              |
| C5                                                          | Digester 6 #1 | 3.58            | 3.44   | 3.51       | 2.0               |
| C6                                                          | Digester 6 #1 | 4.65            | 4.70   | 4.67       | 0.49              |
| C7                                                          | Digester 6 #1 | 1.34            | 1.32   | 1.33       | 1.0               |
| C8                                                          | Digester 6 #1 | 1.56            | 1.61   | 1.59       | 1.7               |
| C9                                                          | Digester 6 #1 | 2.16            | 2.34   | 2.25       | 4.0               |
| C10                                                         | Digester 6 #1 | 10.8            | 11.4   | 11.1       | 2.6               |
| C11                                                         | Digester 6 #1 | 9.83            | 11.7   | 10.8       | 8.8               |
| C12                                                         | Digester 6 #1 | 9.90            | 10.9   | 10.4       | 4.7               |
| C13                                                         | Digester 6 #1 | 8.99            | 10.1   | 9.53       | 5.7               |
| C14                                                         | Digester 6 #1 | 1.14            | 1.31   | 1.22       | 7.0               |
| (Conc. in ppmvC, as methane)                                |               |                 |        |            |                   |
| TNMHC                                                       | Digester 6 #1 | 568             | 624    | 596        | 4.8               |

One SUMMA canister sample, laboratory number 20422-3, was analyzed for hydrocarbon speciation, EPA Method 18. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". The average % difference from mean for 13 repeat measurements from one SUMMA canister sample is 3.4%.



## Calculated values for Specific Volume, BTU, and F (factor)

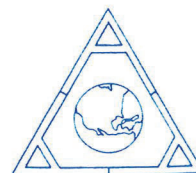
Report Date: February 18, 2022  
 Client: ALS Environmental  
 Project Name: City of Tampa HFC AWTP Master Plan Improvements  
 Date Received: February 11, 2022  
 Date Analyzed: February 11, 2022  
 AtmAA Lab #: 20422-3  
 Sample ID: Digester 6 #1

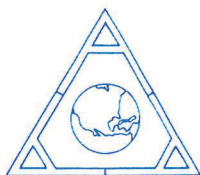
Specific volume, BTU, and F-factor are calculated using laboratory analysis results for methane, carbon dioxide, nitrogen, oxygen, TNMHC, and sulfur compounds in equations that include gross/net heating and specific gas volume values taken from the GPA-2145 Midstream Standard. Heating value factor is a calculated according to ASTM 3588-98 (14.696 psia and 60°F). The F-factor is calculated according to the equation in EPA Method 19.

| Component                                  | Mole % | Wt %   | C,H,O,N,S, Wt. % |             |
|--------------------------------------------|--------|--------|------------------|-------------|
| Methane                                    | 55.7   | 32.7   | Carbon           | 40.1        |
| Carbon dioxide                             | 35.3   | 57.1   | Hydrogen         | 8.29        |
| Nitrogen                                   | 6.11   | 6.28   | Oxygen           | 43.4        |
| Oxygen                                     | 1.61   | 1.89   | Nitrogen         | 6.28        |
| Argon                                      | 0.07   | 0.10   | Argon            | 0.10        |
| Hydrogen                                   | 0.00   | 0.00   | Sulfur           | 1.83        |
| (CH <sub>2</sub> ) <sub>n</sub>            | 0.01   | 0.03   |                  |             |
| Specific Volume                            |        | 13.95  |                  |             |
| BTU/ft3 (Dry @60F, 14.696 psia)            |        | 572.7  | (HHV)            | 515.9 (LHV) |
| BTU/ft3 (Water Saturated @ 0.25636 psia)   |        | 562.7  | (HHV)            | 506.9 (LHV) |
| BTU/lb (Dry @60F, 14.696 psia)             |        | 7990   | (HHV)            | 7197 (LHV)  |
| F <sub>d</sub> (factor)                    |        | 9200   |                  |             |
| F <sub>w</sub> (factor)                    |        | 11203  |                  |             |
| F <sub>c</sub> (factor)                    |        | 1611   |                  |             |
| Compressibility Factor (@60F, 14.696 psia) |        | 0.9970 |                  |             |
| Wobbe Index                                |        | 590.3  |                  |             |
| Specific Gravity                           |        | 0.9414 |                  |             |

| Component      | Specific volume<br>reference values * |
|----------------|---------------------------------------|
| Methane        | 23.7 (ft <sup>3</sup> /lb)            |
| Carbon dioxide | 8.62                                  |
| Nitrogen       | 13.5                                  |
| Oxygen         | 11.9                                  |
| Argon          | 9.52                                  |
| Hydrogen       | 188.2                                 |

\* reference, Rev. 2016, GPA-2145 Midstream Standard, Selected Hydrocarbons 60°F





## LABORATORY ANALYSIS REPORT

### Speciated Hydrocarbons Analysis in SUMMA Canister Sample

Report Date: February 18, 2022  
Client: ALS Environmental  
Project Name: City of Tampa HFC AWTP Master Plan Improvements  
Project No.: P2200535  
Date Received: February 11, 2022  
Date Analyzed: February 11, 2022

### ANALYSIS DESCRIPTION

*Hydrocarbon Speciation analysis was performed by flame ionization detection/gas chromatography (FID/GC), modified EPA-18. Hydrogen sulfide measured by gas chromatography with sulfur chemiluminescence detector (SCD).*

|                                                                   |                   |                       |
|-------------------------------------------------------------------|-------------------|-----------------------|
| AtmAA Lab No.:                                                    | 20422-4           | 20422-4               |
| Sample ID:                                                        | Digester 2/3 #1   | Digester 2/3 #1       |
|                                                                   | P2200535-002      | P2200535-002          |
| Component                                                         | (ppmv, component) | (% by vol, component) |
| Methane                                                           | 547000            | 54.70                 |
| Ethene                                                            | <0.60             | <0.01                 |
| Acetylene                                                         | <0.60             | <0.01                 |
| Ethane                                                            | <0.60             | <0.01                 |
| Hydrogen sulfide                                                  | 14500             | 1.45                  |
| non-methane hydrocarbons<br>analysis by carbon<br>number grouping |                   |                       |
| C3 as Propane                                                     | <0.10             | <0.01                 |
| C4 as n-Butane                                                    | 0.82              | <0.01                 |
| C5 as n-Pentane                                                   | 1.64              | <0.01                 |
| C6 as n-Hexane                                                    | 1.71              | <0.01                 |
| >C6 as n-Hexane                                                   | 37.5              | <0.01                 |

|       |                     |                       |
|-------|---------------------|-----------------------|
|       | (ppmvC, as methane) | (% by vol, component) |
| TNMHC | 434                 | <0.01                 |

TNMHC - total non-methane hydrocarbons as ppmvC, as methane.  
Actual analysis results are reported on a "wet" basis.

Brian W. Fung  
Laboratory Director



## Calculated values for Specific Volume, BTU, and F (factor)

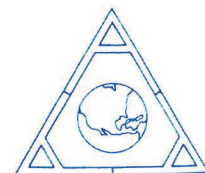
Report Date: February 18, 2022  
 Client: ALS Environmental  
 Project Name: City of Tampa HFC AWTP Master Plan Improvements  
 Date Received: February 11, 2022  
 Date Analyzed: February 11, 2022  
 AtmAA Lab #: 20422-4  
 Sample ID: Digester 2/3 #1

Specific volume, BTU, and F-factor are calculated using laboratory analysis results for methane, carbon dioxide, nitrogen, oxygen, TNMHC, and sulfur compounds in equations that include gross/net heating and specific gas volume values taken from the GPA-2145 Midstream Standard. Heating value factor is a calculated according to ASTM 3588-98 (14.696 psia and 60°F). The F-factor is calculated according to the equation in EPA Method 19.

| Component                                  | Mole % | Wt %   | C,H,O,N,S, Wt. % |             |
|--------------------------------------------|--------|--------|------------------|-------------|
| Methane                                    | 54.7   | 31.6   | Carbon           | 39.1        |
| Carbon dioxide                             | 35.6   | 56.6   | Hydrogen         | 8.01        |
| Nitrogen                                   | 7.56   | 7.63   | Oxygen           | 43.4        |
| Oxygen                                     | 1.97   | 2.28   | Nitrogen         | 7.63        |
| Argon                                      | 0.09   | 0.13   | Argon            | 0.13        |
| Hydrogen                                   | 0.00   | 0.00   | Sulfur           | 1.67        |
| (CH <sub>2</sub> ) <sub>n</sub>            | 0.00   | 0.02   |                  |             |
| Specific Volume                            |        | 13.86  |                  |             |
| BTU/ft3 (Dry @60F, 14.696 psia)            |        | 562.4  | (HHV)            | 506.6 (LHV) |
| BTU/ft3 (Water Saturated @ 0.25636 psia)   |        | 552.6  | (HHV)            | 497.8 (LHV) |
| BTU/lb (Dry @60F, 14.696 psia)             |        | 7796   | (HHV)            | 7023 (LHV)  |
| F <sub>d</sub> (factor)                    |        | 9117   |                  |             |
| F <sub>w</sub> (factor)                    |        | 11098  |                  |             |
| F <sub>c</sub> (factor)                    |        | 1612   |                  |             |
| Compressibility Factor (@60F, 14.696 psia) |        | 0.9970 |                  |             |
| Wobbe Index                                |        | 574.8  |                  |             |
| Specific Gravity                           |        | 0.9577 |                  |             |

| Component      | Specific volume<br>reference values * |
|----------------|---------------------------------------|
| Methane        | 23.7 (ft <sup>3</sup> /lb)            |
| Carbon dioxide | 8.62                                  |
| Nitrogen       | 13.5                                  |
| Oxygen         | 11.9                                  |
| Argon          | 9.52                                  |
| Hydrogen       | 188.2                                 |

\* reference, Rev. 2016, GPA-2145 Midstream Standard, Selected Hydrocarbons 60°F



ALS Environmental Chain of Custody  
2655 Park Center Drive, Suite A • Simi Valley, CA 93065 • 805-526-7161 • FAX

ALS Contact: Nicole Bryson

Project Number: P2200535  
Project Manager: Nicole Bryson  
QAP: LAB QAP

Project Name: City of Tampa HFC AWT Master Plan Improvements

Atm AA 4  
20422-3  
-4

| Project Number: P2200535 |  | Project Manager: Nicole Bryson |            | LAB QAP |        | Project Name: City of Tampa HFC AWTIP Master Plan Improvements |        | Misc Out 1 None |  |
|--------------------------|--|--------------------------------|------------|---------|--------|----------------------------------------------------------------|--------|-----------------|--|
| Lab Code                 |  | Sample ID                      | # of Cont. | Matrix  | Sample |                                                                | Lab ID |                 |  |
| P2200535-001             |  | Digester 6 #1                  | 1          | Air     | Date   |                                                                | Time   | AtmAA, Inc.     |  |
| P2200535-002             |  | Digester 2/3 #1                | 1          | Air     | 2/4/22 |                                                                | 0943   | AtmAA, Inc.     |  |

Test Comments

Misc Out 1 - None

P2200535-001,2

ASTM D 3588 - BTU

Folder Comments:

Canisters were backfilled with Helium

|                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                |                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Special Instructions/Comments<br><br>Report using Client project Name / ID<br>Send Report to <a href="mailto:Sue.Anderson@ALSGlobal.com">Sue.Anderson@ALSGlobal.com</a><br>Send Invoice AP and cc PM:<br><a href="mailto:ALSUSA_AccountsPavable@alsglobal.com">ALSUSA_AccountsPavable@alsglobal.com</a><br><br>H - Test is On Hold<br>P - Test is Authorized for Prep Only | Turnaround Requirements<br><input checked="" type="checkbox"/> RUSH (Surcharges Apply)<br>PLEASE CIRCLE WORK DAYS<br>1 2 3 4 5<br><input type="checkbox"/> STANDARD<br>Requested FAX Date: _____<br>Requested Report Date: <del>02/11/22</del> | Report Requirements<br><input type="checkbox"/> I. Results Only<br><input checked="" type="checkbox"/> II. Results + QC Summaries<br><input type="checkbox"/> III. Results + QC and Calibration Summaries<br><input type="checkbox"/> IV. Data Validation Report with Raw Data<br>PQL/MDL/1 <input type="checkbox"/> N <input type="checkbox"/> Y<br>EDD <input type="checkbox"/> N <input type="checkbox"/> Y | Invoice Information<br>PO# 54P2200535<br>Bill to |
|                                                                                                                                                                                                                                                                                                                                                                            | Relinquished By: <u>AP</u> 2/10/22 3:00 pm Received By: <u>[Signature]</u> 2/11/22 9:30 Airbill Number: _____                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                |                                                  |
|                                                                                                                                                                                                                                                                                                                                                                            | Page 1                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                |                                                  |



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## LABORATORY REPORT

April 5, 2022

Caryssa Joustra, PhD  
Hazen And Sawyer, P.C.  
1000 N. Ashley Dr Suite 1000  
Tampa, FL 33602

**RE: City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13**

Dear Caryssa:

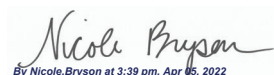
Enclosed are the results of the samples submitted to our laboratory on March 11, 2022. The canister sample was sent out for partial analysis to AtmAA, Inc. Please find their report (Lab No.: 20912-8). For your reference, these analyses have been assigned our service request number P2201098.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at [www.alsglobal.com](http://www.alsglobal.com). Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

**ALS | Environmental**

  
By Nicole.Bryson at 3:39 pm, Apr 05, 2022

Nicole Bryson  
Laboratory Director



2655 Park Center Dr., Suite A  
Simi Valley, CA 93065  
T: +1 805 526 7161  
[www.alsglobal.com](http://www.alsglobal.com)

Client: Hazen And Sawyer, P.C.

Service Request No: P2201098

Project: City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

---

## CASE NARRATIVE

The samples were received intact under chain of custody on March 11, 2022 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

### Sulfur Analysis

Sample Digester 6 #2 (P201098-003) was analyzed for twenty sulfur compounds per ASTM D 5504-12 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan. This method is included on the laboratory's NELAP scope of accreditation, however it is not part of the DoD-ELAP accreditation.

### Siloxanes Analysis

The tube samples were analyzed for siloxanes according to ASTM D8230-19 using an analytical system comprised of a gas chromatograph/mass spectrometer (GC/MS). This method is not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.

### Volatile Organic Compound Analysis

Sample Digester 6 #2 (P2201098-003) was also analyzed for volatile organic compounds and tentatively identified compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. The method was modified to include the use of helium as a diluent gas in place of zero-grade air for container pressurization. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The upper control criteria were exceeded for ethanol, 2-hexanone, n-butyl acetate and d-limonene in the Laboratory Control Sample (LCS) and Duplicate Laboratory Control Sample (DLCS) analyzed on March 29, 2022. Therefore, there exists a potential for high bias in the associated data. Additionally, the spike recoveries of isopropanol, 2-butanone and tetrahydrofuran for the LCS and 2-butanone, tetrahydrofuran, n-octane and n-nonane for the DLCS analyzed on March 29, 2022 were outside the laboratory generated control criteria. The recovery errors equate to a potential high bias. However, the spike recoveries of the analytes in question were within the method criteria; therefore, the data quality has not been significantly affected.





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Client: Hazen And Sawyer, P.C.

Service Request No: P2201098

Project: City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

---

## CASE NARRATIVE

The reporting limits have been elevated in the sample because chromatogram indicated the presence of non-target background components. Therefore, the sample was diluted in order to prevent damage to the instrument and to achieve optimal resolution of the target analytes.

The containers were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. For projects requiring DoD QSM 5.3 compliance canisters were cleaned to <1/2 the MRL. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

---

*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*



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ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

| Agency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Web Site                                                                                                                                                                                                                                            | Number                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Alaska DEC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <a href="http://dec.alaska.gov/eh/lab.aspx">http://dec.alaska.gov/eh/lab.aspx</a>                                                                                                                                                                   | 17-019                     |
| Arizona DHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <a href="http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home">http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home</a> | AZ0694                     |
| Florida DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <a href="http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html">http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html</a>                                               | E871020                    |
| Louisiana DEQ (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>                                                                                                                         | 05071                      |
| Maine DHHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <a href="http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml">http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml</a>                                                             | 2018027                    |
| Minnesota DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>                                                                                                                                               | 1776326                    |
| New Jersey DEP (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>                                                                                                                                                 | CA009                      |
| New York DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <a href="http://www.wadsworth.org/labcert/elap/elap.html">http://www.wadsworth.org/labcert/elap/elap.html</a>                                                                                                                                       | 11221                      |
| Oregon PHD (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <a href="http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>                           | 4068-008                   |
| Pennsylvania DEP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx">http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx</a>                                           | 68-03307<br>(Registration) |
| PJLA (DoD ELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <a href="http://www.pjlab.com/search-accredited-labs">http://www.pjlab.com/search-accredited-labs</a>                                                                                                                                               | 65818<br>(Testing)         |
| Texas CEQ (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <a href="http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html</a>                                                                                                         | T104704413-19-10           |
| Utah DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="http://health.utah.gov/lab/lab_cert_env">http://health.utah.gov/lab/lab_cert_env</a>                                                                                                                                                       | CA016272019-10             |
| Washington DOE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>                                                                                                         | C946                       |
| <p>Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at <a href="http://www.alsglobal.com">www.alsglobal.com</a>, or at the accreditation body's website.</p> <p>Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.</p> |                                                                                                                                                                                                                                                     |                            |

# ALS ENVIRONMENTAL

## DETAIL SUMMARY REPORT

Client: Hazen And Sawyer, P.C.

Project ID: City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

Service Request: P2201098

Date Received: 3/11/2022

Time Received: 14:26

| Client Sample ID | Lab Code     | Matrix | Date Collected | Time Collected | Container ID | Pi1 (psig) | Pf1 (psig) | ASTM D8230 - Siloxanes Tube | ASTM D 5504-12 - Sulfur Can | TO-15 Modified - VOC Cans | None - Misc Out 1 |
|------------------|--------------|--------|----------------|----------------|--------------|------------|------------|-----------------------------|-----------------------------|---------------------------|-------------------|
| Digester 6 #1S   | P2201098-001 | Air    | 3/10/2022      | 09:31          |              |            |            | X                           |                             |                           |                   |
| Digester 2/3 #1S | P2201098-002 | Air    | 3/10/2022      | 10:41          |              |            |            | X                           |                             |                           |                   |
| Digester 6 #2    | P2201098-003 | Air    | 3/10/2022      | 10:01          | AS00890      | 2.07       | 3.82       |                             | X                           | X                         |                   |

## Air - Chain of Custody Record & Analytical Service Request

2655 Park Center Drive, Suite A  
Simi Valley, California 93065  
Phone (805) 526-7161

[illegible]

## Sample Acceptance Check Form

by: ADAVID

**Note:** This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

|    |                                                                                                               | Yes                                 | No                                  | N/A                                 |
|----|---------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 1  | Were <b>sample containers</b> properly marked with client sample ID?                                          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 2  | Did <b>sample containers</b> arrive in good condition?                                                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 3  | Were <b>chain-of-custody</b> papers used and filled out?                                                      | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 4  | Did <b>sample container labels</b> and/or tags agree with custody papers?                                     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 5  | Was <b>sample volume</b> received adequate for analysis?                                                      | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 6  | Are samples within specified holding times?                                                                   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 7  | Was proper <b>temperature</b> (thermal preservation) of cooler at receipt adhered to?                         | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 8  | Were <b>custody seals</b> on outside of cooler/Box/Container?                                                 | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|    | Location of seal(s) _____ Sealing Lid?                                                                        | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Were signature and date included?                                                                             | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Were seals intact?                                                                                            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 9  | Do containers have appropriate <b>preservation</b> , according to method/SOP or Client specified information? | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Is there a client indication that the submitted samples are <b>pH</b> preserved?                              | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Were <b>VOA vials</b> checked for presence/absence of air bubbles?                                            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Does the client/method/SOP require that the analyst check the sample pH and <u>if necessary</u> alter it?     | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 10 | <b>Tubes:</b> Are the tubes capped and intact?                                                                | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 11 | <b>Badges:</b> Are the badges properly capped and intact?                                                     | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Are dual bed badges separated and individually capped and intact?                                             | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

[illegible]

Explain any discrepancies: (include lab sample ID numbers):

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #2

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P2201098-003

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS00890

Date Collected: 3/10/22

Time Collected: 10:01

Date Received: 3/11/22

Date Analyzed: 3/14/22

Time Analyzed: 09:01

Volume(s) Analyzed: 1.0 ml(s)

Container Dilution Factor: 1.77

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | 28,000,000      | 12           | 20,000,000     | 8.9         |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 22           | ND             | 8.9         |                   |
| 74-93-1   | Methyl Mercaptan      | 77,000          | 17           | 39,000         | 8.9         |                   |
| 75-08-1   | Ethyl Mercaptan       | 5,500           | 22           | 2,200          | 8.9         |                   |
| 75-18-3   | Dimethyl Sulfide      | 12,000          | 22           | 4,900          | 8.9         |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 14           | ND             | 4.4         |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 28           | ND             | 8.9         |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 33           | ND             | 8.9         |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 28           | ND             | 8.9         |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 28           | ND             | 8.9         |                   |
| 110-02-1  | Thiophene             | ND              | 30           | ND             | 8.9         |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 33           | ND             | 8.9         |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 33           | ND             | 8.9         |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 33           | ND             | 8.9         |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 17           | ND             | 4.4         |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 36           | ND             | 8.9         |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 32           | ND             | 8.9         |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 41           | ND             | 8.9         |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 41           | ND             | 8.9         |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 22           | ND             | 4.4         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

### Total Reduced Sulfur as Hydrogen Sulfide

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister(s)

Test Notes:

Date(s) Collected: 3/10/22

Date Received: 3/11/22

Date Analyzed: 3/14/22

| Client Sample ID | ALS Sample ID | Container<br>Dilution<br>Factor | Injection<br>Volume<br>ml(s) | Time<br>Analyzed | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------------|---------------|---------------------------------|------------------------------|------------------|-----------------|--------------|----------------|-------------|-------------------|
| Digester 6 #2    | P2201098-003  | 1.77                            | 1.0                          | 09:01            | 28,000,000      | 12           | 20,000,000     | 8.9         |                   |
| Method Blank     | P220314-MB    | 1.00                            | 1.0                          | 08:21            | ND              | 7.0          | ND             | 5.0         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220314-MB

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Time Collected: NA

Date Received: NA

Date Analyzed: 3/14/22

Time Analyzed: 08:21

Volume(s) Analyzed: 1.0 ml(s)

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | ND              | 7.0          | ND             | 5.0         |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 12           | ND             | 5.0         |                   |
| 74-93-1   | Methyl Mercaptan      | ND              | 9.8          | ND             | 5.0         |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 13           | ND             | 5.0         |                   |
| 75-18-3   | Dimethyl Sulfide      | ND              | 13           | ND             | 5.0         |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 7.8          | ND             | 2.5         |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 16           | ND             | 5.0         |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 18           | ND             | 5.0         |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 16           | ND             | 5.0         |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 16           | ND             | 5.0         |                   |
| 110-02-1  | Thiophene             | ND              | 17           | ND             | 5.0         |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 18           | ND             | 5.0         |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 18           | ND             | 5.0         |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 18           | ND             | 5.0         |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 9.6          | ND             | 2.5         |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 20           | ND             | 5.0         |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 18           | ND             | 5.0         |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 23           | ND             | 5.0         |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 23           | ND             | 5.0         |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 12           | ND             | 2.5         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.



# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220314-DLCS

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 3/14/22

Volume(s) Analyzed: NA ml(s)

| CAS #     | Compound         | Spike Amount       | Result      |              | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|------------------|--------------------|-------------|--------------|------------|------|----------------------|-----|-----|------|
|           |                  | LCS / DLCS<br>ppbV | LCS<br>ppbV | DLCS<br>ppbV | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 7783-06-4 | Hydrogen Sulfide | 989                | 951         | 897          | 96         | 91   | 72-122               | 5   | 18  |      |
| 463-58-1  | Carbonyl Sulfide | 1,050              | 1,030       | 1,020        | 98         | 97   | 72-121               | 1   | 17  |      |
| 74-93-1   | Methyl Mercaptan | 1,050              | 1,120       | 1,070        | 107        | 102  | 74-127               | 5   | 18  |      |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #1S

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P2201098-001

Test Code: ASTM D8230-19

Instrument ID: Agilent 5973N/HP6890A/MS7

Analyst: Mathew Meyer

Sample Type: Siloxane Tube

Test Notes: BC, DE

Date Collected: 3/10/22

Date Received: 3/11/22

Date Analyzed: 3/21 - 3/22/22

Desorption Volume: 3.0 ml

Volume Sampled: 6 Liter(s)

| CAS #                | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|----------------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6            | Trimethylsilanol                                | 0.85              | 140             | 50           | 44                            | 15           |                   |
| 107-46-0             | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.30            | ND              | 51           | ND                            | 17           |                   |
| 541-05-9             | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | 0.66              | 110             | 58           | 42                            | 22           |                   |
| 107-51-7             | Octamethyltrisiloxane (L <sub>3</sub> )         | < 0.30            | ND              | 51           | ND                            | 18           |                   |
| 556-67-2             | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | 14                | 2,400           | 51           | 890                           | 19           |                   |
| 141-62-8             | Decamethyltetrasiloxane (L <sub>4</sub> )       | 0.57              | 96              | 51           | 35                            | 18           |                   |
| 541-02-6             | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | 82                | 14,000          | 51           | 5,200                         | 19           |                   |
| 141-63-9             | Dodecamethylpentasiloxane (L <sub>5</sub> )     | 0.81              | 130             | 51           | 49                            | 19           |                   |
| 540-97-6             | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | 1.2               | 200             | 50           | 75                            | 19           |                   |
| <b>Total Silicon</b> |                                                 |                   |                 |              | <b>6,300</b>                  |              |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 2/3 #1S

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P2201098-002

Test Code: ASTM D8230-19

Instrument ID: Agilent 5973N/HP6890A/MS7

Analyst: Mathew Meyer

Sample Type: Siloxane Tube

Test Notes: BC, DE

Date Collected: 3/10/22

Date Received: 3/11/22

Date Analyzed: 3/21 - 3/22/22

Desorption Volume: 3.0 ml

Volume Sampled: 6 Liter(s)

| CAS #                | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|----------------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6            | Trimethylsilanol                                | 0.40              | 67              | 50           | 21                            | 15           |                   |
| 107-46-0             | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.30            | ND              | 51           | ND                            | 17           |                   |
| 541-05-9             | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | < 0.35            | ND              | 58           | ND                            | 22           |                   |
| 107-51-7             | Octamethyltrisiloxane (L <sub>3</sub> )         | < 0.30            | ND              | 51           | ND                            | 18           |                   |
| 556-67-2             | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | 12                | 2,000           | 51           | 760                           | 19           |                   |
| 141-62-8             | Decamethyltetrasiloxane (L <sub>4</sub> )       | 0.72              | 120             | 51           | 43                            | 18           |                   |
| 541-02-6             | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | 81                | 14,000          | 51           | 5,100                         | 19           |                   |
| 141-63-9             | Dodecamethylpentasiloxane (L <sub>5</sub> )     | 1.1               | 190             | 51           | 70                            | 19           |                   |
| 540-97-6             | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | 1.4               | 230             | 50           | 88                            | 19           |                   |
| <b>Total Silicon</b> |                                                 |                   |                 |              | <b>6,100</b>                  |              |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220321-MB

Test Code: ASTM D8230-19

Instrument ID: Agilent 5973N/HP6890A/MS7

Analyst: Mathew Meyer

Sample Type: Siloxane Tube

Test Notes: BC, DE

Date Collected: NA

Date Received: NA

Date Analyzed: 3/21/22

Desorption Volume: 3.0 ml

Volume Sampled: NA Liter(s)

| CAS #         | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|---------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6     | Trimethylsilanol                                | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 107-46-0      | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 541-05-9      | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | < 0.35            | NA              | NA           | NA                            | NA           |                   |
| 107-51-7      | Octamethyltrisiloxane (L <sub>3</sub> )         | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 556-67-2      | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 141-62-8      | Decamethyltetrasiloxane (L <sub>4</sub> )       | < 0.31            | NA              | NA           | NA                            | NA           |                   |
| 541-02-6      | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 141-63-9      | Dodecamethylpentasiloxane (L <sub>5</sub> )     | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 540-97-6      | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| Total Silicon |                                                 |                   |                 |              | NA                            |              |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

NA = Not applicable.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220321-DLCS

Test Code: ASTM D8230-19

Instrument ID: Agilent 5973N/HP6890A/MS7

Analyst: Mathew Meyer

Sampling Type: Siloxane Tube

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 3/21/22

Volume(s) Analyzed: NA Liter(s)

| CAS #     | Compound                      | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|-------------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|           |                               | LCS / DLCS<br>µg/ml | LCS<br>µg/ml | DLCS<br>µg/ml | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 1066-40-6 | Trimethylsilanol              | 10.3                | 8.69         | 8.19          | 84         | 80   | 70-130               | 5   | 25  |      |
| 107-46-0  | Hexamethyldisiloxane          | 11.4                | 12.5         | 11.7          | 110        | 103  | 70-130               | 7   | 25  |      |
| 541-05-9  | Hexamethylcyclotrisiloxane    | 11.6                | 12.2         | 11.5          | 105        | 99   | 70-130               | 6   | 25  |      |
| 107-51-7  | Octamethyltrisiloxane         | 11.9                | 13.0         | 12.2          | 109        | 103  | 70-130               | 6   | 25  |      |
| 556-67-2  | Octamethylcyclotetrasiloxane  | 12.0                | 13.1         | 12.3          | 109        | 103  | 70-130               | 6   | 25  |      |
| 141-62-8  | Decamethyltetrasiloxane       | 11.8                | 12.9         | 12.2          | 109        | 103  | 70-130               | 6   | 25  |      |
| 541-02-6  | Decamethylcyclopentasiloxane  | 11.6                | 12.7         | 12.0          | 109        | 103  | 70-130               | 6   | 25  |      |
| 141-63-9  | Dodecamethylpentasiloxane     | 12.3                | 13.6         | 12.8          | 111        | 104  | 70-130               | 7   | 25  |      |
| 540-97-6  | Dodecamethylcyclohexasiloxane | 10.6                | 11.6         | 11.0          | 109        | 104  | 70-130               | 5   | 25  |      |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #2

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P2201098-003

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS00890

Date Collected: 3/10/22

Date Received: 3/11/22

Date Analyzed: 3/30/22

Volume(s) Analyzed: 0.0010 Liter(s)

Canister Dilution Factor: 1.77

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND                          | 460                      | ND             | 270         |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 480                      | ND             | 97          |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 460                      | ND             | 220         |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 480                      | ND             | 68          |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 460                      | ND             | 180         |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 460                      | ND             | 210         |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 460                      | ND             | 120         |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 460                      | ND             | 170         |                   |
| 64-17-5   | Ethanol                                          | ND                          | 4,400                    | ND             | 2,300       |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 890                      | ND             | 530         |                   |
| 107-02-8  | Acrolein                                         | ND                          | 890                      | ND             | 390         |                   |
| 67-64-1   | Acetone                                          | ND                          | 4,600                    | ND             | 1,900       |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 460                      | ND             | 82          |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 890                      | ND             | 360         |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 890                      | ND             | 410         |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 480                      | ND             | 120         |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 460                      | ND             | 130         |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 480                      | ND             | 150         |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 480                      | ND             | 62          |                   |
| 75-15-0   | Carbon Disulfide                                 | 1,400                       | 970                      | 460            | 310         |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 480                      | ND             | 120         |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 480                      | ND             | 120         |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 480                      | ND             | 130         |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 4,400                    | ND             | 1,300       |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND                          | 890                      | ND             | 300         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #2

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P2201098-003

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS00890

Date Collected: 3/10/22

Date Received: 3/11/22

Date Analyzed: 3/30/22

Volume(s) Analyzed: 0.0010 Liter(s)

Canister Dilution Factor: 1.77

| CAS #      | Compound                  | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND                          | 460                      | ND             | 120         |                   |
| 141-78-6   | Ethyl Acetate             | ND                          | 1,900                    | ND             | 540         |                   |
| 110-54-3   | n-Hexane                  | ND                          | 480                      | ND             | 140         |                   |
| 67-66-3    | Chloroform                | ND                          | 480                      | ND             | 98          |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND                          | 890                      | ND             | 300         |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND                          | 480                      | ND             | 120         |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND                          | 460                      | ND             | 84          |                   |
| 71-43-2    | Benzene                   | ND                          | 440                      | ND             | 140         |                   |
| 56-23-5    | Carbon Tetrachloride      | ND                          | 440                      | ND             | 70          |                   |
| 110-82-7   | Cyclohexane               | ND                          | 970                      | ND             | 280         |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND                          | 440                      | ND             | 96          |                   |
| 75-27-4    | Bromodichloromethane      | ND                          | 480                      | ND             | 71          |                   |
| 79-01-6    | Trichloroethene           | ND                          | 460                      | ND             | 86          |                   |
| 123-91-1   | 1,4-Dioxane               | ND                          | 460                      | ND             | 130         |                   |
| 80-62-6    | Methyl Methacrylate       | ND                          | 970                      | ND             | 240         |                   |
| 142-82-5   | n-Heptane                 | ND                          | 480                      | ND             | 120         |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND                          | 440                      | ND             | 98          |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND                          | 970                      | ND             | 240         |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND                          | 460                      | ND             | 100         |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND                          | 460                      | ND             | 84          |                   |
| 108-88-3   | Toluene                   | 990                         | 460                      | 260            | 120         |                   |
| 591-78-6   | 2-Hexanone                | ND                          | 970                      | ND             | 240         |                   |
| 124-48-1   | Dibromochloromethane      | ND                          | 480                      | ND             | 56          |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND                          | 460                      | ND             | 60          |                   |
| 123-86-4   | n-Butyl Acetate           | ND                          | 970                      | ND             | 200         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #2

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P2201098-003

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS00890

Date Collected: 3/10/22

Date Received: 3/11/22

Date Analyzed: 3/30/22

Volume(s) Analyzed: 0.0010 Liter(s)

Canister Dilution Factor: 1.77

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | ND              | 480          | ND             | 100         |                   |
| 127-18-4    | Tetrachloroethene           | ND              | 460          | ND             | 68          |                   |
| 108-90-7    | Chlorobenzene               | ND              | 460          | ND             | 100         |                   |
| 100-41-4    | Ethylbenzene                | 650             | 460          | 150            | 110         |                   |
| 179601-23-1 | m,p-Xylenes                 | 1,200           | 970          | 270            | 220         |                   |
| 75-25-2     | Bromoform                   | ND              | 460          | ND             | 45          |                   |
| 100-42-5    | Styrene                     | ND              | 440          | ND             | 100         |                   |
| 95-47-6     | o-Xylene                    | ND              | 460          | ND             | 110         |                   |
| 111-84-2    | n-Nonane                    | ND              | 460          | ND             | 88          |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 460          | ND             | 67          |                   |
| 98-82-8     | Cumene                      | ND              | 460          | ND             | 94          |                   |
| 80-56-8     | alpha-Pinene                | 720             | 480          | 130            | 86          |                   |
| 103-65-1    | n-Propylbenzene             | ND              | 480          | ND             | 97          |                   |
| 622-96-8    | 4-Ethyltoluene              | ND              | 480          | ND             | 97          |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND              | 460          | ND             | 94          |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 620             | 460          | 130            | 94          |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 970          | ND             | 190         |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 460          | ND             | 77          |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | 510             | 460          | 84             | 77          |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 480          | ND             | 80          |                   |
| 5989-27-5   | d-Limonene                  | ND              | 440          | ND             | 79          |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 890          | ND             | 92          |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 970          | ND             | 130         |                   |
| 91-20-3     | Naphthalene                 | ND              | 460          | ND             | 88          |                   |
| 87-68-3     | Hexachlorobutadiene         | ND              | 460          | ND             | 43          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220329-MB

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

**Analyst:** Topacio Zavala

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 3/29/22

Volume(s) Analyzed: 0.20 Liter(s)

Canister Dilution Factor: 1.00

| CAS #     | Compound                                         | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND              | 1.3          | ND             | 0.76        |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND              | 1.4          | ND             | 0.27        |                   |
| 74-87-3   | Chloromethane                                    | ND              | 1.3          | ND             | 0.63        |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND              | 1.4          | ND             | 0.19        |                   |
| 75-01-4   | Vinyl Chloride                                   | ND              | 1.3          | ND             | 0.51        |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND              | 1.3          | ND             | 0.59        |                   |
| 74-83-9   | Bromomethane                                     | ND              | 1.3          | ND             | 0.33        |                   |
| 75-00-3   | Chloroethane                                     | ND              | 1.3          | ND             | 0.49        |                   |
| 64-17-5   | Ethanol                                          | ND              | 13           | ND             | 6.6         |                   |
| 75-05-8   | Acetonitrile                                     | ND              | 2.5          | ND             | 1.5         |                   |
| 107-02-8  | Acrolein                                         | ND              | 2.5          | ND             | 1.1         |                   |
| 67-64-1   | Acetone                                          | ND              | 13           | ND             | 5.5         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND              | 1.3          | ND             | 0.23        |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND              | 2.5          | ND             | 1.0         |                   |
| 107-13-1  | Acrylonitrile                                    | ND              | 2.5          | ND             | 1.2         |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND              | 1.4          | ND             | 0.34        |                   |
| 75-09-2   | Methylene Chloride                               | ND              | 1.3          | ND             | 0.37        |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND              | 1.4          | ND             | 0.43        |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND              | 1.4          | ND             | 0.18        |                   |
| 75-15-0   | Carbon Disulfide                                 | ND              | 2.8          | ND             | 0.88        |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND              | 1.4          | ND             | 0.34        |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND              | 1.4          | ND             | 0.33        |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND              | 1.4          | ND             | 0.37        |                   |
| 108-05-4  | Vinyl Acetate                                    | ND              | 13           | ND             | 3.6         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND              | 2.5          | ND             | 0.85        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220329-MB

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

**Analyst:** Topacio Zavala

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 3/29/22

Volume(s) Analyzed: 0.20 Liter(s)

Canister Dilution Factor: 1.00

| CAS #      | Compound                  | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND              | 1.3          | ND             | 0.33        |                   |
| 141-78-6   | Ethyl Acetate             | ND              | 5.5          | ND             | 1.5         |                   |
| 110-54-3   | n-Hexane                  | ND              | 1.4          | ND             | 0.38        |                   |
| 67-66-3    | Chloroform                | ND              | 1.4          | ND             | 0.28        |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND              | 2.5          | ND             | 0.85        |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND              | 1.4          | ND             | 0.33        |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND              | 1.3          | ND             | 0.24        |                   |
| 71-43-2    | Benzene                   | ND              | 1.3          | ND             | 0.39        |                   |
| 56-23-5    | Carbon Tetrachloride      | ND              | 1.3          | ND             | 0.20        |                   |
| 110-82-7   | Cyclohexane               | ND              | 2.8          | ND             | 0.80        |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND              | 1.3          | ND             | 0.27        |                   |
| 75-27-4    | Bromodichloromethane      | ND              | 1.4          | ND             | 0.20        |                   |
| 79-01-6    | Trichloroethene           | ND              | 1.3          | ND             | 0.24        |                   |
| 123-91-1   | 1,4-Dioxane               | ND              | 1.3          | ND             | 0.36        |                   |
| 80-62-6    | Methyl Methacrylate       | ND              | 2.8          | ND             | 0.67        |                   |
| 142-82-5   | n-Heptane                 | ND              | 1.4          | ND             | 0.33        |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND              | 1.3          | ND             | 0.28        |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND              | 2.8          | ND             | 0.67        |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND              | 1.3          | ND             | 0.29        |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND              | 1.3          | ND             | 0.24        |                   |
| 108-88-3   | Toluene                   | ND              | 1.3          | ND             | 0.35        |                   |
| 591-78-6   | 2-Hexanone                | ND              | 2.8          | ND             | 0.67        |                   |
| 124-48-1   | Dibromochloromethane      | ND              | 1.4          | ND             | 0.16        |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND              | 1.3          | ND             | 0.17        |                   |
| 123-86-4   | n-Butyl Acetate           | ND              | 2.8          | ND             | 0.58        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220329-MB

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

**Analyst:** Topacio Zavala

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 3/29/22

Volume(s) Analyzed: 0.20 Liter(s)

Canister Dilution Factor: 1.00

| CAS #       | Compound                    | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | ND                          | 1.4                      | ND             | 0.29        |                   |
| 127-18-4    | Tetrachloroethene           | ND                          | 1.3                      | ND             | 0.19        |                   |
| 108-90-7    | Chlorobenzene               | ND                          | 1.3                      | ND             | 0.28        |                   |
| 100-41-4    | Ethylbenzene                | ND                          | 1.3                      | ND             | 0.30        |                   |
| 179601-23-1 | m,p-Xylenes                 | ND                          | 2.8                      | ND             | 0.63        |                   |
| 75-25-2     | Bromoform                   | ND                          | 1.3                      | ND             | 0.13        |                   |
| 100-42-5    | Styrene                     | ND                          | 1.3                      | ND             | 0.29        |                   |
| 95-47-6     | o-Xylene                    | ND                          | 1.3                      | ND             | 0.30        |                   |
| 111-84-2    | n-Nonane                    | ND                          | 1.3                      | ND             | 0.25        |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND                          | 1.3                      | ND             | 0.19        |                   |
| 98-82-8     | Cumene                      | ND                          | 1.3                      | ND             | 0.26        |                   |
| 80-56-8     | alpha-Pinene                | ND                          | 1.4                      | ND             | 0.24        |                   |
| 103-65-1    | n-Propylbenzene             | ND                          | 1.4                      | ND             | 0.27        |                   |
| 622-96-8    | 4-Ethyltoluene              | ND                          | 1.4                      | ND             | 0.27        |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND                          | 1.3                      | ND             | 0.26        |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | ND                          | 1.3                      | ND             | 0.26        |                   |
| 100-44-7    | Benzyl Chloride             | ND                          | 2.8                      | ND             | 0.53        |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND                          | 1.3                      | ND             | 0.22        |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | ND                          | 1.3                      | ND             | 0.22        |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND                          | 1.4                      | ND             | 0.22        |                   |
| 5989-27-5   | d-Limonene                  | ND                          | 1.3                      | ND             | 0.22        |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND                          | 2.5                      | ND             | 0.26        |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND                          | 2.8                      | ND             | 0.37        |                   |
| 91-20-3     | Naphthalene                 | ND                          | 1.3                      | ND             | 0.25        |                   |
| 87-68-3     | Hexachlorobutadiene         | ND                          | 1.3                      | ND             | 0.12        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## SURROGATE SPIKE RECOVERY RESULTS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

**Analyst:** Topacio Zavala

**Sample Type:** 6.0 L Silonite Canister(s)

**Test Notes:**

**Date(s) Collected:** 3/10/22

**Date(s) Received:** 3/11/22

**Date(s) Analyzed:** 3/29 - 3/30/22

| Client Sample ID             | ALS Sample ID | 1,2-Dichloroethane-d4 | Toluene-d8        | Bromofluorobenzene | Acceptance Limits | Data Qualifier |
|------------------------------|---------------|-----------------------|-------------------|--------------------|-------------------|----------------|
|                              |               | Percent Recovered     | Percent Recovered | Percent Recovered  |                   |                |
| Method Blank                 | P220329-MB    | 93                    | 105               | 98                 | 70-130            |                |
| Lab Control Sample           | P220329-LCS   | 103                   | 103               | 100                | 70-130            |                |
| Duplicate Lab Control Sample | P220329-DLCS  | 101                   | 104               | 101                | 70-130            |                |
| Digester 6 #2                | P2201098-003  | 98                    | 106               | 96                 | 70-130            |                |

Surrogate percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220329-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 3/30/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #     | Compound                                         | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|--------------------------------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|           |                                                  | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 115-07-1  | Propene                                          | 206                 | 201          | 201           | 98         | 98   | 56-128               | 0   | 25  |      |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | 208                 | 204          | 203           | 98         | 98   | 71-112               | 0   | 25  |      |
| 74-87-3   | Chloromethane                                    | 206                 | 196          | 201           | 95         | 98   | 53-126               | 3   | 25  |      |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | 208                 | 214          | 212           | 103        | 102  | 62-121               | 1   | 25  |      |
| 75-01-4   | Vinyl Chloride                                   | 208                 | 207          | 209           | 100        | 100  | 63-123               | 0   | 25  |      |
| 106-99-0  | 1,3-Butadiene                                    | 206                 | 223          | 225           | 108        | 109  | 63-135               | 0.9 | 25  |      |
| 74-83-9   | Bromomethane                                     | 206                 | 206          | 206           | 100        | 100  | 71-112               | 0   | 25  |      |
| 75-00-3   | Chloroethane                                     | 206                 | 206          | 206           | 100        | 100  | 66-117               | 0   | 25  |      |
| 64-17-5   | Ethanol                                          | 832                 | 1090         | 1110          | 131        | 133  | 57-117               | 2   | 25  | L    |
| 75-05-8   | Acetonitrile                                     | 202                 | 188          | 189           | 93         | 94   | 59-131               | 1   | 25  |      |
| 107-02-8  | Acrolein                                         | 416                 | 468          | 417           | 113        | 100  | 71-123               | 12  | 25  |      |
| 67-64-1   | Acetone                                          | 1,020               | 1040         | 885           | 102        | 87   | 60-117               | 16  | 25  |      |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | 202                 | 201          | 181           | 100        | 90   | 71-114               | 11  | 25  |      |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | 400                 | 502          | 435           | 126        | 109  | 61-124               | 14  | 25  | L    |
| 107-13-1  | Acrylonitrile                                    | 402                 | 410          | 348           | 102        | 87   | 65-130               | 16  | 25  |      |
| 75-35-4   | 1,1-Dichloroethene                               | 210                 | 193          | 202           | 92         | 96   | 74-114               | 4   | 25  |      |
| 75-09-2   | Methylene Chloride                               | 208                 | 180          | 182           | 87         | 88   | 75-112               | 1   | 25  |      |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | 204                 | 177          | 190           | 87         | 93   | 57-127               | 7   | 25  |      |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | 216                 | 194          | 208           | 90         | 96   | 73-114               | 6   | 25  |      |
| 75-15-0   | Carbon Disulfide                                 | 414                 | 318          | 379           | 77         | 92   | 70-113               | 18  | 25  |      |
| 156-60-5  | trans-1,2-Dichloroethene                         | 208                 | 223          | 225           | 107        | 108  | 76-119               | 0.9 | 25  |      |
| 75-34-3   | 1,1-Dichloroethane                               | 214                 | 230          | 230           | 107        | 107  | 70-114               | 0   | 25  |      |
| 1634-04-4 | Methyl tert-Butyl Ether                          | 206                 | 239          | 243           | 116        | 118  | 72-118               | 2   | 25  |      |
| 108-05-4  | Vinyl Acetate                                    | 942                 | 1270         | 1280          | 135        | 136  | 56-137               | 0.7 | 25  |      |
| 78-93-3   | 2-Butanone (MEK)                                 | 408                 | 512          | 515           | 125        | 126  | 74-121               | 0.8 | 25  | L    |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

L = Laboratory control sample recovery outside the specified limits, results may be biased high.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220329-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 3/30/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #      | Compound                  | Spike Amount | Result |       | ALS        |      | Acceptance | RPD | RPD | Data |
|------------|---------------------------|--------------|--------|-------|------------|------|------------|-----|-----|------|
|            |                           | LCS / DLCS   | LCS    | DLCS  | % Recovery |      |            |     |     |      |
|            |                           | µg/m³        | µg/m³  | µg/m³ | LCS        | DLCS |            |     |     |      |
| 156-59-2   | cis-1,2-Dichloroethene    | 206          | 232    | 235   | 113        | 114  | 73-117     | 0.9 | 25  | L    |
| 141-78-6   | Ethyl Acetate             | 580          | 674    | 688   | 116        | 119  | 59-161     | 3   | 25  |      |
| 110-54-3   | n-Hexane                  | 208          | 233    | 236   | 112        | 113  | 55-130     | 0.9 | 25  |      |
| 67-66-3    | Chloroform                | 210          | 220    | 221   | 105        | 105  | 71-114     | 0   | 25  |      |
| 109-99-9   | Tetrahydrofuran (THF)     | 404          | 475    | 482   | 118        | 119  | 73-114     | 0.8 | 25  |      |
| 107-06-2   | 1,2-Dichloroethane        | 210          | 210    | 211   | 100        | 100  | 71-119     | 0   | 25  |      |
| 71-55-6    | 1,1,1-Trichloroethane     | 208          | 205    | 208   | 99         | 100  | 73-119     | 1   | 25  |      |
| 71-43-2    | Benzene                   | 208          | 209    | 211   | 100        | 101  | 72-113     | 1   | 25  |      |
| 56-23-5    | Carbon Tetrachloride      | 202          | 203    | 205   | 100        | 101  | 67-123     | 1   | 25  |      |
| 110-82-7   | Cyclohexane               | 412          | 410    | 413   | 100        | 100  | 70-119     | 0   | 25  |      |
| 78-87-5    | 1,2-Dichloropropane       | 206          | 213    | 217   | 103        | 105  | 70-118     | 2   | 25  |      |
| 75-27-4    | Bromodichloromethane      | 208          | 214    | 216   | 103        | 104  | 74-119     | 1   | 25  |      |
| 79-01-6    | Trichloroethene           | 204          | 209    | 212   | 102        | 104  | 74-115     | 2   | 25  |      |
| 123-91-1   | 1,4-Dioxane               | 206          | 234    | 239   | 114        | 116  | 77-124     | 2   | 25  |      |
| 80-62-6    | Methyl Methacrylate       | 410          | 493    | 508   | 120        | 124  | 78-126     | 3   | 25  |      |
| 142-82-5   | n-Heptane                 | 206          | 226    | 231   | 110        | 112  | 70-119     | 2   | 25  |      |
| 10061-01-5 | cis-1,3-Dichloropropene   | 208          | 222    | 229   | 107        | 110  | 81-126     | 3   | 25  |      |
| 108-10-1   | 4-Methyl-2-pentanone      | 412          | 495    | 511   | 120        | 124  | 73-129     | 3   | 25  |      |
| 10061-02-6 | trans-1,3-Dichloropropene | 200          | 211    | 218   | 106        | 109  | 80-127     | 3   | 25  |      |
| 79-00-5    | 1,1,2-Trichloroethane     | 208          | 209    | 212   | 100        | 102  | 78-117     | 2   | 25  |      |
| 108-88-3   | Toluene                   | 206          | 213    | 217   | 103        | 105  | 70-118     | 2   | 25  | L    |
| 591-78-6   | 2-Hexanone                | 406          | 530    | 545   | 131        | 134  | 74-132     | 2   | 25  |      |
| 124-48-1   | Dibromochloromethane      | 210          | 221    | 223   | 105        | 106  | 69-137     | 0.9 | 25  |      |
| 106-93-4   | 1,2-Dibromoethane         | 208          | 210    | 214   | 101        | 103  | 76-128     | 2   | 25  |      |
| 123-86-4   | n-Butyl Acetate           | 406          | 549    | 563   | 135        | 139  | 75-134     | 3   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

L = Laboratory control sample recovery outside the specified limits, results may be biased high.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220329-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 3/30/22

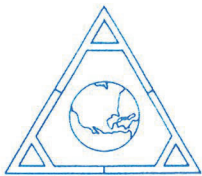
Volume(s) Analyzed: 0.125 Liter(s)

| CAS #       | Compound                    | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-------------|-----------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|             |                             | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 111-65-9    | n-Octane                    | 208                 | 251          | 256           | 121        | 123  | 68-120               | 2   | 25  | L    |
| 127-18-4    | Tetrachloroethene           | 212                 | 210          | 211           | 99         | 100  | 63-130               | 1   | 25  |      |
| 108-90-7    | Chlorobenzene               | 206                 | 204          | 206           | 99         | 100  | 70-118               | 1   | 25  |      |
| 100-41-4    | Ethylbenzene                | 206                 | 238          | 242           | 116        | 117  | 71-123               | 0.9 | 25  |      |
| 179601-23-1 | m,p-Xylenes                 | 416                 | 488          | 493           | 117        | 119  | 67-127               | 2   | 25  |      |
| 75-25-2     | Bromoform                   | 210                 | 226          | 227           | 108        | 108  | 65-149               | 0   | 25  |      |
| 100-42-5    | Styrene                     | 202                 | 259          | 263           | 128        | 130  | 76-132               | 2   | 25  |      |
| 95-47-6     | o-Xylene                    | 208                 | 247          | 249           | 119        | 120  | 69-124               | 0.8 | 25  |      |
| 111-84-2    | n-Nonane                    | 208                 | 262          | 266           | 126        | 128  | 64-127               | 2   | 25  | L    |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | 208                 | 230          | 233           | 111        | 112  | 69-128               | 0.9 | 25  |      |
| 98-82-8     | Cumene                      | 206                 | 233          | 235           | 113        | 114  | 69-125               | 0.9 | 25  |      |
| 80-56-8     | alpha-Pinene                | 210                 | 260          | 265           | 124        | 126  | 68-129               | 2   | 25  |      |
| 103-65-1    | n-Propylbenzene             | 208                 | 251          | 253           | 121        | 122  | 70-127               | 0.8 | 25  |      |
| 622-96-8    | 4-Ethyltoluene              | 208                 | 258          | 261           | 124        | 125  | 69-127               | 0.8 | 25  |      |
| 108-67-8    | 1,3,5-Trimethylbenzene      | 208                 | 255          | 256           | 123        | 123  | 66-129               | 0   | 25  |      |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 206                 | 258          | 261           | 125        | 127  | 63-142               | 2   | 25  |      |
| 100-44-7    | Benzyl Chloride             | 416                 | 517          | 521           | 124        | 125  | 73-145               | 0.8 | 25  |      |
| 541-73-1    | 1,3-Dichlorobenzene         | 208                 | 207          | 209           | 100        | 100  | 67-136               | 0   | 25  |      |
| 106-46-7    | 1,4-Dichlorobenzene         | 210                 | 205          | 207           | 98         | 99   | 63-134               | 1   | 25  |      |
| 95-50-1     | 1,2-Dichlorobenzene         | 210                 | 208          | 209           | 99         | 100  | 64-139               | 1   | 25  |      |
| 5989-27-5   | d-Limonene                  | 206                 | 287          | 290           | 139        | 141  | 63-137               | 1   | 25  | L    |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | 404                 | 493          | 498           | 122        | 123  | 72-145               | 0.8 | 25  |      |
| 120-82-1    | 1,2,4-Trichlorobenzene      | 420                 | 431          | 438           | 103        | 104  | 62-154               | 1   | 25  |      |
| 91-20-3     | Naphthalene                 | 210                 | 257          | 263           | 122        | 125  | 62-156               | 2   | 25  |      |
| 87-68-3     | Hexachlorobutadiene         | 212                 | 202          | 205           | 95         | 97   | 55-142               | 2   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

L = Laboratory control sample recovery outside the specified limits, results may be biased high.



AtmAA Inc.

23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250

specialized air assessment laboratory  
atmaa.com

April 4, 2022

LTR/1964/22

Nicole Bryson  
ALS Environmental  
2655 Park Center Drive, Suite A  
Simi Valley, CA 93065

RE: City of Tampa HFC AWTP P2201098

Dear Nicole:

Please find enclosed the laboratory analysis report, quality assurance summary, and the chain of custody form for one SUMMA canister sample received from City of Tampa HFC AWTP P2201098 April 1, 2022.

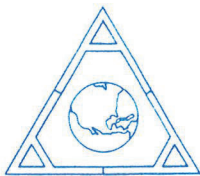
The SUMMA canister sample was analyzed for ASTM 3588 BTU as requested on the chain of custody form.

Sincerely,

AtmAA, Inc.

Brian W. Fung  
Laboratory Director



**LABORATORY ANALYSIS REPORT**

## Speciated Hydrocarbons Analysis in SUMMA Canister Sample

Report Date: April 4, 2022  
Client: ALS Environmental  
Project Name: City of Tampa HFC AWTP Master Plan  
Project No.: P2201098  
Date Received: April 1, 2022  
Date Analyzed: April 1, 2022

**ANALYSIS DESCRIPTION**

*Hydrocarbon Speciation analysis was performed by flame ionization detection/gas chromatography (FID/GC), modified EPA-18. Hydrogen sulfide measured by gas chromatography with sulfur chemiluminescence detector (SCD).*

|                                                                   |                          |                              |
|-------------------------------------------------------------------|--------------------------|------------------------------|
| AtmAA Lab No.:                                                    | 20912-8                  | 20912-8                      |
| Sample ID:                                                        | Digester 6 #2            | Digester 6 #2                |
|                                                                   | P22012098-003            | P22012098-003                |
| <u>Component</u>                                                  | <u>(ppmv, component)</u> | <u>(% by vol, component)</u> |
| Methane                                                           | 608500                   | 60.85                        |
| Ethene                                                            | <0.40                    | <0.01                        |
| Acetylene                                                         | <0.40                    | <0.01                        |
| Ethane                                                            | <0.40                    | <0.01                        |
| Hydrogen sulfide                                                  | 17010                    | 1.70                         |
| non-methane hydrocarbons<br>analysis by carbon<br>number grouping |                          |                              |
| C3 as Propane                                                     | 0.34                     | <0.01                        |
| C4 as n-Butane                                                    | 8.16                     | <0.01                        |
| C5 as n-Pentane                                                   | 4.26                     | <0.01                        |
| C6 as n-Hexane                                                    | 1.79                     | <0.01                        |
| >C6 as n-Hexane                                                   | 38.0                     | <0.01                        |

|       |                     |                       |
|-------|---------------------|-----------------------|
|       | (ppmvC, as methane) | (% by vol, component) |
| TNMHC | 483                 | <0.01                 |

*TNMHC - total non-methane hydrocarbons as ppmvC, as methane.  
Actual analysis results are reported on a "wet" basis.*

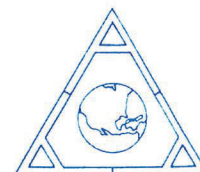
  
\_\_\_\_\_  
Brian W. Fung  
Laboratory Director

QUALITY ASSURANCE SUMMARY  
(Repeat Analyses)

Project Name: City of Tampa HFC AWTP Master Plan  
Project No.: P2201098  
Date Received: April 1, 2022  
Date Analyzed: April 1, 2022

| Component                                                   | Sample ID     | Repeat Analysis |        | Mean Conc. | % Diff. From Mean |
|-------------------------------------------------------------|---------------|-----------------|--------|------------|-------------------|
|                                                             |               | Run #1          | Run #2 |            |                   |
| (Conc. in ppmv, component)                                  |               |                 |        |            |                   |
| Methane                                                     | Digester 6 #2 | 609000          | 608000 | 608500     | 0.08              |
| Ethene                                                      | Digester 6 #2 | <0.40           | <0.40  | <0.40      | ---               |
| Acetylene                                                   | Digester 6 #2 | <0.40           | <0.40  | <0.40      | ---               |
| Ethane                                                      | Digester 6 #2 | <0.40           | <0.40  | <0.40      | ---               |
| non-methane hydrocarbons analysis by carbon number grouping |               |                 |        |            |                   |
| C3                                                          | Digester 6 #2 | 0.32            | 0.35   | 0.34       | 3.9               |
| C4                                                          | Digester 6 #2 | 8.30            | 8.01   | 8.16       | 1.8               |
| C5                                                          | Digester 6 #2 | 4.16            | 4.35   | 4.26       | 2.3               |
| C6                                                          | Digester 6 #2 | 1.89            | 1.68   | 1.79       | 5.8               |
| C7                                                          | Digester 6 #2 | 1.04            | 0.93   | 0.99       | 5.6               |
| C8                                                          | Digester 6 #2 | 1.21            | 1.28   | 1.25       | 2.8               |
| C9                                                          | Digester 6 #2 | 2.31            | 2.31   | 2.31       | 0.07              |
| C10                                                         | Digester 6 #2 | 12.9            | 12.8   | 12.9       | 0.21              |
| C11                                                         | Digester 6 #2 | 5.51            | 4.66   | 5.09       | 8.4               |
| C12                                                         | Digester 6 #2 | 8.55            | 7.83   | 8.19       | 4.3               |
| C13                                                         | Digester 6 #2 | 6.27            | 6.23   | 6.25       | 0.34              |
| C14                                                         | Digester 6 #2 | 1.09            | 1.08   | 1.09       | 0.21              |
| (Conc. in ppmvC, as methane)                                |               |                 |        |            |                   |
| TNMHC                                                       | Digester 6 #2 | 493             | 472    | 483        | 2.1               |

One SUMMA canister sample, laboratory number 20912-8, was analyzed for hydrocarbon speciation, EPA Method 18. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". The average % difference from mean for 14 repeat measurements from one SUMMA canister sample is 2.7%.



### Calculated values for Specific Volume, BTU, and F (factor)

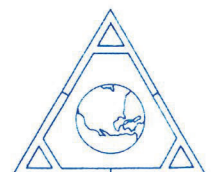
Report Date: April 4, 2022  
 Client: ALS Environmental  
 Project Name: City of Tampa HFC AWTP Master Plan  
 Date Received: April 1, 2022  
 Date Analyzed: April 1, 2022  
 AtmAA Lab #: 20912-8  
 Sample ID: Digester 6 #2

Specific volume, BTU, and F-factor are calculated using laboratory analysis results for methane, carbon dioxide, nitrogen, oxygen, TNMHC, and sulfur compounds in equations that include gross/net heating and specific gas volume values taken from the GPA-2145 Midstream Standard. Heating value factor is calculated according to ASTM 3588-98 (14.696 psia and 60°F). The F-factor is calculated according to the equation in EPA Method 19.

| Component                                  | Mole % | Wt %   | C,H,O,N,S, Wt. % |             |
|--------------------------------------------|--------|--------|------------------|-------------|
| Methane                                    | 60.9   | 35.8   | Carbon           | 43.6        |
| Carbon dioxide                             | 37.9   | 61.3   | Hydrogen         | 9.07        |
| Nitrogen                                   | 0.56   | 0.58   | Oxygen           | 44.8        |
| Oxygen                                     | 0.13   | 0.16   | Nitrogen         | 0.58        |
| Argon                                      | 0.01   | 0.01   | Argon            | 0.01        |
| Hydrogen                                   | 0.00   | 0.00   | Sulfur           | 2.00        |
| (CH <sub>2</sub> ) <sub>n</sub>            | 0.01   | 0.03   |                  |             |
| Specific Volume                            |        | 14.08  |                  |             |
| BTU/ft3 (Dry @60F, 14.696 psia)            |        | 626.0  | (HHV)            | 563.9 (LHV) |
| BTU/ft3 (Water Saturated @ 0.25636 psia)   |        | 615.1  | (HHV)            | 554.1 (LHV) |
| BTU/lb (Dry @60F, 14.696 psia)             |        | 8816   | (HHV)            | 7941 (LHV)  |
| F <sub>d</sub> (factor)                    |        | 9113   |                  |             |
| F <sub>w</sub> (factor)                    |        | 11099  |                  |             |
| F <sub>c</sub> (factor)                    |        | 1587   |                  |             |
| Compressibility Factor (@60F, 14.696 psia) |        | 0.9967 |                  |             |
| Wobbe Index                                |        | 645.2  |                  |             |
| Specific Gravity                           |        | 0.9415 |                  |             |

| Component      | Specific volume<br>reference values * |
|----------------|---------------------------------------|
| Methane        | 23.7 (ft <sup>3</sup> /lb)            |
| Carbon dioxide | 8.62                                  |
| Nitrogen       | 13.5                                  |
| Oxygen         | 11.9                                  |
| Argon          | 9.52                                  |
| Hydrogen       | 188.2                                 |

\* reference, Rev. 2016, GPA-2145 Midstream Standard, Selected Hydrocarbons 60°F



ALS Environmental Chain of Custody  
2655 Park Center Drive, Suite A • Simi Valley, CA 93065 • 805-526-7161 • FAX

ALS Contact: Nicole Bryson

Project Number: P2201098  
Project Manager: Nicole Bryson  
QAP: LAB QAP

PROJECT NAME: City of Tampa HFC AWP Masker Plan

| Lab Code     | Sample ID     | # of Cont. | Matrix | Sample  |      | Lab ID      | Misc Out 1 |
|--------------|---------------|------------|--------|---------|------|-------------|------------|
|              |               |            |        | Date    | Time |             |            |
| P2201098-003 | Digester 6 #2 | 1          | Air    | 3/10/22 | 1001 | AtmAA, Inc. | X          |

AtmAA Lab #  
20912-8

Test Comments

Misc Out 1 - None

P2201098-003

ASTM 3588 - BTU

Folder Comments:

Backfilled with Helium.

|                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                  |                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| <b>Special Instructions/Comments</b><br><br>Report using Client project Name / ID<br>Send Report to <a href="mailto:Sue.Anderson@ALSGlobal.com">Sue.Anderson@ALSGlobal.com</a><br>Send Invoice AP and cc PM:<br><a href="mailto:ALSUSA_AccountsPayable@alsglobal.com">ALSUSA_AccountsPayable@alsglobal.com</a><br><br>H - Test is On Hold      P - Test is Authorized for Prep Only | <b>Turnaround Requirements</b><br><input checked="" type="checkbox"/> RUSH (Surcharges Apply)<br>PLEASE CIRCLE WORK DAYS<br>1 2 3 4 5<br>STANDARD<br>Requested FAX Date: _____<br>Requested Report Date: 03/17/22 | <b>Report Requirements</b><br>I. Results Only<br><input checked="" type="checkbox"/> II. Results + QC Summaries<br>III. Results + QC and Calibration Summaries<br>IV. Data Validation Report with Raw Data<br>PQL/MDL/1 <u>N</u><br>EDD <u>Y</u> | <b>Invoice Information</b><br>PO# 54P2201098<br>Bill to |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|

Relinquished By: AP 3:00pm 3/21/22 Received By: [Signature] AtmAA 4/1/22 1:20  
Airbill Number:



---

2655 Park Center Dr., Suite A  
Simi Valley, CA 93065  
T: +1 805 526 7161  
[www.alsglobal.com](http://www.alsglobal.com)

## LABORATORY REPORT

April 8, 2022

Caryssa Joustra, PhD  
Hazen and Sawyer, P.C.  
1000 N. Ashley Dr., Suite 1000  
Tampa, FL 33602

**RE: City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13**

Dear Caryssa:

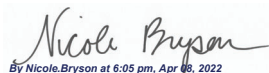
Enclosed are the results of the samples submitted to our laboratory on March 21, 2022. For your reference, these analyses have been assigned our service request number P2201236.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at [www.alsglobal.com](http://www.alsglobal.com). Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

**ALS | Environmental**



By Nicole.Bryson at 6:05 pm, Apr 08, 2022

Nicole Bryson  
Laboratory Director





Client: Hazen and Sawyer, P.C.

Service Request No: P2201236

Project: City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

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## CASE NARRATIVE

The samples were received intact under chain of custody on March 21, 2022 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

### BTU and CHONS Analysis

The results for BTU and CHONS were generated according to ASTM D 3588-98. The following analyses were performed and used to calculate the BTU and CHONS results. This method is not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.

### C2 through C6 Hydrocarbon Analysis

The sample was analyzed according to modified EPA Method TO-3 for C2 through >C6 hydrocarbons using a gas chromatograph equipped with a flame ionization detector (FID). This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP accreditation.

### Fixed Gases Analysis

The sample was also analyzed for fixed gases (hydrogen, oxygen/argon, nitrogen, carbon monoxide, methane and carbon dioxide) according to modified EPA Method 3C (single injection) using a gas chromatograph equipped with a thermal conductivity detector (TCD). This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP accreditation.

### Hydrogen Sulfide Analysis

The sample was also analyzed for hydrogen sulfide per modified SCAQMD Method 307-91 and ASTM D 5504-12 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). Method ASTM D 5504-12 is included on the laboratory's NELAP scope of accreditation, however it is not part of the DoD-ELAP accreditation. Method SCAQMD 307-91 is not included on the laboratory's NELAP or DoD-ELAP accreditation.

### Siloxanes Analysis

The samples were analyzed for siloxanes according to ASTM D8230-19 using an analytical system comprised of a gas chromatograph/mass spectrometer (GC/MS). This method is not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.



### Sulfur and Total Reduced Sulfur as Hydrogen Sulfide Analysis

The sample was analyzed for twenty sulfur compounds and total reduced sulfur as hydrogen sulfide (TRS as H<sub>2</sub>S) using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan. The result(s) were determined by obtaining the total response for all chromatographic peaks and quantitating the value against the initial calibration curve for hydrogen sulfide thus generating a result specified as "Total Reduced Sulfur as Hydrogen Sulfide". This method is included on the laboratory's NELAP scope of accreditation, however it is not part of the DoD-ELAP accreditation.

### Volatile Organic Compound Analysis

The sample was analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. The method was modified to include the use of helium as a diluent gas in place of zero-grade air for container pressurization. When necessary, analytical sample volumes were adjusted by a correction factor for containers pressurized with helium. A summary sheet has been included listing the affected samples. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The chromatogram for the sample named "Digester 6 #3" indicated the presence of non-target background components. The sample was diluted in order to prevent damage to the instrument and to achieve optimal resolution of the target analytes.

The minimum criterion for naphthalene was not met in the Continuing Calibration Verification (CCV) analyzed on April 1, 2022. In accordance with ALS Environmental standard operating procedures, a Method Reporting Limit (MRL) check standard containing the analyte of concern was analyzed each day of analysis. The MRL check standard verified that instrument sensitivity was adequate to detect the analyte at the MRL on the day of analysis. Because the sensitivity was shown to be adequate to detect the compound in question, the data quality is not significantly affected.

The spike recovery of 4-methyl-2-pentanone for the Laboratory Control Sample (LCS) and Duplicate Laboratory Control Sample (DLCS) analyzed on April 1, 2022 was outside the Laboratory generated control criterion. The recovery error equates to a potential high bias. Additionally, the spike recovery of ethanol, and methyl methacrylate for the LCS and DLCS analyzed on April 1, 2022 was outside the Laboratory generated control criterion. However, the spike recovery of the analytes was within the method criteria; therefore, the data quality is not significantly affected.

The container was cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. For projects requiring DoD QSM 5.3 compliance canisters were



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cleaned to  $<1/2$  the MRL. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

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*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*





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ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

| Agency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Web Site                                                                                                                                                                                                                                            | Number                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Alaska DEC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <a href="http://dec.alaska.gov/eh/lab.aspx">http://dec.alaska.gov/eh/lab.aspx</a>                                                                                                                                                                   | 17-019                  |
| Arizona DHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <a href="http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home">http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home</a> | AZ0694                  |
| Florida DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <a href="http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html">http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html</a>                                               | E871020                 |
| Louisiana DEQ (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>                                                                                                                         | 05071                   |
| Maine DHHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <a href="http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml">http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml</a>                                                             | 2018027                 |
| Minnesota DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>                                                                                                                                               | 1776326                 |
| New Jersey DEP (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>                                                                                                                                                 | CA009                   |
| New York DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <a href="http://www.wadsworth.org/labcert/elap/elap.html">http://www.wadsworth.org/labcert/elap/elap.html</a>                                                                                                                                       | 11221                   |
| Oregon PHD (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <a href="http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>                           | 4068-008                |
| Pennsylvania DEP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx">http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx</a>                                           | 68-03307 (Registration) |
| PJLA (DoD ELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <a href="http://www.pjlabs.com/search-accredited-labs">http://www.pjlabs.com/search-accredited-labs</a>                                                                                                                                             | 65818 (Testing)         |
| Texas CEQ (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <a href="http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html</a>                                                                                                         | T104704413-19-10        |
| Utah DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="http://health.utah.gov/lab/lab_cert_env">http://health.utah.gov/lab/lab_cert_env</a>                                                                                                                                                       | CA016272019-10          |
| Washington DOE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>                                                                                                         | C946                    |
| <p>Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at <a href="http://www.alsglobal.com">www.alsglobal.com</a>, or at the accreditation body's website.</p> <p>Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.</p> |                                                                                                                                                                                                                                                     |                         |

# ALS ENVIRONMENTAL

## DETAIL SUMMARY REPORT

Client: Hazen And Sawyer, P.C.  
 Project ID: City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

Service Request: P2201236

Date Received: 3/21/2022  
 Time Received: 09:00

| Client Sample ID | Lab Code     | Matrix | Date Collected | Time Collected | Container ID | Pi1 (psig) | Pf1 (psig) | ASTM D8230 - Siloxanes Tube | TO-3 Modified - ClC6+ Can | 3C Modified - Fxd Gases Can | ASTM D5504-01 - H2S Can | ASTM D 5504-12 - Sulfur Can | TO-15 - VOC Cans |
|------------------|--------------|--------|----------------|----------------|--------------|------------|------------|-----------------------------|---------------------------|-----------------------------|-------------------------|-----------------------------|------------------|
| Digester 6 #25   | P2201236-001 | Air    | 3/18/2022      | 09:42          |              |            |            | X                           |                           |                             |                         |                             |                  |
| Digester 2/3 #25 | P2201236-002 | Air    | 3/18/2022      | 10:28          |              |            |            | X                           |                           |                             |                         |                             |                  |
| Digester 6 #3    | P2201236-003 | Air    | 3/18/2022      | 09:35          | AS01478      | -4.12      | 3.77       |                             | X                         | X                           | X                       | X                           | X                |



# Air - Chain of Custody Record & Analytical Service Request

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Simi Valley, California 93065  
Phone (805) 526-7161

Page \_\_\_\_\_ of \_\_\_\_\_

Requested Turnaround Time in Business Days (Surcharges) please circle  
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day-Standard

ALS Project No. **72201236**

|                                                                                                                                                                                                          |                      |                      |                       |                                                                  |                                        |                             |                                |                      |                   |                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|-----------------------|------------------------------------------------------------------|----------------------------------------|-----------------------------|--------------------------------|----------------------|-------------------|-------------------------------------------------------------------------|
| Company Name & Address (Reporting Information)<br><b>Hazen and Sawyer<br/>1000 N. Ashby Dr.<br/>Tampa, FL 33602</b>                                                                                      |                      |                      |                       | Project Name<br><b>City of Tampa HRC AWP Master Plan Improv.</b> |                                        |                             |                                | ALS Contact:         |                   | Comments<br>e.g. Actual<br>Preservative or<br>specific instructions     |
| Project Manager<br><b>Caryssa Jourstra</b>                                                                                                                                                               |                      |                      |                       | Project Number<br><b>41077-013, AAR No. 13</b>                   |                                        |                             |                                | Analysis Method      |                   |                                                                         |
| Phone<br><b>(813) 682-1223</b>                                                                                                                                                                           |                      |                      |                       | P.O. # / Billing Information<br><b>41077-013, AAR, No. 13</b>    |                                        |                             |                                |                      |                   |                                                                         |
| Email Address for Result Reporting<br><b>cjourstra@hazenandsawyer.com</b>                                                                                                                                |                      |                      |                       | Sampler (Print & Sign)<br><b>Caryssa Jourstra</b>                |                                        |                             |                                |                      |                   |                                                                         |
| Client Sample ID                                                                                                                                                                                         | Laboratory ID Number | Date Collected       | Time Collected        | Canister ID (Bar code # - AC, SC, etc.)                          | Flow Controller ID (Bar code # - FC #) | Canister Start Pressure "Hg | Canister End Pressure "Hg/psig | Sample Volume        |                   |                                                                         |
| Digester 6 #2S                                                                                                                                                                                           | 1                    | 3/18/22              | 9:42 AM               |                                                                  |                                        |                             |                                | 6L                   | ASTM              | DBZ38 Siloxane                                                          |
| Digester 2/3 #2S                                                                                                                                                                                         | 2                    | 3/18/22              | 10:28 AM              |                                                                  |                                        |                             |                                |                      | "                 | "                                                                       |
| Digester 6 #3                                                                                                                                                                                            | 3                    | 3/18/22              | 9:35 AM               |                                                                  |                                        | 0                           | 0                              | 6L                   | ASTM              | D5510-1 *gauge appeared broken & heard vacuum but no reading on gauge # |
|                                                                                                                                                                                                          |                      |                      |                       |                                                                  |                                        |                             |                                |                      | TO-3 Modified     |                                                                         |
|                                                                                                                                                                                                          |                      |                      |                       |                                                                  |                                        |                             |                                |                      | IC Modified       |                                                                         |
|                                                                                                                                                                                                          |                      |                      |                       |                                                                  |                                        |                             |                                |                      | ASTM              | D5504-12 * Still run sample #                                           |
|                                                                                                                                                                                                          |                      |                      |                       |                                                                  |                                        |                             |                                |                      | TO-15             |                                                                         |
|                                                                                                                                                                                                          |                      |                      |                       |                                                                  |                                        |                             |                                |                      | ASTM              | D3588 BTO                                                               |
| Report Tier Levels - please select                                                                                                                                                                       |                      |                      |                       |                                                                  |                                        |                             |                                |                      |                   |                                                                         |
| Tier I - Results (Default if not specified) _____ Tier III (Results + QC & Calibration Summaries) _____ EDD required Yes / <input checked="" type="checkbox"/> No                                        |                      |                      |                       |                                                                  |                                        |                             |                                |                      |                   |                                                                         |
| Tier II (Results + QC Summaries) <input checked="" type="checkbox"/> Tier IV (Data Validation Package) 10% Surcharge _____ Type: _____ Units: _____ Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT |                      |                      |                       |                                                                  |                                        |                             |                                |                      |                   |                                                                         |
| Relinquished by: (Signature) <b>M. M. -</b>                                                                                                                                                              |                      | Date: <b>3/18/22</b> | Time: <b>12:15 pm</b> | Received by: (Signature)                                         |                                        |                             |                                | Date: _____          | Time: _____       | Project Requirements (MRLs, QAPP)                                       |
| Relinquished by: (Signature) <b>FEDEX</b>                                                                                                                                                                |                      | Date: <b>3/18/22</b> | Time: <b>12:15 pm</b> | Received by: (Signature)                                         |                                        |                             |                                | Date: <b>3-21-22</b> | Time: <b>8700</b> |                                                                         |
| Page 7 of 27                                                                                                                                                                                             |                      |                      |                       |                                                                  |                                        |                             |                                |                      |                   | Cooler / Blank Temperature _____ °C                                     |

|                                                                            |                                 |
|----------------------------------------------------------------------------|---------------------------------|
| Client: Hazen And Sawyer, P.C.                                             | Work order: P2201236            |
| Project: City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13 |                                 |
| Sample(s) received on: 3/21/22                                             | Date opened: 3/21/22 by: ADAVID |

|    |                                                                                                               | Yes                                 | No                                  | N/A                                 |
|----|---------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 1  | Were <b>sample containers</b> properly marked with client sample ID?                                          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 2  | Did <b>sample containers</b> arrive in good condition?                                                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 3  | Were <b>chain-of-custody</b> papers used and filled out?                                                      | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 4  | Did <b>sample container labels</b> and/or tags agree with custody papers?                                     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 5  | Was <b>sample volume</b> received adequate for analysis?                                                      | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 6  | Are samples within specified holding times?                                                                   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 7  | Was proper <b>temperature</b> (thermal preservation) of cooler at receipt adhered to?                         | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 8  | Were <b>custody seals</b> on outside of cooler/Box/Container?                                                 | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|    | Location of seal(s) _____ Sealing Lid?                                                                        | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Were signature and date included?                                                                             | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Were seals intact?                                                                                            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 9  | Do containers have appropriate <b>preservation</b> , according to method/SOP or Client specified information? | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Is there a client indication that the submitted samples are <b>pH</b> preserved?                              | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Were <b>VOA vials</b> checked for presence/absence of air bubbles?                                            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Does the client/method/SOP require that the analyst check the sample pH and <u>if necessary</u> alter it?     | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 10 | <b>Tubes:</b> Are the tubes capped and intact?                                                                | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 11 | <b>Badges:</b> Are the badges properly capped and intact?                                                     | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Are dual bed badges separated and individually capped and intact?                                             | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

[illegible]

RSK - MEEPP, HCL (pH<2); RSK - CO<sub>2</sub>, (pH 5-8); Sulfur (pH>4)

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #3

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AARSS Sample ID: P2201236-003

Test Code: ASTM D3588-98

Analyst: Gilbert Gutierrez/Stephanie Reynoso

Date Collected: 3/18/22

Sample Type: 6.0 L Silonite Canister

Date Received: 3/21/22

Test Notes:

Container ID: AS01478

Container Dilution Factor: 4.32

| Components       | Result<br>Volume % | Result<br>ppmV | MRL<br>ppmV | Data<br>Qualifier |
|------------------|--------------------|----------------|-------------|-------------------|
| Hydrogen         | < 0.01             | ND             | 4,300       |                   |
| Oxygen           | 7.22               | 72,200         | 4,300       |                   |
| Nitrogen         | 25.59              | 256,000        | 4,300       |                   |
| Carbon Monoxide  | < 0.01             | ND             | 4,300       |                   |
| Methane          | 41.22              | 412,000        | 4,300       |                   |
| Carbon Dioxide   | 24.99              | 250,000        | 4,300       |                   |
| Hydrogen Sulfide | 0.96               | 9,600          | 5.4         |                   |
| C2 as Ethane     | < 0.01             | ND             | 22          |                   |
| C3 as Propane    | < 0.01             | ND             | 22          |                   |
| C4 as n-Butane   | < 0.01             | ND             | 22          |                   |
| C5 as n-Pentane  | < 0.01             | ND             | 22          |                   |
| C6 as n-Hexane   | < 0.01             | ND             | 22          |                   |
| > C6 as n-Hexane | < 0.01             | 95             | 43          |                   |
| <b>TOTALS</b>    | <b>99.99</b>       |                |             |                   |

| Components | Mole % | Weight % | Data<br>Qualifier |
|------------|--------|----------|-------------------|
| Carbon     | 18.95  | 29.03    |                   |
| Hydrogen   | 47.73  | 6.14     |                   |
| Oxygen     | 18.41  | 37.58    |                   |
| Nitrogen   | 14.63  | 26.14    |                   |
| Sulfur     | 0.27   | 1.12     |                   |

|                                                       |         |         |
|-------------------------------------------------------|---------|---------|
| Specific Gravity (Air = 1)                            |         | 0.9470  |
| Specific Volume                                       | ft3/lb  | 13.84   |
| Gross Heating Value (Dry Gas @ 60 F, 14.696 psia)     | BTU/ft3 | 423.9   |
| Net Heating Value (Dry Gas @ 60 F, 14.696 psia)       | BTU/ft3 | 381.8   |
| Gross Heating Value (Water Saturated at 0.25636 psia) | BTU/ft3 | 415.7   |
| Net Heating Value (Water Saturated at 0.25636 psia)   | BTU/ft3 | 374.4   |
| Gross Heating Value (Dry Gas @ 60 F, 14.696 psia)     | BTU/lb  | 5,865.0 |
| Net Heating Value (Dry Gas @ 60 F, 14.696 psia)       | BTU/lb  | 5,282.8 |
| Compressibility Factor "Z" (60 F, 14.696 psia)        |         | 0.9980  |
| WOBBE Index                                           |         | 435.6   |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #25

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13 ALS Sample ID: P2201236-001

**Test Code:** ASTM D8230-19

Date Collected: 3/18/22

**Instrument ID:** Agilent 5973N/HP6890A/MS7

Date Received: 3/21/22

**Analyst:** Mathew Meyer

Date Analyzed: 3/28/22

**Sample Type:** Siloxane Tube

Desorption Volume: 3.0 ml

**Test Notes:** BC, DE

Volume Sampled: 6 Liter(s)

| CAS #                | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|----------------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6            | Trimethylsilanol                                | < 0.30            | ND              | 50           | ND                            | 15           |                   |
| 107-46-0             | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.30            | ND              | 51           | ND                            | 17           |                   |
| 541-05-9             | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | 0.64              | 110             | 58           | 41                            | 22           |                   |
| 107-51-7             | Octamethyltrisiloxane (L <sub>3</sub> )         | 0.30              | 51              | 51           | 18                            | 18           |                   |
| 556-67-2             | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | 15                | 2,500           | 51           | 950                           | 19           |                   |
| 141-62-8             | Decamethyltetrasiloxane (L <sub>4</sub> )       | 0.62              | 100             | 51           | 37                            | 18           |                   |
| 541-02-6             | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | 76                | 13,000          | 51           | 4,800                         | 19           |                   |
| 141-63-9             | Dodecamethylpentasiloxane (L <sub>5</sub> )     | 0.71              | 120             | 51           | 43                            | 19           |                   |
| 540-97-6             | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | 0.94              | 160             | 50           | 59                            | 19           |                   |
| <b>Total Silicon</b> |                                                 |                   |                 |              | <b>5,900</b>                  |              |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 2/3 #25

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13 ALS Sample ID: P2201236-002

**Test Code:** ASTM D8230-19

Date Collected: 3/18/22

**Instrument ID:** Agilent 5973N/HP6890A/MS7

Date Received: 3/21/22

**Analyst:** Mathew Meyer

Date Analyzed: 3/28/22

**Sample Type:** Siloxane Tube

Desorption Volume: 3.0 ml

**Test Notes:** BC, DE

Volume Sampled: 6 Liter(s)

| CAS #                | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|----------------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6            | Trimethylsilanol                                | < 0.30            | ND              | 50           | ND                            | 15           |                   |
| 107-46-0             | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.30            | ND              | 51           | ND                            | 17           |                   |
| 541-05-9             | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | 0.62              | 100             | 58           | 39                            | 22           |                   |
| 107-51-7             | Octamethyltrisiloxane (L <sub>3</sub> )         | < 0.30            | ND              | 51           | ND                            | 18           |                   |
| 556-67-2             | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | 14                | 2,300           | 51           | 860                           | 19           |                   |
| 141-62-8             | Decamethyltetrasiloxane (L <sub>4</sub> )       | 0.47              | 78              | 51           | 28                            | 18           |                   |
| 541-02-6             | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | 64                | 11,000          | 51           | 4,000                         | 19           |                   |
| 141-63-9             | Dodecamethylpentasiloxane (L <sub>5</sub> )     | 0.62              | 100             | 51           | 38                            | 19           |                   |
| 540-97-6             | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | 1.0               | 170             | 50           | 65                            | 19           |                   |
| <b>Total Silicon</b> |                                                 |                   |                 |              | <b>5,100</b>                  |              |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13 ALS Sample ID: P220328-MB

Test Code: ASTM D8230-19

Date Collected: NA

Instrument ID: Agilent 5973N/HP6890A/MS7

Date Received: NA

Analyst: Mathew Meyer

Date Analyzed: 3/28/22

Sample Type: Siloxane Tube

Desorption Volume: 3.0 ml

Test Notes: BC, DE

Volume Sampled: NA Liter(s)

| CAS #         | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|---------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6     | Trimethylsilanol                                | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 107-46-0      | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 541-05-9      | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | < 0.35            | NA              | NA           | NA                            | NA           |                   |
| 107-51-7      | Octamethyltrisiloxane (L <sub>3</sub> )         | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 556-67-2      | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 141-62-8      | Decamethyltetrasiloxane (L <sub>4</sub> )       | < 0.31            | NA              | NA           | NA                            | NA           |                   |
| 541-02-6      | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 141-63-9      | Dodecamethylpentasiloxane (L <sub>5</sub> )     | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 540-97-6      | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| Total Silicon |                                                 |                   |                 |              | NA                            |              |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

NA = Not applicable.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.



# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13 ALS Sample ID: P220328-DLCS

**Test Code:** ASTM D8230-19

Date Collected: NA

**Instrument ID:** Agilent 5973N/HP6890A/MS7

Date Received: NA

**Analyst:** Mathew Meyer

Date Analyzed: 3/28/22

**Sampling Type:** Siloxane Tube

Volume(s) Analyzed: NA Liter(s)

**Test Notes:**

| CAS #     | Compound                      | Spike Amount |       | Result |       | % Recovery |      | ALS        |     | RPD | RPD | Data      |
|-----------|-------------------------------|--------------|-------|--------|-------|------------|------|------------|-----|-----|-----|-----------|
|           |                               | LCS / DLCS   |       | LCS    | DLCS  |            |      | Acceptance |     |     |     |           |
|           |                               | µg/ml        | µg/ml | µg/ml  | µg/ml | LCS        | DLCS | Limits     |     |     |     | Qualifier |
| 1066-40-6 | Trimethylsilanol              | 10.6         | 10.2  | 10.2   |       | 96         | 96   | 70-130     | 0   | 25  |     |           |
| 107-46-0  | Hexamethyldisiloxane          | 11.4         | 12.1  | 12.2   |       | 106        | 107  | 70-130     | 0.9 | 25  |     |           |
| 541-05-9  | Hexamethylcyclotrisiloxane    | 10.9         | 11.3  | 11.4   |       | 104        | 105  | 70-130     | 1   | 25  |     |           |
| 107-51-7  | Octamethyltrisiloxane         | 11.2         | 12.0  | 12.1   |       | 107        | 108  | 70-130     | 0.9 | 25  |     |           |
| 556-67-2  | Octamethylcyclotetrasiloxane  | 12.8         | 13.7  | 13.7   |       | 107        | 107  | 70-130     | 0   | 25  |     |           |
| 141-62-8  | Decamethyltetrasiloxane       | 10.6         | 11.4  | 11.4   |       | 108        | 108  | 70-130     | 0   | 25  |     |           |
| 541-02-6  | Decamethylcyclopentasiloxane  | 11.3         | 12.1  | 12.0   |       | 107        | 106  | 70-130     | 0.9 | 25  |     |           |
| 141-63-9  | Dodecamethylpentasiloxane     | 11.9         | 12.8  | 12.8   |       | 108        | 108  | 70-130     | 0   | 25  |     |           |
| 540-97-6  | Dodecamethylcyclohexasiloxane | 12.9         | 13.6  | 13.5   |       | 105        | 105  | 70-130     | 0   | 25  |     |           |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #3

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P2201236-003

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS01478

Date Collected: 3/18/22

Time Collected: 09:35

Date Received: 3/21/22

Date Analyzed: 3/21/22

Time Analyzed: 12:04

Volume(s) Analyzed: 0.0040 ml(s)

Container Dilution Factor: 4.32

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | 13,000,000      | 7,500        | 9,600,000      | 5,400       |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 13,000       | ND             | 5,400       |                   |
| 74-93-1   | Methyl Mercaptan      | 51,000          | 11,000       | 26,000         | 5,400       |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 14,000       | ND             | 5,400       |                   |
| 75-18-3   | Dimethyl Sulfide      | 19,000          | 14,000       | 7,300          | 5,400       |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 8,400        | ND             | 2,700       |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 17,000       | ND             | 5,400       |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 20,000       | ND             | 5,400       |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 17,000       | ND             | 5,400       |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 17,000       | ND             | 5,400       |                   |
| 110-02-1  | Thiophene             | ND              | 19,000       | ND             | 5,400       |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 20,000       | ND             | 5,400       |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 20,000       | ND             | 5,400       |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 20,000       | ND             | 5,400       |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 10,000       | ND             | 2,700       |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 22,000       | ND             | 5,400       |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 19,000       | ND             | 5,400       |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 25,000       | ND             | 5,400       |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 25,000       | ND             | 5,400       |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 13,000       | ND             | 2,700       |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

### Total Reduced Sulfur as Hydrogen Sulfide

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister(s)

Test Notes:

Date(s) Collected: 3/18/22

Date Received: 3/21/22

Date Analyzed: 3/21/22

| Client Sample ID | ALS Sample ID | Container<br>Dilution<br>Factor | Injection<br>Volume<br>ml(s) | Time<br>Analyzed | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------------|---------------|---------------------------------|------------------------------|------------------|-----------------|--------------|----------------|-------------|-------------------|
| Digester 6 #3    | P2201236-003  | 4.32                            | 0.0040                       | 12:04            | 13,000,000      | 7,500        | 9,600,000      | 5,400       |                   |
| Method Blank     | P220321-MB    | 1.00                            | 1.0                          | 08:05            | ND              | 7.0          | ND             | 5.0         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

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# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P220321-MB

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Time Collected: NA

Date Received: NA

Date Analyzed: 3/21/22

Time Analyzed: 08:05

Volume(s) Analyzed: 1.0 ml(s)

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | ND              | 7.0          | ND             | 5.0         |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 12           | ND             | 5.0         |                   |
| 74-93-1   | Methyl Mercaptan      | ND              | 9.8          | ND             | 5.0         |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 13           | ND             | 5.0         |                   |
| 75-18-3   | Dimethyl Sulfide      | ND              | 13           | ND             | 5.0         |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 7.8          | ND             | 2.5         |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 16           | ND             | 5.0         |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 18           | ND             | 5.0         |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 16           | ND             | 5.0         |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 16           | ND             | 5.0         |                   |
| 110-02-1  | Thiophene             | ND              | 17           | ND             | 5.0         |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 18           | ND             | 5.0         |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 18           | ND             | 5.0         |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 18           | ND             | 5.0         |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 9.6          | ND             | 2.5         |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 20           | ND             | 5.0         |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 18           | ND             | 5.0         |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 23           | ND             | 5.0         |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 23           | ND             | 5.0         |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 12           | ND             | 2.5         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P220321-DLCS

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 3/21/22

Volume(s) Analyzed: NA ml(s)

| CAS #     | Compound         | Spike Amount       | Result      |              | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|------------------|--------------------|-------------|--------------|------------|------|----------------------|-----|-----|------|
|           |                  | LCS / DLCS<br>ppbV | LCS<br>ppbV | DLCS<br>ppbV | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 7783-06-4 | Hydrogen Sulfide | 989                | 978         | 900          | 99         | 91   | 72-122               | 8   | 18  |      |
| 463-58-1  | Carbonyl Sulfide | 1,050              | 1,020       | 943          | 97         | 90   | 72-121               | 7   | 17  |      |
| 74-93-1   | Methyl Mercaptan | 1,050              | 1,130       | 1,030        | 108        | 98   | 74-127               | 10  | 18  |      |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #3

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P2201236-003

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS01478

Date Collected: 3/18/22

Date Received: 3/21/22

Date Analyzed: 4/1/22

Volume(s) Analyzed: 0.0020 Liter(s)

Canister Dilution Factor: 4.32

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND                          | 560                      | ND             | 330         |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 580                      | ND             | 120         |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 560                      | ND             | 270         |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 580                      | ND             | 83          |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 560                      | ND             | 220         |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 560                      | ND             | 250         |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 560                      | ND             | 140         |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 560                      | ND             | 210         |                   |
| 64-17-5   | Ethanol                                          | ND                          | 5,400                    | ND             | 2,900       |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 1,100                    | ND             | 640         |                   |
| 107-02-8  | Acrolein                                         | ND                          | 1,100                    | ND             | 470         |                   |
| 67-64-1   | Acetone                                          | ND                          | 5,600                    | ND             | 2,400       |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 560                      | ND             | 100         |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 1,100                    | ND             | 440         |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 1,100                    | ND             | 500         |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 580                      | ND             | 150         |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 560                      | ND             | 160         |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 580                      | ND             | 190         |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 580                      | ND             | 76          |                   |
| 75-15-0   | Carbon Disulfide                                 | ND                          | 1,200                    | ND             | 380         |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 580                      | ND             | 150         |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 580                      | ND             | 140         |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 580                      | ND             | 160         |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 5,400                    | ND             | 1,500       |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND                          | 1,100                    | ND             | 370         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #3

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P2201236-003

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS01478

Date Collected: 3/18/22

Date Received: 3/21/22

Date Analyzed: 4/1/22

Volume(s) Analyzed: 0.0020 Liter(s)

Canister Dilution Factor: 4.32

| CAS #      | Compound                  | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND                          | 560                      | ND             | 140         |                   |
| 141-78-6   | Ethyl Acetate             | ND                          | 2,400                    | ND             | 660         |                   |
| 110-54-3   | n-Hexane                  | ND                          | 580                      | ND             | 170         |                   |
| 67-66-3    | Chloroform                | ND                          | 580                      | ND             | 120         |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND                          | 1,100                    | ND             | 370         |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND                          | 580                      | ND             | 140         |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND                          | 560                      | ND             | 100         |                   |
| 71-43-2    | Benzene                   | ND                          | 540                      | ND             | 170         |                   |
| 56-23-5    | Carbon Tetrachloride      | ND                          | 540                      | ND             | 86          |                   |
| 110-82-7   | Cyclohexane               | ND                          | 1,200                    | ND             | 350         |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND                          | 540                      | ND             | 120         |                   |
| 75-27-4    | Bromodichloromethane      | ND                          | 580                      | ND             | 87          |                   |
| 79-01-6    | Trichloroethene           | ND                          | 560                      | ND             | 100         |                   |
| 123-91-1   | 1,4-Dioxane               | ND                          | 560                      | ND             | 160         |                   |
| 80-62-6    | Methyl Methacrylate       | ND                          | 1,200                    | ND             | 290         |                   |
| 142-82-5   | n-Heptane                 | ND                          | 580                      | ND             | 140         |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND                          | 540                      | ND             | 120         |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND                          | 1,200                    | ND             | 290         |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND                          | 560                      | ND             | 120         |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND                          | 560                      | ND             | 100         |                   |
| 108-88-3   | Toluene                   | ND                          | 560                      | ND             | 150         |                   |
| 591-78-6   | 2-Hexanone                | ND                          | 1,200                    | ND             | 290         |                   |
| 124-48-1   | Dibromochloromethane      | ND                          | 580                      | ND             | 68          |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND                          | 560                      | ND             | 73          |                   |
| 123-86-4   | n-Butyl Acetate           | ND                          | 1,200                    | ND             | 250         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #3

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P2201236-003

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS01478

Date Collected: 3/18/22

Date Received: 3/21/22

Date Analyzed: 4/1/22

Volume(s) Analyzed: 0.0020 Liter(s)

Canister Dilution Factor: 4.32

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | ND              | 580          | ND             | 120         |                   |
| 127-18-4    | Tetrachloroethene           | ND              | 560          | ND             | 83          |                   |
| 108-90-7    | Chlorobenzene               | ND              | 560          | ND             | 120         |                   |
| 100-41-4    | Ethylbenzene                | ND              | 560          | ND             | 130         |                   |
| 179601-23-1 | m,p-Xylenes                 | ND              | 1,200        | ND             | 270         |                   |
| 75-25-2     | Bromoform                   | ND              | 560          | ND             | 54          |                   |
| 100-42-5    | Styrene                     | ND              | 540          | ND             | 130         |                   |
| 95-47-6     | o-Xylene                    | ND              | 560          | ND             | 130         |                   |
| 111-84-2    | n-Nonane                    | ND              | 560          | ND             | 110         |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 560          | ND             | 82          |                   |
| 98-82-8     | Cumene                      | ND              | 560          | ND             | 110         |                   |
| 80-56-8     | alpha-Pinene                | ND              | 580          | ND             | 100         |                   |
| 103-65-1    | n-Propylbenzene             | ND              | 580          | ND             | 120         |                   |
| 622-96-8    | 4-Ethyltoluene              | ND              | 580          | ND             | 120         |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND              | 560          | ND             | 110         |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | ND              | 560          | ND             | 110         |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 1,200        | ND             | 230         |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 560          | ND             | 93          |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | ND              | 560          | ND             | 93          |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 580          | ND             | 97          |                   |
| 5989-27-5   | d-Limonene                  | ND              | 540          | ND             | 97          |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 1,100        | ND             | 110         |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 1,200        | ND             | 160         |                   |
| 91-20-3     | Naphthalene                 | ND              | 560          | ND             | 110         | V                 |
| 87-68-3     | Hexachlorobutadiene         | ND              | 560          | ND             | 53          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

V = The continuing calibration verification standard was outside (biased low) the specified limits for this compound.



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P220401-MB

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

**Analyst:** Topacio Zavala

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 4/1/22

Volume(s) Analyzed: 0.20 Liter(s)

Canister Dilution Factor: 1.00

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND                          | 1.3                      | ND             | 0.76        |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 1.4                      | ND             | 0.27        |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 1.3                      | ND             | 0.63        |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 1.4                      | ND             | 0.19        |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 1.3                      | ND             | 0.51        |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 1.3                      | ND             | 0.59        |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 1.3                      | ND             | 0.33        |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 1.3                      | ND             | 0.49        |                   |
| 64-17-5   | Ethanol                                          | ND                          | 13                       | ND             | 6.6         |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 2.5                      | ND             | 1.5         |                   |
| 107-02-8  | Acrolein                                         | ND                          | 2.5                      | ND             | 1.1         |                   |
| 67-64-1   | Acetone                                          | ND                          | 13                       | ND             | 5.5         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 1.3                      | ND             | 0.23        |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 2.5                      | ND             | 1.0         |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 2.5                      | ND             | 1.2         |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 1.4                      | ND             | 0.34        |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 1.3                      | ND             | 0.37        |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 1.4                      | ND             | 0.43        |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 1.4                      | ND             | 0.18        |                   |
| 75-15-0   | Carbon Disulfide                                 | ND                          | 2.8                      | ND             | 0.88        |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 1.4                      | ND             | 0.34        |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 1.4                      | ND             | 0.33        |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 1.4                      | ND             | 0.37        |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 13                       | ND             | 3.6         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND                          | 2.5                      | ND             | 0.85        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Sample ID: P220401-MB

**Test Code:** EPA TO-15 Modified

Date Collected: NA

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

Date Received: NA

**Analyst:** Topacio Zavala

Date Analyzed: 4/1/22

**Sample Type:** 6.0 L Silonite Canister

Volume(s) Analyzed: 0.20 Liter(s)

**Test Notes:**

Canister Dilution Factor: 1.00

| CAS #      | Compound                  | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND              | 1.3          | ND             | 0.33        |                   |
| 141-78-6   | Ethyl Acetate             | ND              | 5.5          | ND             | 1.5         |                   |
| 110-54-3   | n-Hexane                  | ND              | 1.4          | ND             | 0.38        |                   |
| 67-66-3    | Chloroform                | ND              | 1.4          | ND             | 0.28        |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND              | 2.5          | ND             | 0.85        |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND              | 1.4          | ND             | 0.33        |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND              | 1.3          | ND             | 0.24        |                   |
| 71-43-2    | Benzene                   | ND              | 1.3          | ND             | 0.39        |                   |
| 56-23-5    | Carbon Tetrachloride      | ND              | 1.3          | ND             | 0.20        |                   |
| 110-82-7   | Cyclohexane               | ND              | 2.8          | ND             | 0.80        |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND              | 1.3          | ND             | 0.27        |                   |
| 75-27-4    | Bromodichloromethane      | ND              | 1.4          | ND             | 0.20        |                   |
| 79-01-6    | Trichloroethene           | ND              | 1.3          | ND             | 0.24        |                   |
| 123-91-1   | 1,4-Dioxane               | ND              | 1.3          | ND             | 0.36        |                   |
| 80-62-6    | Methyl Methacrylate       | ND              | 2.8          | ND             | 0.67        |                   |
| 142-82-5   | n-Heptane                 | ND              | 1.4          | ND             | 0.33        |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND              | 1.3          | ND             | 0.28        |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND              | 2.8          | ND             | 0.67        |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND              | 1.3          | ND             | 0.29        |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND              | 1.3          | ND             | 0.24        |                   |
| 108-88-3   | Toluene                   | ND              | 1.3          | ND             | 0.35        |                   |
| 591-78-6   | 2-Hexanone                | ND              | 2.8          | ND             | 0.67        |                   |
| 124-48-1   | Dibromochloromethane      | ND              | 1.4          | ND             | 0.16        |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND              | 1.3          | ND             | 0.17        |                   |
| 123-86-4   | n-Butyl Acetate           | ND              | 2.8          | ND             | 0.58        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Sample ID: P220401-MB

**Test Code:** EPA TO-15 Modified

Date Collected: NA

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

Date Received: NA

**Analyst:** Topacio Zavala

Date Analyzed: 4/1/22

**Sample Type:** 6.0 L Silonite Canister

Volume(s) Analyzed: 0.20 Liter(s)

**Test Notes:**

Canister Dilution Factor: 1.00

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | ND              | 1.4          | ND             | 0.29        |                   |
| 127-18-4    | Tetrachloroethene           | ND              | 1.3          | ND             | 0.19        |                   |
| 108-90-7    | Chlorobenzene               | ND              | 1.3          | ND             | 0.28        |                   |
| 100-41-4    | Ethylbenzene                | ND              | 1.3          | ND             | 0.30        |                   |
| 179601-23-1 | m,p-Xylenes                 | ND              | 2.8          | ND             | 0.63        |                   |
| 75-25-2     | Bromoform                   | ND              | 1.3          | ND             | 0.13        |                   |
| 100-42-5    | Styrene                     | ND              | 1.3          | ND             | 0.29        |                   |
| 95-47-6     | o-Xylene                    | ND              | 1.3          | ND             | 0.30        |                   |
| 111-84-2    | n-Nonane                    | ND              | 1.3          | ND             | 0.25        |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 1.3          | ND             | 0.19        |                   |
| 98-82-8     | Cumene                      | ND              | 1.3          | ND             | 0.26        |                   |
| 80-56-8     | alpha-Pinene                | ND              | 1.4          | ND             | 0.24        |                   |
| 103-65-1    | n-Propylbenzene             | ND              | 1.4          | ND             | 0.27        |                   |
| 622-96-8    | 4-Ethyltoluene              | ND              | 1.4          | ND             | 0.27        |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND              | 1.3          | ND             | 0.26        |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | ND              | 1.3          | ND             | 0.26        |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 2.8          | ND             | 0.53        |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 1.3          | ND             | 0.22        |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | ND              | 1.3          | ND             | 0.22        |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 1.4          | ND             | 0.22        |                   |
| 5989-27-5   | d-Limonene                  | ND              | 1.3          | ND             | 0.22        |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 2.5          | ND             | 0.26        |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 2.8          | ND             | 0.37        |                   |
| 91-20-3     | Naphthalene                 | ND              | 1.3          | ND             | 0.25        | V                 |
| 87-68-3     | Hexachlorobutadiene         | ND              | 1.3          | ND             | 0.12        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

V = The continuing calibration verification standard was outside (biased low) the specified limits for this compound.

# ALS ENVIRONMENTAL

## SURROGATE SPIKE RECOVERY RESULTS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister(s)

Test Notes:

Date(s) Collected: 3/18/22

Date(s) Received: 3/21/22

Date(s) Analyzed: 4/1/22

| Client Sample ID             | ALS Sample ID | 1,2-Dichloroethane-d4 | Toluene-d8        | Bromofluorobenzene | Acceptance Limits | Data Qualifier |
|------------------------------|---------------|-----------------------|-------------------|--------------------|-------------------|----------------|
|                              |               | Percent Recovered     | Percent Recovered | Percent Recovered  |                   |                |
| Method Blank                 | P220401-MB    | 94                    | 102               | 83                 | 70-130            |                |
| Lab Control Sample           | P220401-LCS   | 97                    | 100               | 106                | 70-130            |                |
| Duplicate Lab Control Sample | P220401-DLCS  | 97                    | 101               | 103                | 70-130            |                |
| Digester 6 #3                | P2201236-003  | 108                   | 106               | 92                 | 70-130            |                |

Surrogate percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P220401-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 4/1/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #     | Compound                                         | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|--------------------------------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|           |                                                  | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 115-07-1  | Propene                                          | 206                 | 194          | 194           | 94         | 94   | 56-128               | 0   | 25  |      |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | 208                 | 198          | 197           | 95         | 95   | 71-112               | 0   | 25  |      |
| 74-87-3   | Chloromethane                                    | 206                 | 193          | 191           | 94         | 93   | 53-126               | 1   | 25  |      |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | 208                 | 207          | 204           | 100        | 98   | 62-121               | 2   | 25  |      |
| 75-01-4   | Vinyl Chloride                                   | 208                 | 200          | 199           | 96         | 96   | 63-123               | 0   | 25  |      |
| 106-99-0  | 1,3-Butadiene                                    | 206                 | 216          | 214           | 105        | 104  | 63-135               | 1   | 25  |      |
| 74-83-9   | Bromomethane                                     | 206                 | 198          | 188           | 96         | 91   | 71-112               | 5   | 25  |      |
| 75-00-3   | Chloroethane                                     | 206                 | 196          | 186           | 95         | 90   | 66-117               | 5   | 25  |      |
| 64-17-5   | Ethanol                                          | 832                 | 1080         | 1050          | 130        | 126  | 57-117               | 3   | 25  | L    |
| 75-05-8   | Acetonitrile                                     | 202                 | 165          | 184           | 82         | 91   | 59-131               | 10  | 25  |      |
| 107-02-8  | Acrolein                                         | 416                 | 386          | 412           | 93         | 99   | 71-123               | 6   | 25  |      |
| 67-64-1   | Acetone                                          | 1,020               | 869          | 864           | 85         | 85   | 60-117               | 0   | 25  |      |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | 202                 | 183          | 175           | 91         | 87   | 71-114               | 4   | 25  |      |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | 400                 | 441          | 423           | 110        | 106  | 61-124               | 4   | 25  |      |
| 107-13-1  | Acrylonitrile                                    | 402                 | 374          | 343           | 93         | 85   | 65-130               | 9   | 25  |      |
| 75-35-4   | 1,1-Dichloroethene                               | 210                 | 213          | 212           | 101        | 101  | 74-114               | 0   | 25  |      |
| 75-09-2   | Methylene Chloride                               | 208                 | 200          | 197           | 96         | 95   | 75-112               | 1   | 25  |      |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | 204                 | 215          | 215           | 105        | 105  | 57-127               | 0   | 25  |      |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | 216                 | 207          | 203           | 96         | 94   | 73-114               | 2   | 25  |      |
| 75-15-0   | Carbon Disulfide                                 | 414                 | 369          | 366           | 89         | 88   | 70-113               | 1   | 25  |      |
| 156-60-5  | trans-1,2-Dichloroethene                         | 208                 | 216          | 215           | 104        | 103  | 76-119               | 1   | 25  |      |
| 75-34-3   | 1,1-Dichloroethane                               | 214                 | 221          | 219           | 103        | 102  | 70-114               | 1   | 25  |      |
| 1634-04-4 | Methyl tert-Butyl Ether                          | 206                 | 228          | 225           | 111        | 109  | 72-118               | 2   | 25  |      |
| 108-05-4  | Vinyl Acetate                                    | 942                 | 1190         | 1170          | 126        | 124  | 56-137               | 2   | 25  |      |
| 78-93-3   | 2-Butanone (MEK)                                 | 408                 | 491          | 484           | 120        | 119  | 74-121               | 0.8 | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

L = Laboratory control sample recovery outside the specified limits, results may be biased high.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P220401-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 4/1/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #      | Compound                  | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|------------|---------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|            |                           | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 156-59-2   | cis-1,2-Dichloroethene    | 206                 | 225          | 222           | 109        | 108  | 73-117               | 0.9 | 25  |      |
| 141-78-6   | Ethyl Acetate             | 580                 | 656          | 643           | 113        | 111  | 59-161               | 2   | 25  |      |
| 110-54-3   | n-Hexane                  | 208                 | 228          | 225           | 110        | 108  | 55-130               | 2   | 25  |      |
| 67-66-3    | Chloroform                | 210                 | 213          | 210           | 101        | 100  | 71-114               | 1   | 25  |      |
| 109-99-9   | Tetrahydrofuran (THF)     | 404                 | 459          | 453           | 114        | 112  | 73-114               | 2   | 25  |      |
| 107-06-2   | 1,2-Dichloroethane        | 210                 | 206          | 202           | 98         | 96   | 71-119               | 2   | 25  |      |
| 71-55-6    | 1,1,1-Trichloroethane     | 208                 | 209          | 198           | 100        | 95   | 73-119               | 5   | 25  |      |
| 71-43-2    | Benzene                   | 208                 | 198          | 192           | 95         | 92   | 72-113               | 3   | 25  |      |
| 56-23-5    | Carbon Tetrachloride      | 202                 | 200          | 198           | 99         | 98   | 67-123               | 1   | 25  |      |
| 110-82-7   | Cyclohexane               | 412                 | 388          | 382           | 94         | 93   | 70-119               | 1   | 25  |      |
| 78-87-5    | 1,2-Dichloropropane       | 206                 | 228          | 224           | 111        | 109  | 70-118               | 2   | 25  |      |
| 75-27-4    | Bromodichloromethane      | 208                 | 232          | 225           | 112        | 108  | 74-119               | 4   | 25  |      |
| 79-01-6    | Trichloroethene           | 204                 | 226          | 221           | 111        | 108  | 74-115               | 3   | 25  |      |
| 123-91-1   | 1,4-Dioxane               | 206                 | 252          | 248           | 122        | 120  | 77-124               | 2   | 25  |      |
| 80-62-6    | Methyl Methacrylate       | 410                 | 532          | 524           | 130        | 128  | 78-126               | 2   | 25  | L    |
| 142-82-5   | n-Heptane                 | 206                 | 244          | 240           | 118        | 117  | 70-119               | 0.9 | 25  |      |
| 10061-01-5 | cis-1,3-Dichloropropene   | 208                 | 239          | 235           | 115        | 113  | 81-126               | 2   | 25  |      |
| 108-10-1   | 4-Methyl-2-pentanone      | 412                 | 541          | 533           | 131        | 129  | 73-129               | 2   | 25  | L    |
| 10061-02-6 | trans-1,3-Dichloropropene | 200                 | 225          | 222           | 113        | 111  | 80-127               | 2   | 25  |      |
| 79-00-5    | 1,1,2-Trichloroethane     | 208                 | 226          | 219           | 109        | 105  | 78-117               | 4   | 25  |      |
| 108-88-3   | Toluene                   | 206                 | 203          | 204           | 99         | 99   | 70-118               | 0   | 25  |      |
| 591-78-6   | 2-Hexanone                | 406                 | 523          | 520           | 129        | 128  | 74-132               | 0.8 | 25  |      |
| 124-48-1   | Dibromochloromethane      | 210                 | 211          | 211           | 100        | 100  | 69-137               | 0   | 25  |      |
| 106-93-4   | 1,2-Dibromoethane         | 208                 | 200          | 198           | 96         | 95   | 76-128               | 1   | 25  |      |
| 123-86-4   | n-Butyl Acetate           | 406                 | 534          | 531           | 132        | 131  | 75-134               | 0.8 | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

L = Laboratory control sample recovery outside the specified limits, results may be biased high.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P220401-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 4/1/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #       | Compound                    | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-------------|-----------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|             |                             | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 111-65-9    | n-Octane                    | 208                 | 244          | 242           | 117        | 116  | 68-120               | 0.9 | 25  |      |
| 127-18-4    | Tetrachloroethene           | 212                 | 201          | 199           | 95         | 94   | 63-130               | 1   | 25  |      |
| 108-90-7    | Chlorobenzene               | 206                 | 194          | 193           | 94         | 94   | 70-118               | 0   | 25  |      |
| 100-41-4    | Ethylbenzene                | 206                 | 227          | 226           | 110        | 110  | 71-123               | 0   | 25  |      |
| 179601-23-1 | m,p-Xylenes                 | 416                 | 468          | 465           | 113        | 112  | 67-127               | 0.9 | 25  |      |
| 75-25-2     | Bromoform                   | 210                 | 214          | 214           | 102        | 102  | 65-149               | 0   | 25  |      |
| 100-42-5    | Styrene                     | 202                 | 239          | 239           | 118        | 118  | 76-132               | 0   | 25  |      |
| 95-47-6     | o-Xylene                    | 208                 | 236          | 235           | 113        | 113  | 69-124               | 0   | 25  |      |
| 111-84-2    | n-Nonane                    | 208                 | 254          | 253           | 122        | 122  | 64-127               | 0   | 25  |      |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | 208                 | 220          | 220           | 106        | 106  | 69-128               | 0   | 25  |      |
| 98-82-8     | Cumene                      | 206                 | 224          | 223           | 109        | 108  | 69-125               | 0.9 | 25  |      |
| 80-56-8     | alpha-Pinene                | 210                 | 233          | 243           | 111        | 116  | 68-129               | 4   | 25  |      |
| 103-65-1    | n-Propylbenzene             | 208                 | 224          | 238           | 108        | 114  | 70-127               | 5   | 25  |      |
| 622-96-8    | 4-Ethyltoluene              | 208                 | 232          | 243           | 112        | 117  | 69-127               | 4   | 25  |      |
| 108-67-8    | 1,3,5-Trimethylbenzene      | 208                 | 234          | 243           | 113        | 117  | 66-129               | 3   | 25  |      |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 206                 | 242          | 225           | 117        | 109  | 63-142               | 7   | 25  |      |
| 100-44-7    | Benzyl Chloride             | 416                 | 468          | 435           | 113        | 105  | 73-145               | 7   | 25  |      |
| 541-73-1    | 1,3-Dichlorobenzene         | 208                 | 186          | 187           | 89         | 90   | 67-136               | 1   | 25  |      |
| 106-46-7    | 1,4-Dichlorobenzene         | 210                 | 188          | 188           | 90         | 90   | 63-134               | 0   | 25  |      |
| 95-50-1     | 1,2-Dichlorobenzene         | 210                 | 198          | 197           | 94         | 94   | 64-139               | 0   | 25  |      |
| 5989-27-5   | d-Limonene                  | 206                 | 262          | 264           | 127        | 128  | 63-137               | 0.8 | 25  |      |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | 404                 | 430          | 461           | 106        | 114  | 72-145               | 7   | 25  |      |
| 120-82-1    | 1,2,4-Trichlorobenzene      | 420                 | 391          | 387           | 93         | 92   | 62-154               | 1   | 25  |      |
| 91-20-3     | Naphthalene                 | 210                 | 223          | 222           | 106        | 106  | 62-156               | 0   | 25  |      |
| 87-68-3     | Hexachlorobutadiene         | 212                 | 196          | 195           | 92         | 92   | 55-142               | 0   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

## Appendix H: Biogas Test Results - Siloxanes



| <b>Species</b>                | <b>Units</b> | <b>Digester 2/3<br/>(03/10/2022)</b> | <b>Digester 6<br/>(03/10/2022)</b> | <b>Digester 2/3<br/>(03/18/2022)</b> |
|-------------------------------|--------------|--------------------------------------|------------------------------------|--------------------------------------|
| Trimethylsilanol              | UG/M3        | 67                                   | 140                                | ND                                   |
| Hexamethyldisiloxane          | UG/M3        |                                      |                                    | ND                                   |
| Hexamethylcyclotrisiloxane    | UG/M3        |                                      | 110                                | 100                                  |
| Octamethyltrisiloxane         | UG/M3        |                                      |                                    | ND                                   |
| Octamethylcyclotetrasiloxane  | UG/M3        | 2,000                                | 2,400                              | 2300                                 |
| Decamethyltetrasiloxane       | UG/M3        | 120                                  | 96                                 | 78                                   |
| Decamethylcyclopentasiloxane  | UG/M3        | 14,000                               | 14,000                             | 11000                                |
| Dodecamethylpentasiloxane     | UG/M3        | 190                                  | 130                                | 100                                  |
| Dodecamethylcyclohexasiloxane | UG/M3        | 230                                  | 200                                | 170                                  |

**Digester 6**  
**(03/18/2022)**

ND

ND

110

51

2500

100

13000

120

160

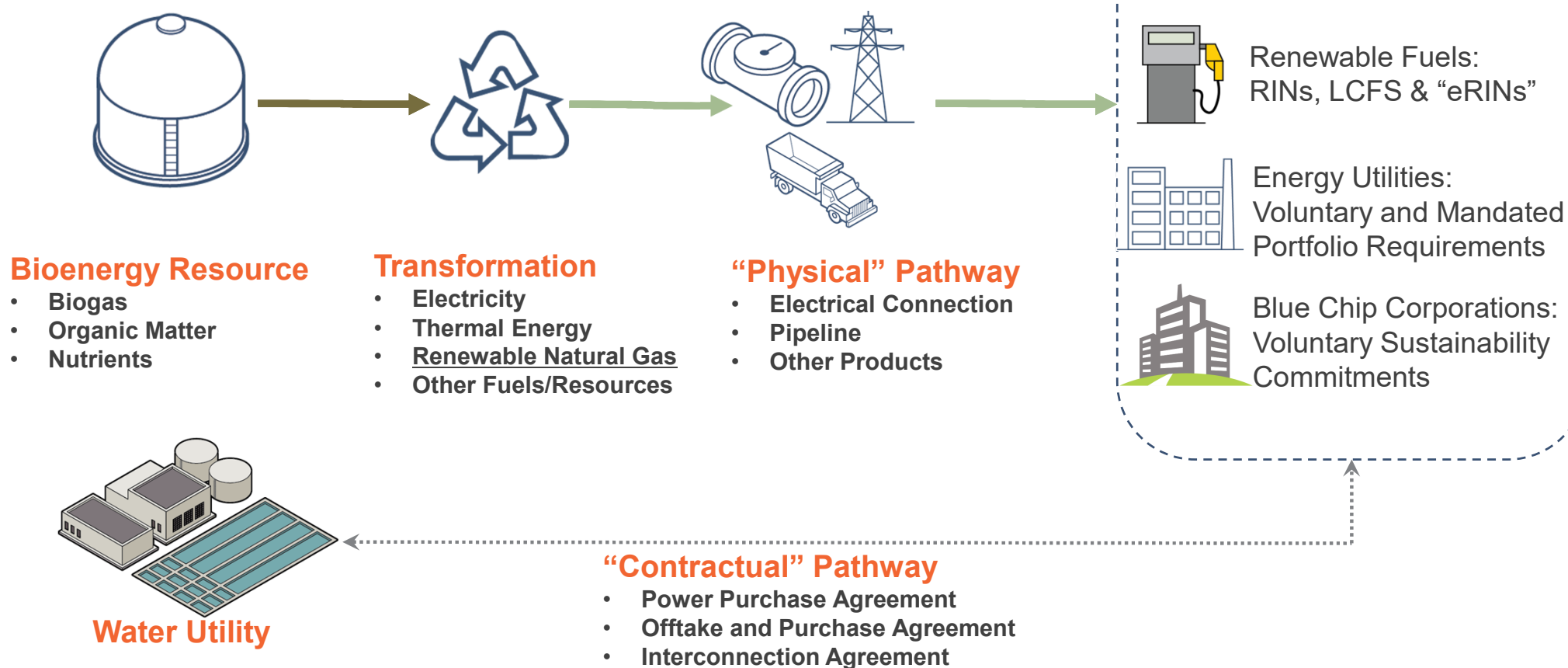
# RNG Production Requirements

- RNG is biogas converted to natural gas standards
- **RNG and natural gas have the same chemical makeup after treatment**

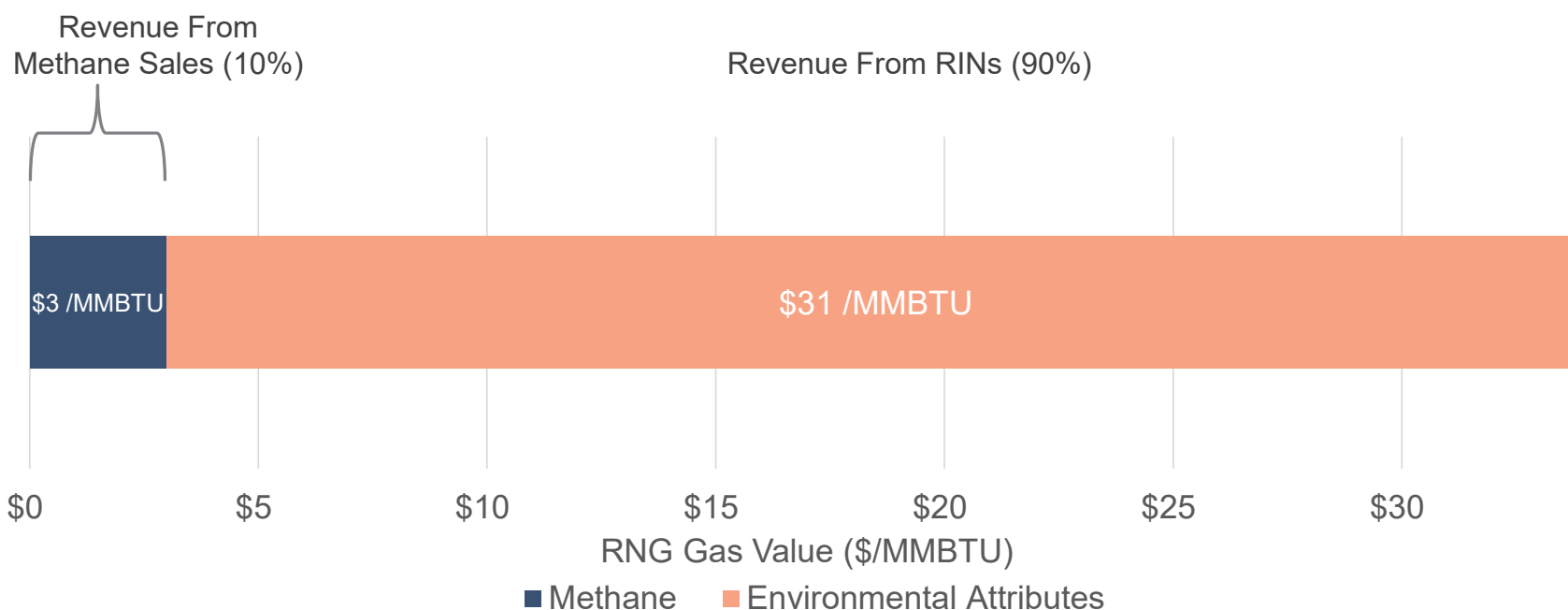


| Parameter                 | HFC Raw Gas                          | TECO RNG Standard                      |
|---------------------------|--------------------------------------|----------------------------------------|
| CH <sub>4</sub>           | 60%                                  | >=85%                                  |
| CO <sub>2</sub>           | 38%                                  | <3%                                    |
| N <sub>2</sub>            | 1%                                   | <3%                                    |
| O <sub>2</sub>            | 0.4%                                 | <1%                                    |
| H <sub>2</sub> S          | 9,500 PPMV                           | <=4 PPMV                               |
| Total Sulfur              | 594 grains S per 100 ft <sup>3</sup> | <= 20 grains S per 100 ft <sup>3</sup> |
| Total Siloxanes           | 1 ppmv                               | "Free of impurities"                   |
| VOCs                      | 7,000 ppmv                           | "Free of impurities"                   |
| Water Content             | Saturated                            | <= 7 lb / 1,000 MCF                    |
| Gross Heating Value (HHV) | 600 BTU/SCF                          | >= 980 BTU/SCF                         |
| Temp                      | 95 F                                 | 40-120F                                |

# Trend – Evolving Bioenergy Markets & Pathways

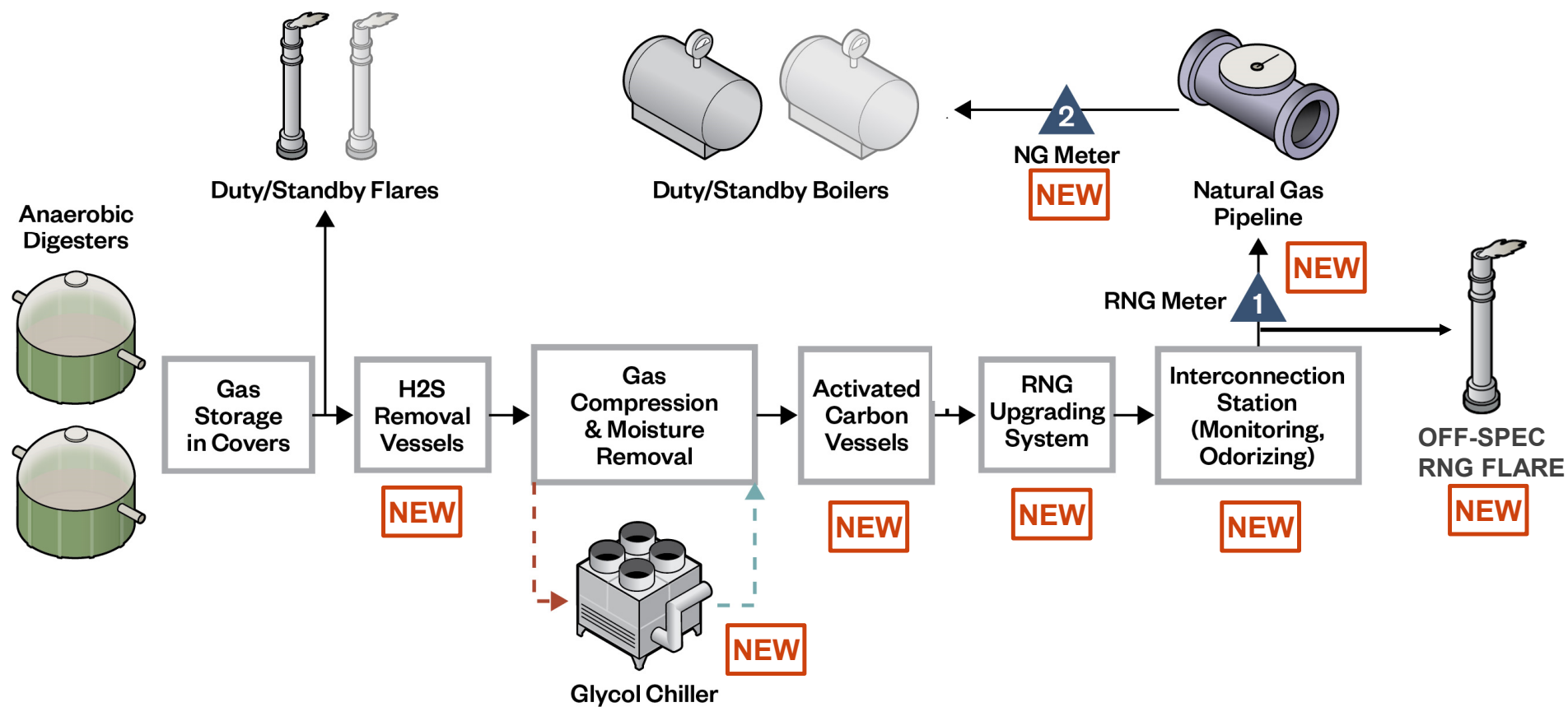


## Typical Renewable Natural Gas (RNG) Revenue Breakdown: Methane Sales and RINs



***RNG's NPV is highly sensitive to RIN prices***

## Renewable Natural Gas – Process Flow Diagram



## H<sub>2</sub>S Removal

- Media Vessels (i.e. iron sponge)
- Caustic Scrubbing
- Bio-Caustic Scrubbing
- Chemical Scrubbing
- Amine Scrubbing
- Biotrickling Filter

## Moisture Removal

- **Gas Chilling**

## Siloxane/VOC Removal

- Temperature Swing Adsorption (TSA)
- **Fixed Bed Adsorption**

## Upgrading (CO<sub>2</sub>, O<sub>2</sub>, N<sub>2</sub> Removal)

- Single- or **Multi-pass Membranes**
- Pressure Swing Adsorption (PSA)
- Water Scrubbing
- Amine Scrubbing

Previously recommended for bulk H<sub>2</sub>S removal w/ CHP. However, this introduces N<sub>2</sub> & O<sub>2</sub> into treated gas (not recommended w/ RNG).

RNG Lineup Alternatives

## RNG Upgrading Technologies (CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub> Removal)

- Solvent (Amine) Scrubbing
  - CO<sub>2</sub> dissolved into chemical solution
  - Chemical solution heated to remove CO<sub>2</sub>
  - Also effective at H<sub>2</sub>S removal
- Water Scrubbing
  - CO<sub>2</sub> dissolved into water at high pressure
  - CO<sub>2</sub> released under low pressure
- Pressure Swing Adsorption (PSA)
  - System alternates between cycles of adsorption and desorption
  - CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub> adsorbed at high pressure into media while CH<sub>4</sub> passes through
  - Depressurized to remove CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub> from media
- Membranes (Single- or Multi-pass) – ***Basis of RNG LCCA Evaluation***
  - Gas is pressurized and forced through membrane filter that acts as a sieve
  - CH<sub>4</sub> molecules pass through pores in membrane while larger molecules are discharged with tail gas



RNG Upgrading Membranes

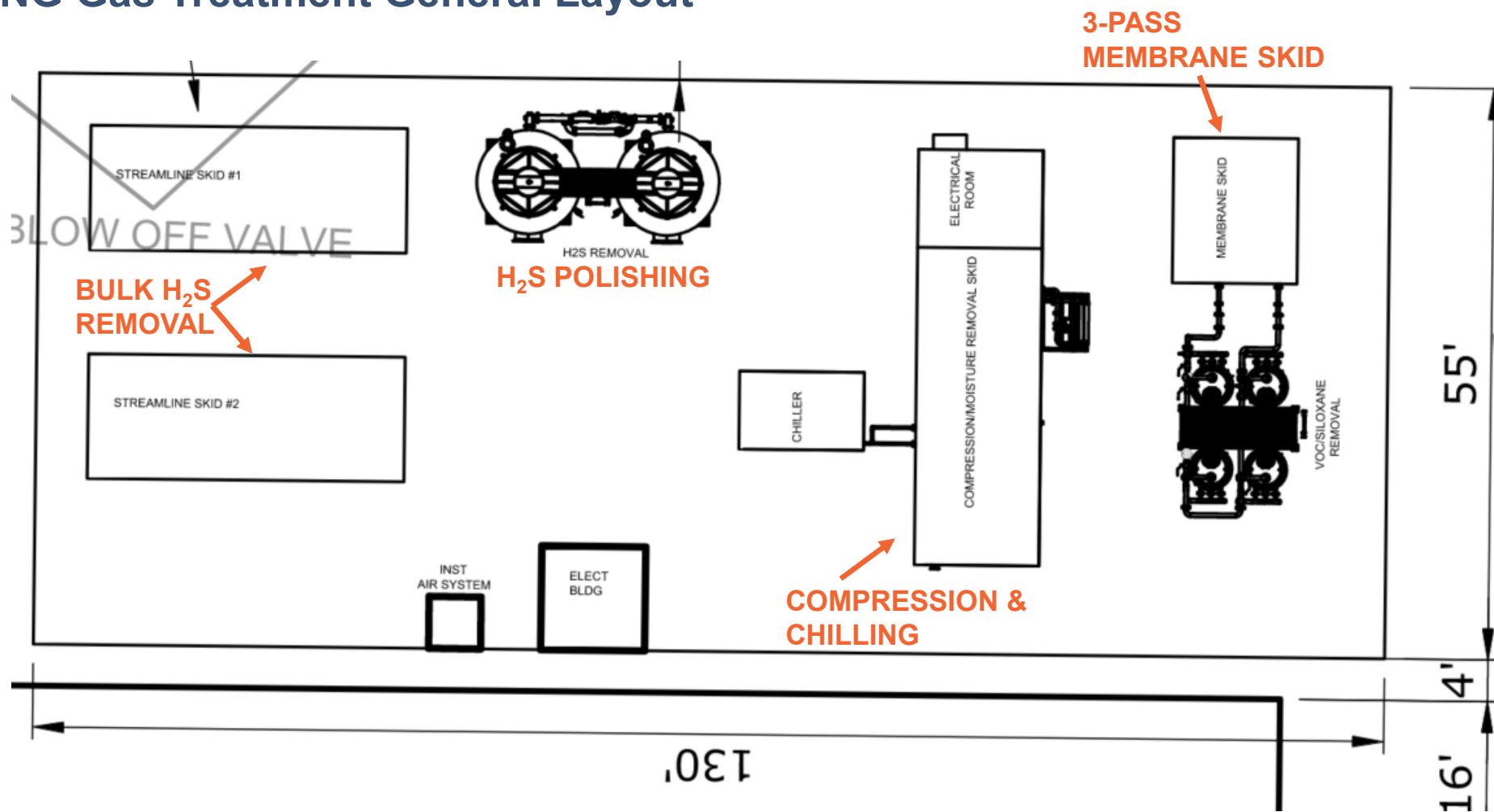


## Typical RNG Upgrading Technologies

| Technology                     | Appx. Scale (Typ.)   | Footprint                                                                           | Methane Recovery | Removes O <sub>2</sub> | Removes N <sub>2</sub> | Heat Required | Operating Pressure (Proxy for Energy Consumption) | Tail Gas Treatment Typical |
|--------------------------------|----------------------|-------------------------------------------------------------------------------------|------------------|------------------------|------------------------|---------------|---------------------------------------------------|----------------------------|
| <b>Solvent/Amine Scrubbing</b> | 1,000 to 5,000+ SCFM |    | >99%             | No                     | No                     | Yes           | 1 psig                                            | No                         |
| <b>Water Scrubbing</b>         | 50 to 3,000 SCFM     |    | 97-99%           | No                     | No                     | No            | 150 psig                                          | No                         |
| <b>PSA</b>                     | 200 to 5,000+ SCFM   |    | 96-99%           | Some                   | 60-80%                 | No            | 120 psig                                          | <i>Depends</i>             |
| <b>Single-Pass Membranes</b>   | 50 to 400 SCFM       |  | 90-95%           | Some (Up to 50%)       | Minimal                | No            | 200-250 psig                                      | Yes                        |
| <b>Triple-Pass Membranes</b>   | 200 to 5,000+ SCFM   |  | >99%             | Some (Up to 50%)       | Minimal                | No            | 200-250 psig                                      | No                         |

Note: technologies in RNG field are ever evolving. This is meant as a starting point to estimate project value. Technology should be thoroughly evaluated during preliminary design.

# RNG Gas Treatment General Layout



## TECO coordination update – two injection point options

### Option 1: Previous Injection Point

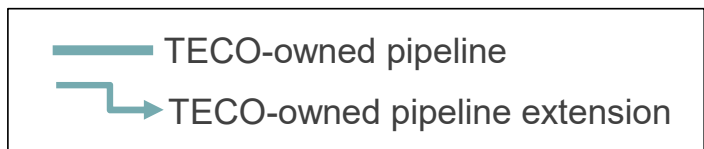
- Original injection point along Guy N Verger Blvd
- **Contract cost: \$24-36k/month**
- TECO completed their evaluation (7/2/2024) and stated that there is not enough NG flow through this segment for BTU Waiver to apply
- TECO requires **>1,000 BTU/SCF** if using this injection point
  - ~99% pure methane
- Likely would require a small amount of higher BTU fuel like propane to be blended
  - Typical DG-to-RNG systems can only achieve 985-1000 BTU/SCF because of trace amounts of residual inerts like N<sub>2</sub>, CO<sub>2</sub>, O<sub>2</sub>

### Option 2: Alternate Injection Point

- TECO could pipe RNG further upstream in system so that BTU Waiver would apply
- **Contract cost: \$60-80k/month**
  - 3 miles of 4" STL pipe through heavy residential and industrial areas
- **Only >980 BTU/SCF required** if using this injection point
- Would not require any propane blending to meet minimum heating value

**Option 2 used as basis-of-design for this evaluation to be conservative**

# Overall Site Plan



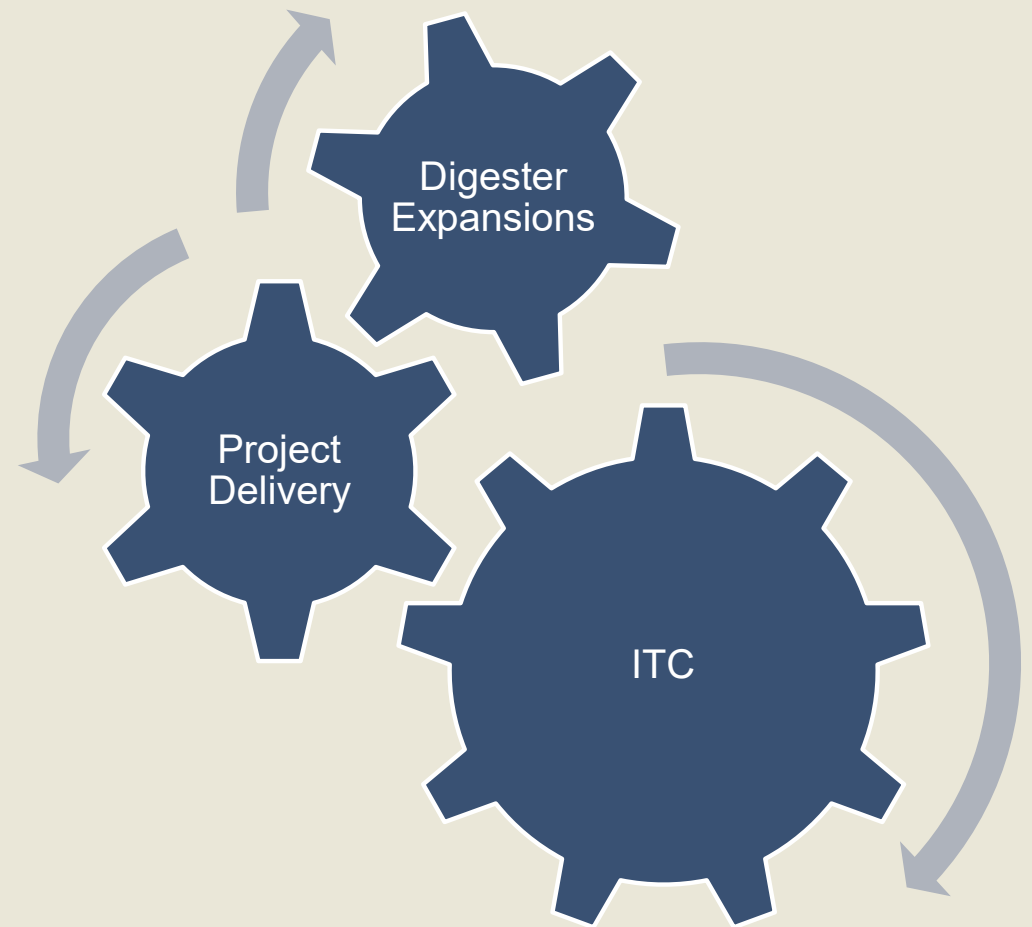
TECO INTERCONNECTION STATION

RNG FACILITY  
(GAS TREATMENT)

Note: Evaluation  
assumes higher cost  
Option 2.

PIPE ROUTING

# Federal Incentives: Investment Tax Credits (ITCs)



## Overview of Available Tax Credits

| Eligible Energy Technology                                                                                                                                           | Tax Credit Type and I.R.C. Section | Credit Structure                                             | Timeline & Milestones                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|--------------------------------------------------------------|-----------------------------------------|
| Electricity Production <ul style="list-style-type: none"> <li>• CHP, Fuel Cells</li> <li>• Solar, Wind</li> <li>• Geothermal</li> </ul>                              | §48 Energy Credit ITC              | §48: 6%-50% of Eligible Project Costs *                      | Start Construction by <b>12/31/2024</b> |
|                                                                                                                                                                      | §45 Renewable Electricity PTC      | §45: \$0.0055 - \$0.0335/kWh for 10 years *                  |                                         |
| <u>Biofuel Production</u> <ul style="list-style-type: none"> <li>• <b>Qualified Biogas Property</b></li> <li>• RNG</li> </ul>                                        | §48 Energy Credit ITC              | §48: 6%-50% of Eligible Project Costs *                      | Start Construction by <b>12/31/2024</b> |
|                                                                                                                                                                      | §45Z Clean Fuel PTC                | §45Z: \$1.12-\$5.60/MMBTU for RNG <b>sold by end of 2027</b> |                                         |
| <u>Electricity Production</u> <ul style="list-style-type: none"> <li>• Net Zero GHG Electricity Technologies (Solar, <b>heat recovery/ORC</b>, wind, etc)</li> </ul> | §48E Clean Electricity ITC         | §48E: 6%-50% of Eligible Project Costs *                     | Start Construction <b>2025-2032</b>     |
|                                                                                                                                                                      | §45Y Clean Electricity PTC         | §45Y: \$0.0055 - \$0.0335/kWh for 10 years *                 |                                         |
| GHG Reduction <ul style="list-style-type: none"> <li>• 20% GHG Reduction of an industrial facility</li> </ul>                                                        | §48C Advanced Energy Projects      | 30% of Eligible Project Costs *                              | Second competitive round opens 2024     |

\*Depending on Prevailing Wage & Apprenticeship, Domestic Contents, and Energy Community bonuses

## ITC and PTC Construction Start Timelines

|                                | 2023                | 2024 | 2025                                | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 |
|--------------------------------|---------------------|------|-------------------------------------|------|------|------|------|------|------|------|
| <b>CHP<br/>(Electricity)</b>   | 48 ITC /<br>45 PTC  |      | 48E ITC / 45Y PTC Clean Electricity |      |      |      |      |      |      |      |
| <b>RNG<br/>(BioFuels)</b>      | 48 ITC              |      |                                     |      |      |      |      |      |      |      |
|                                | 45Z Clean Fuels PTC |      |                                     |      |      |      |      |      |      |      |
| <b>Anaerobic<br/>Digestion</b> | 48 ITC              |      |                                     |      |      |      |      |      |      |      |
|                                | 48C                 |      |                                     |      |      |      |      |      |      |      |

|  |                                                 |
|--|-------------------------------------------------|
|  | Confirmed                                       |
|  | Further IRS Guidance Needed /<br>Not Guaranteed |

\*Qualified projects that are currently underway and meet the 2024 construction deadline qualifies for these credits

# How is the “Start of Construction” Established?

Construction Start Can Be Established In Two Ways

## 1 - Physical work of a significant nature

- Work performed to manufacture, construct, or produce property for use in the facility
- Includes physical work such as:
  - **Excavation for the foundation,**
  - **Pouring of concrete pads and/or foundations,**
  - **Off-site manufacture of components for energy facilities.**
  - **Other similar physical installations.**
- Excludes activities such as planning, designing, securing financing, exploring, obtaining permits, surveys, site clearing, etc.

## 2 - Safe Harbor

- Point at which “five (5) percent or more of the total cost of the facility” has been paid or incurred.
- “Total cost of the facility” is defined as “all costs properly included in the depreciable basis of the facility”
  - **Includes machinery, equipment and structures integral to the activity of the energy property.**
  - **Includes soft costs like architect and engineering fees, permits, and other expenditures that are necessary to put an energy property asset into service.**
  - **Excludes the cost of land, building or facilities that aren’t considered “integral” or “Energy Property”.**



## HFC AWTP Phase I & II Biogas and Digestion - Status

- GMP No. 3 – Digester 7 Rehab
  - **NTP 11/01/23**
  - **Digester 7 In Service 12/30/24**
  - **Final Completion of 04/29/25**
- GMP No. 4 – New Digesters
  - **NTP 10/17/24**
  - **Digester 8 In Service 05/31/27**
  - **Digester 9 in Service 06/29/27**
  - **Digester 6 in Service 01/12/29**
  - **Digester 7 Connected to new Systems 05/02/29**



✓ *Physical work of a significant nature*

## 5% Safe Harbor Test Check

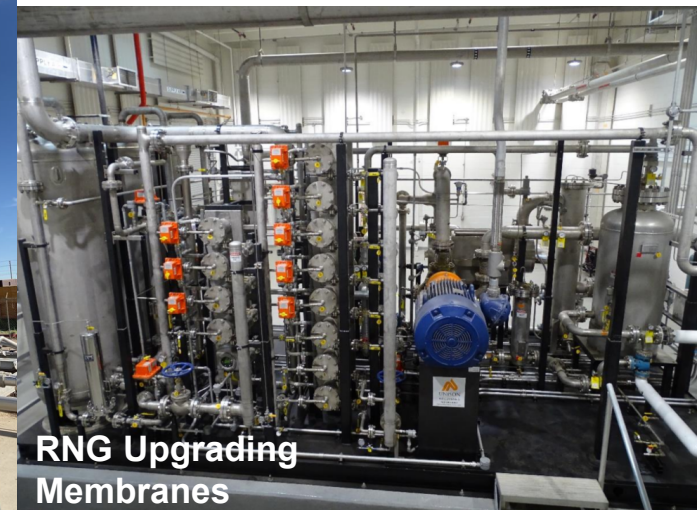
- 5% Safe Harbor met
- **Note: City should confirm with tax professional that construction insurance / bonding counts toward 5% Safe Harbor**

| Incurred Costs                              | Digestion Work                                 |
|---------------------------------------------|------------------------------------------------|
| Design Work                                 | \$1,944,000                                    |
| Engineering/GC Costs During Construction    | \$1,063,000                                    |
| Construction Insurance                      | \$4,797,000                                    |
| Physical Construction & Equipment           | \$6,784,000                                    |
| Total                                       | \$12,640,000                                   |
| <b>Percent Incurred</b>                     | <b>13% <input checked="" type="checkbox"/></b> |
| <b>Percent Incurred (if City-owned RNG)</b> | <b>10% <input checked="" type="checkbox"/></b> |

**✓ Safe Harbor**

## What is “Qualified Biogas Property”??? (Section 48)

1. Must convert biomass into a gas that is  $\geq 52\%$  methane, **OR** concentrate the gas to  $\geq 52\%$  methane
  2. Gas must be captured for **sale or productive use**
  3. Qualified biogas property includes any property which is part of such system which cleans or conditions such gas.
- A unit of Qualified Biogas Property is the full system that accomplishes the three (3) bullets above
  - Does not include non-integral property: buildings, unrelated electrical, flare, etc.



## Examples of “Qualified Biogas Property” (Partial List)

| System Component                          | Converts biomass into gas $\geq$ 52% methane | Captures such gas for sale or productive use | Energy Property    |
|-------------------------------------------|----------------------------------------------|----------------------------------------------|--------------------|
| Digester tanks                            | x                                            |                                              | Yes                |
| Digester covers                           | x                                            | x                                            | Yes                |
| Mixing system                             | x                                            |                                              | Yes                |
| Heating system                            | x                                            |                                              | Yes                |
| Sludge transfer pumps                     | x                                            |                                              | Yes                |
| Sludge piping                             | x                                            |                                              | Yes                |
| Digester gas system (storage, conveyance) |                                              | x                                            | Yes                |
| Emergency flare                           |                                              |                                              | Maybe <sup>1</sup> |
| Electrical & I&C for above systems        | x                                            | x                                            | Yes                |
| Access roads                              |                                              |                                              | Maybe <sup>2</sup> |
| Buildings, Lighting, HVAC, etc.           |                                              |                                              | No                 |
| RNG Upgrading                             | x                                            | x                                            | Yes                |

<sup>1</sup> Safety components are being considered by IRS/DOE

<sup>2</sup> On-site roads that provide access for equipment to operate and maintain the system and, therefore, its functionality ([2023-25539.pdf \(federalregister.gov\)](https://www.federalregister.gov/documents/2023/05/25/2023-25539))

## Potential Qualified Biogas Property ITC

|                                                                                    | Anaerobic Digestion | RNG          |
|------------------------------------------------------------------------------------|---------------------|--------------|
| Total Project Cost                                                                 | \$170M              | \$32M        |
| Qualified Biogas Property Costs                                                    | \$94M               | \$31M        |
| <b>30% ITC (Prevailing Wage and Apprenticeship Standard met)</b>                   |                     |              |
| 30% ITC                                                                            | \$28M               | \$9M         |
| Administrative/Compliance Costs                                                    | (\$1M)              | (\$1M)       |
| <b>Net ITC Benefit (30% ITC)</b>                                                   | <b>\$27M</b>        | <b>\$8M*</b> |
| <b>6% Base ITC (if Prevailing Wage and Apprenticeship Standard <u>not</u> met)</b> |                     |              |
| 6% ITC                                                                             | \$6M                | \$2M         |
| Administrative/Compliance Costs                                                    | (\$1M)              | (\$1M)       |
| <b>Net ITC Benefit (6% ITC)</b>                                                    | <b>\$5M</b>         | <b>\$1M*</b> |

**\*RNG ITC is only feasible if City were to own the RNG facility.**

P3 Partner could not claim the ITC for RNG facility (due to Construction-Start Deadline)

## Digester 6&7 Upgrades: 80/20 Rule Check

- Used property being reused: digesters 6 & 7 tankage & piles
- Fair Market Value of Used = (Cost to Build New) – (Accumulated Depreciation)
- Accumulated depreciation on digesters 6 & 7: \$3M per digester (ASSUMED)
- Physical Construction of Significant Nature already started on Digester No. 7 (11/1/2023)
- **Note: fair market value of used property and 80/20 eligibility should be confirmed with tax professional to confirm eligibility**

|                                                        |               |                                                    |
|--------------------------------------------------------|---------------|----------------------------------------------------|
| Value of Used Property (Digesters 6&7 Tankage)         | \$11,644,000  |                                                    |
| Final Value of Biogas Property (Digesters 6-9) w/o RNG | \$105,644,000 |                                                    |
| Percent of Value from Used Property                    | 11%           | <input checked="" type="checkbox"/> 80/20 Rule Met |
| Final Value of Biogas Property (Digesters 6-9) w/ RNG  | \$136,943,000 |                                                    |
| Percent of Value from Used Property                    | 9%            | <input checked="" type="checkbox"/> 80/20 Rule Met |



# Critical ITC Requirements to Consider

## AD and RNG

1. Meet construction start deadline
2. Max duration limits
  1. Automatically four (4) years
  2. If longer than four (4) years, must maintain a continuous program of construction
3. RNG system ownership considerations:
  1. 3<sup>rd</sup> party ownership – RNG must be completed and operational by the end of the digester project (Aug 2029)
  2. City ownership – must demonstrate continuous program of construction
4. Must have beneficial use of DG

## ITC Prevailing Wages and Apprenticeships (PWA) Requirement

- Base credit is 6% of total project cost of qualified property
- PWA is a 5x multiplier (i.e. 30% ITC)
- PWA requirements applies to any work completed after Jan 29, 2023 and for any construction/alteration/repairs for five years after system is in-service
- “Cure Provisions”:
  - Must back-pay workers the difference in wages & pay additional penalty to IRS (\$5k/worker/year)
  - \$50 multiplied by the total labor hours for which the apprenticeship requirements were not met. The amount of the penalty with respect to the apprenticeship requirements is also increased to \$500 per labor hour if the IRS determines the failure was due to intentional disregard.
  - Note: there is a waiver for the penalty payments on work completed between January 29, 2023 and June 25, 2024
- [IRS Releases Final Energy Property Regulations Under Section 48 Investment Tax Credit | Insights | Mayer Brown](#)
- [Frequently asked questions about the prevailing wage and apprenticeship under the Inflation Reduction Act | Internal Revenue Service](#)



# Financial Analysis

## Lifecycle Net Present Value Results – City-Owned RNG Facility (20Yr NPV)

|                                           | Low Market            | Base Market           | High Market    |
|-------------------------------------------|-----------------------|-----------------------|----------------|
| 20-Year Debt Service                      | (\$47,500,000)        | <b>(\$47,500,000)</b> | (\$47,500,000) |
| 20-Year Interconnection Agreement         | (\$16,800,000)        | (\$16,800,000)        | (\$16,800,000) |
| 20-Year O&M                               | (\$65,200,000)        | <b>(\$65,400,000)</b> | (\$67,200,000) |
| 20-Year Revenue                           | \$103,200,000         | <b>\$128,700,000</b>  | \$156,200,000  |
| <b>20-Year Net Present Value w/o ITCs</b> | <b>(\$26,300,000)</b> | <b>(\$1,000,000)</b>  | \$24,700,000   |
| 6% AD ITC                                 | \$5,000,000           | <b>\$5,000,000</b>    | \$5,000,000    |
| 6% RNG ITC                                | \$1,000,000           | <b>\$1,000,000</b>    | \$1,000,000    |
| <b>NPV w/ ITCs</b>                        | <b>(\$20,300,000)</b> | \$5,000,000           | \$30,700,000   |

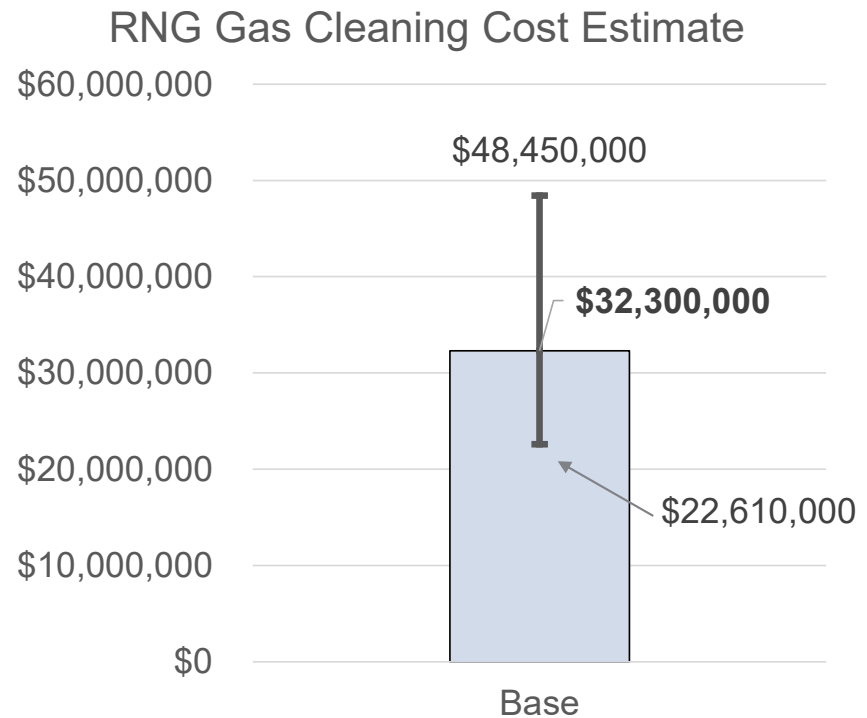
### Assumptions:

- 0% discount rate (i.e. nominal totals)
- 4% interest rate
- City-owned RNG system with contracted O&M
- \$70k/month TECO interconnection cost
- Assumes 6% ITC obtained

## RNG Cost Estimate

### Notes:

- Cost estimate based on Q2 2024 market conditions
- Class 4 Estimate (-30% / +50%)
- 20% contingency included
- Does not include TECO interconnection cost



# RNG Cost Estimate (Detailed)

| Description                             | Cost                    |
|-----------------------------------------|-------------------------|
| General Conditions                      | \$ 2,810,000.00         |
| Cost of Construction                    | \$ 18,731,000.00        |
| Field Management                        | \$ 2,007,000.00         |
| Site & Civil                            | \$ 3,281,000.00         |
| Demolition                              | \$ 400,000.00           |
| Truck Loading Demolition                | \$ 250,000.00           |
| Sludge Drying Bed Modification          | \$ 150,000.00           |
| Site Work                               | \$ 42,000.00            |
| Earthwork                               | \$ 42,000.00            |
| Stormwater System (Applied Sciences)    | \$ 250,000.00           |
| Facility Access                         | \$ 150,000.00           |
| Sod                                     | \$ 20,000.00            |
| Sidewalks                               | \$ 24,000.00            |
| Electrical Ductbanks                    | \$ 250,000.00           |
| Yard Piping                             | \$ 2,145,000.00         |
| From Gas Upgrading to TECO Interconnect | \$ 1,925,000.00         |
| Misc Work and Restoration               | \$ 60,000.00            |
| Water Supply                            | \$ 160,000.00           |
| Electrical Building                     | \$ 1,486,000.00         |
| Concrete                                | \$ 24,000.00            |
| Special Construction                    | \$ 92,000.00            |
| Heating Ventilating and Air Condition   | \$ 95,000.00            |
| Process Interconnections                | \$ 375,000.00           |
| Instrumentation & Controls              | \$ 375,000.00           |
| Electrical                              | \$ 900,000.00           |
| RNG Treatment Facilities                | \$ 11,957,000.00        |
| Earthwork                               | \$ 616,000.00           |
| Fine Grade                              | \$ 42,000.00            |
| Termite Treatment                       | \$ 3,000.00             |
| Pile Installation                       | \$ 461,000.00           |
| Pile Mobilization                       | \$ 50,000.00            |
| PDA Testing                             | \$ 60,000.00            |
| Concrete                                | \$ 1,123,000.00         |
| Electrical                              | \$ 500,000.00           |
| Process Interconnections                | \$ 1,500,000.00         |
| Process Gas and Liquid Equipment        | \$ 8,218,000.00         |
| Biogas Upgrading System - Unison        | \$ 4,656,000.00         |
| Installation                            | \$ 200,000.00           |
| Bulk H2S Removal - Streamline           | \$ 2,062,000.00         |
| Installation                            | \$ 100,000.00           |
| Waste Gas Burner - Varec                | \$ 1,000,000.00         |
| Installation                            | \$ 50,000.00            |
| Gas Control and Safety                  | \$ 150,000.00           |
| Firm's Contingency (20%)                | \$ 4,308,000.00         |
| Design-Build Fee (7%)                   | \$ 1,809,000.00         |
| Owner's Contingency (10%)               | \$ 2,766,000.00         |
| Allowances                              | \$ 50,000.00            |
| Bonds & Insurance (6%)                  | \$ 1,828,000.00         |
| <b>Total</b>                            | <b>\$ 32,302,000.00</b> |

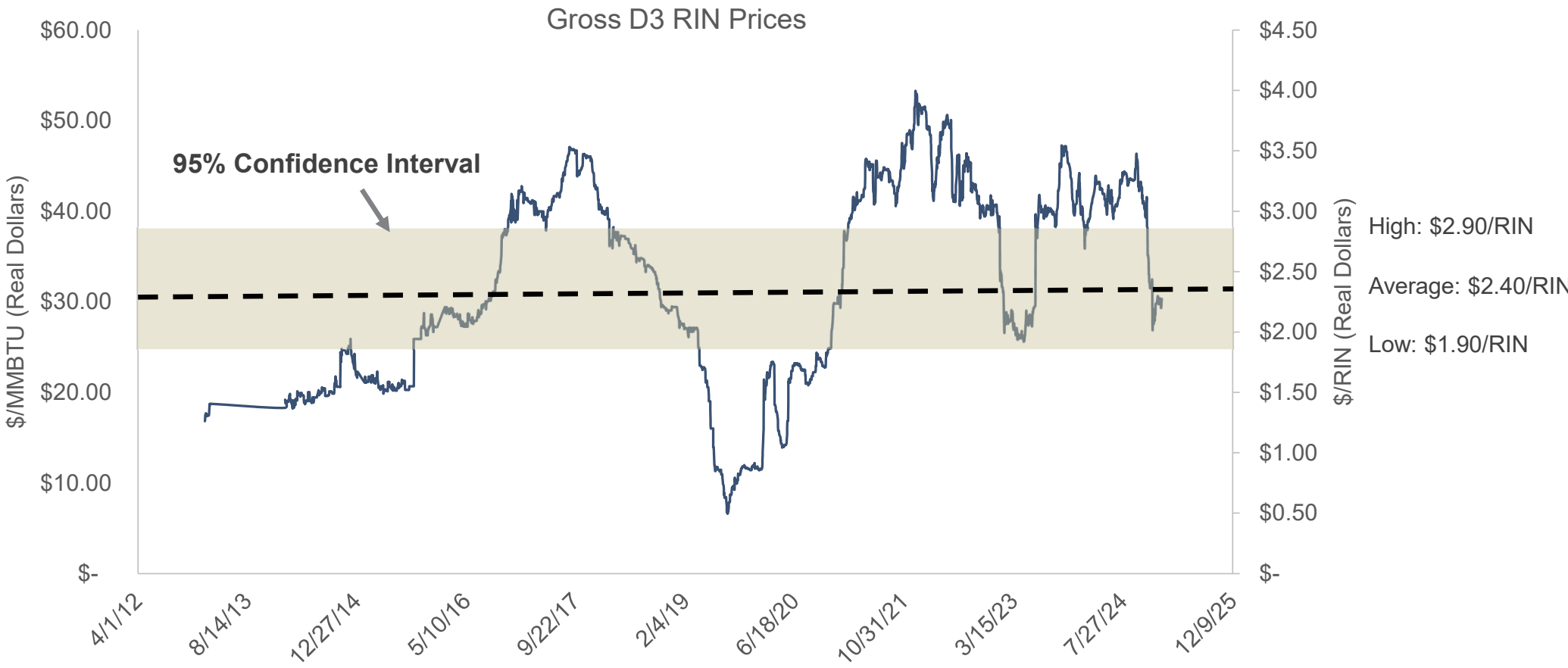
## RNG O&M Breakdown

Electricity consumption of RNG system calculated separately

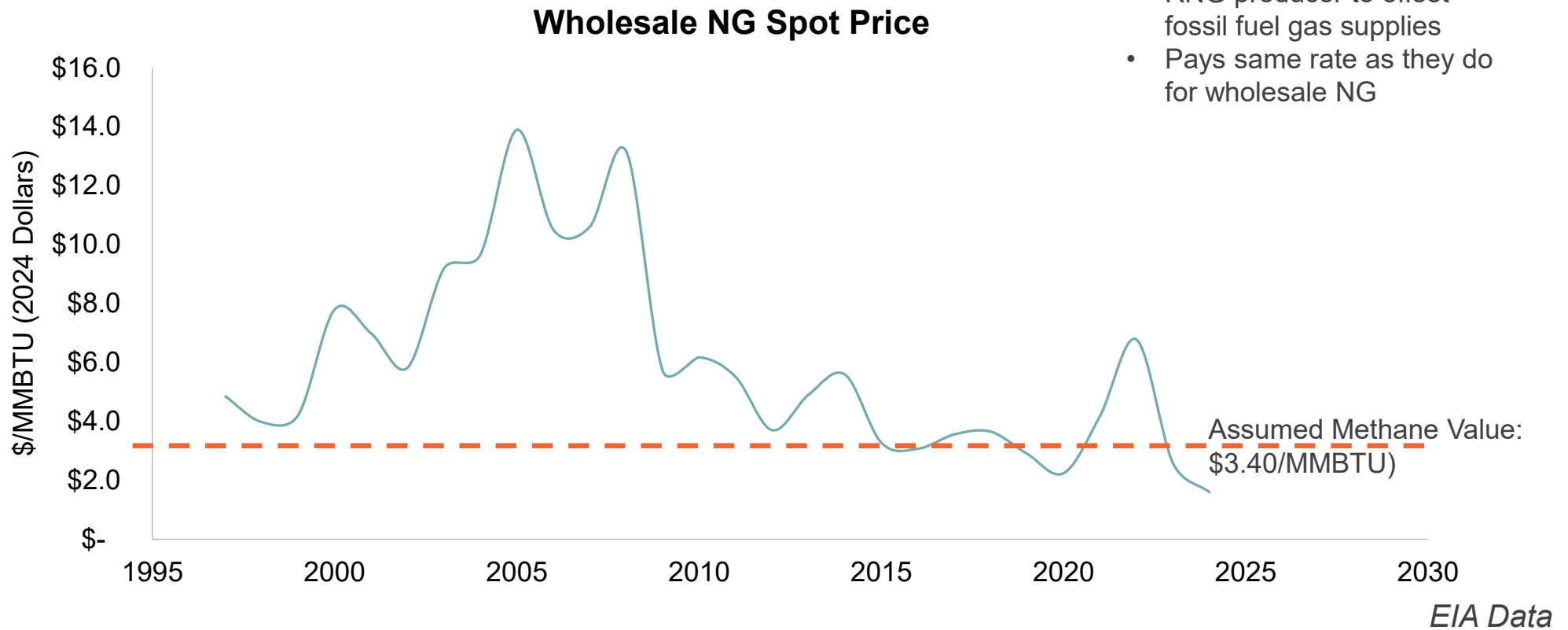
**Assuming contracted O&M**

| O&M Item                                                                    | Annual Cost (\$/Yr) |
|-----------------------------------------------------------------------------|---------------------|
| Labor                                                                       |                     |
| 3 FTE Operators                                                             | \$450,000           |
| Service & Maintenance Technical Support                                     | \$97,000            |
| Bulk H <sub>2</sub> S Removal                                               |                     |
| Process Chemistry                                                           | \$329,000           |
| H <sub>2</sub> S & Reduced Sulfur Compounds Polishing                       |                     |
| H <sub>2</sub> S Removal Media                                              | \$11,000            |
| Media Changeout                                                             | \$4,000             |
| Siloxanes & VOCs Removal                                                    |                     |
| Activated Carbon Media                                                      | \$299,000           |
| Media Changeout                                                             | \$23,000            |
| Miscellaneous                                                               |                     |
| Misc. Parts & Maintenance                                                   | \$60,000            |
| Gas Testing                                                                 | \$10,000            |
| Total, \$/yr                                                                | \$1,279,000         |
| <b>Total w/ 40% Contingency for Contracted O&amp;M Profit and OH, \$/yr</b> | <b>\$1,791,000</b>  |

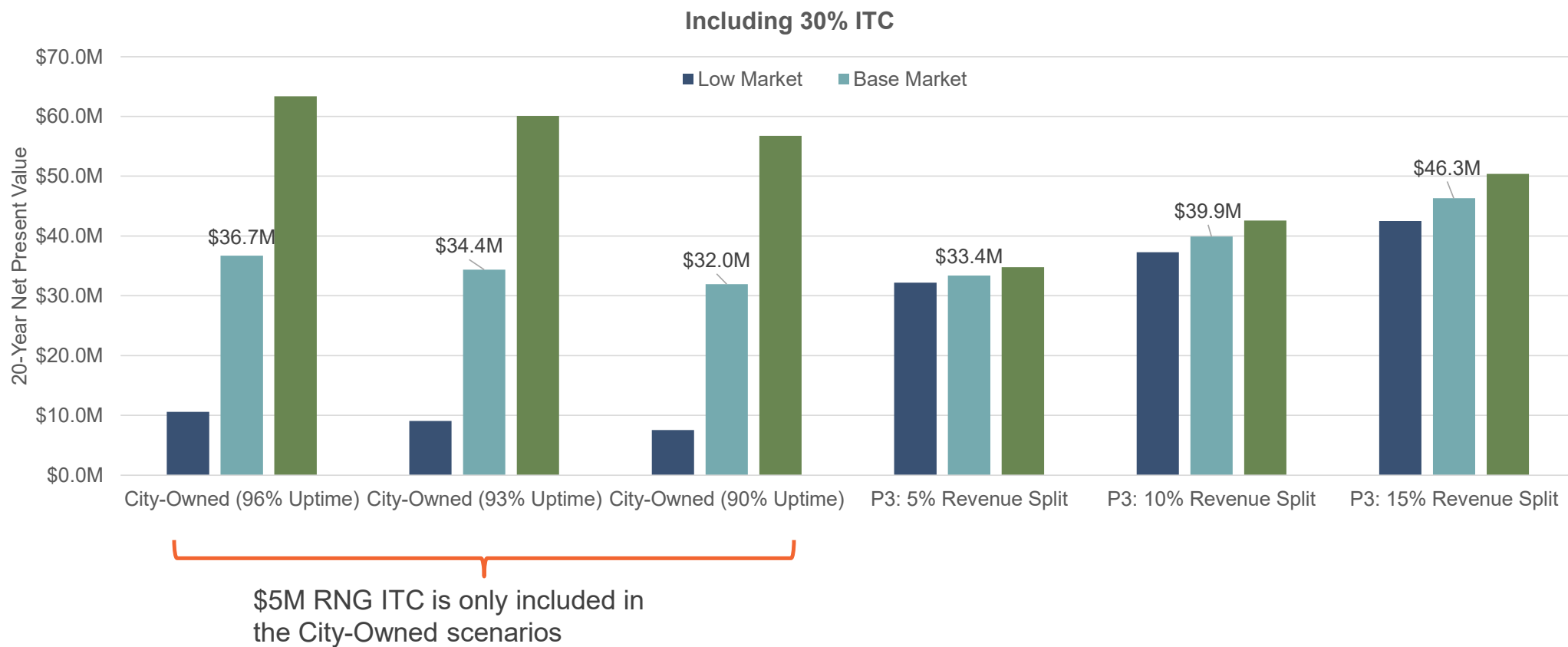
# Revenue – D3 RINs



## Revenue – Methane Sales to TECO



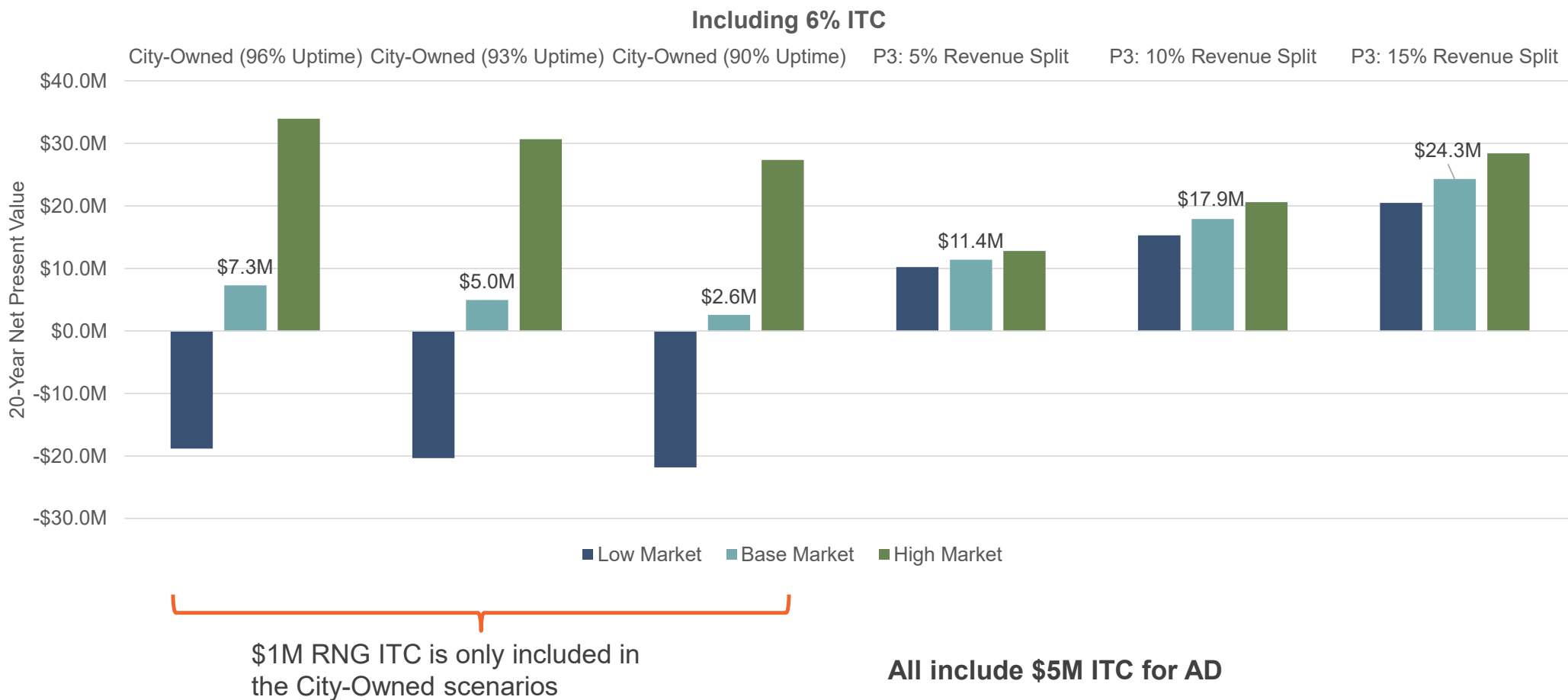
## Preliminary P3 Comparison – Including 30% ITCs



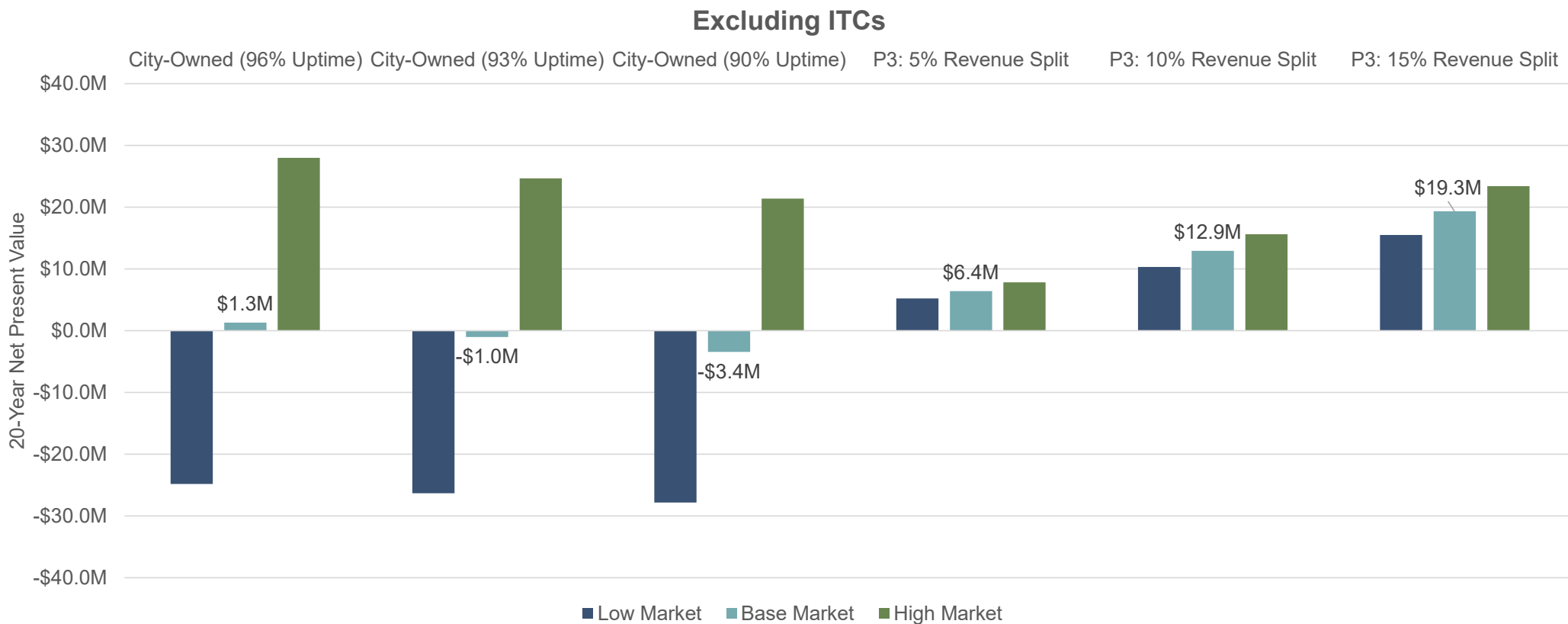
All include \$27M ITC for AD



## Preliminary P3 Comparison – Including 6% ITCs



## Preliminary P3 Comparison – Without Any ITCs



**City-owned RNG project may not produce a positive 20-year NPV if the ITC for digester work isn't obtained.**

# **Public-Private-Partnership (P3)**

## **Risks, Costs, Benefits**

## P3 Partnerships Have Many Forms

### Private Operations and Maintenance

- Private party O&M only
- Facility financed, built and owned by public utility

### Design Build Operate Maintain (DBOM)

- Private party designs, builds operates and maintains facility
- Financed and owned by public utility

### Design, Build Finance, Own, Operate and Maintain (DBFOOM) (P3)

- Private party has full project delivery, operations and maintenance responsibility
- Public utility has no financial, operational and maintenance responsibilities

### Key Considerations

- Risk vs reward appetite
- Capital dollars availability and allocation
- O&M responsibilities
- Availability of resources
  - Specialty skills – RIN management
- Time sensitivity and urgency

## Considerations Before Pursuing a P3 Partnership

### Understand True Value and Risks

- Revenue and Return on Investment
- O&M/Performance Risks
- Capital at Risk
- Market Volatility
- Reliance on FOG/HSW codigestion to meet financial objectives

### Regulatory Landscape & Trends

- Evolving markets & pathways (i.e. eRIN Pathway)
- Funding Opportunities
- Evolving Regulations (PFAS, emissions, organics recycling, etc.)

### Alignment With Biosolids Long Term Plan

- Future Biosolids Processing (i.e. dryers, gasification, etc.)
- Co-digestion Process Impacts
- Impacts from Biosolids Hauling/Disposal Costs

### Know the “Pitfalls”

- Unrealistic Proposals
- Equitable Allocation of Revenue and Risk
- Unclear Roles and Responsibilities
- Transparency and “Off Ramps” During Development

***“Stack the deck in your favor”***

# Florida Laws Governing P3 Contracts

## [Section 255.065 of the Florida Statutes](#)

- A public entity may partner with a private entity to develop a project that serves a public purpose. A wastewater facility or related infrastructure is specifically defined as a qualifying project. The intent of the Florida law is to expedite cost-effective projects, encourage private financing of public facilities, and provide flexibility to public and private entities contracting for the provision of public services.
- A public entity may receive unsolicited proposals, or may solicit proposals, through a process defined in Section 255.065 of the Florida Statutes.
- Either the public entity or private entity may finance the project. As of July 1, 2024, the private entity may own the project if there are public benefits apart from ownership. The private entity must develop or operate and maintain the project, or reimburse the public entity for maintenance of the project or other services provided to the private entity. The comprehensive agreement must set forth the manner in which any revenue is applied and the negotiated portion of the revenue returned to the public entity.
- P3 comprehensive agreements must have safeguards in place to 1) prevent additional costs or service disruptions if the public entity terminates the agreement, and 2) allow the public or private entity to add capacity to the project.

## Typical Division of Responsibilities for RNG Under a DBFOOM P3 Contract

| Private Partner                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Public Utility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• Design, Construct and Own</li><li>• Operate and Maintain</li><li>• Permitting, Approvals</li><li>• Property Agreements, Easements</li><li>• Raw Gas Supply &amp; Quality Monitoring</li><li>• Minimum System Performance Guarantee</li><li>• Gas Environmental Attribute &amp; Commodity Marketing</li><li>• Management and Disposal of Gas Processing Wastes, Condensate</li><li>• Environmental Remediation</li></ul> | <ul style="list-style-type: none"><li>• Own, operate and maintain raw biogas conveyance infrastructure to RNG facility.</li><li>• Operate digesters in accordance with best industry practices.</li><li>• Provide accurate biogas production data during project development phase.<ul style="list-style-type: none"><li>• <b>Gas characteristics, production and variation limits.</b></li></ul></li><li>• Maintain open lines of communication with P3 entity on near term conditions or potential plant changes that may impact biogas supply.</li><li>• Provide site space and access for RNG facility.</li><li>• Maintain a safe working environment for P3 staff.</li></ul> |

## Feedback from Wastewater Utilities on RNG Project Delivery

- Colorado Springs Utilities (CSU)
  - CSU has been pursuing RNG for the past 6 years. CSU considered P3 project delivery of RNG to mitigate risk and provide financing, however, only one P3 proposal received (from ALPRO consortium made up of Alder Constructors and Aqua Engineers out of Salt Lake City)
  - CSU then decided to Design-Build the RNG project instead because CSU wants full control of project and is concerned that a P3 would take most of the RNG profits. The RNG project is at 60% design but was put on hold in 2023 due to concerns about the project cost.
- Middlesex County Utilities Authority (MCUA)
  - PSE&G (Public Service Energy and Gas) approached MCUA to enter into a P3 to capitalize and deliver an RNG project to meet their decarbonization goals.
  - MCUA and PSE&G entered into a preliminary financial agreement through a MOU with a 30/70 revenue split (30% of the revenue to MCUA). MCUA has since decided to self perform RNG because PSE&G needed to delay the project by two years to get funding from rate payers. The project is now in 30% design through Design-Bid-Build.
- South Platte Renew (SPR)
  - SPR considered P3 project delivery but preferred to maximize RNG revenue by self-owning and operating their RNG system (two stage Unison membrane). The RNG system was commissioned in October 2019 and was fully operational in March 2020. Full payback of the system is anticipated by Spring 2025.
  - An O&M contract was considered but SPR preferred that their own staff be available 24/7 to troubleshoot issues. Staff had some O&M difficulties at first (RTO issues, not enough airflow and overheating of compressor Conex box) but resolved them by switching RTO maintenance service providers and establishing SOPs, including preventative maintenance during the summer.
- City of Phoenix 91st Avenue WWTP
  - The 91st Avenue WWTP is co-owned by five municipalities who were not interested in capitalizing an RNG system, so they signed a P3 contract with Ameresco. Ameresco pays the municipalities for the raw biogas (fee varies if the gas is off-spec), a negotiated percentage of the RNG revenue and a leasing fee for the land.
  - Lesson-learned: calculations of the RNG revenue due to the municipalities is complicated and requires more staff time than anticipated to audit. It is recommended that electricity, potable water, and other utilities are serviced and billed directly to the P3 rather than through the WWTP. However, the City of Phoenix is otherwise satisfied with Ameresco's P3 delivery and risk versus reward of the RNG project.



## Typical RNG Project Development Steps for P3 Delivery

- |                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>Initial Feasibility</b><br><i>Understand the project value and risks</i>   | <ul style="list-style-type: none"><li>• Overall feasibility evaluation (understand value, risks &amp; <u>delivery alternatives</u>)</li><li>• Initial pipeline interconnection evaluation</li><li>• Alignment with long term biosolids strategies</li><li>• Life Cycle Cost Assessment (<b>Completed</b>)</li></ul>                                                                                                                                                                                                           |
|  <b>Preliminary Engineering</b><br><i>Basis for RFP</i>                        | <ul style="list-style-type: none"><li>• 10-20% design development for PPP proposals</li><li>• Layout, major equipment, design criteria, cost, etc.</li><li>• RNG interconnection coordination with gas company (conditioning, volume, offtake monitoring)</li><li>• <b>(4-8 months)</b></li></ul>                                                                                                                                                                                                                             |
|  <b>RFQ/RFP – PPP</b><br><i>solicitation and selection</i>                     | <ul style="list-style-type: none"><li>• Define operating conditions – gas production, co-digestion limitations, gas storage, performance requirements, roles and responsibilities, etc.</li><li>• Agreement parameters – i.e. Ownership, roles and responsibilities, O&amp;M requirements</li><li>• Provide 10-20% design documents if RFP includes a binding financial proposal</li><li>• Experience, internal capabilities, financial stability, RNG ownership history, references</li><li>• <b>(6-12 months)</b></li></ul> |
|  <b>Memo of Understanding</b><br><i>Document project needs and intentions</i> | <ul style="list-style-type: none"><li>• Document initial negotiations and what makes a successful project</li><li>• Develop and integrate “<b>off ramps</b>” as possible</li><li>• Define performance metrics</li><li>• <b>(2-3 months)</b></li></ul>                                                                                                                                                                                                                                                                         |
|  <b>Final Agreement</b><br><i>Expansion of the MOU</i>                       | <ul style="list-style-type: none"><li>• Expand the MOU</li><li>• Project cost and profit sharing framework</li><li>• Finalize roles and responsibilities, address cost runs, build in specific check points</li><li>• <b>Define all off ramps. (4-8 months)</b></li></ul>                                                                                                                                                                                                                                                     |

## Recommended Next Steps

- **Proceed with the RNG preliminary design and P3 RFP development**
  - Proceed with P3 RNG but select RNG P3 partner carefully
  - Note that ITC funding is at risk if RNG project not delivered in the appropriate time frame.
- Confirm biogas production and biogas quality through additional testing
- Confirm the location, minimum gas quality and other requirements associated with the TECO Peoples Gas natural gas pipeline interconnection
- Note that the evaluations show P3 project would be beneficial under all scenarios analyzed, even worst-case conditions. Positive factors, like ITCs or better market conditions, would further improve the financial value from a P3 RNG project.

# Additional References (ITC)

## How to Obtain These ITC Credits

### Section 48 Example

**Pre-filing Registration - Portal opened Dec 22, 2023 (Publication 5884 (irs.gov))**

**Pre-filing Registration should be completed as soon as possible after system is in service.**

**IRS recommends completing pre-filing at least 120 days prior to when they file taxes and paperwork to claim the ITC.**

**Summary Report is required as supporting documentation**

**IRS will review and provide a registration number**

#### **Filing will require**

- Tax paperwork (tax professional)
- Technical report with detailed description of the facility and justification of integral parts
- Cost segregation study which is an accounting of the basis for the facility (tax professional)

## PWA Recordkeeping

- [Q5. What recordkeeping requirements apply with respect to the IRA prevailing wage and apprenticeship requirements? \(added August 29, 2023\)](#)
- A5. Taxpayers are required to maintain and preserve sufficient records to establish compliance with the requirement that all laborers and mechanics (including those of contractors and subcontractors) were paid wages at rates not less than the applicable prevailing rates. These records include payroll records that reflect the hours worked in each classification and the actual wages and fringe benefits paid to each laborer and mechanic performing construction, alteration, or repair work on the facility. Taxpayers are also required to maintain records of any correction payments made to any laborer or mechanic.
- Taxpayers are also required to maintain and preserve records to establish compliance with the apprenticeship requirements. These records include copies of any written requests for apprentices by the taxpayer (or contractor or subcontractor), any agreement entered by the taxpayer (or contractor or subcontractor) with a registered apprenticeship program, documents reflecting any registered apprenticeship program sponsored by the taxpayer (or contractor or subcontractor), documents verifying participation in a registered apprenticeship program by each apprentice, records reflecting the required ratio of apprentices to journeyworkers prescribed by each registered apprenticeship program from which qualified apprentices are employed, records reflecting the daily ratio of apprentices to journeyworkers, and the payroll records for any work performed by apprentices.

# Tax Paperwork and Forms

- Requires completion of IRS tax forms
- Must be completed by client's tax professional with support from client's engineering consultants

|                                                                  |                             |                                                     |                                |
|------------------------------------------------------------------|-----------------------------|-----------------------------------------------------|--------------------------------|
| (30C) Alternative Fuel Refueling Property Credit                 | Form 8911                   | (45) Renewable Electricity Production Credit        | Form 8835                      |
| (45Q) Carbon Oxide Sequestration Credit                          | Form 8933                   | (45U) Zero Emission Nuclear Power Production Credit | Form 7213                      |
| (45V) Clean Hydrogen Production Credit                           | Form 7210                   | (45W) Qualified Commercial Clean Vehicles Credit    | Form 8936<br>Form 8936 (Sch A) |
| (45Z) Clean Fuel Production Credit                               | Form 8835 (future revision) |                                                     |                                |
| (45X) Advanced Manufacturing Production Credit                   | Form 7207                   | (45Y) Clean Electricity Production Credit           | Form 7211 (pending)            |
| (48) Energy Credit                                               |                             |                                                     |                                |
| (48C) Qualifying Advanced Energy Project Credit                  |                             |                                                     |                                |
| (48E) Clean Electricity Investment Credit (future form revision) |                             |                                                     |                                |
| (48D (CHIPS)) Advanced Manufacturing Investment Credit           |                             |                                                     | Form 3468                      |

|                                                                                                                                                                                                                                                                                                                                                                                             |  |                                                                                                                                                                             |                    |                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------------------|
| <b>Form 3468</b><br>Department of the Treasury<br>Internal Revenue Service<br>Name(s) shown on return                                                                                                                                                                                                                                                                                       |  | <b>Investment Credit</b><br>Attach to your tax return.<br>Go to <a href="http://www.irs.gov/Form3468">www.irs.gov/Form3468</a> for instructions and the latest information. |                    | OMB No. 1545-0155<br><b>2022</b><br>Attachment Sequence No. 174 |
| <b>Part I Information Regarding the Election To Treat the Lessee as the Purchaser of Investment Credit Property</b><br>If you are claiming the investment credit as a lessee based on a section 48(d) (as in effect on November 4, 1990) election, provide the following information. If you acquired more than one property as a lessee, attach a statement showing the information below. |  |                                                                                                                                                                             | Identifying number |                                                                 |
| 1 Name of lessor: _____<br>2 Address of lessor: _____<br>3 Description of property: _____<br>4 Amount for which you were treated as having acquired the property . . . . . \$ _____                                                                                                                                                                                                         |  |                                                                                                                                                                             |                    |                                                                 |
| <b>Part II Qualifying Advanced Coal Project Credit, Qualifying Gasification Project Credit, Qualifying Advanced Energy Project Credit, and Advanced Manufacturing Investment Credit</b>                                                                                                                                                                                                     |  |                                                                                                                                                                             |                    |                                                                 |
| 5 Qualifying advanced coal project credit (see instructions):                                                                                                                                                                                                                                                                                                                               |  |                                                                                                                                                                             |                    |                                                                 |
| a Qualified investment in integrated gasification combined cycle property placed in service during the tax year for projects described in section 48A(d)(3)(B)(i) . . . .                                                                                                                                                                                                                   |  | \$ _____ × 20% (0.20)                                                                                                                                                       | 5a                 |                                                                 |
| b Qualified investment in advanced coal-generation technology property placed in service during the tax year for projects described in section 48A(d)(3)(B)(ii) . . . .                                                                                                                                                                                                                     |  | \$ _____ × 15% (0.15)                                                                                                                                                       | 5b                 |                                                                 |
| c Qualified investment in advanced coal-generation technology property placed in service during the tax year for projects described in section 48A(d)(3)(B)(iii) . . . .                                                                                                                                                                                                                    |  | \$ _____ × 30% (0.30)                                                                                                                                                       | 5c                 |                                                                 |
|                                                                                                                                                                                                                                                                                                                                                                                             |  |                                                                                                                                                                             | 5d                 |                                                                 |
| Qualifying gasification or advanced energy project credit (see instructions):                                                                                                                                                                                                                                                                                                               |  |                                                                                                                                                                             |                    |                                                                 |
| d Investment in property placed in service during the tax year (a) of advanced project property or (b) of qualified ion property for which credits located or reallocated after October 1, 2002, and that includes equipment that sequesters at least 75% of project's carbon dioxide emissions . . . .                                                                                     |  | \$ _____ × 30% (0.30)                                                                                                                                                       | 6a                 |                                                                 |
| e Investment in property other than described in (d) placed in service during the tax year . . . . .                                                                                                                                                                                                                                                                                        |  | \$ _____ × 20% (0.20)                                                                                                                                                       | 6b                 |                                                                 |
|                                                                                                                                                                                                                                                                                                                                                                                             |  |                                                                                                                                                                             | 6c                 |                                                                 |
| Advanced manufacturing investment credit (see instructions):                                                                                                                                                                                                                                                                                                                                |  |                                                                                                                                                                             |                    |                                                                 |
| f Qualified property as part of an advanced manufacturing project placed in service during the tax year and after 2022, the production of which began after August 9, 2022 . . . . .                                                                                                                                                                                                        |  | \$ _____ × 25% (0.25)                                                                                                                                                       | 7                  |                                                                 |
| g Investment in property placed in service during the tax year for which credits located or reallocated after October 1, 2002, and that includes equipment that sequesters at least 75% of project's carbon dioxide emissions . . . .                                                                                                                                                       |  |                                                                                                                                                                             | 8                  |                                                                 |
| h Investment in property placed in service during the tax year for which credits located or reallocated after October 1, 2002, and that includes equipment that sequesters at least 75% of project's carbon dioxide emissions . . . .                                                                                                                                                       |  |                                                                                                                                                                             | 9                  |                                                                 |
| i Investment in property placed in service during the tax year for which credits located or reallocated after October 1, 2002, and that includes equipment that sequesters at least 75% of project's carbon dioxide emissions . . . .                                                                                                                                                       |  |                                                                                                                                                                             | 10                 |                                                                 |
| Reduction Act Notice, see separate instructions.                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                             |                    |                                                                 |
|                                                                                                                                                                                                                                                                                                                                                                                             |  |                                                                                                                                                                             | Cat. No. 12276E    | Form 3468 (2022)                                                |

## Itemized Cost Segregation Study (48 and 48E ITC)

- Itemized project costs required and reviewed by the IRS.
- Needed to determine what costs qualify for the ITC
- Coordinate bookkeeping requirements with contractor.

| New ID  | New Description                                                    | Total           | Previous        | This Period  | % To date | TTD          | Notes                 |
|---------|--------------------------------------------------------------------|-----------------|-----------------|--------------|-----------|--------------|-----------------------|
| 96680   | P&D Basic Electrical Materials (26 05 02-33)                       | \$ 6,821,978.00 | \$ 6,821,978.00 | \$ -         | 100%      | \$ 6,821,978 |                       |
| 96960   | P&D Glass-Lined DI Pipe (40 27 00.01)                              | \$ 3,097,272.00 | \$ 3,097,272.00 | \$ -         | 100%      | \$ 3,097,272 |                       |
| 96980   | P&D Stainless Steel Pipe (40 27 00.09)                             | \$ 150,000.00   | \$ 150,000.00   | \$ -         | 100%      | \$ 150,000   |                       |
| 97160   | P&D Odor Control Biofilter Equip. (44 31 33)                       | \$ 265,391.00   | \$ 265,391.00   | \$ -         | 100%      | \$ 265,391   |                       |
| 97280   | P&D Centrifugal Chopper Pumps (44 42 56.09)                        | \$ 50,812.00    | \$ 47,763.00    | \$ -         | 94%       | \$ 47,763    |                       |
| 97330   | P&D Pump Mixing Systems (44 42 80)                                 | \$ 431,726.00   | \$ 194,277.00   | \$ -         | 45%       | \$ 194,277   |                       |
| 97370   | P&D Digester Gas Safety Equip (44 46 20)                           | \$ 210,741.00   | \$ 208,634.00   | \$ -         | 99%       | \$ 208,634   |                       |
| 97380   | P&D Sludge Heat Exchanger (44 46 21)                               | \$ 95,669.00    | \$ 95,669.00    | \$ -         | 100%      | \$ 95,669    |                       |
| 03-1660 | ST70/Z8 - Excavate/Install/Test/Backfill 4" PS (124')              | \$ 34,863.00    | \$ 27,890.00    | \$ -         | 80%       | \$ 27,890    | ST22 to ST70          |
| 03-1670 | ST72/Z8 - Excavate/Install/Test/Backfill 1" 1W (106')              | \$ 34,863.00    | \$ 34,863.00    | \$ -         | 100%      | \$ 34,863    | To ST72               |
| 03-1680 | ST72/Z8 - Excavate/Install/Test/Backfill 3" CW (142')              | \$ 52,349.00    | \$ 52,349.00    | \$ -         | 100%      | \$ 52,349    |                       |
| 03-1690 | ST72/Z8 - Excavate/Install/Test/Backfill 3" THS (175')             | \$ 69,983.00    | \$ 41,990.00    | \$ 27,993.00 | 100%      | \$ 69,983    | From ST72             |
| 03-1700 | ST72/Z8 - Excavate/Install/Test/Backfill 3" THS (221')             | \$ 69,983.00    | \$ 41,990.00    | \$ 27,993.00 | 100%      | \$ 69,983    | From ST72             |
| 03-1710 | ST72/Z8 - Excavate/Install/Test/Backfill 4" BS (16')               | \$ 34,863.00    | \$ 34,863.00    | \$ -         | 100%      | \$ 34,863    | From ST72             |
| 03-1720 | ST72/Z8 - Excavate/Install/Test/Backfill 4" BS (16')               | \$ 34,863.00    | \$ 34,863.00    | \$ -         | 100%      | \$ 34,863    | From ST72             |
| 03-1730 | ST72/Z8 - Excavate/Install/Test/Backfill 6" PD (124')              | \$ 34,863.00    | \$ 34,863.00    | \$ -         | 100%      | \$ 34,863    |                       |
| 03-1740 | ST72/Z8 - Excavate/Install/Test/Backfill 8" 1/4" FSS (72'+65' 14') | \$ 69,983.00    | \$ 69,983.00    | \$ -         | 100%      | \$ 69,983    |                       |
| 03-1750 | ST72/Z8 - Excavate/Install/Test/Backfill 8" 3" 3W (110'+64')       | \$ 69,983.00    | \$ 69,983.00    | \$ -         | 100%      | \$ 69,983    |                       |
| 03-1760 | ST73/Z11 - Excavate/Install/Test/Backfill (15') - 4" FSS           | \$ 11,256.00    | \$ 11,256.00    | \$ -         | 100%      | \$ 11,256    |                       |
| 03-1770 | ST73/Z11 - Excavate/Install/Test/Backfill 8" 1/4" FSS (98')        | \$ 52,349.00    | \$ 52,349.00    | \$ -         | 100%      | \$ 52,349    |                       |
| 03-1780 | ST80/Z8 - Excavate/Install/Test/Backfill 14" 1/2" DSM (12')        | \$ 17,376.00    | \$ -            | \$ -         | 0%        | \$ -         | ST83 to ST80          |
| 03-1790 | ST80/Z8 - Excavate/Install/Test/Backfill 2" 3/4" 3W (96'+54')      | \$ 52,349.00    | \$ 26,175.00    | \$ -         | 50%       | \$ 26,175    | ST80 to ST85          |
| 03-1800 | ST80/Z8 - Excavate/Install/Test/Backfill 4" D (115')               | \$ 34,863.00    | \$ 17,432.00    | \$ -         | 50%       | \$ 17,432    | ST80 to ST85          |
| 03-1810 | ST80/Z8 - Excavate/Install/Test/Backfill 4" DS (125')              | \$ 52,349.00    | \$ 26,175.00    | \$ -         | 50%       | \$ 26,175    | ST80 to ST85          |
| 03-1820 | ST80/Z8 - Excavate/Install/Test/Backfill 4" PSC (35')              | \$ 17,376.00    | \$ 1,738.00     | \$ -         | 10%       | \$ 1,738     | Is this 80 or 83 psc? |
| 03-1830 | ST80/Z8 - Excavate/Install/Test/Backfill 6" 1/4" DS/H (12')        | \$ 17,376.00    | \$ 1,738.00     | \$ -         | 10%       | \$ 1,738     | ST83 to ST80          |
| 03-1840 | ST82/Z8 - Excavate/Install/Test/Backfill 14" 1/2" DSM (15')        | \$ 17,376.00    | \$ 4,344.00     | \$ -         | 25%       | \$ 4,344     | ST83 to ST82          |
| 03-1850 | ST82/Z8 - Excavate/Install/Test/Backfill 6" 1/4" DS/H (15')        | \$ 17,376.00    | \$ 4,344.00     | \$ -         | 25%       | \$ 4,344     | ST83 to ST82          |
| 03-1860 | ST82/Z8 - Excavate/Install/Test/Backfill 1 1/2" FS (18')           | \$ 17,376.00    | \$ 1,738.00     | \$ -         | 10%       | \$ 1,738     | To ST82               |
| 03-1870 | ST83/Z8 - Excavate/Install/Test/Backfill 10" 6" D (115')           | \$ 22,588.00    | \$ 6,776.00     | \$ -         | 30%       | \$ 6,776     |                       |
| 03-1880 | ST83/Z8 - Excavate/Install/Test/Backfill 12" TD (125')             | \$ 140,074.00   | \$ 42,022.00    | \$ -         | 30%       | \$ 42,022    |                       |
| 03-1890 | ST83/Z8 - Excavate/Install/Test/Backfill 2" 1W (58'+164'+191')     | \$ 157,707.00   | \$ 157,707.00   | \$ -         | 100%      | \$ 157,707   | Admin to ST72 & ST83  |
| 03-1900 | ST83/Z8 - Excavate/Install/Test/Backfill 2" 3W (35')               | \$ 17,376.00    | \$ 17,376.00    | \$ -         | 100%      | \$ 17,376    | To ST83               |
| 03-1910 | ST83/Z8 - Excavate/Install/Test/Backfill 2" D (78')                | \$ 34,863.00    | \$ 34,863.00    | \$ -         | 100%      | \$ 34,863    | ST83 to ST85          |
| 03-1920 | ST83/Z8 - Excavate/Install/Test/Backfill 2" NG (131')              | \$ 52,349.00    | \$ 52,349.00    | \$ -         | 100%      | \$ 52,349    | ST83 to ST84          |
| 03-1930 | ST83/Z8 - Excavate/Install/Test/Backfill 5" HWR (139')             | \$ 52,349.00    | \$ 52,349.00    | \$ -         | 100%      | \$ 52,349    | ST83 to ST84          |
| 03-1940 | ST83/Z8 - Excavate/Install/Test/Backfill 5" HWR (142')             | \$ 52,349.00    | \$ 52,349.00    | \$ -         | 100%      | \$ 52,349    | ST83 to ST84          |
| 03-1950 | ST83/Z8 - Excavate/Install/Test/Backfill 6" FSS (178')             | \$ 69,983.00    | \$ 55,986.00    | \$ -         | 80%       | \$ 55,986    | To ST83 (relocated)   |
| 03-1960 | ST84/Z8 - Excavate/Install/Test/Backfill (295') 5" HWS/HWR         | \$ 87,469.00    | \$ 87,469.00    | \$ -         | 100%      | \$ 87,469    | Dup 03-1930 & 1940    |
| 03-1970 | ST85/Z8 - Excavate/Install/Test/Backfill 10" DSM (37')             | \$ 17,376.00    | \$ -            | \$ -         | 0%        | \$ -         | ST85 to PS            |

April 29, 2022

Anthony Baxley  
Senior Project Manager  
Reliable Tampa Partners  
4912 W. La Salle Street  
Tampa, Florida 33607

**Re: Biogas Testing Lab Results**  
**AAR No. 013 Biogas Testing**  
**620500-001-04**

Mr. Baxley:

Enclosed are the results of the biogas samples for support of the evaluations and design of the Biogas Use and Digestion System Improvements which were authorized under a Design Allowance. Four (4) digester gas canister samples and four (4) siloxane samples were collected and sent to ALS Environmental for analysis.

**Digester Gas Canister Samples**

| Date Collected | Sample          | Lab Code     |
|----------------|-----------------|--------------|
| 2/4/2022       | Digester 6 #1   | P2200535-001 |
| 2/4/2022       | Digester 2/3 #1 | P2200535-002 |
| 3/10/2022      | Digester 6 #2   | P2201098-003 |
| 3/18/2022      | Digester 6 #3   | P2201236-003 |

**Siloxane Samples**

| Date Collected | Sample           | Lab Code     |
|----------------|------------------|--------------|
| 3/10/22        | Digester 6 #1S   | P2201098-001 |
| 3/10/22        | Digester 2/3 #1S | P2201098-002 |
| 3/18/22        | Digester 6 #25   | P2201236-001 |
| 3/18/22        | Digester 2/3 #25 | P2201236-002 |

The following notes provide additional context for reported results:

- Per the case narrative provided for Sample **Digester 6 #2** (P P2201098), “the reporting limits have been elevated in the sample because chromatogram indicated the presence of non-target background components. Therefore, the sample was diluted in order to prevent damage to the instrument and to achieve optimal resolution of the target analytes... Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.”
- The Chain of Custody (COC) form for Sample **Digester 6 #3** (P2201236) notes that the canister gauge appeared broken. A vacuum was heard during sampling, but there was no



reading reflected on the gauge. It is likely that some ambient air was pulled in with the sample based on the reported lab results.

This completes the allowance task.

Respectfully submitted,



Caryssa Joustra, PE  
Principal Engineer

Enclosures

Lab Report\_P2200535

Lab Report\_P2201098

Lab Report\_P2201236

cc: David Baar, John French, Rusty Haughn, Jacob Porter



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2655 Park Center Dr., Suite A  
Simi Valley, CA 93065  
T: +1 805 526 7161  
[www.alsglobal.com](http://www.alsglobal.com)

## LABORATORY REPORT

February 18, 2022

Caryssa Joustra, PhD  
Hazen and Sawyer, P.C.  
1000 N. Ashley Dr., Suite 1000  
Tampa, FL 33602

**RE: City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13**

Dear Caryssa:

Enclosed are the results of the samples submitted to our laboratory on February 7, 2022. The samples were sent out for partial analysis to AtmAA, Inc. Please find their report (Lab #: 20422-3, -4) attached. For your reference, these analyses have been assigned our service request number P2200535.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at [www.alsglobal.com](http://www.alsglobal.com). Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

**ALS | Environmental**

  
By Sue Anderson at 5:59 pm, Feb 18, 2022

For Nicole Bryson  
Laboratory Director



2655 Park Center Dr., Suite A  
Simi Valley, CA 93065  
T: +1 805 526 7161  
[www.alsglobal.com](http://www.alsglobal.com)

Client: Hazen and Sawyer, P.C. Service Request No: P2200535  
Project: City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

## CASE NARRATIVE

The samples were received intact under chain of custody on February 7, 2022 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

### Sulfur Analysis

The samples were analyzed for twenty sulfur compounds per ASTM D 5504-12 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan. This method is included on the laboratory's NELAP scope of accreditation, however it is not part of the DoD-ELAP accreditation.

### Volatile Organic Compound Analysis

The samples were also analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. The method was modified to include the use of helium as a diluent gas in place of zero-grade air for container pressurization. When necessary, analytical sample volumes were adjusted by a correction factor for containers pressurized with helium. A summary sheet has been included listing the affected samples. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The upper control criteria were exceeded for benzyl chloride, 1,2-dibromo-3-chloropropane and 1,2,4-trichlorobenzene in the Continuing Calibration Verification (CCV) analyzed on February 10, 2022. Since the apparent problem equates to a potential high bias and the field samples analyzed in this sequence did not contain the analytes in question, the data quality has not been affected. No corrective action was required.

The containers were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. For projects requiring DoD QSM 5.3 compliance canisters were cleaned to  $<1/2$  the MRL. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

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*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*



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ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

| Agency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Web Site                                                                                                                                                                                                                                            | Number                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Alaska DEC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <a href="http://dec.alaska.gov/eh/lab.aspx">http://dec.alaska.gov/eh/lab.aspx</a>                                                                                                                                                                   | 17-019                  |
| Arizona DHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <a href="http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home">http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home</a> | AZ0694                  |
| Florida DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <a href="http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html">http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html</a>                                               | E871020                 |
| Louisiana DEQ (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>                                                                                                                         | 05071                   |
| Maine DHHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <a href="http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml">http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml</a>                                                             | 2018027                 |
| Minnesota DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>                                                                                                                                               | 1776326                 |
| New Jersey DEP (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>                                                                                                                                                 | CA009                   |
| New York DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <a href="http://www.wadsworth.org/labcert/elap/elap.html">http://www.wadsworth.org/labcert/elap/elap.html</a>                                                                                                                                       | 11221                   |
| Oregon PHD (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <a href="http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>                           | 4068-008                |
| Pennsylvania DEP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx">http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx</a>                                           | 68-03307 (Registration) |
| PJLA (DoD ELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <a href="http://www.pjlabs.com/search-accredited-labs">http://www.pjlabs.com/search-accredited-labs</a>                                                                                                                                             | 65818 (Testing)         |
| Texas CEQ (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <a href="http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html</a>                                                                                                         | T104704413-19-10        |
| Utah DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="http://health.utah.gov/lab/lab_cert_env">http://health.utah.gov/lab/lab_cert_env</a>                                                                                                                                                       | CA016272019-10          |
| Washington DOE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>                                                                                                         | C946                    |
| <p>Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at <a href="http://www.alsglobal.com">www.alsglobal.com</a>, or at the accreditation body's website.</p> <p>Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.</p> |                                                                                                                                                                                                                                                     |                         |

## ALS ENVIRONMENTAL

### DETAIL SUMMARY REPORT

Client: Hazen And Sawyer, P.C.

Service Request: P2200535

Project ID: City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

Date Received: 2/7/2022

Time Received: 09:00

| Client Sample ID | Lab Code     | Matrix | Date Collected | Time Collected | Container ID | Pi1 (psig) | Pf1 (psig) | ASTM D 5504-12 - Sulfur Can | TO-15 Modified - VOC Cans | ASTM D3588 - Sub-Out to AAC |
|------------------|--------------|--------|----------------|----------------|--------------|------------|------------|-----------------------------|---------------------------|-----------------------------|
| Digester 6 #1    | P2200535-001 | Air    | 2/4/2022       | 09:21          | SSC00137     | -1.66      | 3.61       | X                           | X                         | X                           |
| Digester 2/3 #1  | P2200535-002 | Air    | 2/4/2022       | 09:43          | SSC00282     | -0.01      | 3.53       | X                           | X                         | X                           |



**ALS ENVIRONMENTAL**  
**Sample Volume Correction for Helium Pressurization**  
**for SCAN Analysis**

| <u>Sample ID</u> | <u>P0</u> | <u>Pi</u> | <u>Pf</u> | <u>Sample<br/>Volume (L)</u> | <u>Adjusted<br/>Volume (L)</u> |
|------------------|-----------|-----------|-----------|------------------------------|--------------------------------|
| P2200535-001     | -8.4      | -1.66     | 3.61      | 0.015                        | 0.0185                         |
| P2200535-002     | -8.4      | -0.01     | 3.53      | 0.015                        | 0.0180                         |



2655 Park Center Drive, Suite A  
Simi Valley, California 93065  
Phone (805) 526-7161

|                                                                                                                                                                                           |  |                                                                                                                                                                                                         |  |                                                                     |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------|--|
| <b>Company Name &amp; Address (Reporting Information)</b><br>Hazen and Sawyer<br>1000 N Ashley Dr<br>Tampa, FL 33602<br>Project Manager<br>Caryssa Jovstra<br>Phone (813) 682-1223<br>Fax |  | <b>Requested Turnaround Time in Business Days (Surcharges) please circle</b><br>1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 6 Day (20%) 7 Day (15%) 8 Day (10%) 9 Day (5%) 10 Day (0%) |  | ALS Project No.<br>220535                                           |  |
|                                                                                                                                                                                           |  | ALS Contact:                                                                                                                                                                                            |  | Comments<br>e.g. Actual<br>Preservative or<br>specific instructions |  |
| <b>Project Name</b><br>City of Tampa HFC AWT Master Plan Improvements                                                                                                                     |  | <b>Project Number</b><br>41077-013, AAR No. 13                                                                                                                                                          |  | <b>Analysis Method</b>                                              |  |
| <b>P.O. # / Billing Information</b>                                                                                                                                                       |  | <b>Sampler (Print &amp; Sign)</b><br>Ryan McKenna                                                                                                                                                       |  | <b>Flow Controller ID</b><br>(Bar code # - FC #)                    |  |
| <b>Canister ID</b><br>(Bar code # - AC, SC, etc.)                                                                                                                                         |  | <b>Canister Start Pressure</b><br>"Hg                                                                                                                                                                   |  | <b>Canister End Pressure</b><br>"Hg/psig                            |  |
| <b>Time Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>ASTM</b>                                                         |  |
| <b>Date Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>TO-3</b>                                                         |  |
| <b>Laboratory ID Number</b>                                                                                                                                                               |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>3C Modified</b>                                                  |  |
| <b>Client Sample ID</b>                                                                                                                                                                   |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>D8230</b>                                                        |  |
| <b>Digester 4 #1</b>                                                                                                                                                                      |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>D5504-12</b>                                                     |  |
| <b>Digester 2/3 #1</b>                                                                                                                                                                    |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>TO-15</b>                                                        |  |
| <b>Time Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Samples in two separate boxes</b>                                |  |
| <b>Date Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Did not receive</b>                                              |  |
| <b>Laboratory ID Number</b>                                                                                                                                                               |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Siloxan sample kit</b>                                           |  |
| <b>Client Sample ID</b>                                                                                                                                                                   |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Project Requirements (MRLs, QAPP)</b>                            |  |
| <b>Time Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Chain of Custody Seal: (Circle)</b><br>INTACT BROKEN ABSENT      |  |
| <b>Date Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>EDD required Yes / No</b><br>Type:                               |  |
| <b>Laboratory ID Number</b>                                                                                                                                                               |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Received by: (Signature)</b><br>Date:                            |  |
| <b>Client Sample ID</b>                                                                                                                                                                   |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Received by: (Signature)</b><br>Date:                            |  |
| <b>Time Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Date Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Laboratory ID Number</b>                                                                                                                                                               |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Client Sample ID</b>                                                                                                                                                                   |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Time Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Date Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Laboratory ID Number</b>                                                                                                                                                               |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Client Sample ID</b>                                                                                                                                                                   |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Time Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Date Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Laboratory ID Number</b>                                                                                                                                                               |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Client Sample ID</b>                                                                                                                                                                   |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Time Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Date Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Laboratory ID Number</b>                                                                                                                                                               |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Client Sample ID</b>                                                                                                                                                                   |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Time Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Date Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Laboratory ID Number</b>                                                                                                                                                               |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Client Sample ID</b>                                                                                                                                                                   |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Time Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Date Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Laboratory ID Number</b>                                                                                                                                                               |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Client Sample ID</b>                                                                                                                                                                   |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Time Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Date Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Laboratory ID Number</b>                                                                                                                                                               |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Client Sample ID</b>                                                                                                                                                                   |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Time Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Date Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Laboratory ID Number</b>                                                                                                                                                               |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Client Sample ID</b>                                                                                                                                                                   |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Time Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |
| <b>Date Collected</b>                                                                                                                                                                     |  | <b>Sample Volume</b>                                                                                                                                                                                    |  | <b>Relinquished by: (Signature)</b><br>Date:                        |  |

Client: Hazen And Sawyer, P.C. Work order: P2200535  
Project: City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13  
Sample(s) received on: 2/7/22 Date opened: 2/7/22 by: ADAVID

|    |                                                                                                               | Yes                                 | No                                  | N/A                                 |
|----|---------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 1  | Were <b>sample containers</b> properly marked with client sample ID?                                          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 2  | Did <b>sample containers</b> arrive in good condition?                                                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 3  | Were <b>chain-of-custody</b> papers used and filled out?                                                      | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 4  | Did <b>sample container labels</b> and/or tags agree with custody papers?                                     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 5  | Was <b>sample volume</b> received adequate for analysis?                                                      | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 6  | Are samples within specified holding times?                                                                   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| 7  | Was proper <b>temperature</b> (thermal preservation) of cooler at receipt adhered to?                         | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 8  | Were <b>custody seals</b> on outside of cooler/Box/Container?                                                 | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|    | Location of seal(s)? _____ Sealing Lid?                                                                       | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Were signature and date included?                                                                             | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Were seals intact?                                                                                            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 9  | Do containers have appropriate <b>preservation</b> , according to method/SOP or Client specified information? | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Is there a client indication that the submitted samples are <b>pH</b> preserved?                              | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Were <b>VOA vials</b> checked for presence/absence of air bubbles?                                            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Does the client/method/SOP require that the analyst check the sample pH and <u>if necessary</u> alter it?     | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 10 | <b>Tubes:</b> Are the tubes capped and intact?                                                                | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 11 | <b>Badges:</b> Are the badges properly capped and intact?                                                     | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|    | Are dual bed badges separated and individually capped and intact?                                             | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

[illegible]

Explain any discrepancies: (include lab sample ID numbers): \_\_\_\_\_



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-001

Test Code: ASTM D 5504-12

Instrument ID: Agilent 7890A/GC22/SCD

Analyst: Gilbert Gutierrez

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00137

Date Collected: 2/4/22

Time Collected: 09:21

Date Received: 2/7/22

Date Analyzed: 2/8/22

Time Analyzed: 09:45

Volume(s) Analyzed: 0.0040 ml(s)

Container Dilution Factor: 2.72

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | 13,000,000      | 4,700        | 9,300,000      | 3,400       |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 8,300        | ND             | 3,400       |                   |
| 74-93-1   | Methyl Mercaptan      | 28,000          | 6,700        | 14,000         | 3,400       |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 8,600        | ND             | 3,400       |                   |
| 75-18-3   | Dimethyl Sulfide      | 9,500           | 8,600        | 3,700          | 3,400       |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 5,300        | ND             | 1,700       |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 11,000       | ND             | 3,400       |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 13,000       | ND             | 3,400       |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 11,000       | ND             | 3,400       |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 11,000       | ND             | 3,400       |                   |
| 110-02-1  | Thiophene             | ND              | 12,000       | ND             | 3,400       |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 13,000       | ND             | 3,400       |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 13,000       | ND             | 3,400       |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 13,000       | ND             | 3,400       |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 6,500        | ND             | 1,700       |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 14,000       | ND             | 3,400       |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 12,000       | ND             | 3,400       |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 16,000       | ND             | 3,400       |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 16,000       | ND             | 3,400       |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 8,500        | ND             | 1,700       |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 2/3 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-002

Test Code: ASTM D 5504-12

Instrument ID: Agilent 7890A/GC22/SCD

Analyst: Gilbert Gutierrez

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00282

Date Collected: 2/4/22

Time Collected: 09:43

Date Received: 2/7/22

Date Analyzed: 2/8/22

Time Analyzed: 10:19

Volume(s) Analyzed: 0.0040 ml(s)

Container Dilution Factor: 2.17

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | 13,000,000      | 3,800        | 9,600,000      | 2,700       |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 6,700        | ND             | 2,700       |                   |
| 74-93-1   | Methyl Mercaptan      | 10,000          | 5,300        | 5,200          | 2,700       |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 6,900        | ND             | 2,700       |                   |
| 75-18-3   | Dimethyl Sulfide      | ND              | 6,900        | ND             | 2,700       |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 4,200        | ND             | 1,400       |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 8,400        | ND             | 2,700       |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 10,000       | ND             | 2,700       |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 8,400        | ND             | 2,700       |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 8,400        | ND             | 2,700       |                   |
| 110-02-1  | Thiophene             | ND              | 9,300        | ND             | 2,700       |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 10,000       | ND             | 2,700       |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 10,000       | ND             | 2,700       |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 10,000       | ND             | 2,700       |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 5,200        | ND             | 1,400       |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 11,000       | ND             | 2,700       |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 9,800        | ND             | 2,700       |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 12,000       | ND             | 2,700       |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 12,000       | ND             | 2,700       |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 6,800        | ND             | 1,400       |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P220208-MB

Test Code: ASTM D 5504-12

Instrument ID: Agilent 7890A/GC22/SCD

Analyst: Gilbert Gutierrez

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Time Collected: NA

Date Received: NA

Date Analyzed: 2/08/22

Time Analyzed: 07:55

Volume(s) Analyzed: 1.0 ml(s)

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | ND              | 7.0          | ND             | 5.0         |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 12           | ND             | 5.0         |                   |
| 74-93-1   | Methyl Mercaptan      | ND              | 9.8          | ND             | 5.0         |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 13           | ND             | 5.0         |                   |
| 75-18-3   | Dimethyl Sulfide      | ND              | 13           | ND             | 5.0         |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 7.8          | ND             | 2.5         |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 16           | ND             | 5.0         |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 18           | ND             | 5.0         |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 16           | ND             | 5.0         |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 16           | ND             | 5.0         |                   |
| 110-02-1  | Thiophene             | ND              | 17           | ND             | 5.0         |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 18           | ND             | 5.0         |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 18           | ND             | 5.0         |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 18           | ND             | 5.0         |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 9.6          | ND             | 2.5         |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 20           | ND             | 5.0         |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 18           | ND             | 5.0         |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 23           | ND             | 5.0         |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 23           | ND             | 5.0         |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 12           | ND             | 2.5         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

ALS Project ID: P2200535

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Sample ID: P220208-DLCS

Test Code: ASTM D 5504-12

Date Collected: NA

Instrument ID: Agilent 7890A/GC22/SCD

Date Received: NA

Analyst: Gilbert Gutierrez

Date Analyzed: 2/08/22

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: NA ml(s)

Test Notes:

| CAS #     | Compound         | Spike Amount       | Result      |              | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|------------------|--------------------|-------------|--------------|------------|------|----------------------|-----|-----|------|
|           |                  | LCS / DLCS<br>ppbV | LCS<br>ppbV | DLCS<br>ppbV | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 7783-06-4 | Hydrogen Sulfide | 989                | 868         | 875          | 88         | 88   | 72-122               | 0   | 18  |      |
| 463-58-1  | Carbonyl Sulfide | 1,050              | 873         | 906          | 83         | 86   | 72-121               | 4   | 17  |      |
| 74-93-1   | Methyl Mercaptan | 1,050              | 943         | 960          | 90         | 91   | 74-127               | 1   | 18  |      |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-001

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00137

Date Collected: 2/4/22

Date Received: 2/7/22

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.0185 Liter(s)

Canister Dilution Factor: 2.72

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND                          | 76                       | ND             | 44          |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 78                       | ND             | 16          |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 75                       | ND             | 36          |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 79                       | ND             | 11          |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 76                       | ND             | 30          |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 76                       | ND             | 35          |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 75                       | ND             | 19          |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 75                       | ND             | 28          |                   |
| 64-17-5   | Ethanol                                          | ND                          | 740                      | ND             | 390         |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 150                      | ND             | 88          |                   |
| 107-02-8  | Acrolein                                         | ND                          | 150                      | ND             | 64          |                   |
| 67-64-1   | Acetone                                          | ND                          | 760                      | ND             | 320         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 76                       | ND             | 14          |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 150                      | ND             | 60          |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 150                      | ND             | 68          |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 79                       | ND             | 20          |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 76                       | ND             | 22          |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 78                       | ND             | 25          |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 79                       | ND             | 10          |                   |
| 75-15-0   | Carbon Disulfide                                 | 690                         | 160                      | 220            | 52          |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 78                       | ND             | 20          |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 78                       | ND             | 19          |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 78                       | ND             | 22          |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 740                      | ND             | 210         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | 200                         | 150                      | 67             | 50          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-001

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00137

Date Collected: 2/4/22

Date Received: 2/7/22

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.0185 Liter(s)

Canister Dilution Factor: 2.72

| CAS #      | Compound                  | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND                          | 76                       | ND             | 19          |                   |
| 141-78-6   | Ethyl Acetate             | ND                          | 310                      | ND             | 86          |                   |
| 110-54-3   | n-Hexane                  | 340                         | 78                       | 96             | 22          |                   |
| 67-66-3    | Chloroform                | ND                          | 79                       | ND             | 16          |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND                          | 150                      | ND             | 50          |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND                          | 78                       | ND             | 19          |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND                          | 76                       | ND             | 14          |                   |
| 71-43-2    | Benzene                   | ND                          | 74                       | ND             | 23          |                   |
| 56-23-5    | Carbon Tetrachloride      | ND                          | 74                       | ND             | 12          |                   |
| 110-82-7   | Cyclohexane               | ND                          | 160                      | ND             | 47          |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND                          | 74                       | ND             | 16          |                   |
| 75-27-4    | Bromodichloromethane      | 92                          | 78                       | 14             | 12          |                   |
| 79-01-6    | Trichloroethene           | ND                          | 76                       | ND             | 14          |                   |
| 123-91-1   | 1,4-Dioxane               | ND                          | 76                       | ND             | 21          |                   |
| 80-62-6    | Methyl Methacrylate       | ND                          | 160                      | ND             | 40          |                   |
| 142-82-5   | n-Heptane                 | 170                         | 78                       | 41             | 19          |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND                          | 74                       | ND             | 16          |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND                          | 160                      | ND             | 39          |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND                          | 75                       | ND             | 17          |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND                          | 76                       | ND             | 14          |                   |
| 108-88-3   | Toluene                   | 630                         | 76                       | 170            | 20          |                   |
| 591-78-6   | 2-Hexanone                | ND                          | 160                      | ND             | 39          |                   |
| 124-48-1   | Dibromochloromethane      | 87                          | 78                       | 10             | 9.2         |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND                          | 76                       | ND             | 10          |                   |
| 123-86-4   | n-Butyl Acetate           | ND                          | 160                      | ND             | 34          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-001

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00137

Date Collected: 2/4/22

Date Received: 2/7/22

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.0185 Liter(s)

Canister Dilution Factor: 2.72

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | 290             | 78           | 63             | 17          |                   |
| 127-18-4    | Tetrachloroethene           | 230             | 76           | 34             | 11          |                   |
| 108-90-7    | Chlorobenzene               | ND              | 76           | ND             | 17          |                   |
| 100-41-4    | Ethylbenzene                | 610             | 76           | 140            | 18          |                   |
| 179601-23-1 | m,p-Xylenes                 | 1,200           | 160          | 290            | 37          |                   |
| 75-25-2     | Bromoform                   | ND              | 76           | ND             | 7.4         |                   |
| 100-42-5    | Styrene                     | ND              | 74           | ND             | 17          |                   |
| 95-47-6     | o-Xylene                    | 370             | 76           | 86             | 18          |                   |
| 111-84-2    | n-Nonane                    | 450             | 76           | 86             | 15          |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 76           | ND             | 11          |                   |
| 98-82-8     | Cumene                      | ND              | 76           | ND             | 16          |                   |
| 80-56-8     | alpha-Pinene                | 370             | 79           | 67             | 14          |                   |
| 103-65-1    | n-Propylbenzene             | ND              | 78           | ND             | 16          |                   |
| 622-96-8    | 4-Ethyltoluene              | ND              | 78           | ND             | 16          |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND              | 76           | ND             | 16          |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 96              | 76           | 19             | 16          |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 160          | ND             | 31          |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 76           | ND             | 13          |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | 350             | 76           | 58             | 13          |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 78           | ND             | 13          |                   |
| 5989-27-5   | d-Limonene                  | 5,000           | 74           | 890            | 13          |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 150          | ND             | 15          |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 160          | ND             | 22          |                   |
| 91-20-3     | Naphthalene                 | ND              | 76           | ND             | 15          |                   |
| 87-68-3     | Hexachlorobutadiene         | ND              | 76           | ND             | 7.2         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 2/3 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-002

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00282

Date Collected: 2/4/22

Date Received: 2/7/22

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.018 Liter(s)

Canister Dilution Factor: 2.17

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | 130                         | 63                       | 78             | 36          |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 64                       | ND             | 13          |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 61                       | ND             | 30          |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 65                       | ND             | 9.3         |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 63                       | ND             | 25          |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 63                       | ND             | 28          |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 61                       | ND             | 16          |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 61                       | ND             | 23          |                   |
| 64-17-5   | Ethanol                                          | ND                          | 600                      | ND             | 320         |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 120                      | ND             | 72          |                   |
| 107-02-8  | Acrolein                                         | ND                          | 120                      | ND             | 53          |                   |
| 67-64-1   | Acetone                                          | ND                          | 630                      | ND             | 260         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 63                       | ND             | 11          |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 120                      | ND             | 49          |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 120                      | ND             | 56          |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 65                       | ND             | 16          |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 63                       | ND             | 18          |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 64                       | ND             | 20          |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 65                       | ND             | 8.5         |                   |
| 75-15-0   | Carbon Disulfide                                 | 370                         | 130                      | 120            | 43          |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 64                       | ND             | 16          |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 64                       | ND             | 16          |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 64                       | ND             | 18          |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 600                      | ND             | 170         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND                          | 120                      | ND             | 41          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 2/3 #1

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P2200535-002

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: SSC00282

Date Collected: 2/4/22

Date Received: 2/7/22

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.018 Liter(s)

Canister Dilution Factor: 2.17

| CAS #      | Compound                  | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND              | 63           | ND             | 16          |                   |
| 141-78-6   | Ethyl Acetate             | ND              | 250          | ND             | 70          |                   |
| 110-54-3   | n-Hexane                  | 300             | 64           | 85             | 18          |                   |
| 67-66-3    | Chloroform                | ND              | 65           | ND             | 13          |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND              | 120          | ND             | 41          |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND              | 64           | ND             | 16          |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND              | 63           | ND             | 11          |                   |
| 71-43-2    | Benzene                   | ND              | 60           | ND             | 19          |                   |
| 56-23-5    | Carbon Tetrachloride      | ND              | 60           | ND             | 9.6         |                   |
| 110-82-7   | Cyclohexane               | ND              | 130          | ND             | 39          |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND              | 60           | ND             | 13          |                   |
| 75-27-4    | Bromodichloromethane      | ND              | 64           | ND             | 9.5         |                   |
| 79-01-6    | Trichloroethene           | ND              | 63           | ND             | 12          |                   |
| 123-91-1   | 1,4-Dioxane               | ND              | 63           | ND             | 17          |                   |
| 80-62-6    | Methyl Methacrylate       | ND              | 130          | ND             | 32          |                   |
| 142-82-5   | n-Heptane                 | 160             | 64           | 40             | 16          |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND              | 60           | ND             | 13          |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND              | 130          | ND             | 32          |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND              | 61           | ND             | 14          |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND              | 63           | ND             | 11          |                   |
| 108-88-3   | Toluene                   | 370             | 63           | 99             | 17          |                   |
| 591-78-6   | 2-Hexanone                | ND              | 130          | ND             | 32          |                   |
| 124-48-1   | Dibromochloromethane      | ND              | 64           | ND             | 7.5         |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND              | 63           | ND             | 8.2         |                   |
| 123-86-4   | n-Butyl Acetate           | ND              | 130          | ND             | 28          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 2/3 #1

ALS Project ID: P2200535

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Sample ID: P2200535-002

Test Code: EPA TO-15 Modified

Date Collected: 2/4/22

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Date Received: 2/7/22

Analyst: Wida Ang

Date Analyzed: 2/10/22

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: 0.018 Liter(s)

Test Notes:

Container ID: SSC00282

Canister Dilution Factor: 2.17

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | 290             | 64           | 63             | 14          |                   |
| 127-18-4    | Tetrachloroethene           | 170             | 63           | 26             | 9.2         |                   |
| 108-90-7    | Chlorobenzene               | ND              | 63           | ND             | 14          |                   |
| 100-41-4    | Ethylbenzene                | 550             | 63           | 130            | 14          |                   |
| 179601-23-1 | m,p-Xylenes                 | 1,000           | 130          | 240            | 31          |                   |
| 75-25-2     | Bromoform                   | ND              | 63           | ND             | 6.1         |                   |
| 100-42-5    | Styrene                     | ND              | 60           | ND             | 14          |                   |
| 95-47-6     | o-Xylene                    | 310             | 63           | 72             | 14          |                   |
| 111-84-2    | n-Nonane                    | 430             | 63           | 82             | 12          |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 63           | ND             | 9.1         |                   |
| 98-82-8     | Cumene                      | ND              | 63           | ND             | 13          |                   |
| 80-56-8     | alpha-Pinene                | 340             | 65           | 61             | 12          |                   |
| 103-65-1    | n-Propylbenzene             | ND              | 64           | ND             | 13          |                   |
| 622-96-8    | 4-Ethyltoluene              | ND              | 64           | ND             | 13          |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND              | 63           | ND             | 13          |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 79              | 63           | 16             | 13          |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 130          | ND             | 26          |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 63           | ND             | 10          |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | 280             | 63           | 47             | 10          |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 64           | ND             | 11          |                   |
| 5989-27-5   | d-Limonene                  | 2,600           | 60           | 470            | 11          |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 120          | ND             | 12          |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 130          | ND             | 18          |                   |
| 91-20-3     | Naphthalene                 | ND              | 63           | ND             | 12          |                   |
| 87-68-3     | Hexachlorobutadiene         | ND              | 63           | ND             | 5.9         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P220210-MB

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

**Analyst:** Wida Ang

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 2/10/22

Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND                          | 0.52                     | ND             | 0.30        |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 0.53                     | ND             | 0.11        |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 0.51                     | ND             | 0.25        |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 0.54                     | ND             | 0.077       |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 0.52                     | ND             | 0.20        |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 0.52                     | ND             | 0.24        |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 0.51                     | ND             | 0.13        |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 0.51                     | ND             | 0.19        |                   |
| 64-17-5   | Ethanol                                          | ND                          | 5.0                      | ND             | 2.7         |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 1.0                      | ND             | 0.60        |                   |
| 107-02-8  | Acrolein                                         | ND                          | 1.0                      | ND             | 0.44        |                   |
| 67-64-1   | Acetone                                          | ND                          | 5.2                      | ND             | 2.2         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 0.52                     | ND             | 0.093       |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 1.0                      | ND             | 0.41        |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 1.0                      | ND             | 0.46        |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 0.54                     | ND             | 0.14        |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 0.52                     | ND             | 0.15        |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 0.53                     | ND             | 0.17        |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 0.54                     | ND             | 0.070       |                   |
| 75-15-0   | Carbon Disulfide                                 | ND                          | 1.1                      | ND             | 0.35        |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 0.53                     | ND             | 0.13        |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 0.53                     | ND             | 0.13        |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 0.53                     | ND             | 0.15        |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 5.0                      | ND             | 1.4         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND                          | 1.0                      | ND             | 0.34        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P220210-MB

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

**Analyst:** Wida Ang

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 2/10/22

Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

| CAS #      | Compound                  | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND              | 0.52         | ND             | 0.13        |                   |
| 141-78-6   | Ethyl Acetate             | ND              | 2.1          | ND             | 0.58        |                   |
| 110-54-3   | n-Hexane                  | ND              | 0.53         | ND             | 0.15        |                   |
| 67-66-3    | Chloroform                | ND              | 0.54         | ND             | 0.11        |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND              | 1.0          | ND             | 0.34        |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND              | 0.53         | ND             | 0.13        |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND              | 0.52         | ND             | 0.095       |                   |
| 71-43-2    | Benzene                   | ND              | 0.50         | ND             | 0.16        |                   |
| 56-23-5    | Carbon Tetrachloride      | ND              | 0.50         | ND             | 0.080       |                   |
| 110-82-7   | Cyclohexane               | ND              | 1.1          | ND             | 0.32        |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND              | 0.50         | ND             | 0.11        |                   |
| 75-27-4    | Bromodichloromethane      | ND              | 0.53         | ND             | 0.079       |                   |
| 79-01-6    | Trichloroethene           | ND              | 0.52         | ND             | 0.097       |                   |
| 123-91-1   | 1,4-Dioxane               | ND              | 0.52         | ND             | 0.14        |                   |
| 80-62-6    | Methyl Methacrylate       | ND              | 1.1          | ND             | 0.27        |                   |
| 142-82-5   | n-Heptane                 | ND              | 0.53         | ND             | 0.13        |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND              | 0.50         | ND             | 0.11        |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND              | 1.1          | ND             | 0.27        |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND              | 0.51         | ND             | 0.11        |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND              | 0.52         | ND             | 0.095       |                   |
| 108-88-3   | Toluene                   | ND              | 0.52         | ND             | 0.14        |                   |
| 591-78-6   | 2-Hexanone                | ND              | 1.1          | ND             | 0.27        |                   |
| 124-48-1   | Dibromochloromethane      | ND              | 0.53         | ND             | 0.062       |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND              | 0.52         | ND             | 0.068       |                   |
| 123-86-4   | n-Butyl Acetate           | ND              | 1.1          | ND             | 0.23        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P220210-MB

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

**Analyst:** Wida Ang

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 2/10/22

Volume(s) Analyzed: 1.00 Liter(s)

Canister Dilution Factor: 1.00

| CAS #       | Compound                    | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | ND                          | 0.53                     | ND             | 0.11        |                   |
| 127-18-4    | Tetrachloroethene           | ND                          | 0.52                     | ND             | 0.077       |                   |
| 108-90-7    | Chlorobenzene               | ND                          | 0.52                     | ND             | 0.11        |                   |
| 100-41-4    | Ethylbenzene                | ND                          | 0.52                     | ND             | 0.12        |                   |
| 179601-23-1 | m,p-Xylenes                 | ND                          | 1.1                      | ND             | 0.25        |                   |
| 75-25-2     | Bromoform                   | ND                          | 0.52                     | ND             | 0.050       |                   |
| 100-42-5    | Styrene                     | ND                          | 0.50                     | ND             | 0.12        |                   |
| 95-47-6     | o-Xylene                    | ND                          | 0.52                     | ND             | 0.12        |                   |
| 111-84-2    | n-Nonane                    | ND                          | 0.52                     | ND             | 0.099       |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND                          | 0.52                     | ND             | 0.076       |                   |
| 98-82-8     | Cumene                      | ND                          | 0.52                     | ND             | 0.11        |                   |
| 80-56-8     | alpha-Pinene                | ND                          | 0.54                     | ND             | 0.097       |                   |
| 103-65-1    | n-Propylbenzene             | ND                          | 0.53                     | ND             | 0.11        |                   |
| 622-96-8    | 4-Ethyltoluene              | ND                          | 0.53                     | ND             | 0.11        |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND                          | 0.52                     | ND             | 0.11        |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | ND                          | 0.52                     | ND             | 0.11        |                   |
| 100-44-7    | Benzyl Chloride             | ND                          | 1.1                      | ND             | 0.21        |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND                          | 0.52                     | ND             | 0.087       |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | ND                          | 0.52                     | ND             | 0.087       |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND                          | 0.53                     | ND             | 0.088       |                   |
| 5989-27-5   | d-Limonene                  | ND                          | 0.50                     | ND             | 0.090       |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND                          | 1.0                      | ND             | 0.10        |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND                          | 1.1                      | ND             | 0.15        |                   |
| 91-20-3     | Naphthalene                 | ND                          | 0.52                     | ND             | 0.099       |                   |
| 87-68-3     | Hexachlorobutadiene         | ND                          | 0.52                     | ND             | 0.049       |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## SURROGATE SPIKE RECOVERY RESULTS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister(s)

Test Notes:

Date(s) Collected: 2/4/22

Date(s) Received: 2/7/22

Date(s) Analyzed: 2/10/22

| Client Sample ID             | ALS Sample ID | 1,2-Dichloroethane-d4 | Toluene-d8        | Bromofluorobenzene | Acceptance Limits | Data Qualifier |
|------------------------------|---------------|-----------------------|-------------------|--------------------|-------------------|----------------|
|                              |               | Percent Recovered     | Percent Recovered | Percent Recovered  |                   |                |
| Method Blank                 | P220210-MB    | 95                    | 98                | 100                | 70-130            |                |
| Lab Control Sample           | P220210-LCS   | 93                    | 97                | 102                | 70-130            |                |
| Duplicate Lab Control Sample | P220210-DLCS  | 94                    | 98                | 101                | 70-130            |                |
| Digester 6 #1                | P2200535-001  | 85                    | 100               | 104                | 70-130            |                |
| Digester 2/3 #1              | P2200535-002  | 89                    | 101               | 104                | 70-130            |                |

Surrogate percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P220210-DLCS

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

**Analyst:** Wida Ang

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #     | Compound                                         | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|--------------------------------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|           |                                                  | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 115-07-1  | Propene                                          | 206                 | 207          | 218           | 100        | 106  | 56-128               | 6   | 25  |      |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | 208                 | 187          | 190           | 90         | 91   | 71-112               | 1   | 25  |      |
| 74-87-3   | Chloromethane                                    | 206                 | 178          | 181           | 86         | 88   | 53-126               | 2   | 25  |      |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | 208                 | 201          | 203           | 97         | 98   | 62-121               | 1   | 25  |      |
| 75-01-4   | Vinyl Chloride                                   | 208                 | 188          | 191           | 90         | 92   | 63-123               | 2   | 25  |      |
| 106-99-0  | 1,3-Butadiene                                    | 206                 | 200          | 203           | 97         | 99   | 63-135               | 2   | 25  |      |
| 74-83-9   | Bromomethane                                     | 206                 | 187          | 194           | 91         | 94   | 71-112               | 3   | 25  |      |
| 75-00-3   | Chloroethane                                     | 206                 | 188          | 195           | 91         | 95   | 66-117               | 4   | 25  |      |
| 64-17-5   | Ethanol                                          | 832                 | 779          | 808           | 94         | 97   | 57-117               | 3   | 25  |      |
| 75-05-8   | Acetonitrile                                     | 202                 | 157          | 162           | 78         | 80   | 59-131               | 3   | 25  |      |
| 107-02-8  | Acrolein                                         | 416                 | 409          | 421           | 98         | 101  | 71-123               | 3   | 25  |      |
| 67-64-1   | Acetone                                          | 1,020               | 926          | 940           | 91         | 92   | 60-117               | 1   | 25  |      |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | 202                 | 182          | 188           | 90         | 93   | 71-114               | 3   | 25  |      |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | 400                 | 309          | 313           | 77         | 78   | 61-124               | 1   | 25  |      |
| 107-13-1  | Acrylonitrile                                    | 402                 | 361          | 369           | 90         | 92   | 65-130               | 2   | 25  |      |
| 75-35-4   | 1,1-Dichloroethene                               | 210                 | 194          | 201           | 92         | 96   | 74-114               | 4   | 25  |      |
| 75-09-2   | Methylene Chloride                               | 208                 | 192          | 195           | 92         | 94   | 75-112               | 2   | 25  |      |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | 204                 | 174          | 177           | 85         | 87   | 57-127               | 2   | 25  |      |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | 216                 | 195          | 201           | 90         | 93   | 73-114               | 3   | 25  |      |
| 75-15-0   | Carbon Disulfide                                 | 414                 | 402          | 410           | 97         | 99   | 70-113               | 2   | 25  |      |
| 156-60-5  | trans-1,2-Dichloroethene                         | 208                 | 190          | 194           | 91         | 93   | 76-119               | 2   | 25  |      |
| 75-34-3   | 1,1-Dichloroethane                               | 214                 | 194          | 198           | 91         | 93   | 70-114               | 2   | 25  |      |
| 1634-04-4 | Methyl tert-Butyl Ether                          | 206                 | 201          | 205           | 98         | 100  | 72-118               | 2   | 25  |      |
| 108-05-4  | Vinyl Acetate                                    | 942                 | 1090         | 1100          | 116        | 117  | 56-137               | 0.9 | 25  |      |
| 78-93-3   | 2-Butanone (MEK)                                 | 408                 | 391          | 397           | 96         | 97   | 74-121               | 1   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P220210-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

Analyst: Wida Ang

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #      | Compound                  | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|------------|---------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|            |                           | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 156-59-2   | cis-1,2-Dichloroethene    | 206                 | 188          | 191           | 91         | 93   | 73-117               | 2   | 25  |      |
| 141-78-6   | Ethyl Acetate             | 580                 | 549          | 555           | 95         | 96   | 59-161               | 1   | 25  |      |
| 110-54-3   | n-Hexane                  | 208                 | 207          | 209           | 100        | 100  | 55-130               | 0   | 25  |      |
| 67-66-3    | Chloroform                | 210                 | 201          | 204           | 96         | 97   | 71-114               | 1   | 25  |      |
| 109-99-9   | Tetrahydrofuran (THF)     | 404                 | 403          | 408           | 100        | 101  | 73-114               | 1   | 25  |      |
| 107-06-2   | 1,2-Dichloroethane        | 210                 | 183          | 185           | 87         | 88   | 71-119               | 1   | 25  |      |
| 71-55-6    | 1,1,1-Trichloroethane     | 208                 | 197          | 199           | 95         | 96   | 73-119               | 1   | 25  |      |
| 71-43-2    | Benzene                   | 208                 | 207          | 208           | 100        | 100  | 72-113               | 0   | 25  |      |
| 56-23-5    | Carbon Tetrachloride      | 202                 | 197          | 200           | 98         | 99   | 67-123               | 1   | 25  |      |
| 110-82-7   | Cyclohexane               | 412                 | 460          | 459           | 112        | 111  | 70-119               | 0.9 | 25  |      |
| 78-87-5    | 1,2-Dichloropropane       | 206                 | 203          | 204           | 99         | 99   | 70-118               | 0   | 25  |      |
| 75-27-4    | Bromodichloromethane      | 208                 | 213          | 216           | 102        | 104  | 74-119               | 2   | 25  |      |
| 79-01-6    | Trichloroethene           | 204                 | 216          | 218           | 106        | 107  | 74-115               | 0.9 | 25  |      |
| 123-91-1   | 1,4-Dioxane               | 206                 | 205          | 207           | 100        | 100  | 77-124               | 0   | 25  |      |
| 80-62-6    | Methyl Methacrylate       | 410                 | 449          | 456           | 110        | 111  | 78-126               | 0.9 | 25  |      |
| 142-82-5   | n-Heptane                 | 206                 | 218          | 218           | 106        | 106  | 70-119               | 0   | 25  |      |
| 10061-01-5 | cis-1,3-Dichloropropene   | 208                 | 215          | 217           | 103        | 104  | 81-126               | 1   | 25  |      |
| 108-10-1   | 4-Methyl-2-pentanone      | 412                 | 440          | 440           | 107        | 107  | 73-129               | 0   | 25  |      |
| 10061-02-6 | trans-1,3-Dichloropropene | 200                 | 200          | 202           | 100        | 101  | 80-127               | 1   | 25  |      |
| 79-00-5    | 1,1,2-Trichloroethane     | 208                 | 209          | 210           | 100        | 101  | 78-117               | 1   | 25  |      |
| 108-88-3   | Toluene                   | 206                 | 200          | 207           | 97         | 100  | 70-118               | 3   | 25  |      |
| 591-78-6   | 2-Hexanone                | 406                 | 358          | 367           | 88         | 90   | 74-132               | 2   | 25  |      |
| 124-48-1   | Dibromochloromethane      | 210                 | 204          | 212           | 97         | 101  | 69-137               | 4   | 25  |      |
| 106-93-4   | 1,2-Dibromoethane         | 208                 | 189          | 196           | 91         | 94   | 76-128               | 3   | 25  |      |
| 123-86-4   | n-Butyl Acetate           | 406                 | 371          | 378           | 91         | 93   | 75-134               | 2   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.



# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improvements / 41077-013. AAR No. 13

ALS Project ID: P2200535

ALS Sample ID: P220210-DLCS

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16

**Analyst:** Wida Ang

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 2/10/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #       | Compound                    | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-------------|-----------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|             |                             | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 111-65-9    | n-Octane                    | 208                 | 207          | 213           | 100        | 102  | 68-120               | 2   | 25  |      |
| 127-18-4    | Tetrachloroethene           | 212                 | 206          | 212           | 97         | 100  | 63-130               | 3   | 25  |      |
| 108-90-7    | Chlorobenzene               | 206                 | 210          | 215           | 102        | 104  | 70-118               | 2   | 25  |      |
| 100-41-4    | Ethylbenzene                | 206                 | 212          | 217           | 103        | 105  | 71-123               | 2   | 25  |      |
| 179601-23-1 | m,p-Xylenes                 | 416                 | 441          | 452           | 106        | 109  | 67-127               | 3   | 25  |      |
| 75-25-2     | Bromoform                   | 210                 | 193          | 200           | 92         | 95   | 65-149               | 3   | 25  |      |
| 100-42-5    | Styrene                     | 202                 | 205          | 210           | 101        | 104  | 76-132               | 3   | 25  |      |
| 95-47-6     | o-Xylene                    | 208                 | 223          | 227           | 107        | 109  | 69-124               | 2   | 25  |      |
| 111-84-2    | n-Nonane                    | 208                 | 205          | 208           | 99         | 100  | 64-127               | 1   | 25  |      |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | 208                 | 229          | 235           | 110        | 113  | 69-128               | 3   | 25  |      |
| 98-82-8     | Cumene                      | 206                 | 218          | 223           | 106        | 108  | 69-125               | 2   | 25  |      |
| 80-56-8     | alpha-Pinene                | 210                 | 244          | 250           | 116        | 119  | 68-129               | 3   | 25  |      |
| 103-65-1    | n-Propylbenzene             | 208                 | 220          | 225           | 106        | 108  | 70-127               | 2   | 25  |      |
| 622-96-8    | 4-Ethyltoluene              | 208                 | 221          | 227           | 106        | 109  | 69-127               | 3   | 25  |      |
| 108-67-8    | 1,3,5-Trimethylbenzene      | 208                 | 227          | 232           | 109        | 112  | 66-129               | 3   | 25  |      |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 206                 | 245          | 248           | 119        | 120  | 63-142               | 0.8 | 25  |      |
| 100-44-7    | Benzyl Chloride             | 416                 | 448          | 460           | 108        | 111  | 73-145               | 3   | 25  |      |
| 541-73-1    | 1,3-Dichlorobenzene         | 208                 | 225          | 230           | 108        | 111  | 67-136               | 3   | 25  |      |
| 106-46-7    | 1,4-Dichlorobenzene         | 210                 | 192          | 197           | 91         | 94   | 63-134               | 3   | 25  |      |
| 95-50-1     | 1,2-Dichlorobenzene         | 210                 | 237          | 240           | 113        | 114  | 64-139               | 0.9 | 25  |      |
| 5989-27-5   | d-Limonene                  | 206                 | 255          | 259           | 124        | 126  | 63-137               | 2   | 25  |      |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | 404                 | 459          | 469           | 114        | 116  | 72-145               | 2   | 25  |      |
| 120-82-1    | 1,2,4-Trichlorobenzene      | 420                 | 398          | 404           | 95         | 96   | 62-154               | 1   | 25  |      |
| 91-20-3     | Naphthalene                 | 210                 | 144          | 147           | 69         | 70   | 62-156               | 1   | 25  |      |
| 87-68-3     | Hexachlorobutadiene         | 212                 | 214          | 218           | 101        | 103  | 55-142               | 2   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.



AtmAA Inc.

23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250

specialized air assessment laboratory  
atmaa.com

February 18, 2022

LTR/1914/22

Nicole Bryson  
ALS Environmental  
2655 Park Center Drive, Suite A  
Simi Valley, CA 93065

RE: City of Tampa HFC AWTP Master Plan Improvements /  
P2200535

Dear Nicole:

Please find enclosed the laboratory analysis report, quality assurance summary, and the chain of custody form for two SUMMA canister samples received from City of Tampa HFC AWTP P2200535 received February 11, 2022.

The SUMMA canister samples were analyzed for ASTM 3588 BTU as requested on the chain of custody form.

Sincerely,

AtmAA, Inc.

Brian W. Fung  
Laboratory Director

**LABORATORY ANALYSIS REPORT**

## Speciated Hydrocarbons Analysis in SUMMA Canister Sample

Report Date: February 18, 2022  
Client: ALS Environmental  
Project Name: City of Tampa HFC AWTP Master Plan Improvements  
Project No.: P2200535  
Date Received: February 11, 2022  
Date Analyzed: February 11, 2022

**ANALYSIS DESCRIPTION**

*Hydrocarbon Speciation analysis was performed by flame ionization detection/gas chromatography (FID/GC), modified EPA-18. Hydrogen sulfide measured by gas chromatography with sulfur chemiluminescence detector (SCD).*

|                          |                          |                              |
|--------------------------|--------------------------|------------------------------|
| AtmAA Lab No.:           | 20422-3                  | 20422-3                      |
| Sample ID:               | Digester 6 #1            | Digester 6 #1                |
|                          | P2200535-001             | P2200535-001                 |
| <u>Component</u>         | <u>(ppmv, component)</u> | <u>(% by vol, component)</u> |
| Methane                  | 558000                   | 55.80                        |
| Ethene                   | <0.60                    | <0.01                        |
| Acetylene                | <0.60                    | <0.01                        |
| Ethane                   | <0.60                    | <0.01                        |
| Hydrogen sulfide         | 15600                    | 1.56                         |
| non-methane hydrocarbons |                          |                              |
| analysis by carbon       |                          |                              |
| <u>number grouping</u>   |                          |                              |
| C3 as Propane            | <0.10                    | <0.01                        |
| C4 as n-Butane           | 3.27                     | <0.01                        |
| C5 as n-Pentane          | 3.51                     | <0.01                        |
| C6 as n-Hexane           | 4.67                     | <0.01                        |
| >C6 as n-Hexane          | 48.2                     | <0.01                        |

|       |                     |                       |
|-------|---------------------|-----------------------|
|       | (ppmvC, as methane) | (% by vol, component) |
| TNMHC | 596                 | <0.01                 |

TNMHC - total non-methane hydrocarbons as ppmvC, as methane.  
Actual analysis results are reported on a "wet" basis.

Brian W. Fung  
Laboratory Director

# QUALITY ASSURANCE SUMMARY

(Repeat Analyses)

Project Name: City of Tampa HFC AWTP Master Plan Improvements  
 Project No.: P2200535  
 Date Received: February 11, 2022  
 Date Analyzed: February 11, 2022

| Component                                                   | Sample ID     | Repeat Analysis |        | Mean Conc. | % Diff. From Mean |
|-------------------------------------------------------------|---------------|-----------------|--------|------------|-------------------|
|                                                             |               | Run #1          | Run #2 |            |                   |
| (Conc. in ppmv, component)                                  |               |                 |        |            |                   |
| Methane                                                     | Digester 6 #1 | 557000          | 559000 | 558000     | 0.18              |
| Ethene                                                      | Digester 6 #1 | <0.60           | <0.60  | <0.60      | ---               |
| Acetylene                                                   | Digester 6 #1 | <0.60           | <0.60  | <0.60      | ---               |
| Ethane                                                      | Digester 6 #1 | <0.60           | <0.60  | <0.60      | ---               |
| non-methane hydrocarbons analysis by carbon number grouping |               |                 |        |            |                   |
| C3                                                          | Digester 6 #1 | <0.10           | <0.10  | <0.10      | ---               |
| C4                                                          | Digester 6 #1 | 3.24            | 3.29   | 3.27       | 0.77              |
| C5                                                          | Digester 6 #1 | 3.58            | 3.44   | 3.51       | 2.0               |
| C6                                                          | Digester 6 #1 | 4.65            | 4.70   | 4.67       | 0.49              |
| C7                                                          | Digester 6 #1 | 1.34            | 1.32   | 1.33       | 1.0               |
| C8                                                          | Digester 6 #1 | 1.56            | 1.61   | 1.59       | 1.7               |
| C9                                                          | Digester 6 #1 | 2.16            | 2.34   | 2.25       | 4.0               |
| C10                                                         | Digester 6 #1 | 10.8            | 11.4   | 11.1       | 2.6               |
| C11                                                         | Digester 6 #1 | 9.83            | 11.7   | 10.8       | 8.8               |
| C12                                                         | Digester 6 #1 | 9.90            | 10.9   | 10.4       | 4.7               |
| C13                                                         | Digester 6 #1 | 8.99            | 10.1   | 9.53       | 5.7               |
| C14                                                         | Digester 6 #1 | 1.14            | 1.31   | 1.22       | 7.0               |
| (Conc. in ppmvC, as methane)                                |               |                 |        |            |                   |
| TNMHC                                                       | Digester 6 #1 | 568             | 624    | 596        | 4.8               |

One SUMMA canister sample, laboratory number 20422-3, was analyzed for hydrocarbon speciation, EPA Method 18. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". The average % difference from mean for 13 repeat measurements from one SUMMA canister sample is 3.4%.



## Calculated values for Specific Volume, BTU, and F (factor)

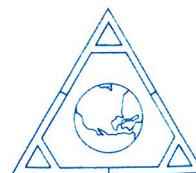
Report Date: February 18, 2022  
 Client: ALS Environmental  
 Project Name: City of Tampa HFC AWTP Master Plan Improvements  
 Date Received: February 11, 2022  
 Date Analyzed: February 11, 2022  
 AtmAA Lab #: 20422-3  
 Sample ID: Digester 6 #1

Specific volume, BTU, and F-factor are calculated using laboratory analysis results for methane, carbon dioxide, nitrogen, oxygen, TNMHC, and sulfur compounds in equations that include gross/net heating and specific gas volume values taken from the GPA-2145 Midstream Standard. Heating value factor is a calculated according to ASTM 3588-98 (14.696 psia and 60°F). The F-factor is calculated according to the equation in EPA Method 19.

| Component                                            | Mole % | Wt %   | C,H,O,N,S, Wt. % |             |
|------------------------------------------------------|--------|--------|------------------|-------------|
| Methane                                              | 55.7   | 32.7   | Carbon           | 40.1        |
| Carbon dioxide                                       | 35.3   | 57.1   | Hydrogen         | 8.29        |
| Nitrogen                                             | 6.11   | 6.28   | Oxygen           | 43.4        |
| Oxygen                                               | 1.61   | 1.89   | Nitrogen         | 6.28        |
| Argon                                                | 0.07   | 0.10   | Argon            | 0.10        |
| Hydrogen                                             | 0.00   | 0.00   | Sulfur           | 1.83        |
| (CH <sub>2</sub> ) <sub>n</sub>                      | 0.01   | 0.03   |                  |             |
| Specific Volume                                      |        | 13.95  |                  |             |
| BTU/ft <sup>3</sup> (Dry @60F, 14.696 psia)          |        | 572.7  | (HHV)            | 515.9 (LHV) |
| BTU/ft <sup>3</sup> (Water Saturated @ 0.25636 psia) |        | 562.7  | (HHV)            | 506.9 (LHV) |
| BTU/lb (Dry @60F, 14.696 psia)                       |        | 7990   | (HHV)            | 7197 (LHV)  |
| F <sub>d</sub> (factor)                              |        | 9200   |                  |             |
| F <sub>w</sub> (factor)                              |        | 11203  |                  |             |
| F <sub>c</sub> (factor)                              |        | 1611   |                  |             |
| Compressibility Factor (@60F, 14.696 psia)           |        | 0.9970 |                  |             |
| Wobbe Index                                          |        | 590.3  |                  |             |
| Specific Gravity                                     |        | 0.9414 |                  |             |

| Component      | Specific volume<br>reference values * |
|----------------|---------------------------------------|
| Methane        | 23.7 (ft <sup>3</sup> /lb)            |
| Carbon dioxide | 8.62                                  |
| Nitrogen       | 13.5                                  |
| Oxygen         | 11.9                                  |
| Argon          | 9.52                                  |
| Hydrogen       | 188.2                                 |

\* reference, Rev. 2016, GPA-2145 Midstream Standard, Selected Hydrocarbons 60°F







## LABORATORY ANALYSIS REPORT

### Speciated Hydrocarbons Analysis in SUMMA Canister Sample

Report Date: February 18, 2022  
Client: ALS Environmental  
Project Name: City of Tampa HFC AWTP Master Plan Improvements  
Project No.: P2200535  
Date Received: February 11, 2022  
Date Analyzed: February 11, 2022

### ANALYSIS DESCRIPTION

*Hydrocarbon Speciation analysis was performed by flame ionization detection/gas chromatography (FID/GC), modified EPA-18. Hydrogen sulfide measured by gas chromatography with sulfur chemiluminescence detector (SCD).*

|                                                                   |                   |                       |
|-------------------------------------------------------------------|-------------------|-----------------------|
| AtmAA Lab No.:                                                    | 20422-4           | 20422-4               |
| Sample ID:                                                        | Digester 2/3 #1   | Digester 2/3 #1       |
|                                                                   | P2200535-002      | P2200535-002          |
| Component                                                         | (ppmv, component) | (% by vol, component) |
| Methane                                                           | 547000            | 54.70                 |
| Ethene                                                            | <0.60             | <0.01                 |
| Acetylene                                                         | <0.60             | <0.01                 |
| Ethane                                                            | <0.60             | <0.01                 |
| Hydrogen sulfide                                                  | 14500             | 1.45                  |
| non-methane hydrocarbons<br>analysis by carbon<br>number grouping |                   |                       |
| C3 as Propane                                                     | <0.10             | <0.01                 |
| C4 as n-Butane                                                    | 0.82              | <0.01                 |
| C5 as n-Pentane                                                   | 1.64              | <0.01                 |
| C6 as n-Hexane                                                    | 1.71              | <0.01                 |
| >C6 as n-Hexane                                                   | 37.5              | <0.01                 |

|       |                     |                       |
|-------|---------------------|-----------------------|
|       | (ppmvC, as methane) | (% by vol, component) |
| TNMHC | 434                 | <0.01                 |

TNMHC - total non-methane hydrocarbons as ppmvC, as methane.  
Actual analysis results are reported on a "wet" basis.

Brian W. Fung  
Laboratory Director

## Calculated values for Specific Volume, BTU, and F (factor)

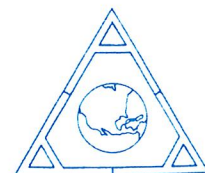
Report Date: February 18, 2022  
 Client: ALS Environmental  
 Project Name: City of Tampa HFC AWTP Master Plan Improvements  
 Date Received: February 11, 2022  
 Date Analyzed: February 11, 2022  
 AtmAA Lab #: 20422-4  
 Sample ID: Digester 2/3 #1

Specific volume, BTU, and F-factor are calculated using laboratory analysis results for methane, carbon dioxide, nitrogen, oxygen, TNMHC, and sulfur compounds in equations that include gross/net heating and specific gas volume values taken from the GPA-2145 Midstream Standard. Heating value factor is a calculated according to ASTM 3588-98 (14.696 psia and 60°F). The F-factor is calculated according to the equation in EPA Method 19.

| Component                                  | Mole % | Wt %   | C,H,O,N,S, Wt. % |             |
|--------------------------------------------|--------|--------|------------------|-------------|
| Methane                                    | 54.7   | 31.6   | Carbon           | 39.1        |
| Carbon dioxide                             | 35.6   | 56.6   | Hydrogen         | 8.01        |
| Nitrogen                                   | 7.56   | 7.63   | Oxygen           | 43.4        |
| Oxygen                                     | 1.97   | 2.28   | Nitrogen         | 7.63        |
| Argon                                      | 0.09   | 0.13   | Argon            | 0.13        |
| Hydrogen                                   | 0.00   | 0.00   | Sulfur           | 1.67        |
| (CH <sub>2</sub> ) <sub>n</sub>            | 0.00   | 0.02   |                  |             |
| Specific Volume                            |        | 13.86  |                  |             |
| BTU/ft3 (Dry @60F, 14.696 psia)            |        | 562.4  | (HHV)            | 506.6 (LHV) |
| BTU/ft3 (Water Saturated @ 0.25636 psia)   |        | 552.6  | (HHV)            | 497.8 (LHV) |
| BTU/lb (Dry @60F, 14.696 psia)             |        | 7796   | (HHV)            | 7023 (LHV)  |
| F <sub>d</sub> (factor)                    |        | 9117   |                  |             |
| F <sub>w</sub> (factor)                    |        | 11098  |                  |             |
| F <sub>c</sub> (factor)                    |        | 1612   |                  |             |
| Compressibility Factor (@60F, 14.696 psia) |        | 0.9970 |                  |             |
| Wobbe Index                                |        | 574.8  |                  |             |
| Specific Gravity                           |        | 0.9577 |                  |             |

| Component      | Specific volume<br>reference values * |
|----------------|---------------------------------------|
| Methane        | 23.7 (ft <sup>3</sup> /lb)            |
| Carbon dioxide | 8.62                                  |
| Nitrogen       | 13.5                                  |
| Oxygen         | 11.9                                  |
| Argon          | 9.52                                  |
| Hydrogen       | 188.2                                 |

\* reference, Rev. 2016, GPA-2145 Midstream Standard, Selected Hydrocarbons 60°F



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ALS Contact: Nicole Bryson

2655 Park Center Drive, Suite A • Simi Valley, CA 93065 • 805-526-7161 • FAX

Project Number: P2200535

**Project Manager:** Nicole Bryson

OAP: LAB QAP

QAP: LABQAP  
Project Name City of Tampa HFC AWP Master Plan Improvements

| Lab Code     | Sample ID       | # of Cont. | Matrix | Sample |      | Lab ID |
|--------------|-----------------|------------|--------|--------|------|--------|
|              |                 |            |        | Date   | Time |        |
| P2200535-001 | Digester 6 #1   | 1          | Air    | 2/4/22 | 0921 | X      |
| P2200535-002 | Digester 2/3 #1 | 1          | Air    | 2/4/22 | 0943 | X      |

Atm AA H  
20422-3  
-4

### Test Comments

Misc Out 1 - None

ASTM D 3588 - BTU

P2200535-001.2

**Folder Comments:**

### Canisters were backfilled with Helium

|                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                       |                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <b>Special Instructions/Comments</b><br><br><div>Report using Client project Name / ID</div> <div>Send Report to <a href="mailto:Sue.Anderson@ALSGlobal.com">Sue.Anderson@ALSGlobal.com</a></div> <div>Send Invoice AP and cc PM:</div> <div><a href="mailto:ALSUSA_AccountsPayable@alsglobal.com">ALSUSA_AccountsPayable@alsglobal.com</a></div> | <b>Turnaround Requirements</b><br><input checked="" type="checkbox"/> <b>RUSH</b> (Surcharges Apply)<br><b>PLEASE CIRCLE WORK DAYS</b><br><div>1    2    3    4    5</div> <input type="checkbox"/> <b>STANDARD</b> | <b>Report Requirements</b><br><input type="checkbox"/> I. Results Only<br><input checked="" type="checkbox"/> II. Results + QC Summaries<br><input type="checkbox"/> III. Results + QC and Calibration Summaries<br><input type="checkbox"/> IV. Data Validation Report with Raw Data | <b>Invoice Information</b><br><br><div>PO#</div> <div>54P2200535</div> <div>Bill to</div> |
| <div>H - Test is On Hold</div> <div>P - Test is Authorized for Prep Only</div>                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                       |                                                                                           |

Relinquished By: 10 Received By: [Signature] 2/11/22  
 2/10/22 9:30 Airbill Number: 9530





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## LABORATORY REPORT

April 5, 2022

Caryssa Joustra, PhD  
Hazen And Sawyer, P.C.  
1000 N. Ashley Dr Suite 1000  
Tampa, FL 33602

**RE: City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13**

Dear Caryssa:

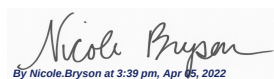
Enclosed are the results of the samples submitted to our laboratory on March 11, 2022. The canister sample was sent out for partial analysis to AtmAA, Inc. Please find their report (Lab No.: 20912-8). For your reference, these analyses have been assigned our service request number P2201098.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at [www.alsglobal.com](http://www.alsglobal.com). Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

**ALS | Environmental**



By Nicole.Bryson at 3:39 pm, Apr 05, 2022

Nicole Bryson  
Laboratory Director



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Simi Valley, CA 93065  
T: +1 805 526 7161  
[www.alsglobal.com](http://www.alsglobal.com)

Client: Hazen And Sawyer, P.C.

Service Request No: P2201098

Project: City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

---

## CASE NARRATIVE

The samples were received intact under chain of custody on March 11, 2022 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

### Sulfur Analysis

Sample Digester 6 #2 (P201098-003) was analyzed for twenty sulfur compounds per ASTM D 5504-12 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan. This method is included on the laboratory's NELAP scope of accreditation, however it is not part of the DoD-ELAP accreditation.

### Siloxanes Analysis

The tube samples were analyzed for siloxanes according to ASTM D8230-19 using an analytical system comprised of a gas chromatograph/mass spectrometer (GC/MS). This method is not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.

### Volatile Organic Compound Analysis

Sample Digester 6 #2 (P2201098-003) was also analyzed for volatile organic compounds and tentatively identified compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. The method was modified to include the use of helium as a diluent gas in place of zero-grade air for container pressurization. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The upper control criteria were exceeded for ethanol, 2-hexanone, n-butyl acetate and d-limonene in the Laboratory Control Sample (LCS) and Duplicate Laboratory Control Sample (DLCS) analyzed on March 29, 2022. Therefore, there exists a potential for high bias in the associated data. Additionally, the spike recoveries of isopropanol, 2-butanone and tetrahydrofuran for the LCS and 2-butanone, tetrahydrofuran, n-octane and n-nonane for the DLCS analyzed on March 29, 2022 were outside the laboratory generated control criteria. The recovery errors equate to a potential high bias. However, the spike recoveries of the analytes in question were within the method criteria; therefore, the data quality has not been significantly affected.



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Client: Hazen And Sawyer, P.C.

Service Request No: P2201098

Project: City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

---

## CASE NARRATIVE

The reporting limits have been elevated in the sample because chromatogram indicated the presence of non-target background components. Therefore, the sample was diluted in order to prevent damage to the instrument and to achieve optimal resolution of the target analytes.

The containers were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. For projects requiring DoD QSM 5.3 compliance canisters were cleaned to <1/2 the MRL. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

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*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*



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ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

| Agency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Web Site                                                                                                                                                                                                                                            | Number                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Alaska DEC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <a href="http://dec.alaska.gov/eh/lab.aspx">http://dec.alaska.gov/eh/lab.aspx</a>                                                                                                                                                                   | 17-019                  |
| Arizona DHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <a href="http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home">http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home</a> | AZ0694                  |
| Florida DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <a href="http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html">http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html</a>                                               | E871020                 |
| Louisiana DEQ (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>                                                                                                                         | 05071                   |
| Maine DHHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <a href="http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml">http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml</a>                                                             | 2018027                 |
| Minnesota DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>                                                                                                                                               | 1776326                 |
| New Jersey DEP (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>                                                                                                                                                 | CA009                   |
| New York DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <a href="http://www.wadsworth.org/labcert/elap/elap.html">http://www.wadsworth.org/labcert/elap/elap.html</a>                                                                                                                                       | 11221                   |
| Oregon PHD (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <a href="http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>                           | 4068-008                |
| Pennsylvania DEP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx">http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx</a>                                           | 68-03307 (Registration) |
| PJLA (DoD ELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <a href="http://www.pjlabs.com/search-accredited-labs">http://www.pjlabs.com/search-accredited-labs</a>                                                                                                                                             | 65818 (Testing)         |
| Texas CEQ (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <a href="http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html</a>                                                                                                         | T104704413-19-10        |
| Utah DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="http://health.utah.gov/lab/lab_cert_env">http://health.utah.gov/lab/lab_cert_env</a>                                                                                                                                                       | CA016272019-10          |
| Washington DOE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>                                                                                                         | C946                    |
| <p>Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at <a href="http://www.alsglobal.com">www.alsglobal.com</a>, or at the accreditation body's website.</p> <p>Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.</p> |                                                                                                                                                                                                                                                     |                         |

# ALS ENVIRONMENTAL

## DETAIL SUMMARY REPORT

Client: Hazen And Sawyer, P.C.

Project ID: City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

Service Request: P2201098

Date Received: 3/11/2022

Time Received: 14:26

| Client Sample ID | Lab Code     | Matrix | Date Collected | Time Collected | Container ID | Pi1 (psig) | Pf1 (psig) | ASTM D8230 - Siloxanes Tube | ASTM D 5504-12 - Sulfur Can | TO-15 Modified - VOC Cans | None - Misc Out 1 |
|------------------|--------------|--------|----------------|----------------|--------------|------------|------------|-----------------------------|-----------------------------|---------------------------|-------------------|
| Digester 6 #1S   | P2201098-001 | Air    | 3/10/2022      | 09:31          |              |            |            | X                           |                             |                           |                   |
| Digester 2/3 #1S | P2201098-002 | Air    | 3/10/2022      | 10:41          |              |            |            | X                           |                             |                           |                   |
| Digester 6 #2    | P2201098-003 | Air    | 3/10/2022      | 10:01          | AS00890      | 2.07       | 3.82       |                             | X                           | X                         |                   |

[illegible]



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #2

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P2201098-003

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS00890

Date Collected: 3/10/22

Time Collected: 10:01

Date Received: 3/11/22

Date Analyzed: 3/14/22

Time Analyzed: 09:01

Volume(s) Analyzed: 1.0 ml(s)

Container Dilution Factor: 1.77

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | 28,000,000      | 12           | 20,000,000     | 8.9         |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 22           | ND             | 8.9         |                   |
| 74-93-1   | Methyl Mercaptan      | 77,000          | 17           | 39,000         | 8.9         |                   |
| 75-08-1   | Ethyl Mercaptan       | 5,500           | 22           | 2,200          | 8.9         |                   |
| 75-18-3   | Dimethyl Sulfide      | 12,000          | 22           | 4,900          | 8.9         |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 14           | ND             | 4.4         |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 28           | ND             | 8.9         |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 33           | ND             | 8.9         |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 28           | ND             | 8.9         |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 28           | ND             | 8.9         |                   |
| 110-02-1  | Thiophene             | ND              | 30           | ND             | 8.9         |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 33           | ND             | 8.9         |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 33           | ND             | 8.9         |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 33           | ND             | 8.9         |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 17           | ND             | 4.4         |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 36           | ND             | 8.9         |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 32           | ND             | 8.9         |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 41           | ND             | 8.9         |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 41           | ND             | 8.9         |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 22           | ND             | 4.4         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

### Total Reduced Sulfur as Hydrogen Sulfide

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister(s)

Test Notes:

Date(s) Collected: 3/10/22

Date Received: 3/11/22

Date Analyzed: 3/14/22

| Client Sample ID | ALS Sample ID | Container<br>Dilution<br>Factor | Injection<br>Volume<br>ml(s) | Time<br>Analyzed | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------------|---------------|---------------------------------|------------------------------|------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| Digester 6 #2    | P2201098-003  | 1.77                            | 1.0                          | 09:01            | 28,000,000                  | 12                       | 20,000,000     | 8.9         |                   |
| Method Blank     | P220314-MB    | 1.00                            | 1.0                          | 08:21            | ND                          | 7.0                      | ND             | 5.0         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220314-MB

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Time Collected: NA

Date Received: NA

Date Analyzed: 3/14/22

Time Analyzed: 08:21

Volume(s) Analyzed: 1.0 ml(s)

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | ND              | 7.0          | ND             | 5.0         |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 12           | ND             | 5.0         |                   |
| 74-93-1   | Methyl Mercaptan      | ND              | 9.8          | ND             | 5.0         |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 13           | ND             | 5.0         |                   |
| 75-18-3   | Dimethyl Sulfide      | ND              | 13           | ND             | 5.0         |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 7.8          | ND             | 2.5         |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 16           | ND             | 5.0         |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 18           | ND             | 5.0         |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 16           | ND             | 5.0         |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 16           | ND             | 5.0         |                   |
| 110-02-1  | Thiophene             | ND              | 17           | ND             | 5.0         |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 18           | ND             | 5.0         |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 18           | ND             | 5.0         |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 18           | ND             | 5.0         |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 9.6          | ND             | 2.5         |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 20           | ND             | 5.0         |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 18           | ND             | 5.0         |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 23           | ND             | 5.0         |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 23           | ND             | 5.0         |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 12           | ND             | 2.5         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220314-DLCS

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 3/14/22

Volume(s) Analyzed: NA ml(s)

| CAS #     | Compound         | Spike Amount       | Result      |              | % Recovery |            | ALS                  | RPD | RPD | Data |
|-----------|------------------|--------------------|-------------|--------------|------------|------------|----------------------|-----|-----|------|
|           |                  | LCS / DLCS<br>ppbV | LCS<br>ppbV | DLCS<br>ppbV | LCS        | DLCS       | Acceptance<br>Limits |     |     |      |
| 7783-06-4 | Hydrogen Sulfide | 989                | 951         | 897          | <b>96</b>  | <b>91</b>  | 72-122               | 5   | 18  |      |
| 463-58-1  | Carbonyl Sulfide | 1,050              | 1,030       | 1,020        | <b>98</b>  | <b>97</b>  | 72-121               | 1   | 17  |      |
| 74-93-1   | Methyl Mercaptan | 1,050              | 1,120       | 1,070        | <b>107</b> | <b>102</b> | 74-127               | 5   | 18  |      |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #1S

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P2201098-001

Test Code: ASTM D8230-19

Instrument ID: Agilent 5973N/HP6890A/MS7

Analyst: Mathew Meyer

Sample Type: Siloxane Tube

Test Notes: **BC, DE**

Date Collected: 3/10/22

Date Received: 3/11/22

Date Analyzed: 3/21 - 3/22/22

Desorption Volume: 3.0 ml

Volume Sampled: 6 Liter(s)

| CAS #                | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|----------------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6            | Trimethylsilanol                                | 0.85              | <b>140</b>      | 50           | <b>44</b>                     | 15           |                   |
| 107-46-0             | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.30            | ND              | 51           | ND                            | 17           |                   |
| 541-05-9             | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | 0.66              | <b>110</b>      | 58           | <b>42</b>                     | 22           |                   |
| 107-51-7             | Octamethyltrisiloxane (L <sub>3</sub> )         | < 0.30            | ND              | 51           | ND                            | 18           |                   |
| 556-67-2             | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | 14                | <b>2,400</b>    | 51           | <b>890</b>                    | 19           |                   |
| 141-62-8             | Decamethyltetrasiloxane (L <sub>4</sub> )       | 0.57              | <b>96</b>       | 51           | <b>35</b>                     | 18           |                   |
| 541-02-6             | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | 82                | <b>14,000</b>   | 51           | <b>5,200</b>                  | 19           |                   |
| 141-63-9             | Dodecamethylpentasiloxane (L <sub>5</sub> )     | 0.81              | <b>130</b>      | 51           | <b>49</b>                     | 19           |                   |
| 540-97-6             | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | 1.2               | <b>200</b>      | 50           | <b>75</b>                     | 19           |                   |
| <b>Total Silicon</b> |                                                 |                   |                 |              | <b>6,300</b>                  |              |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 2/3 #1S

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P2201098-002

**Test Code:** ASTM D8230-19

**Instrument ID:** Agilent 5973N/HP6890A/MS7

**Analyst:** Mathew Meyer

**Sample Type:** Siloxane Tube

**Test Notes:** BC, DE

Date Collected: 3/10/22

Date Received: 3/11/22

Date Analyzed: 3/21 - 3/22/22

Desorption Volume: 3.0 ml

Volume Sampled: 6 Liter(s)

| CAS #                | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|----------------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6            | Trimethylsilanol                                | 0.40              | 67              | 50           | 21                            | 15           |                   |
| 107-46-0             | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.30            | ND              | 51           | ND                            | 17           |                   |
| 541-05-9             | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | < 0.35            | ND              | 58           | ND                            | 22           |                   |
| 107-51-7             | Octamethyltrisiloxane (L <sub>3</sub> )         | < 0.30            | ND              | 51           | ND                            | 18           |                   |
| 556-67-2             | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | 12                | 2,000           | 51           | 760                           | 19           |                   |
| 141-62-8             | Decamethyltetrasiloxane (L <sub>4</sub> )       | 0.72              | 120             | 51           | 43                            | 18           |                   |
| 541-02-6             | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | 81                | 14,000          | 51           | 5,100                         | 19           |                   |
| 141-63-9             | Dodecamethylpentasiloxane (L <sub>5</sub> )     | 1.1               | 190             | 51           | 70                            | 19           |                   |
| 540-97-6             | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | 1.4               | 230             | 50           | 88                            | 19           |                   |
| <b>Total Silicon</b> |                                                 |                   |                 |              | <b>6,100</b>                  |              |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220321-MB

Test Code: ASTM D8230-19

Instrument ID: Agilent 5973N/HP6890A/MS7

Analyst: Mathew Meyer

Sample Type: Siloxane Tube

Test Notes: BC, DE

Date Collected: NA

Date Received: NA

Date Analyzed: 3/21/22

Desorption Volume: 3.0 ml

Volume Sampled: NA Liter(s)

| CAS #         | Compound                                        | Result<br>µg/Tube | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>as Silicon<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Data<br>Qualifier |
|---------------|-------------------------------------------------|-------------------|-----------------------------|--------------------------|-------------------------------------------|--------------------------|-------------------|
| 1066-40-6     | Trimethylsilanol                                | < 0.30            | NA                          | NA                       | NA                                        | NA                       |                   |
| 107-46-0      | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.30            | NA                          | NA                       | NA                                        | NA                       |                   |
| 541-05-9      | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | < 0.35            | NA                          | NA                       | NA                                        | NA                       |                   |
| 107-51-7      | Octamethyltrisiloxane (L <sub>3</sub> )         | < 0.30            | NA                          | NA                       | NA                                        | NA                       |                   |
| 556-67-2      | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | < 0.30            | NA                          | NA                       | NA                                        | NA                       |                   |
| 141-62-8      | Decamethyltetrasiloxane (L <sub>4</sub> )       | < 0.31            | NA                          | NA                       | NA                                        | NA                       |                   |
| 541-02-6      | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | < 0.30            | NA                          | NA                       | NA                                        | NA                       |                   |
| 141-63-9      | Dodecamethylpentasiloxane (L <sub>5</sub> )     | < 0.30            | NA                          | NA                       | NA                                        | NA                       |                   |
| 540-97-6      | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | < 0.30            | NA                          | NA                       | NA                                        | NA                       |                   |
| Total Silicon |                                                 |                   |                             |                          | NA                                        |                          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

NA = Not applicable.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220321-DLCS

Test Code: ASTM D8230-19

Instrument ID: Agilent 5973N/HP6890A/MS7

Analyst: Mathew Meyer

Sampling Type: Siloxane Tube

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 3/21/22

Volume(s) Analyzed: NA Liter(s)

| CAS #     | Compound                      | Spike Amount | Result |       | % Recovery |            | ALS        | RPD | RPD   | Data      |
|-----------|-------------------------------|--------------|--------|-------|------------|------------|------------|-----|-------|-----------|
|           |                               | LCS / DLCS   | LCS    | DLCS  | LCS        | DLCS       | Acceptance |     |       |           |
|           |                               | µg/ml        | µg/ml  | µg/ml |            |            | Limits     |     | Limit | Qualifier |
| 1066-40-6 | Trimethylsilanol              | 10.3         | 8.69   | 8.19  | <b>84</b>  | <b>80</b>  | 70-130     | 5   | 25    |           |
| 107-46-0  | Hexamethyldisiloxane          | 11.4         | 12.5   | 11.7  | <b>110</b> | <b>103</b> | 70-130     | 7   | 25    |           |
| 541-05-9  | Hexamethylcyclotrisiloxane    | 11.6         | 12.2   | 11.5  | <b>105</b> | <b>99</b>  | 70-130     | 6   | 25    |           |
| 107-51-7  | Octamethyltrisiloxane         | 11.9         | 13.0   | 12.2  | <b>109</b> | <b>103</b> | 70-130     | 6   | 25    |           |
| 556-67-2  | Octamethylcyclotetrasiloxane  | 12.0         | 13.1   | 12.3  | <b>109</b> | <b>103</b> | 70-130     | 6   | 25    |           |
| 141-62-8  | Decamethyltetrasiloxane       | 11.8         | 12.9   | 12.2  | <b>109</b> | <b>103</b> | 70-130     | 6   | 25    |           |
| 541-02-6  | Decamethylcyclopentasiloxane  | 11.6         | 12.7   | 12.0  | <b>109</b> | <b>103</b> | 70-130     | 6   | 25    |           |
| 141-63-9  | Dodecamethylpentasiloxane     | 12.3         | 13.6   | 12.8  | <b>111</b> | <b>104</b> | 70-130     | 7   | 25    |           |
| 540-97-6  | Dodecamethylcyclohexasiloxane | 10.6         | 11.6   | 11.0  | <b>109</b> | <b>104</b> | 70-130     | 5   | 25    |           |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #2

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P2201098-003

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS00890

Date Collected: 3/10/22

Date Received: 3/11/22

Date Analyzed: 3/30/22

Volume(s) Analyzed: 0.0010 Liter(s)

Canister Dilution Factor: 1.77

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND                          | 460                      | ND             | 270         |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 480                      | ND             | 97          |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 460                      | ND             | 220         |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 480                      | ND             | 68          |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 460                      | ND             | 180         |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 460                      | ND             | 210         |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 460                      | ND             | 120         |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 460                      | ND             | 170         |                   |
| 64-17-5   | Ethanol                                          | ND                          | 4,400                    | ND             | 2,300       |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 890                      | ND             | 530         |                   |
| 107-02-8  | Acrolein                                         | ND                          | 890                      | ND             | 390         |                   |
| 67-64-1   | Acetone                                          | ND                          | 4,600                    | ND             | 1,900       |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 460                      | ND             | 82          |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 890                      | ND             | 360         |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 890                      | ND             | 410         |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 480                      | ND             | 120         |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 460                      | ND             | 130         |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 480                      | ND             | 150         |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 480                      | ND             | 62          |                   |
| 75-15-0   | Carbon Disulfide                                 | 1,400                       | 970                      | 460            | 310         |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 480                      | ND             | 120         |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 480                      | ND             | 120         |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 480                      | ND             | 130         |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 4,400                    | ND             | 1,300       |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND                          | 890                      | ND             | 300         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #2

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P2201098-003

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS00890

Date Collected: 3/10/22

Date Received: 3/11/22

Date Analyzed: 3/30/22

Volume(s) Analyzed: 0.0010 Liter(s)

Canister Dilution Factor: 1.77

| CAS #      | Compound                  | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND                          | 460                      | ND             | 120         |                   |
| 141-78-6   | Ethyl Acetate             | ND                          | 1,900                    | ND             | 540         |                   |
| 110-54-3   | n-Hexane                  | ND                          | 480                      | ND             | 140         |                   |
| 67-66-3    | Chloroform                | ND                          | 480                      | ND             | 98          |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND                          | 890                      | ND             | 300         |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND                          | 480                      | ND             | 120         |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND                          | 460                      | ND             | 84          |                   |
| 71-43-2    | Benzene                   | ND                          | 440                      | ND             | 140         |                   |
| 56-23-5    | Carbon Tetrachloride      | ND                          | 440                      | ND             | 70          |                   |
| 110-82-7   | Cyclohexane               | ND                          | 970                      | ND             | 280         |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND                          | 440                      | ND             | 96          |                   |
| 75-27-4    | Bromodichloromethane      | ND                          | 480                      | ND             | 71          |                   |
| 79-01-6    | Trichloroethene           | ND                          | 460                      | ND             | 86          |                   |
| 123-91-1   | 1,4-Dioxane               | ND                          | 460                      | ND             | 130         |                   |
| 80-62-6    | Methyl Methacrylate       | ND                          | 970                      | ND             | 240         |                   |
| 142-82-5   | n-Heptane                 | ND                          | 480                      | ND             | 120         |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND                          | 440                      | ND             | 98          |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND                          | 970                      | ND             | 240         |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND                          | 460                      | ND             | 100         |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND                          | 460                      | ND             | 84          |                   |
| 108-88-3   | Toluene                   | 990                         | 460                      | 260            | 120         |                   |
| 591-78-6   | 2-Hexanone                | ND                          | 970                      | ND             | 240         |                   |
| 124-48-1   | Dibromochloromethane      | ND                          | 480                      | ND             | 56          |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND                          | 460                      | ND             | 60          |                   |
| 123-86-4   | n-Butyl Acetate           | ND                          | 970                      | ND             | 200         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #2

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P2201098-003

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS00890

Date Collected: 3/10/22

Date Received: 3/11/22

Date Analyzed: 3/30/22

Volume(s) Analyzed: 0.0010 Liter(s)

Canister Dilution Factor: 1.77

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | ND              | 480          | ND             | 100         |                   |
| 127-18-4    | Tetrachloroethene           | ND              | 460          | ND             | 68          |                   |
| 108-90-7    | Chlorobenzene               | ND              | 460          | ND             | 100         |                   |
| 100-41-4    | Ethylbenzene                | 650             | 460          | 150            | 110         |                   |
| 179601-23-1 | m,p-Xylenes                 | 1,200           | 970          | 270            | 220         |                   |
| 75-25-2     | Bromoform                   | ND              | 460          | ND             | 45          |                   |
| 100-42-5    | Styrene                     | ND              | 440          | ND             | 100         |                   |
| 95-47-6     | o-Xylene                    | ND              | 460          | ND             | 110         |                   |
| 111-84-2    | n-Nonane                    | ND              | 460          | ND             | 88          |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 460          | ND             | 67          |                   |
| 98-82-8     | Cumene                      | ND              | 460          | ND             | 94          |                   |
| 80-56-8     | alpha-Pinene                | 720             | 480          | 130            | 86          |                   |
| 103-65-1    | n-Propylbenzene             | ND              | 480          | ND             | 97          |                   |
| 622-96-8    | 4-Ethyltoluene              | ND              | 480          | ND             | 97          |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND              | 460          | ND             | 94          |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 620             | 460          | 130            | 94          |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 970          | ND             | 190         |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 460          | ND             | 77          |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | 510             | 460          | 84             | 77          |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 480          | ND             | 80          |                   |
| 5989-27-5   | d-Limonene                  | ND              | 440          | ND             | 79          |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 890          | ND             | 92          |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 970          | ND             | 130         |                   |
| 91-20-3     | Naphthalene                 | ND              | 460          | ND             | 88          |                   |
| 87-68-3     | Hexachlorobutadiene         | ND              | 460          | ND             | 43          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220329-MB

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

**Analyst:** Topacio Zavala

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 3/29/22

Volume(s) Analyzed: 0.20 Liter(s)

Canister Dilution Factor: 1.00

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND                          | 1.3                      | ND             | 0.76        |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 1.4                      | ND             | 0.27        |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 1.3                      | ND             | 0.63        |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 1.4                      | ND             | 0.19        |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 1.3                      | ND             | 0.51        |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 1.3                      | ND             | 0.59        |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 1.3                      | ND             | 0.33        |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 1.3                      | ND             | 0.49        |                   |
| 64-17-5   | Ethanol                                          | ND                          | 13                       | ND             | 6.6         |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 2.5                      | ND             | 1.5         |                   |
| 107-02-8  | Acrolein                                         | ND                          | 2.5                      | ND             | 1.1         |                   |
| 67-64-1   | Acetone                                          | ND                          | 13                       | ND             | 5.5         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 1.3                      | ND             | 0.23        |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 2.5                      | ND             | 1.0         |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 2.5                      | ND             | 1.2         |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 1.4                      | ND             | 0.34        |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 1.3                      | ND             | 0.37        |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 1.4                      | ND             | 0.43        |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 1.4                      | ND             | 0.18        |                   |
| 75-15-0   | Carbon Disulfide                                 | ND                          | 2.8                      | ND             | 0.88        |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 1.4                      | ND             | 0.34        |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 1.4                      | ND             | 0.33        |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 1.4                      | ND             | 0.37        |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 13                       | ND             | 3.6         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND                          | 2.5                      | ND             | 0.85        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220329-MB

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 3/29/22

Volume(s) Analyzed: 0.20 Liter(s)

Canister Dilution Factor: 1.00

| CAS #      | Compound                  | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND              | 1.3          | ND             | 0.33        |                   |
| 141-78-6   | Ethyl Acetate             | ND              | 5.5          | ND             | 1.5         |                   |
| 110-54-3   | n-Hexane                  | ND              | 1.4          | ND             | 0.38        |                   |
| 67-66-3    | Chloroform                | ND              | 1.4          | ND             | 0.28        |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND              | 2.5          | ND             | 0.85        |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND              | 1.4          | ND             | 0.33        |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND              | 1.3          | ND             | 0.24        |                   |
| 71-43-2    | Benzene                   | ND              | 1.3          | ND             | 0.39        |                   |
| 56-23-5    | Carbon Tetrachloride      | ND              | 1.3          | ND             | 0.20        |                   |
| 110-82-7   | Cyclohexane               | ND              | 2.8          | ND             | 0.80        |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND              | 1.3          | ND             | 0.27        |                   |
| 75-27-4    | Bromodichloromethane      | ND              | 1.4          | ND             | 0.20        |                   |
| 79-01-6    | Trichloroethene           | ND              | 1.3          | ND             | 0.24        |                   |
| 123-91-1   | 1,4-Dioxane               | ND              | 1.3          | ND             | 0.36        |                   |
| 80-62-6    | Methyl Methacrylate       | ND              | 2.8          | ND             | 0.67        |                   |
| 142-82-5   | n-Heptane                 | ND              | 1.4          | ND             | 0.33        |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND              | 1.3          | ND             | 0.28        |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND              | 2.8          | ND             | 0.67        |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND              | 1.3          | ND             | 0.29        |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND              | 1.3          | ND             | 0.24        |                   |
| 108-88-3   | Toluene                   | ND              | 1.3          | ND             | 0.35        |                   |
| 591-78-6   | 2-Hexanone                | ND              | 2.8          | ND             | 0.67        |                   |
| 124-48-1   | Dibromochloromethane      | ND              | 1.4          | ND             | 0.16        |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND              | 1.3          | ND             | 0.17        |                   |
| 123-86-4   | n-Butyl Acetate           | ND              | 2.8          | ND             | 0.58        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220329-MB

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

**Analyst:** Topacio Zavala

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 3/29/22

Volume(s) Analyzed: 0.20 Liter(s)

Canister Dilution Factor: 1.00

| CAS #       | Compound                    | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | ND                          | 1.4                      | ND             | 0.29        |                   |
| 127-18-4    | Tetrachloroethene           | ND                          | 1.3                      | ND             | 0.19        |                   |
| 108-90-7    | Chlorobenzene               | ND                          | 1.3                      | ND             | 0.28        |                   |
| 100-41-4    | Ethylbenzene                | ND                          | 1.3                      | ND             | 0.30        |                   |
| 179601-23-1 | m,p-Xylenes                 | ND                          | 2.8                      | ND             | 0.63        |                   |
| 75-25-2     | Bromoform                   | ND                          | 1.3                      | ND             | 0.13        |                   |
| 100-42-5    | Styrene                     | ND                          | 1.3                      | ND             | 0.29        |                   |
| 95-47-6     | o-Xylene                    | ND                          | 1.3                      | ND             | 0.30        |                   |
| 111-84-2    | n-Nonane                    | ND                          | 1.3                      | ND             | 0.25        |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND                          | 1.3                      | ND             | 0.19        |                   |
| 98-82-8     | Cumene                      | ND                          | 1.3                      | ND             | 0.26        |                   |
| 80-56-8     | alpha-Pinene                | ND                          | 1.4                      | ND             | 0.24        |                   |
| 103-65-1    | n-Propylbenzene             | ND                          | 1.4                      | ND             | 0.27        |                   |
| 622-96-8    | 4-Ethyltoluene              | ND                          | 1.4                      | ND             | 0.27        |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND                          | 1.3                      | ND             | 0.26        |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | ND                          | 1.3                      | ND             | 0.26        |                   |
| 100-44-7    | Benzyl Chloride             | ND                          | 2.8                      | ND             | 0.53        |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND                          | 1.3                      | ND             | 0.22        |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | ND                          | 1.3                      | ND             | 0.22        |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND                          | 1.4                      | ND             | 0.22        |                   |
| 5989-27-5   | d-Limonene                  | ND                          | 1.3                      | ND             | 0.22        |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND                          | 2.5                      | ND             | 0.26        |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND                          | 2.8                      | ND             | 0.37        |                   |
| 91-20-3     | Naphthalene                 | ND                          | 1.3                      | ND             | 0.25        |                   |
| 87-68-3     | Hexachlorobutadiene         | ND                          | 1.3                      | ND             | 0.12        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## SURROGATE SPIKE RECOVERY RESULTS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister(s)

Test Notes:

Date(s) Collected: 3/10/22

Date(s) Received: 3/11/22

Date(s) Analyzed: 3/29 - 3/30/22

| Client Sample ID             | ALS Sample ID | 1,2-Dichloroethane-d4 | Toluene-d8        | Bromofluorobenzene | Acceptance Limits | Data Qualifier |
|------------------------------|---------------|-----------------------|-------------------|--------------------|-------------------|----------------|
|                              |               | Percent Recovered     | Percent Recovered | Percent Recovered  |                   |                |
| Method Blank                 | P220329-MB    | 93                    | 105               | 98                 | 70-130            |                |
| Lab Control Sample           | P220329-LCS   | 103                   | 103               | 100                | 70-130            |                |
| Duplicate Lab Control Sample | P220329-DLCS  | 101                   | 104               | 101                | 70-130            |                |
| Digester 6 #2                | P2201098-003  | 98                    | 106               | 96                 | 70-130            |                |

Surrogate percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220329-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 3/30/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #     | Compound                                         | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|--------------------------------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|           |                                                  | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 115-07-1  | Propene                                          | 206                 | 201          | 201           | 98         | 98   | 56-128               | 0   | 25  |      |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | 208                 | 204          | 203           | 98         | 98   | 71-112               | 0   | 25  |      |
| 74-87-3   | Chloromethane                                    | 206                 | 196          | 201           | 95         | 98   | 53-126               | 3   | 25  |      |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | 208                 | 214          | 212           | 103        | 102  | 62-121               | 1   | 25  |      |
| 75-01-4   | Vinyl Chloride                                   | 208                 | 207          | 209           | 100        | 100  | 63-123               | 0   | 25  |      |
| 106-99-0  | 1,3-Butadiene                                    | 206                 | 223          | 225           | 108        | 109  | 63-135               | 0.9 | 25  |      |
| 74-83-9   | Bromomethane                                     | 206                 | 206          | 206           | 100        | 100  | 71-112               | 0   | 25  |      |
| 75-00-3   | Chloroethane                                     | 206                 | 206          | 206           | 100        | 100  | 66-117               | 0   | 25  |      |
| 64-17-5   | Ethanol                                          | 832                 | 1090         | 1110          | 131        | 133  | 57-117               | 2   | 25  | L    |
| 75-05-8   | Acetonitrile                                     | 202                 | 188          | 189           | 93         | 94   | 59-131               | 1   | 25  |      |
| 107-02-8  | Acrolein                                         | 416                 | 468          | 417           | 113        | 100  | 71-123               | 12  | 25  |      |
| 67-64-1   | Acetone                                          | 1,020               | 1040         | 885           | 102        | 87   | 60-117               | 16  | 25  |      |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | 202                 | 201          | 181           | 100        | 90   | 71-114               | 11  | 25  |      |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | 400                 | 502          | 435           | 126        | 109  | 61-124               | 14  | 25  | L    |
| 107-13-1  | Acrylonitrile                                    | 402                 | 410          | 348           | 102        | 87   | 65-130               | 16  | 25  |      |
| 75-35-4   | 1,1-Dichloroethene                               | 210                 | 193          | 202           | 92         | 96   | 74-114               | 4   | 25  |      |
| 75-09-2   | Methylene Chloride                               | 208                 | 180          | 182           | 87         | 88   | 75-112               | 1   | 25  |      |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | 204                 | 177          | 190           | 87         | 93   | 57-127               | 7   | 25  |      |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | 216                 | 194          | 208           | 90         | 96   | 73-114               | 6   | 25  |      |
| 75-15-0   | Carbon Disulfide                                 | 414                 | 318          | 379           | 77         | 92   | 70-113               | 18  | 25  |      |
| 156-60-5  | trans-1,2-Dichloroethene                         | 208                 | 223          | 225           | 107        | 108  | 76-119               | 0.9 | 25  |      |
| 75-34-3   | 1,1-Dichloroethane                               | 214                 | 230          | 230           | 107        | 107  | 70-114               | 0   | 25  |      |
| 1634-04-4 | Methyl tert-Butyl Ether                          | 206                 | 239          | 243           | 116        | 118  | 72-118               | 2   | 25  |      |
| 108-05-4  | Vinyl Acetate                                    | 942                 | 1270         | 1280          | 135        | 136  | 56-137               | 0.7 | 25  |      |
| 78-93-3   | 2-Butanone (MEK)                                 | 408                 | 512          | 515           | 125        | 126  | 74-121               | 0.8 | 25  | L    |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

L = Laboratory control sample recovery outside the specified limits, results may be biased high.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220329-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 3/30/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #      | Compound                  | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|------------|---------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|            |                           | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 156-59-2   | cis-1,2-Dichloroethene    | 206                 | 232          | 235           | 113        | 114  | 73-117               | 0.9 | 25  |      |
| 141-78-6   | Ethyl Acetate             | 580                 | 674          | 688           | 116        | 119  | 59-161               | 3   | 25  |      |
| 110-54-3   | n-Hexane                  | 208                 | 233          | 236           | 112        | 113  | 55-130               | 0.9 | 25  |      |
| 67-66-3    | Chloroform                | 210                 | 220          | 221           | 105        | 105  | 71-114               | 0   | 25  |      |
| 109-99-9   | Tetrahydrofuran (THF)     | 404                 | 475          | 482           | 118        | 119  | 73-114               | 0.8 | 25  | L    |
| 107-06-2   | 1,2-Dichloroethane        | 210                 | 210          | 211           | 100        | 100  | 71-119               | 0   | 25  |      |
| 71-55-6    | 1,1,1-Trichloroethane     | 208                 | 205          | 208           | 99         | 100  | 73-119               | 1   | 25  |      |
| 71-43-2    | Benzene                   | 208                 | 209          | 211           | 100        | 101  | 72-113               | 1   | 25  |      |
| 56-23-5    | Carbon Tetrachloride      | 202                 | 203          | 205           | 100        | 101  | 67-123               | 1   | 25  |      |
| 110-82-7   | Cyclohexane               | 412                 | 410          | 413           | 100        | 100  | 70-119               | 0   | 25  |      |
| 78-87-5    | 1,2-Dichloropropane       | 206                 | 213          | 217           | 103        | 105  | 70-118               | 2   | 25  |      |
| 75-27-4    | Bromodichloromethane      | 208                 | 214          | 216           | 103        | 104  | 74-119               | 1   | 25  |      |
| 79-01-6    | Trichloroethene           | 204                 | 209          | 212           | 102        | 104  | 74-115               | 2   | 25  |      |
| 123-91-1   | 1,4-Dioxane               | 206                 | 234          | 239           | 114        | 116  | 77-124               | 2   | 25  |      |
| 80-62-6    | Methyl Methacrylate       | 410                 | 493          | 508           | 120        | 124  | 78-126               | 3   | 25  |      |
| 142-82-5   | n-Heptane                 | 206                 | 226          | 231           | 110        | 112  | 70-119               | 2   | 25  |      |
| 10061-01-5 | cis-1,3-Dichloropropene   | 208                 | 222          | 229           | 107        | 110  | 81-126               | 3   | 25  |      |
| 108-10-1   | 4-Methyl-2-pentanone      | 412                 | 495          | 511           | 120        | 124  | 73-129               | 3   | 25  |      |
| 10061-02-6 | trans-1,3-Dichloropropene | 200                 | 211          | 218           | 106        | 109  | 80-127               | 3   | 25  |      |
| 79-00-5    | 1,1,2-Trichloroethane     | 208                 | 209          | 212           | 100        | 102  | 78-117               | 2   | 25  |      |
| 108-88-3   | Toluene                   | 206                 | 213          | 217           | 103        | 105  | 70-118               | 2   | 25  |      |
| 591-78-6   | 2-Hexanone                | 406                 | 530          | 545           | 131        | 134  | 74-132               | 2   | 25  | L    |
| 124-48-1   | Dibromochloromethane      | 210                 | 221          | 223           | 105        | 106  | 69-137               | 0.9 | 25  |      |
| 106-93-4   | 1,2-Dibromoethane         | 208                 | 210          | 214           | 101        | 103  | 76-128               | 2   | 25  |      |
| 123-86-4   | n-Butyl Acetate           | 406                 | 549          | 563           | 135        | 139  | 75-134               | 3   | 25  | L    |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

L = Laboratory control sample recovery outside the specified limits, results may be biased high.



# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan / 41077-013, AAR No. 13

ALS Project ID: P2201098

ALS Sample ID: P220329-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 3/30/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #       | Compound                    | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-------------|-----------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|             |                             | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 111-65-9    | n-Octane                    | 208                 | 251          | 256           | 121        | 123  | 68-120               | 2   | 25  | L    |
| 127-18-4    | Tetrachloroethene           | 212                 | 210          | 211           | 99         | 100  | 63-130               | 1   | 25  |      |
| 108-90-7    | Chlorobenzene               | 206                 | 204          | 206           | 99         | 100  | 70-118               | 1   | 25  |      |
| 100-41-4    | Ethylbenzene                | 206                 | 238          | 242           | 116        | 117  | 71-123               | 0.9 | 25  |      |
| 179601-23-1 | m,p-Xylenes                 | 416                 | 488          | 493           | 117        | 119  | 67-127               | 2   | 25  |      |
| 75-25-2     | Bromoform                   | 210                 | 226          | 227           | 108        | 108  | 65-149               | 0   | 25  |      |
| 100-42-5    | Styrene                     | 202                 | 259          | 263           | 128        | 130  | 76-132               | 2   | 25  |      |
| 95-47-6     | o-Xylene                    | 208                 | 247          | 249           | 119        | 120  | 69-124               | 0.8 | 25  |      |
| 111-84-2    | n-Nonane                    | 208                 | 262          | 266           | 126        | 128  | 64-127               | 2   | 25  | L    |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | 208                 | 230          | 233           | 111        | 112  | 69-128               | 0.9 | 25  |      |
| 98-82-8     | Cumene                      | 206                 | 233          | 235           | 113        | 114  | 69-125               | 0.9 | 25  |      |
| 80-56-8     | alpha-Pinene                | 210                 | 260          | 265           | 124        | 126  | 68-129               | 2   | 25  |      |
| 103-65-1    | n-Propylbenzene             | 208                 | 251          | 253           | 121        | 122  | 70-127               | 0.8 | 25  |      |
| 622-96-8    | 4-Ethyltoluene              | 208                 | 258          | 261           | 124        | 125  | 69-127               | 0.8 | 25  |      |
| 108-67-8    | 1,3,5-Trimethylbenzene      | 208                 | 255          | 256           | 123        | 123  | 66-129               | 0   | 25  |      |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 206                 | 258          | 261           | 125        | 127  | 63-142               | 2   | 25  |      |
| 100-44-7    | Benzyl Chloride             | 416                 | 517          | 521           | 124        | 125  | 73-145               | 0.8 | 25  |      |
| 541-73-1    | 1,3-Dichlorobenzene         | 208                 | 207          | 209           | 100        | 100  | 67-136               | 0   | 25  |      |
| 106-46-7    | 1,4-Dichlorobenzene         | 210                 | 205          | 207           | 98         | 99   | 63-134               | 1   | 25  |      |
| 95-50-1     | 1,2-Dichlorobenzene         | 210                 | 208          | 209           | 99         | 100  | 64-139               | 1   | 25  |      |
| 5989-27-5   | d-Limonene                  | 206                 | 287          | 290           | 139        | 141  | 63-137               | 1   | 25  | L    |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | 404                 | 493          | 498           | 122        | 123  | 72-145               | 0.8 | 25  |      |
| 120-82-1    | 1,2,4-Trichlorobenzene      | 420                 | 431          | 438           | 103        | 104  | 62-154               | 1   | 25  |      |
| 91-20-3     | Naphthalene                 | 210                 | 257          | 263           | 122        | 125  | 62-156               | 2   | 25  |      |
| 87-68-3     | Hexachlorobutadiene         | 212                 | 202          | 205           | 95         | 97   | 55-142               | 2   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

L = Laboratory control sample recovery outside the specified limits, results may be biased high.



AtmAA Inc.

23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250

specialized air assessment laboratory  
atmaa.com

April 4, 2022

LTR/1964/22

Nicole Bryson  
ALS Environmental  
2655 Park Center Drive, Suite A  
Simi Valley, CA 93065

RE: City of Tampa HFC AWTP P2201098

Dear Nicole:

Please find enclosed the laboratory analysis report, quality assurance summary, and the chain of custody form for one SUMMA canister sample received from City of Tampa HFC AWTP P2201098 April 1, 2022.

The SUMMA canister sample was analyzed for ASTM 3588 BTU as requested on the chain of custody form.

Sincerely,

AtmAA, Inc.

Brian W. Fung  
Laboratory Director

**LABORATORY ANALYSIS REPORT**

## Speciated Hydrocarbons Analysis in SUMMA Canister Sample

Report Date: April 4, 2022  
Client: ALS Environmental  
Project Name: City of Tampa HFC AWTP Master Plan  
Project No.: P2201098  
Date Received: April 1, 2022  
Date Analyzed: April 1, 2022

**ANALYSIS DESCRIPTION**

*Hydrocarbon Speciation analysis was performed by flame ionization detection/gas chromatography (FID/GC), modified EPA-18. Hydrogen sulfide measured by gas chromatography with sulfur chemiluminescence detector (SCD).*

|                                                                   |                          |                              |
|-------------------------------------------------------------------|--------------------------|------------------------------|
| AtmAA Lab No.:                                                    | 20912-8                  | 20912-8                      |
| Sample ID:                                                        | Digester 6 #2            | Digester 6 #2                |
|                                                                   | P22012098-003            | P22012098-003                |
| <u>Component</u>                                                  | <i>(ppmv, component)</i> | <i>(% by vol, component)</i> |
| Methane                                                           | 608500                   | 60.85                        |
| Ethene                                                            | <0.40                    | <0.01                        |
| Acetylene                                                         | <0.40                    | <0.01                        |
| Ethane                                                            | <0.40                    | <0.01                        |
| Hydrogen sulfide                                                  | 17010                    | 1.70                         |
| non-methane hydrocarbons<br>analysis by carbon<br>number grouping |                          |                              |
| C3 as Propane                                                     | 0.34                     | <0.01                        |
| C4 as n-Butane                                                    | 8.16                     | <0.01                        |
| C5 as n-Pentane                                                   | 4.26                     | <0.01                        |
| C6 as n-Hexane                                                    | 1.79                     | <0.01                        |
| >C6 as n-Hexane                                                   | 38.0                     | <0.01                        |

|       |                            |                              |
|-------|----------------------------|------------------------------|
|       | <i>(ppmvC, as methane)</i> | <i>(% by vol, component)</i> |
| TNMHC | 483                        | <0.01                        |

*TNMHC - total non-methane hydrocarbons as ppmvC, as methane.  
Actual analysis results are reported on a "wet" basis.*

  
\_\_\_\_\_  
Brian W. Fung  
Laboratory Director

QUALITY ASSURANCE SUMMARY  
(Repeat Analyses)

Project Name: City of Tampa HFC AWTP Master Plan  
Project No.: P2201098  
Date Received: April 1, 2022  
Date Analyzed: April 1, 2022

| Component                                                   | Sample ID     | Repeat Analysis |        | Mean Conc. | % Diff. From Mean |
|-------------------------------------------------------------|---------------|-----------------|--------|------------|-------------------|
|                                                             |               | Run #1          | Run #2 |            |                   |
| (Conc. in ppmv, component)                                  |               |                 |        |            |                   |
| Methane                                                     | Digester 6 #2 | 609000          | 608000 | 608500     | 0.08              |
| Ethene                                                      | Digester 6 #2 | <0.40           | <0.40  | <0.40      | ---               |
| Acetylene                                                   | Digester 6 #2 | <0.40           | <0.40  | <0.40      | ---               |
| Ethane                                                      | Digester 6 #2 | <0.40           | <0.40  | <0.40      | ---               |
| non-methane hydrocarbons analysis by carbon number grouping |               |                 |        |            |                   |
| C3                                                          | Digester 6 #2 | 0.32            | 0.35   | 0.34       | 3.9               |
| C4                                                          | Digester 6 #2 | 8.30            | 8.01   | 8.16       | 1.8               |
| C5                                                          | Digester 6 #2 | 4.16            | 4.35   | 4.26       | 2.3               |
| C6                                                          | Digester 6 #2 | 1.89            | 1.68   | 1.79       | 5.8               |
| C7                                                          | Digester 6 #2 | 1.04            | 0.93   | 0.99       | 5.6               |
| C8                                                          | Digester 6 #2 | 1.21            | 1.28   | 1.25       | 2.8               |
| C9                                                          | Digester 6 #2 | 2.31            | 2.31   | 2.31       | 0.07              |
| C10                                                         | Digester 6 #2 | 12.9            | 12.8   | 12.9       | 0.21              |
| C11                                                         | Digester 6 #2 | 5.51            | 4.66   | 5.09       | 8.4               |
| C12                                                         | Digester 6 #2 | 8.55            | 7.83   | 8.19       | 4.3               |
| C13                                                         | Digester 6 #2 | 6.27            | 6.23   | 6.25       | 0.34              |
| C14                                                         | Digester 6 #2 | 1.09            | 1.08   | 1.09       | 0.21              |
| (Conc. in ppmvC, as methane)                                |               |                 |        |            |                   |
| TNMHC                                                       | Digester 6 #2 | 493             | 472    | 483        | 2.1               |

One SUMMA canister sample, laboratory number 20912-8, was analyzed for hydrocarbon speciation, EPA Method 18. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". The average % difference from mean for 14 repeat measurements from one SUMMA canister sample is 2.7%.



### Calculated values for Specific Volume, BTU, and F (factor)

Report Date: April 4, 2022  
 Client: ALS Environmental  
 Project Name: City of Tampa HFC AWTP Master Plan  
 Date Received: April 1, 2022  
 Date Analyzed: April 1, 2022  
 AtmAA Lab #: 20912-8  
 Sample ID: Digester 6 #2

Specific volume, BTU, and F-factor are calculated using laboratory analysis results for methane, carbon dioxide, nitrogen, oxygen, TNMHC, and sulfur compounds in equations that include gross/net heating and specific gas volume values taken from the GPA-2145 Midstream Standard. Heating value factor is calculated according to ASTM 3588-98 (14.696 psia and 60°F). The F-factor is calculated according to the equation in EPA Method 19.

| Component                                  | Mole % | Wt %   | C,H,O,N,S, Wt. % |             |
|--------------------------------------------|--------|--------|------------------|-------------|
| Methane                                    | 60.9   | 35.8   | Carbon           | 43.6        |
| Carbon dioxide                             | 37.9   | 61.3   | Hydrogen         | 9.07        |
| Nitrogen                                   | 0.56   | 0.58   | Oxygen           | 44.8        |
| Oxygen                                     | 0.13   | 0.16   | Nitrogen         | 0.58        |
| Argon                                      | 0.01   | 0.01   | Argon            | 0.01        |
| Hydrogen                                   | 0.00   | 0.00   | Sulfur           | 2.00        |
| (CH <sub>2</sub> ) <sub>n</sub>            | 0.01   | 0.03   |                  |             |
| Specific Volume                            |        | 14.08  |                  |             |
| BTU/ft3 (Dry @60F, 14.696 psia)            |        | 626.0  | (HHV)            | 563.9 (LHV) |
| BTU/ft3 (Water Saturated @ 0.25636 psia)   |        | 615.1  | (HHV)            | 554.1 (LHV) |
| BTU/lb (Dry @60F, 14.696 psia)             |        | 8816   | (HHV)            | 7941 (LHV)  |
| F <sub>d</sub> (factor)                    |        | 9113   |                  |             |
| F <sub>w</sub> (factor)                    |        | 11099  |                  |             |
| F <sub>c</sub> (factor)                    |        | 1587   |                  |             |
| Compressibility Factor (@60F, 14.696 psia) |        | 0.9967 |                  |             |
| Wobbe Index                                |        | 645.2  |                  |             |
| Specific Gravity                           |        | 0.9415 |                  |             |

| Component      | Specific volume<br>reference values * |
|----------------|---------------------------------------|
| Methane        | 23.7 (ft <sup>3</sup> /lb)            |
| Carbon dioxide | 8.62                                  |
| Nitrogen       | 13.5                                  |
| Oxygen         | 11.9                                  |
| Argon          | 9.52                                  |
| Hydrogen       | 188.2                                 |

\* reference, Rev. 2016, GPA-2145 Midstream Standard, Selected Hydrocarbons 60°F





# ALS Environmental Chain of Custody

2655 Park Center Drive, Suite A • Simi Valley, CA 93065 • 805-526-7161 • FAX

ALS Contact: Nicole Bryson

Project Number: P2201098  
Project Manager: Nicole Bryson  
QAP: LAB QAP

PROJECT NAME: City of Tampa HFC AWP Masker Plan

| Lab Code     | Sample ID     | # of Cont. | Matrix | Sample  |      | Lab ID      | Misc Out 1 |
|--------------|---------------|------------|--------|---------|------|-------------|------------|
|              |               |            |        | Date    | Time |             |            |
| P2201098-003 | Digester 6 #2 | 1          | Air    | 3/10/22 | 1001 | AtmAA, Inc. | X          |

AtmAA Lab #  
20912-8

## Test Comments

Misc Out 1 - None

P2201098-003

ASTM 3588 - BTU

## Folder Comments:

Backfilled with Helium.

|                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                        |                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| <b>Special Instructions/Comments</b><br><br>Report using Client project Name / ID<br>Send Report to <a href="mailto:Sue.Anderson@ALSGlobal.com">Sue.Anderson@ALSGlobal.com</a><br>Send Invoice AP and cc PM:<br><a href="mailto:ALSUSA_AccountsPayable@alsglobal.com">ALSUSA_AccountsPayable@alsglobal.com</a><br><br>H - Test is On Hold      P - Test is Authorized for Prep Only | <b>Turnaround Requirements</b><br><input checked="" type="checkbox"/> RUSH (Surcharges Apply)<br>PLEASE CIRCLE WORK DAYS<br>1 2 3 4 5<br><input checked="" type="checkbox"/> STANDARD<br>Requested FAX Date: _____<br>Requested Report Date: 03/17/22 | <b>Report Requirements</b><br>I. Results Only<br><input checked="" type="checkbox"/> II. Results + QC Summaries<br><input type="checkbox"/> III. Results + QC and Calibration Summaries<br><input type="checkbox"/> IV. Data Validation Report with Raw Data<br><br>PQL/MDL/1 <u>N</u><br>EDD <u>Y</u> | <b>Invoice Information</b><br><br>PO# 54P2201098<br><br>Bill to |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|

Relinquished By: AP 3/21/22 Received By: [Signature] 4/1/22 1:20  
Airbill Number: AtmAA



---

2655 Park Center Dr., Suite A  
Simi Valley, CA 93065  
T: +1 805 526 7161  
[www.alsglobal.com](http://www.alsglobal.com)

## LABORATORY REPORT

April 8, 2022

Caryssa Joustra, PhD  
Hazen and Sawyer, P.C.  
1000 N. Ashley Dr., Suite 1000  
Tampa, FL 33602

**RE: City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13**

Dear Caryssa:

Enclosed are the results of the samples submitted to our laboratory on March 21, 2022. For your reference, these analyses have been assigned our service request number P2201236.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at [www.alsglobal.com](http://www.alsglobal.com). Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

**ALS | Environmental**



By Nicole.Bryson at 6:05 pm, Apr 08, 2022

Nicole Bryson  
Laboratory Director



Client: Hazen and Sawyer, P.C.

Service Request No: P2201236

Project: City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

---

## CASE NARRATIVE

The samples were received intact under chain of custody on March 21, 2022 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

### BTU and CHONS Analysis

The results for BTU and CHONS were generated according to ASTM D 3588-98. The following analyses were performed and used to calculate the BTU and CHONS results. This method is not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.

### C2 through C6 Hydrocarbon Analysis

The sample was analyzed according to modified EPA Method TO-3 for C2 through >C6 hydrocarbons using a gas chromatograph equipped with a flame ionization detector (FID). This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP accreditation.

### Fixed Gases Analysis

The sample was also analyzed for fixed gases (hydrogen, oxygen/argon, nitrogen, carbon monoxide, methane and carbon dioxide) according to modified EPA Method 3C (single injection) using a gas chromatograph equipped with a thermal conductivity detector (TCD). This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP accreditation.

### Hydrogen Sulfide Analysis

The sample was also analyzed for hydrogen sulfide per modified SCAQMD Method 307-91 and ASTM D 5504-12 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). Method ASTM D 5504-12 is included on the laboratory's NELAP scope of accreditation, however it is not part of the DoD-ELAP accreditation. Method SCAQMD 307-91 is not included on the laboratory's NELAP or DoD-ELAP accreditation.

### Siloxanes Analysis

The samples were analyzed for siloxanes according to ASTM D8230-19 using an analytical system comprised of a gas chromatograph/mass spectrometer (GC/MS). This method is not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.





### Sulfur and Total Reduced Sulfur as Hydrogen Sulfide Analysis

The sample was analyzed for twenty sulfur compounds and total reduced sulfur as hydrogen sulfide (TRS as H<sub>2</sub>S) using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan. The result(s) were determined by obtaining the total response for all chromatographic peaks and quantitating the value against the initial calibration curve for hydrogen sulfide thus generating a result specified as "Total Reduced Sulfur as Hydrogen Sulfide". This method is included on the laboratory's NELAP scope of accreditation, however it is not part of the DoD-ELAP accreditation.

### Volatile Organic Compound Analysis

The sample was analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. The method was modified to include the use of helium as a diluent gas in place of zero-grade air for container pressurization. When necessary, analytical sample volumes were adjusted by a correction factor for containers pressurized with helium. A summary sheet has been included listing the affected samples. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The chromatogram for the sample named "Digester 6 #3" indicated the presence of non-target background components. The sample was diluted in order to prevent damage to the instrument and to achieve optimal resolution of the target analytes.

The minimum criterion for naphthalene was not met in the Continuing Calibration Verification (CCV) analyzed on April 1, 2022. In accordance with ALS Environmental standard operating procedures, a Method Reporting Limit (MRL) check standard containing the analyte of concern was analyzed each day of analysis. The MRL check standard verified that instrument sensitivity was adequate to detect the analyte at the MRL on the day of analysis. Because the sensitivity was shown to be adequate to detect the compound in question, the data quality is not significantly affected.

The spike recovery of 4-methyl-2-pentanone for the Laboratory Control Sample (LCS) and Duplicate Laboratory Control Sample (DLCS) analyzed on April 1, 2022 was outside the Laboratory generated control criterion. The recovery error equates to a potential high bias. Additionally, the spike recovery of ethanol, and methyl methacrylate for the LCS and DLCS analyzed on April 1, 2022 was outside the Laboratory generated control criterion. However, the spike recovery of the analytes was within the method criteria; therefore, the data quality is not significantly affected.

The container was cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. For projects requiring DoD QSM 5.3 compliance canisters were



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cleaned to  $<1/2$  the MRL. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

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*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*



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ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

| Agency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Web Site                                                                                                                                                                                                                                            | Number                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Alaska DEC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <a href="http://dec.alaska.gov/eh/lab.aspx">http://dec.alaska.gov/eh/lab.aspx</a>                                                                                                                                                                   | 17-019                  |
| Arizona DHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <a href="http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home">http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home</a> | AZ0694                  |
| Florida DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <a href="http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html">http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html</a>                                               | E871020                 |
| Louisiana DEQ (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>                                                                                                                         | 05071                   |
| Maine DHHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <a href="http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml">http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml</a>                                                             | 2018027                 |
| Minnesota DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>                                                                                                                                               | 1776326                 |
| New Jersey DEP (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>                                                                                                                                                 | CA009                   |
| New York DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <a href="http://www.wadsworth.org/labcert/elap/elap.html">http://www.wadsworth.org/labcert/elap/elap.html</a>                                                                                                                                       | 11221                   |
| Oregon PHD (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <a href="http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>                           | 4068-008                |
| Pennsylvania DEP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx">http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx</a>                                           | 68-03307 (Registration) |
| PJLA (DoD ELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <a href="http://www.pjlabs.com/search-accredited-labs">http://www.pjlabs.com/search-accredited-labs</a>                                                                                                                                             | 65818 (Testing)         |
| Texas CEQ (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <a href="http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html</a>                                                                                                         | T104704413-19-10        |
| Utah DOH (NELAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="http://health.utah.gov/lab/lab_cert_env">http://health.utah.gov/lab/lab_cert_env</a>                                                                                                                                                       | CA016272019-10          |
| Washington DOE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>                                                                                                         | C946                    |
| <p>Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at <a href="http://www.alsglobal.com">www.alsglobal.com</a>, or at the accreditation body's website.</p> <p>Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.</p> |                                                                                                                                                                                                                                                     |                         |

# ALS ENVIRONMENTAL

## DETAIL SUMMARY REPORT

Client: Hazen And Sawyer, P.C.

Service Request: P2201236

Project ID: City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

Date Received: 3/21/2022

Time Received: 09:00

| Client Sample ID | Lab Code     | Matrix | Date Collected | Time Collected | Container ID | Pi1 (psig) | Pf1 (psig) | ASTM D8230 - Siloxanes Tube | TO-3 Modified - C1C6+ Can | 3C Modified - Fxd Gases Can | ASTM D5504-01 - H2S Can | ASTM D 5504-12 - Sulfur Can | TO-15 - VOC Cans |
|------------------|--------------|--------|----------------|----------------|--------------|------------|------------|-----------------------------|---------------------------|-----------------------------|-------------------------|-----------------------------|------------------|
| Digester 6 #25   | P2201236-001 | Air    | 3/18/2022      | 09:42          |              |            |            | X                           |                           |                             |                         |                             |                  |
| Digester 2/3 #25 | P2201236-002 | Air    | 3/18/2022      | 10:28          |              |            |            | X                           |                           |                             |                         |                             |                  |
| Digester 6 #3    | P2201236-003 | Air    | 3/18/2022      | 09:35          | AS01478      | -4.12      | 3.77       |                             | X                         | X                           | X                       | X                           | X                |





# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #3

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AARSS Sample ID: P2201236-003

Test Code: ASTM D3588-98

Analyst: Gilbert Gutierrez/Stephanie Reynoso

Date Collected: 3/18/22

Sample Type: 6.0 L Silonite Canister

Date Received: 3/21/22

Test Notes:

Container ID: AS01478

| Components       | Result<br>Volume % | Container Dilution Factor: 4.32 |             |                   |
|------------------|--------------------|---------------------------------|-------------|-------------------|
|                  |                    | Result<br>ppmV                  | MRL<br>ppmV | Data<br>Qualifier |
| Hydrogen         | < 0.01             | ND                              | 4,300       |                   |
| Oxygen           | 7.22               | 72,200                          | 4,300       |                   |
| Nitrogen         | 25.59              | 256,000                         | 4,300       |                   |
| Carbon Monoxide  | < 0.01             | ND                              | 4,300       |                   |
| Methane          | 41.22              | 412,000                         | 4,300       |                   |
| Carbon Dioxide   | 24.99              | 250,000                         | 4,300       |                   |
| Hydrogen Sulfide | 0.96               | 9,600                           | 5.4         |                   |
| C2 as Ethane     | < 0.01             | ND                              | 22          |                   |
| C3 as Propane    | < 0.01             | ND                              | 22          |                   |
| C4 as n-Butane   | < 0.01             | ND                              | 22          |                   |
| C5 as n-Pentane  | < 0.01             | ND                              | 22          |                   |
| C6 as n-Hexane   | < 0.01             | ND                              | 22          |                   |
| > C6 as n-Hexane | < 0.01             | 95                              | 43          |                   |
| <b>TOTALS</b>    | <b>99.99</b>       |                                 |             |                   |

| Components | Mole % | Weight % | Data<br>Qualifier |
|------------|--------|----------|-------------------|
| Carbon     | 18.95  | 29.03    |                   |
| Hydrogen   | 47.73  | 6.14     |                   |
| Oxygen     | 18.41  | 37.58    |                   |
| Nitrogen   | 14.63  | 26.14    |                   |
| Sulfur     | 0.27   | 1.12     |                   |

|                                                       |         |         |
|-------------------------------------------------------|---------|---------|
| Specific Gravity (Air = 1)                            |         | 0.9470  |
| Specific Volume                                       | ft3/lb  | 13.84   |
| Gross Heating Value (Dry Gas @ 60 F, 14.696 psia)     | BTU/ft3 | 423.9   |
| Net Heating Value (Dry Gas @ 60 F, 14.696 psia)       | BTU/ft3 | 381.8   |
| Gross Heating Value (Water Saturated at 0.25636 psia) | BTU/ft3 | 415.7   |
| Net Heating Value (Water Saturated at 0.25636 psia)   | BTU/ft3 | 374.4   |
| Gross Heating Value (Dry Gas @ 60 F, 14.696 psia)     | BTU/lb  | 5,865.0 |
| Net Heating Value (Dry Gas @ 60 F, 14.696 psia)       | BTU/lb  | 5,282.8 |
| Compressibility Factor "Z" (60 F, 14.696 psia)        |         | 0.9980  |
| WOBBE Index                                           |         | 435.6   |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #25

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13 ALS Sample ID: P2201236-001

**Test Code:** ASTM D8230-19

**Date Collected:** 3/18/22

**Instrument ID:** Agilent 5973N/HP6890A/MS7

**Date Received:** 3/21/22

**Analyst:** Mathew Meyer

**Date Analyzed:** 3/28/22

**Sample Type:** Siloxane Tube

**Desorption Volume:** 3.0 ml

**Test Notes:** BC, DE

**Volume Sampled:** 6 Liter(s)

| CAS #                | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|----------------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6            | Trimethylsilanol                                | < 0.30            | ND              | 50           | ND                            | 15           |                   |
| 107-46-0             | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.30            | ND              | 51           | ND                            | 17           |                   |
| 541-05-9             | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | 0.64              | 110             | 58           | 41                            | 22           |                   |
| 107-51-7             | Octamethyltrisiloxane (L <sub>3</sub> )         | 0.30              | 51              | 51           | 18                            | 18           |                   |
| 556-67-2             | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | 15                | 2,500           | 51           | 950                           | 19           |                   |
| 141-62-8             | Decamethyltetrasiloxane (L <sub>4</sub> )       | 0.62              | 100             | 51           | 37                            | 18           |                   |
| 541-02-6             | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | 76                | 13,000          | 51           | 4,800                         | 19           |                   |
| 141-63-9             | Dodecamethylpentasiloxane (L <sub>5</sub> )     | 0.71              | 120             | 51           | 43                            | 19           |                   |
| 540-97-6             | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | 0.94              | 160             | 50           | 59                            | 19           |                   |
| <b>Total Silicon</b> |                                                 |                   |                 |              | <b>5,900</b>                  |              |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 2/3 #25

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13 ALS Sample ID: P2201236-002

**Test Code:** ASTM D8230-19

Date Collected: 3/18/22

**Instrument ID:** Agilent 5973N/HP6890A/MS7

Date Received: 3/21/22

**Analyst:** Mathew Meyer

Date Analyzed: 3/28/22

**Sample Type:** Siloxane Tube

Desorption Volume: 3.0 ml

**Test Notes:** BC, DE

Volume Sampled: 6 Liter(s)

| CAS #                | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|----------------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6            | Trimethylsilanol                                | < 0.30            | ND              | 50           | ND                            | 15           |                   |
| 107-46-0             | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.30            | ND              | 51           | ND                            | 17           |                   |
| 541-05-9             | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | 0.62              | 100             | 58           | 39                            | 22           |                   |
| 107-51-7             | Octamethyltrisiloxane (L <sub>3</sub> )         | < 0.30            | ND              | 51           | ND                            | 18           |                   |
| 556-67-2             | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | 14                | 2,300           | 51           | 860                           | 19           |                   |
| 141-62-8             | Decamethyltetrasiloxane (L <sub>4</sub> )       | 0.47              | 78              | 51           | 28                            | 18           |                   |
| 541-02-6             | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | 64                | 11,000          | 51           | 4,000                         | 19           |                   |
| 141-63-9             | Dodecamethylpentasiloxane (L <sub>5</sub> )     | 0.62              | 100             | 51           | 38                            | 19           |                   |
| 540-97-6             | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | 1.0               | 170             | 50           | 65                            | 19           |                   |
| <b>Total Silicon</b> |                                                 |                   |                 |              | <b>5,100</b>                  |              |                   |

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DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13 ALS Sample ID: P220328-MB

**Test Code:** ASTM D8230-19

Date Collected: NA

**Instrument ID:** Agilent 5973N/HP6890A/MS7

Date Received: NA

**Analyst:** Mathew Meyer

Date Analyzed: 3/28/22

**Sample Type:** Siloxane Tube

Desorption Volume: 3.0 ml

**Test Notes:** BC, DE

Volume Sampled: NA Liter(s)

| CAS #         | Compound                                        | Result<br>µg/Tube | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>as Silicon<br>µg/m³ | MRL<br>µg/m³ | Data<br>Qualifier |
|---------------|-------------------------------------------------|-------------------|-----------------|--------------|-------------------------------|--------------|-------------------|
| 1066-40-6     | Trimethylsilanol                                | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 107-46-0      | Hexamethyldisiloxane (L <sub>2</sub> )          | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 541-05-9      | Hexamethylcyclotrisiloxane (D <sub>3</sub> )    | < 0.35            | NA              | NA           | NA                            | NA           |                   |
| 107-51-7      | Octamethyltrisiloxane (L <sub>3</sub> )         | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 556-67-2      | Octamethylcyclotetrasiloxane (D <sub>4</sub> )  | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 141-62-8      | Decamethyltetrasiloxane (L <sub>4</sub> )       | < 0.31            | NA              | NA           | NA                            | NA           |                   |
| 541-02-6      | Decamethylcyclopentasiloxane (D <sub>5</sub> )  | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 141-63-9      | Dodecamethylpentasiloxane (L <sub>5</sub> )     | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| 540-97-6      | Dodecamethylcyclohexasiloxane (D <sub>6</sub> ) | < 0.30            | NA              | NA           | NA                            | NA           |                   |
| Total Silicon |                                                 |                   |                 |              | NA                            |              |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

NA = Not applicable.

BC = Results reported are not blank corrected.

DE = Results reported are corrected for desorption efficiency.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Sample ID: P220328-DLCS

**Test Code:** ASTM D8230-19

Date Collected: NA

**Instrument ID:** Agilent 5973N/HP6890A/MS7

Date Received: NA

**Analyst:** Mathew Meyer

Date Analyzed: 3/28/22

**Sampling Type:** Siloxane Tube

Volume(s) Analyzed: NA Liter(s)

**Test Notes:**

| CAS #     | Compound                      | Spike Amount | Result |       | % Recovery |      | ALS        | RPD | RPD   | Data      |
|-----------|-------------------------------|--------------|--------|-------|------------|------|------------|-----|-------|-----------|
|           |                               | LCS / DLCS   | LCS    | DLCS  | LCS        | DLCS | Acceptance |     |       |           |
|           |                               | µg/ml        | µg/ml  | µg/ml |            |      | Limits     |     | Limit | Qualifier |
| 1066-40-6 | Trimethylsilanol              | 10.6         | 10.2   | 10.2  | 96         | 96   | 70-130     | 0   | 25    |           |
| 107-46-0  | Hexamethyldisiloxane          | 11.4         | 12.1   | 12.2  | 106        | 107  | 70-130     | 0.9 | 25    |           |
| 541-05-9  | Hexamethylcyclotrisiloxane    | 10.9         | 11.3   | 11.4  | 104        | 105  | 70-130     | 1   | 25    |           |
| 107-51-7  | Octamethyltrisiloxane         | 11.2         | 12.0   | 12.1  | 107        | 108  | 70-130     | 0.9 | 25    |           |
| 556-67-2  | Octamethylcyclotetrasiloxane  | 12.8         | 13.7   | 13.7  | 107        | 107  | 70-130     | 0   | 25    |           |
| 141-62-8  | Decamethyltetrasiloxane       | 10.6         | 11.4   | 11.4  | 108        | 108  | 70-130     | 0   | 25    |           |
| 541-02-6  | Decamethylcyclopentasiloxane  | 11.3         | 12.1   | 12.0  | 107        | 106  | 70-130     | 0.9 | 25    |           |
| 141-63-9  | Dodecamethylpentasiloxane     | 11.9         | 12.8   | 12.8  | 108        | 108  | 70-130     | 0   | 25    |           |
| 540-97-6  | Dodecamethylcyclohexasiloxane | 12.9         | 13.6   | 13.5  | 105        | 105  | 70-130     | 0   | 25    |           |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #3

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P2201236-003

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister

Test Notes:

Container ID: AS01478

Date Collected: 3/18/22

Time Collected: 09:35

Date Received: 3/21/22

Date Analyzed: 3/21/22

Time Analyzed: 12:04

Volume(s) Analyzed: 0.0040 ml(s)

Container Dilution Factor: 4.32

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | 13,000,000      | 7,500        | 9,600,000      | 5,400       |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 13,000       | ND             | 5,400       |                   |
| 74-93-1   | Methyl Mercaptan      | 51,000          | 11,000       | 26,000         | 5,400       |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 14,000       | ND             | 5,400       |                   |
| 75-18-3   | Dimethyl Sulfide      | 19,000          | 14,000       | 7,300          | 5,400       |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 8,400        | ND             | 2,700       |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 17,000       | ND             | 5,400       |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 20,000       | ND             | 5,400       |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 17,000       | ND             | 5,400       |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 17,000       | ND             | 5,400       |                   |
| 110-02-1  | Thiophene             | ND              | 19,000       | ND             | 5,400       |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 20,000       | ND             | 5,400       |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 20,000       | ND             | 5,400       |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 20,000       | ND             | 5,400       |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 10,000       | ND             | 2,700       |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 22,000       | ND             | 5,400       |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 19,000       | ND             | 5,400       |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 25,000       | ND             | 5,400       |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 25,000       | ND             | 5,400       |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 13,000       | ND             | 2,700       |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

### Total Reduced Sulfur as Hydrogen Sulfide

Test Code: ASTM D 5504-12

Instrument ID: Agilent 6890A/GC13/SCD

Analyst: Stephanie Reynoso

Sample Type: 6.0 L Silonite Canister(s)

Test Notes:

Date(s) Collected: 3/18/22

Date Received: 3/21/22

Date Analyzed: 3/21/22

| Client Sample ID | ALS Sample ID | Container<br>Dilution<br>Factor | Injection<br>Volume<br>ml(s) | Time<br>Analyzed | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------------|---------------|---------------------------------|------------------------------|------------------|-----------------|--------------|----------------|-------------|-------------------|
| Digester 6 #3    | P2201236-003  | 4.32                            | 0.0040                       | 12:04            | 13,000,000      | 7,500        | 9,600,000      | 5,400       |                   |
| Method Blank     | P220321-MB    | 1.00                            | 1.0                          | 08:05            | ND              | 7.0          | ND             | 5.0         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P220321-MB

**Test Code:** ASTM D 5504-12

**Instrument ID:** Agilent 6890A/GC13/SCD

**Analyst:** Stephanie Reynoso

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Time Collected: NA

Date Received: NA

Date Analyzed: 3/21/22

Time Analyzed: 08:05

Volume(s) Analyzed: 1.0 ml(s)

| CAS #     | Compound              | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|-----------------------|-----------------|--------------|----------------|-------------|-------------------|
| 7783-06-4 | Hydrogen Sulfide      | ND              | 7.0          | ND             | 5.0         |                   |
| 463-58-1  | Carbonyl Sulfide      | ND              | 12           | ND             | 5.0         |                   |
| 74-93-1   | Methyl Mercaptan      | ND              | 9.8          | ND             | 5.0         |                   |
| 75-08-1   | Ethyl Mercaptan       | ND              | 13           | ND             | 5.0         |                   |
| 75-18-3   | Dimethyl Sulfide      | ND              | 13           | ND             | 5.0         |                   |
| 75-15-0   | Carbon Disulfide      | ND              | 7.8          | ND             | 2.5         |                   |
| 75-33-2   | Isopropyl Mercaptan   | ND              | 16           | ND             | 5.0         |                   |
| 75-66-1   | tert-Butyl Mercaptan  | ND              | 18           | ND             | 5.0         |                   |
| 107-03-9  | n-Propyl Mercaptan    | ND              | 16           | ND             | 5.0         |                   |
| 624-89-5  | Ethyl Methyl Sulfide  | ND              | 16           | ND             | 5.0         |                   |
| 110-02-1  | Thiophene             | ND              | 17           | ND             | 5.0         |                   |
| 513-44-0  | Isobutyl Mercaptan    | ND              | 18           | ND             | 5.0         |                   |
| 352-93-2  | Diethyl Sulfide       | ND              | 18           | ND             | 5.0         |                   |
| 109-79-5  | n-Butyl Mercaptan     | ND              | 18           | ND             | 5.0         |                   |
| 624-92-0  | Dimethyl Disulfide    | ND              | 9.6          | ND             | 2.5         |                   |
| 616-44-4  | 3-Methylthiophene     | ND              | 20           | ND             | 5.0         |                   |
| 110-01-0  | Tetrahydrothiophene   | ND              | 18           | ND             | 5.0         |                   |
| 638-02-8  | 2,5-Dimethylthiophene | ND              | 23           | ND             | 5.0         |                   |
| 872-55-9  | 2-Ethylthiophene      | ND              | 23           | ND             | 5.0         |                   |
| 110-81-6  | Diethyl Disulfide     | ND              | 12           | ND             | 2.5         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.  
**Client Sample ID:** Duplicate Lab Control Sample  
**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236  
 ALS Sample ID: P220321-DLCS

**Test Code:** ASTM D 5504-12  
**Instrument ID:** Agilent 6890A/GC13/SCD  
**Analyst:** Stephanie Reynoso  
**Sample Type:** 6.0 L Silonite Canister  
**Test Notes:**

Date Collected: NA  
 Date Received: NA  
 Date Analyzed: 3/21/22  
 Volume(s) Analyzed: NA ml(s)

| CAS #     | Compound         | Spike Amount       | Result      |              | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|------------------|--------------------|-------------|--------------|------------|------|----------------------|-----|-----|------|
|           |                  | LCS / DLCS<br>ppbV | LCS<br>ppbV | DLCS<br>ppbV | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 7783-06-4 | Hydrogen Sulfide | 989                | 978         | 900          | 99         | 91   | 72-122               | 8   | 18  |      |
| 463-58-1  | Carbonyl Sulfide | 1,050              | 1,020       | 943          | 97         | 90   | 72-121               | 7   | 17  |      |
| 74-93-1   | Methyl Mercaptan | 1,050              | 1,130       | 1,030        | 108        | 98   | 74-127               | 10  | 18  |      |

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #3

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Sample ID: P2201236-003

**Test Code:** EPA TO-15 Modified

Date Collected: 3/18/22

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

Date Received: 3/21/22

**Analyst:** Topacio Zavala

Date Analyzed: 4/1/22

**Sample Type:** 6.0 L Silonite Canister

Volume(s) Analyzed: 0.0020 Liter(s)

**Test Notes:**

**Container ID:** AS01478

Canister Dilution Factor: 4.32

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND                          | 560                      | ND             | 330         |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 580                      | ND             | 120         |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 560                      | ND             | 270         |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 580                      | ND             | 83          |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 560                      | ND             | 220         |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 560                      | ND             | 250         |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 560                      | ND             | 140         |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 560                      | ND             | 210         |                   |
| 64-17-5   | Ethanol                                          | ND                          | 5,400                    | ND             | 2,900       |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 1,100                    | ND             | 640         |                   |
| 107-02-8  | Acrolein                                         | ND                          | 1,100                    | ND             | 470         |                   |
| 67-64-1   | Acetone                                          | ND                          | 5,600                    | ND             | 2,400       |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 560                      | ND             | 100         |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 1,100                    | ND             | 440         |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 1,100                    | ND             | 500         |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 580                      | ND             | 150         |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 560                      | ND             | 160         |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 580                      | ND             | 190         |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 580                      | ND             | 76          |                   |
| 75-15-0   | Carbon Disulfide                                 | ND                          | 1,200                    | ND             | 380         |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 580                      | ND             | 150         |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 580                      | ND             | 140         |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 580                      | ND             | 160         |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 5,400                    | ND             | 1,500       |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND                          | 1,100                    | ND             | 370         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.



# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #3

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Sample ID: P2201236-003

Test Code: EPA TO-15 Modified

Date Collected: 3/18/22

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Date Received: 3/21/22

Analyst: Topacio Zavala

Date Analyzed: 4/1/22

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: 0.0020 Liter(s)

Test Notes:

Container ID: AS01478

Canister Dilution Factor: 4.32

| CAS #      | Compound                  | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND                          | 560                      | ND             | 140         |                   |
| 141-78-6   | Ethyl Acetate             | ND                          | 2,400                    | ND             | 660         |                   |
| 110-54-3   | n-Hexane                  | ND                          | 580                      | ND             | 170         |                   |
| 67-66-3    | Chloroform                | ND                          | 580                      | ND             | 120         |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND                          | 1,100                    | ND             | 370         |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND                          | 580                      | ND             | 140         |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND                          | 560                      | ND             | 100         |                   |
| 71-43-2    | Benzene                   | ND                          | 540                      | ND             | 170         |                   |
| 56-23-5    | Carbon Tetrachloride      | ND                          | 540                      | ND             | 86          |                   |
| 110-82-7   | Cyclohexane               | ND                          | 1,200                    | ND             | 350         |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND                          | 540                      | ND             | 120         |                   |
| 75-27-4    | Bromodichloromethane      | ND                          | 580                      | ND             | 87          |                   |
| 79-01-6    | Trichloroethene           | ND                          | 560                      | ND             | 100         |                   |
| 123-91-1   | 1,4-Dioxane               | ND                          | 560                      | ND             | 160         |                   |
| 80-62-6    | Methyl Methacrylate       | ND                          | 1,200                    | ND             | 290         |                   |
| 142-82-5   | n-Heptane                 | ND                          | 580                      | ND             | 140         |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND                          | 540                      | ND             | 120         |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND                          | 1,200                    | ND             | 290         |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND                          | 560                      | ND             | 120         |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND                          | 560                      | ND             | 100         |                   |
| 108-88-3   | Toluene                   | ND                          | 560                      | ND             | 150         |                   |
| 591-78-6   | 2-Hexanone                | ND                          | 1,200                    | ND             | 290         |                   |
| 124-48-1   | Dibromochloromethane      | ND                          | 580                      | ND             | 68          |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND                          | 560                      | ND             | 73          |                   |
| 123-86-4   | n-Butyl Acetate           | ND                          | 1,200                    | ND             | 250         |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Digester 6 #3

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Sample ID: P2201236-003

Test Code: EPA TO-15 Modified

Date Collected: 3/18/22

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Date Received: 3/21/22

Analyst: Topacio Zavala

Date Analyzed: 4/1/22

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: 0.0020 Liter(s)

Test Notes:

Container ID: AS01478

Canister Dilution Factor: 4.32

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | ND              | 580          | ND             | 120         |                   |
| 127-18-4    | Tetrachloroethene           | ND              | 560          | ND             | 83          |                   |
| 108-90-7    | Chlorobenzene               | ND              | 560          | ND             | 120         |                   |
| 100-41-4    | Ethylbenzene                | ND              | 560          | ND             | 130         |                   |
| 179601-23-1 | m,p-Xylenes                 | ND              | 1,200        | ND             | 270         |                   |
| 75-25-2     | Bromoform                   | ND              | 560          | ND             | 54          |                   |
| 100-42-5    | Styrene                     | ND              | 540          | ND             | 130         |                   |
| 95-47-6     | o-Xylene                    | ND              | 560          | ND             | 130         |                   |
| 111-84-2    | n-Nonane                    | ND              | 560          | ND             | 110         |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 560          | ND             | 82          |                   |
| 98-82-8     | Cumene                      | ND              | 560          | ND             | 110         |                   |
| 80-56-8     | alpha-Pinene                | ND              | 580          | ND             | 100         |                   |
| 103-65-1    | n-Propylbenzene             | ND              | 580          | ND             | 120         |                   |
| 622-96-8    | 4-Ethyltoluene              | ND              | 580          | ND             | 120         |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND              | 560          | ND             | 110         |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | ND              | 560          | ND             | 110         |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 1,200        | ND             | 230         |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 560          | ND             | 93          |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | ND              | 560          | ND             | 93          |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 580          | ND             | 97          |                   |
| 5989-27-5   | d-Limonene                  | ND              | 540          | ND             | 97          |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 1,100        | ND             | 110         |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 1,200        | ND             | 160         |                   |
| 91-20-3     | Naphthalene                 | ND              | 560          | ND             | 110         | V                 |
| 87-68-3     | Hexachlorobutadiene         | ND              | 560          | ND             | 53          |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

V = The continuing calibration verification standard was outside (biased low) the specified limits for this compound.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P220401-MB

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

**Analyst:** Topacio Zavala

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 4/1/22

Volume(s) Analyzed: 0.20 Liter(s)

Canister Dilution Factor: 1.00

| CAS #     | Compound                                         | Result<br>µg/m <sup>3</sup> | MRL<br>µg/m <sup>3</sup> | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-----------|--------------------------------------------------|-----------------------------|--------------------------|----------------|-------------|-------------------|
| 115-07-1  | Propene                                          | ND                          | 1.3                      | ND             | 0.76        |                   |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | ND                          | 1.4                      | ND             | 0.27        |                   |
| 74-87-3   | Chloromethane                                    | ND                          | 1.3                      | ND             | 0.63        |                   |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | ND                          | 1.4                      | ND             | 0.19        |                   |
| 75-01-4   | Vinyl Chloride                                   | ND                          | 1.3                      | ND             | 0.51        |                   |
| 106-99-0  | 1,3-Butadiene                                    | ND                          | 1.3                      | ND             | 0.59        |                   |
| 74-83-9   | Bromomethane                                     | ND                          | 1.3                      | ND             | 0.33        |                   |
| 75-00-3   | Chloroethane                                     | ND                          | 1.3                      | ND             | 0.49        |                   |
| 64-17-5   | Ethanol                                          | ND                          | 13                       | ND             | 6.6         |                   |
| 75-05-8   | Acetonitrile                                     | ND                          | 2.5                      | ND             | 1.5         |                   |
| 107-02-8  | Acrolein                                         | ND                          | 2.5                      | ND             | 1.1         |                   |
| 67-64-1   | Acetone                                          | ND                          | 13                       | ND             | 5.5         |                   |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | ND                          | 1.3                      | ND             | 0.23        |                   |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | ND                          | 2.5                      | ND             | 1.0         |                   |
| 107-13-1  | Acrylonitrile                                    | ND                          | 2.5                      | ND             | 1.2         |                   |
| 75-35-4   | 1,1-Dichloroethene                               | ND                          | 1.4                      | ND             | 0.34        |                   |
| 75-09-2   | Methylene Chloride                               | ND                          | 1.3                      | ND             | 0.37        |                   |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | ND                          | 1.4                      | ND             | 0.43        |                   |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | ND                          | 1.4                      | ND             | 0.18        |                   |
| 75-15-0   | Carbon Disulfide                                 | ND                          | 2.8                      | ND             | 0.88        |                   |
| 156-60-5  | trans-1,2-Dichloroethene                         | ND                          | 1.4                      | ND             | 0.34        |                   |
| 75-34-3   | 1,1-Dichloroethane                               | ND                          | 1.4                      | ND             | 0.33        |                   |
| 1634-04-4 | Methyl tert-Butyl Ether                          | ND                          | 1.4                      | ND             | 0.37        |                   |
| 108-05-4  | Vinyl Acetate                                    | ND                          | 13                       | ND             | 3.6         |                   |
| 78-93-3   | 2-Butanone (MEK)                                 | ND                          | 2.5                      | ND             | 0.85        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Sample ID: P220401-MB

**Test Code:** EPA TO-15 Modified

Date Collected: NA

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

Date Received: NA

**Analyst:** Topacio Zavala

Date Analyzed: 4/1/22

**Sample Type:** 6.0 L Silonite Canister

Volume(s) Analyzed: 0.20 Liter(s)

**Test Notes:**

Canister Dilution Factor: 1.00

| CAS #      | Compound                  | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|------------|---------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 156-59-2   | cis-1,2-Dichloroethene    | ND              | 1.3          | ND             | 0.33        |                   |
| 141-78-6   | Ethyl Acetate             | ND              | 5.5          | ND             | 1.5         |                   |
| 110-54-3   | n-Hexane                  | ND              | 1.4          | ND             | 0.38        |                   |
| 67-66-3    | Chloroform                | ND              | 1.4          | ND             | 0.28        |                   |
| 109-99-9   | Tetrahydrofuran (THF)     | ND              | 2.5          | ND             | 0.85        |                   |
| 107-06-2   | 1,2-Dichloroethane        | ND              | 1.4          | ND             | 0.33        |                   |
| 71-55-6    | 1,1,1-Trichloroethane     | ND              | 1.3          | ND             | 0.24        |                   |
| 71-43-2    | Benzene                   | ND              | 1.3          | ND             | 0.39        |                   |
| 56-23-5    | Carbon Tetrachloride      | ND              | 1.3          | ND             | 0.20        |                   |
| 110-82-7   | Cyclohexane               | ND              | 2.8          | ND             | 0.80        |                   |
| 78-87-5    | 1,2-Dichloropropane       | ND              | 1.3          | ND             | 0.27        |                   |
| 75-27-4    | Bromodichloromethane      | ND              | 1.4          | ND             | 0.20        |                   |
| 79-01-6    | Trichloroethene           | ND              | 1.3          | ND             | 0.24        |                   |
| 123-91-1   | 1,4-Dioxane               | ND              | 1.3          | ND             | 0.36        |                   |
| 80-62-6    | Methyl Methacrylate       | ND              | 2.8          | ND             | 0.67        |                   |
| 142-82-5   | n-Heptane                 | ND              | 1.4          | ND             | 0.33        |                   |
| 10061-01-5 | cis-1,3-Dichloropropene   | ND              | 1.3          | ND             | 0.28        |                   |
| 108-10-1   | 4-Methyl-2-pentanone      | ND              | 2.8          | ND             | 0.67        |                   |
| 10061-02-6 | trans-1,3-Dichloropropene | ND              | 1.3          | ND             | 0.29        |                   |
| 79-00-5    | 1,1,2-Trichloroethane     | ND              | 1.3          | ND             | 0.24        |                   |
| 108-88-3   | Toluene                   | ND              | 1.3          | ND             | 0.35        |                   |
| 591-78-6   | 2-Hexanone                | ND              | 2.8          | ND             | 0.67        |                   |
| 124-48-1   | Dibromochloromethane      | ND              | 1.4          | ND             | 0.16        |                   |
| 106-93-4   | 1,2-Dibromoethane         | ND              | 1.3          | ND             | 0.17        |                   |
| 123-86-4   | n-Butyl Acetate           | ND              | 2.8          | ND             | 0.58        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

# ALS ENVIRONMENTAL

## RESULTS OF ANALYSIS

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Method Blank

ALS Project ID: P2201236

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Sample ID: P220401-MB

**Test Code:** EPA TO-15 Modified

Date Collected: NA

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

Date Received: NA

**Analyst:** Topacio Zavala

Date Analyzed: 4/1/22

**Sample Type:** 6.0 L Silonite Canister

Volume(s) Analyzed: 0.20 Liter(s)

**Test Notes:**

Canister Dilution Factor: 1.00

| CAS #       | Compound                    | Result<br>µg/m³ | MRL<br>µg/m³ | Result<br>ppbV | MRL<br>ppbV | Data<br>Qualifier |
|-------------|-----------------------------|-----------------|--------------|----------------|-------------|-------------------|
| 111-65-9    | n-Octane                    | ND              | 1.4          | ND             | 0.29        |                   |
| 127-18-4    | Tetrachloroethene           | ND              | 1.3          | ND             | 0.19        |                   |
| 108-90-7    | Chlorobenzene               | ND              | 1.3          | ND             | 0.28        |                   |
| 100-41-4    | Ethylbenzene                | ND              | 1.3          | ND             | 0.30        |                   |
| 179601-23-1 | m,p-Xylenes                 | ND              | 2.8          | ND             | 0.63        |                   |
| 75-25-2     | Bromoform                   | ND              | 1.3          | ND             | 0.13        |                   |
| 100-42-5    | Styrene                     | ND              | 1.3          | ND             | 0.29        |                   |
| 95-47-6     | o-Xylene                    | ND              | 1.3          | ND             | 0.30        |                   |
| 111-84-2    | n-Nonane                    | ND              | 1.3          | ND             | 0.25        |                   |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | ND              | 1.3          | ND             | 0.19        |                   |
| 98-82-8     | Cumene                      | ND              | 1.3          | ND             | 0.26        |                   |
| 80-56-8     | alpha-Pinene                | ND              | 1.4          | ND             | 0.24        |                   |
| 103-65-1    | n-Propylbenzene             | ND              | 1.4          | ND             | 0.27        |                   |
| 622-96-8    | 4-Ethyltoluene              | ND              | 1.4          | ND             | 0.27        |                   |
| 108-67-8    | 1,3,5-Trimethylbenzene      | ND              | 1.3          | ND             | 0.26        |                   |
| 95-63-6     | 1,2,4-Trimethylbenzene      | ND              | 1.3          | ND             | 0.26        |                   |
| 100-44-7    | Benzyl Chloride             | ND              | 2.8          | ND             | 0.53        |                   |
| 541-73-1    | 1,3-Dichlorobenzene         | ND              | 1.3          | ND             | 0.22        |                   |
| 106-46-7    | 1,4-Dichlorobenzene         | ND              | 1.3          | ND             | 0.22        |                   |
| 95-50-1     | 1,2-Dichlorobenzene         | ND              | 1.4          | ND             | 0.22        |                   |
| 5989-27-5   | d-Limonene                  | ND              | 1.3          | ND             | 0.22        |                   |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | ND              | 2.5          | ND             | 0.26        |                   |
| 120-82-1    | 1,2,4-Trichlorobenzene      | ND              | 2.8          | ND             | 0.37        |                   |
| 91-20-3     | Naphthalene                 | ND              | 1.3          | ND             | 0.25        | V                 |
| 87-68-3     | Hexachlorobutadiene         | ND              | 1.3          | ND             | 0.12        |                   |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

V = The continuing calibration verification standard was outside (biased low) the specified limits for this compound.

# ALS ENVIRONMENTAL

## SURROGATE SPIKE RECOVERY RESULTS

Page 1 of 1

**Client:** Hazen And Sawyer, P.C.

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister(s)

Test Notes:

Date(s) Collected: 3/18/22

Date(s) Received: 3/21/22

Date(s) Analyzed: 4/1/22

| Client Sample ID             | ALS Sample ID | 1,2-Dichloroethane-d4 | Toluene-d8        | Bromofluorobenzene | Acceptance Limits | Data Qualifier |
|------------------------------|---------------|-----------------------|-------------------|--------------------|-------------------|----------------|
|                              |               | Percent Recovered     | Percent Recovered | Percent Recovered  |                   |                |
| Method Blank                 | P220401-MB    | 94                    | 102               | 83                 | 70-130            |                |
| Lab Control Sample           | P220401-LCS   | 97                    | 100               | 106                | 70-130            |                |
| Duplicate Lab Control Sample | P220401-DLCS  | 97                    | 101               | 103                | 70-130            |                |
| Digester 6 #3                | P2201236-003  | 108                   | 106               | 92                 | 70-130            |                |

Surrogate percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P220401-DLCS

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

**Analyst:** Topacio Zavala

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 4/1/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #     | Compound                                         | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-----------|--------------------------------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|           |                                                  | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 115-07-1  | Propene                                          | 206                 | 194          | 194           | 94         | 94   | 56-128               | 0   | 25  |      |
| 75-71-8   | Dichlorodifluoromethane (CFC 12)                 | 208                 | 198          | 197           | 95         | 95   | 71-112               | 0   | 25  |      |
| 74-87-3   | Chloromethane                                    | 206                 | 193          | 191           | 94         | 93   | 53-126               | 1   | 25  |      |
| 76-14-2   | 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114) | 208                 | 207          | 204           | 100        | 98   | 62-121               | 2   | 25  |      |
| 75-01-4   | Vinyl Chloride                                   | 208                 | 200          | 199           | 96         | 96   | 63-123               | 0   | 25  |      |
| 106-99-0  | 1,3-Butadiene                                    | 206                 | 216          | 214           | 105        | 104  | 63-135               | 1   | 25  |      |
| 74-83-9   | Bromomethane                                     | 206                 | 198          | 188           | 96         | 91   | 71-112               | 5   | 25  |      |
| 75-00-3   | Chloroethane                                     | 206                 | 196          | 186           | 95         | 90   | 66-117               | 5   | 25  |      |
| 64-17-5   | Ethanol                                          | 832                 | 1080         | 1050          | 130        | 126  | 57-117               | 3   | 25  | L    |
| 75-05-8   | Acetonitrile                                     | 202                 | 165          | 184           | 82         | 91   | 59-131               | 10  | 25  |      |
| 107-02-8  | Acrolein                                         | 416                 | 386          | 412           | 93         | 99   | 71-123               | 6   | 25  |      |
| 67-64-1   | Acetone                                          | 1,020               | 869          | 864           | 85         | 85   | 60-117               | 0   | 25  |      |
| 75-69-4   | Trichlorofluoromethane (CFC 11)                  | 202                 | 183          | 175           | 91         | 87   | 71-114               | 4   | 25  |      |
| 67-63-0   | 2-Propanol (Isopropyl Alcohol)                   | 400                 | 441          | 423           | 110        | 106  | 61-124               | 4   | 25  |      |
| 107-13-1  | Acrylonitrile                                    | 402                 | 374          | 343           | 93         | 85   | 65-130               | 9   | 25  |      |
| 75-35-4   | 1,1-Dichloroethene                               | 210                 | 213          | 212           | 101        | 101  | 74-114               | 0   | 25  |      |
| 75-09-2   | Methylene Chloride                               | 208                 | 200          | 197           | 96         | 95   | 75-112               | 1   | 25  |      |
| 107-05-1  | 3-Chloro-1-propene (Allyl Chloride)              | 204                 | 215          | 215           | 105        | 105  | 57-127               | 0   | 25  |      |
| 76-13-1   | Trichlorotrifluoroethane (CFC 113)               | 216                 | 207          | 203           | 96         | 94   | 73-114               | 2   | 25  |      |
| 75-15-0   | Carbon Disulfide                                 | 414                 | 369          | 366           | 89         | 88   | 70-113               | 1   | 25  |      |
| 156-60-5  | trans-1,2-Dichloroethene                         | 208                 | 216          | 215           | 104        | 103  | 76-119               | 1   | 25  |      |
| 75-34-3   | 1,1-Dichloroethane                               | 214                 | 221          | 219           | 103        | 102  | 70-114               | 1   | 25  |      |
| 1634-04-4 | Methyl tert-Butyl Ether                          | 206                 | 228          | 225           | 111        | 109  | 72-118               | 2   | 25  |      |
| 108-05-4  | Vinyl Acetate                                    | 942                 | 1190         | 1170          | 126        | 124  | 56-137               | 2   | 25  |      |
| 78-93-3   | 2-Butanone (MEK)                                 | 408                 | 491          | 484           | 120        | 119  | 74-121               | 0.8 | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

L = Laboratory control sample recovery outside the specified limits, results may be biased high.

# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 2 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P220401-DLCS

**Test Code:** EPA TO-15 Modified

**Instrument ID:** Entech 7200CTS/Agilent 7890B/5977B/MS25

**Analyst:** Topacio Zavala

**Sample Type:** 6.0 L Silonite Canister

**Test Notes:**

Date Collected: NA

Date Received: NA

Date Analyzed: 4/1/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #      | Compound                  | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|------------|---------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|            |                           | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 156-59-2   | cis-1,2-Dichloroethene    | 206                 | 225          | 222           | 109        | 108  | 73-117               | 0.9 | 25  |      |
| 141-78-6   | Ethyl Acetate             | 580                 | 656          | 643           | 113        | 111  | 59-161               | 2   | 25  |      |
| 110-54-3   | n-Hexane                  | 208                 | 228          | 225           | 110        | 108  | 55-130               | 2   | 25  |      |
| 67-66-3    | Chloroform                | 210                 | 213          | 210           | 101        | 100  | 71-114               | 1   | 25  |      |
| 109-99-9   | Tetrahydrofuran (THF)     | 404                 | 459          | 453           | 114        | 112  | 73-114               | 2   | 25  |      |
| 107-06-2   | 1,2-Dichloroethane        | 210                 | 206          | 202           | 98         | 96   | 71-119               | 2   | 25  |      |
| 71-55-6    | 1,1,1-Trichloroethane     | 208                 | 209          | 198           | 100        | 95   | 73-119               | 5   | 25  |      |
| 71-43-2    | Benzene                   | 208                 | 198          | 192           | 95         | 92   | 72-113               | 3   | 25  |      |
| 56-23-5    | Carbon Tetrachloride      | 202                 | 200          | 198           | 99         | 98   | 67-123               | 1   | 25  |      |
| 110-82-7   | Cyclohexane               | 412                 | 388          | 382           | 94         | 93   | 70-119               | 1   | 25  |      |
| 78-87-5    | 1,2-Dichloropropane       | 206                 | 228          | 224           | 111        | 109  | 70-118               | 2   | 25  |      |
| 75-27-4    | Bromodichloromethane      | 208                 | 232          | 225           | 112        | 108  | 74-119               | 4   | 25  |      |
| 79-01-6    | Trichloroethene           | 204                 | 226          | 221           | 111        | 108  | 74-115               | 3   | 25  |      |
| 123-91-1   | 1,4-Dioxane               | 206                 | 252          | 248           | 122        | 120  | 77-124               | 2   | 25  |      |
| 80-62-6    | Methyl Methacrylate       | 410                 | 532          | 524           | 130        | 128  | 78-126               | 2   | 25  | L    |
| 142-82-5   | n-Heptane                 | 206                 | 244          | 240           | 118        | 117  | 70-119               | 0.9 | 25  |      |
| 10061-01-5 | cis-1,3-Dichloropropene   | 208                 | 239          | 235           | 115        | 113  | 81-126               | 2   | 25  |      |
| 108-10-1   | 4-Methyl-2-pentanone      | 412                 | 541          | 533           | 131        | 129  | 73-129               | 2   | 25  | L    |
| 10061-02-6 | trans-1,3-Dichloropropene | 200                 | 225          | 222           | 113        | 111  | 80-127               | 2   | 25  |      |
| 79-00-5    | 1,1,2-Trichloroethane     | 208                 | 226          | 219           | 109        | 105  | 78-117               | 4   | 25  |      |
| 108-88-3   | Toluene                   | 206                 | 203          | 204           | 99         | 99   | 70-118               | 0   | 25  |      |
| 591-78-6   | 2-Hexanone                | 406                 | 523          | 520           | 129        | 128  | 74-132               | 0.8 | 25  |      |
| 124-48-1   | Dibromochloromethane      | 210                 | 211          | 211           | 100        | 100  | 69-137               | 0   | 25  |      |
| 106-93-4   | 1,2-Dibromoethane         | 208                 | 200          | 198           | 96         | 95   | 76-128               | 1   | 25  |      |
| 123-86-4   | n-Butyl Acetate           | 406                 | 534          | 531           | 132        | 131  | 75-134               | 0.8 | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

L = Laboratory control sample recovery outside the specified limits, results may be biased high.



# ALS ENVIRONMENTAL

## LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Page 3 of 3

**Client:** Hazen And Sawyer, P.C.

**Client Sample ID:** Duplicate Lab Control Sample

**Client Project ID:** City of Tampa HFC AWTP Master Plan Improv. / 41079-013.AAR No. 13

ALS Project ID: P2201236

ALS Sample ID: P220401-DLCS

Test Code: EPA TO-15 Modified

Instrument ID: Entech 7200CTS/Agilent 7890B/5977B/MS25

Analyst: Topacio Zavala

Sample Type: 6.0 L Silonite Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 4/1/22

Volume(s) Analyzed: 0.125 Liter(s)

| CAS #       | Compound                    | Spike Amount        | Result       |               | % Recovery |      | ALS                  | RPD | RPD | Data |
|-------------|-----------------------------|---------------------|--------------|---------------|------------|------|----------------------|-----|-----|------|
|             |                             | LCS / DLCS<br>µg/m³ | LCS<br>µg/m³ | DLCS<br>µg/m³ | LCS        | DLCS | Acceptance<br>Limits |     |     |      |
| 111-65-9    | n-Octane                    | 208                 | 244          | 242           | 117        | 116  | 68-120               | 0.9 | 25  |      |
| 127-18-4    | Tetrachloroethene           | 212                 | 201          | 199           | 95         | 94   | 63-130               | 1   | 25  |      |
| 108-90-7    | Chlorobenzene               | 206                 | 194          | 193           | 94         | 94   | 70-118               | 0   | 25  |      |
| 100-41-4    | Ethylbenzene                | 206                 | 227          | 226           | 110        | 110  | 71-123               | 0   | 25  |      |
| 179601-23-1 | m,p-Xylenes                 | 416                 | 468          | 465           | 113        | 112  | 67-127               | 0.9 | 25  |      |
| 75-25-2     | Bromoform                   | 210                 | 214          | 214           | 102        | 102  | 65-149               | 0   | 25  |      |
| 100-42-5    | Styrene                     | 202                 | 239          | 239           | 118        | 118  | 76-132               | 0   | 25  |      |
| 95-47-6     | o-Xylene                    | 208                 | 236          | 235           | 113        | 113  | 69-124               | 0   | 25  |      |
| 111-84-2    | n-Nonane                    | 208                 | 254          | 253           | 122        | 122  | 64-127               | 0   | 25  |      |
| 79-34-5     | 1,1,2,2-Tetrachloroethane   | 208                 | 220          | 220           | 106        | 106  | 69-128               | 0   | 25  |      |
| 98-82-8     | Cumene                      | 206                 | 224          | 223           | 109        | 108  | 69-125               | 0.9 | 25  |      |
| 80-56-8     | alpha-Pinene                | 210                 | 233          | 243           | 111        | 116  | 68-129               | 4   | 25  |      |
| 103-65-1    | n-Propylbenzene             | 208                 | 224          | 238           | 108        | 114  | 70-127               | 5   | 25  |      |
| 622-96-8    | 4-Ethyltoluene              | 208                 | 232          | 243           | 112        | 117  | 69-127               | 4   | 25  |      |
| 108-67-8    | 1,3,5-Trimethylbenzene      | 208                 | 234          | 243           | 113        | 117  | 66-129               | 3   | 25  |      |
| 95-63-6     | 1,2,4-Trimethylbenzene      | 206                 | 242          | 225           | 117        | 109  | 63-142               | 7   | 25  |      |
| 100-44-7    | Benzyl Chloride             | 416                 | 468          | 435           | 113        | 105  | 73-145               | 7   | 25  |      |
| 541-73-1    | 1,3-Dichlorobenzene         | 208                 | 186          | 187           | 89         | 90   | 67-136               | 1   | 25  |      |
| 106-46-7    | 1,4-Dichlorobenzene         | 210                 | 188          | 188           | 90         | 90   | 63-134               | 0   | 25  |      |
| 95-50-1     | 1,2-Dichlorobenzene         | 210                 | 198          | 197           | 94         | 94   | 64-139               | 0   | 25  |      |
| 5989-27-5   | d-Limonene                  | 206                 | 262          | 264           | 127        | 128  | 63-137               | 0.8 | 25  |      |
| 96-12-8     | 1,2-Dibromo-3-chloropropane | 404                 | 430          | 461           | 106        | 114  | 72-145               | 7   | 25  |      |
| 120-82-1    | 1,2,4-Trichlorobenzene      | 420                 | 391          | 387           | 93         | 92   | 62-154               | 1   | 25  |      |
| 91-20-3     | Naphthalene                 | 210                 | 223          | 222           | 106        | 106  | 62-156               | 0   | 25  |      |
| 87-68-3     | Hexachlorobutadiene         | 212                 | 196          | 195           | 92         | 92   | 55-142               | 0   | 25  |      |

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.



## EBO Guidelines for Evaluation Points on RFP and CCNA Proposals

| <b>Points Pursuant to Designated Industry Category: _____</b><br><b>DMI-71 FORM</b><br><b>(Refer to DMI 50 Form - Good Faith Efforts (GFE) Outreach)</b>                                       |                                                                                                                                                                   |                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
|                                                                                                                                                                                                | <b>Evaluation Criteria</b>                                                                                                                                        | <b>Point Values</b> |
| A.                                                                                                                                                                                             | SLBE participating as the Prime Contractor (City of Tampa Certified Only) with meaningful subcontractor/subconsultant participation of City Certified SLBE firms. | 5-15                |
| *B.                                                                                                                                                                                            | Prime Contractor with meaningful subcontractor/subconsultant of City Certified SLBE firms.                                                                        | 0 - 10              |
| <b>Note: The maximum points available for SLBE participation will not exceed fifteen (15) points. In addition, evaluation points will be awarded for To-Be-Determined (TBD) participation.</b> |                                                                                                                                                                   |                     |

Points are determined as follows (Requires DMI 50 Form - GFE):

- A. Five to Fifteen (5-15) rating points **may** be awarded when the Proposer is a City of Tampa Certified SLBE firm and utilizes SLBE certified firm(s) as sub-contractors/ sub-consultants and assigned to perform meaningful segments of the contractual services detailed herein and documented on the enclosed DMI 10 & 20 Forms.
- B. Zero to Ten (0-10) rating points **may** be awarded when the proposer is not a City of Tampa certified SLBE prime contractor but utilizes SLBE certified firm(s) as sub-contractors/ sub-consultants and is assigned to perform meaningful segments of the contractual services detailed herein and documented on the enclosed DMI 10 & 20 Forms.

\*A maximum of three (3) “discretionary” rating points **may** be awarded when the Proposer provides SLBE participation from an external agency recognized by the City of Tampa. **In addition, evaluation points may be awarded for To-Be-Determined (TBD) participation.**

**The maximum number of points available for SLBE participation will not exceed fifteen (15) points.**



## EBO Guidelines for Evaluation Points on RFP and CCNA Proposals

### **Equal Business Opportunity Evaluation Weighted Points: CCNA Proposal Guidelines**

Under CCNA solicitations, proposers must submit to preconstruction Good Faith Efforts (GFE) requirements covering the inclusion of City of Tampa-certified SLBE firms. Such inclusion shall be clearly addressed and documented utilizing DMI 10, 20, and 50 Forms. Proof of certification shall include copies of current certification certificates. This applies to ALL Phase 1 preconstruction design services.

Points awarded during the shortlist selection process will be more heavily weighed predominantly on the design side (this does not preclude identification of phase 2 projections of construction participation that follow in the future, i.e., GMPs). In order to ensure the maximum points, a proposer must **clearly identify and quantify** its planned participation without ambiguity. Simply marking "To Be Determined" (TBD) will not satisfy this requirement and may result in significantly lower ratings. Finally, additional favorable consideration will be granted to the firm(s) that, beyond all others, provide the highest *relevant* and most binding participation.

### **Additional Evaluation Information:**

The evaluation includes, but is not limited to, the following criteria:

- SLBE subcontractors listed to be utilized (DMI Form 20)
- Percentage of proposal/scope committed to SLBE subcontracting.
- The collective factors in determining the total points awarded will be based on the overall weight of evidence in the proposal that specified the participation.
- Subcontractors are utilized for meaningful tasks, which are viewed as related to the core scope of work.

In all cases, the Proposer and/or subcontractor(s) must be SLBE certified prior to the opening date and time of the RFP to be eligible to earn SLBE rating points. The City of Tampa's Office of Equal Business Opportunity will evaluate the SLBE participation evaluation process. The Successful Proposer will be required to execute the DMI 40 Form (Letter of Intent-LOI) with their subcontractors/sub-consultants prior to award.





Instructions for completing The Sub- (Contractor's/Consultants/ Suppliers) Solicited Form  
(DMI 10 Form)

**This form must be submitted with all bids or proposals.** All subcontractors (regardless of ownership or size) solicited and subcontractors from whom unsolicited quotations were received must be included in this form. The instructions that follow correspond to the headings on the form required to be completed. **Note:** Ability or desire to perform all work shall not exempt the prime from Good Faith Efforts to achieve participation.

**Contract No.** This is the number assigned by the City of Tampa for the proposal.

- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business and/or doing business as (dba), if applicable.
- **Address.** The physical address of your business.
- **Federal ID. FIN.** A number assigned to your business for tax reporting purposes.
- **Phone.** Telephone number to contact the business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **No Firms were contacted or solicited for this contract.** Checking the box indicates that a pre-determined Subcontract Goal or Participation Plan Requirement was not set by the city, resulting in your business not using subcontractors and will self-perform all work. If, during the performance of the contract, you employ subcontractors, the City must pre-approve subcontractors. Use of the "Sub-(Contractors/Consultants/Suppliers) Payments" form (DMI 30 Form) must be submitted with every pay application and invoice. **Note:** Certified SLBE firms bidding as Primes are not exempt from outreach and solicitation of subcontractors.
- **No Firms were contacted because.** Provide a brief explanation of why no firms were contacted or solicited.
- **See attached documents.** Check the box if, after you have completed the DMI Form in its entirety, you need more space to list additional firms and/or if you have supplemental information/documentation relating to the form. All DMI data not submitted on the DMI 10 Form must be in the same format and include all the requested data from the DMI 10 Form.

The following instructions are for the information of all subcontractors solicited.

- **"S" = SLBE.** Enter "S" for firms Certified by the City as Small Local Business Enterprises; **"O" = non-certified others.**
- **Federal ID. FIN.** A number assigned to a business for tax reporting purposes. This information is critical in the proper identification and payment of the contractor/subcontractor.
- **Company Name, Address, Phone & Fax.** Provide company information for verification of payments.
- **Trade, Services, or Materials** indicate the trade, service, or materials provided by the subcontractor. NIGP codes, aka "National Institute of Governmental Purchasing," are listed in the top section of the document.
- **Contact Method L=letter, F=fax, E=Email, P=Phone.** Indicate with a letter the method(s) of soliciting for bids.
- **Quote or Resp. (response) Rec'd (received) Y/N.** Indicate "Y" Yes if you received a quotation or if you received a response to your solicitation. Indicate "N" No if you received no response to your solicitation from the subcontractor. Must keep records: log, ledger, documentation, etc. that can validate/verify.

If additional information is required or you have questions, please contact the Equal Business Opportunity Program - Office of Equal Business Opportunity at (813) 274-5522

Check applicable box(es). Detailed Instructions for completing this form are on page 4 of 4.

NOTICE: This document is the property of the U.S. Department of Justice. It is loaned to your agency and is not to be distributed outside your agency.

☐ No Subcontracting/consulting (of any kind) will be performed on this contract.

**No Firms are listed to be utilized because:**\_\_\_\_\_

Enter "S" for firms Certified as Small Local Business Enterprises: "O" for Other Non-Certified

[illegible]

**Total SLBE Utilization \$** \_\_\_\_\_

It is hereby certified that the following information is a true and accurate account of utilization for sub-contracting opportunities on this Contract.

Signed: \_\_\_\_\_ Name/Title: \_\_\_\_\_ Date: \_\_\_\_\_

DMI 20 rev./effective 08/2025



Instructions for completing The Sub- (Contractor's/Consultants/ Suppliers) to be Utilized Form  
(DMI 20 Form)

**This form must be submitted with all bids or proposals. All subcontractors (regardless of ownership or size) projected to be utilized must be included in this form.**

- **Contract No.** This is the number assigned by the City of Tampa for the proposal.
- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business and/or doing business as (dba) if applicable.
- **Address.** The physical address of your business.
- **Federal ID.** FIN. A number assigned to your business for tax reporting purposes.
- **Phone.** Telephone number to contact the business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **No Subcontracting/consulting (of any kind) will be performed on this contract.** Checking the box indicates your business will not use subcontractors when no Subcontract Goal or Participation Plan Requirement was set by the city but will self-perform all work. When subcontractors are utilized during the performance of the contract, the "Sub-(Contractors/Consultants/Suppliers) Payments" form (DMI 30 Form) must be submitted with every pay application and invoice. Note: Certified **SLBE firms** bidding as Primes **are not exempt** from outreach and solicitation of subcontractors, including completion and submission of Form-10 and Form-20.
- **No Firms listed To-Be-Utilized.** Check box: provide a brief explanation why no firms were retained when a goal or participation plan requirement was set on the contract. **Note: Mandatory compliance with Good Faith Effort outreach (GFECP) requirements applies (DMI 50 Form), and supporting documentation must accompany the bid.**
- **See attached documents.** Check the box if, after completing the DMI Form in its entirety, you need more space to list additional firms and/or if you have supplemental information/documentation relating to the scope/value/percent utilization of subcontractors. Reproduce copies of DMI-20 and attach. All data not submitted on duplicate forms must be in the same format and content as specified in these instructions.

The following instructions are for the information of all subcontractors To Be Utilized.

- **Federal ID.** FIN. A number assigned to a business for tax reporting purposes. This information is critical in the proper identification of the subcontractor.
- **"S" = SLBE,** enter "S" for firms Certified by the City as Small Local Business Enterprises; **"O" = non-certified others.**
- **Company Name, Address, Phone & Fax.** Provide company information for verification of payments.
- **Trade, Services, or Materials (NIGP code if known).** Indicate the trade, service, or material provided by the subcontractor. Abbreviated list of NIGP is available at <http://www.tampagov.net/DMI> "Information Resources".
- **Amount of Quote, Letters of Intent** (required for SLBEs).
- **Percent of Work/Contract.** Indicate the percentage of the total contract price the subcontract(s) represent. For CCNA only (i.e., Consultant A/E Services), you must indicate subcontracts as a percentage of the total scope/contract.
- **Total Subcontract/Supplier Utilization.** – Provide the total dollar amount of all subcontractors/suppliers projected to be used for the contract. (Dollar amounts may be optional in CCNA depending on solicitation format).
- **Total SLBE Utilization.** Provide the total dollar amount for all projected SLBE subcontractors/Suppliers used for this contract. (Dollar amounts may be optional in CCNA proposals depending on the solicitation format).
- **Percent SLBE Utilization.** Total amount allocated to SLBEs divided by the total bid/proposal amount.

If additional information is required or you have questions, please contact the Equal Business Opportunity Program - Office of Equal Business Opportunity at (813) 274-5522.



## **Good Faith Effort Compliance Plan (GFECP) Guidelines**

for Small Local Business Enterprise Participation  
City of Tampa - Equal Business Opportunity Program  
**(DMI 50 Form – See detailed instructions on page 3 of 3)**

Contract Name \_\_\_\_\_ Bid Date \_\_\_\_\_  
Bidder/Proposer \_\_\_\_\_  
Signature \_\_\_\_\_ Date \_\_\_\_\_  
Name \_\_\_\_\_ Title \_\_\_\_\_

The Compliance Plan with attachments is a true account of Good Faith Efforts (GFE) made to achieve the participation goals as specified for Small Local Business Enterprises (SLBE) on the referenced contract:

- ☐ SLBE participation **Goal is Not Specified for this Solicitation** however participation is aspirational and **GFECP is required**.
- ☐ SLBE participation **Goal is Met or Exceeded** (refer to Goal-Set DMI-90 Form).
- ☐ SLBE participation Goal is **Not Fully Achieved** (refer to Goal-Set DMI-90 Form).

For each checkbox above Bidders/Proposers shall submit DMI Forms 10 and 20 which accurately report **all subcontractors solicited** and **all subcontractors to-be-utilized**. The following list is an overview of the required baseline GFECP action steps for all bids/proposals. Furthermore, it is understood that these GFECP requirements are weighted in the compliance evaluation based on the veracity and demonstrable degree of documentation provided with the bid/proposal:

**(Check applicable boxes below - Must enclose supporting documents accordingly with Qualifying Remarks)**

- (1) Solicited through reasonable and available means the interest of SLBEs that have the capability to perform the work of the contract. The Bidder or Proposer must solicit this interest within enough time to allow the SLBEs to respond. The Bidder or Proposer must take appropriate steps to follow up initial solicitations with interested SLBEs. ☐ **See DMI report forms for subcontractors solicited.** ☐ **See enclosed supplemental data on solicitation efforts.**
  - ☐ **Qualifying Remarks**
- (2) Provided interested SLBEs with adequate, specific scope information about the plans, specifications, and requirements of the contract, including addenda, in a timely manner to assist them in responding to the requested scope identified by bidder/proposer for the solicitation. ☐ **See enclosed actual solicitations used.**
  - ☐ **Qualifying Remarks**
- (3) Negotiated in good faith with interested SLBEs that have submitted bids (e.g. adjusted quantities or scale). Documentation of negotiation must include the names, addresses, and telephone numbers of SLBEs that were solicited; the date of each such solicitation; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why agreements could not be reached with SLBEs to perform the work. Additional costs involved in soliciting and using subcontractors is not a sufficient reason for a bidder/proposer's failure to meet goals or achieve participation, as long as such costs are reasonable. Bidders are not required to accept excessive quotes in order to meet the goal.
  - ☐ **DMI Utilized Forms for sub-(contractor/consultant) reflect genuine negotiations** ☐ **This project is an RFQ/RFP in nature and negotiations are limited to clarifications of scope/percentages, specifications, qualifications and subs fee schedules.**
  - ☐ **See enclosed documentation.**
  - ☐ **Qualifying Remarks**
- (4) Not rejecting SLBEs as being unqualified without justification based on a thorough investigation of their capabilities. The SLBEs standing within its industry, membership in specific groups, organizations / associations and political or social affiliations are not legitimate causes for rejecting or not soliciting bids to meet the goals.
  - ☐ **Not applicable.** ☐ **See attached justification for rejection of a subcontractor's bid or proposal.** ☐ **Qualifying Remarks**
- (5) Made scope(s) of work available to SLBE subcontractors and suppliers; and, segmented portions of the work or material consistent with the available SLBE subcontractors and suppliers, to facilitate meeting the goal. ☐ **In addition, Sub-Contractors could bid on their own choice of work or trade without restriction to a pre-determined portion.** ☐ **See enclosed comments.** ☐ **Qualifying Remarks**
- (6) Made good faith efforts, despite the ability or desire of Bidder/Proposer to perform the sub-tasks of a contract with its



**Failure to Complete, Sign, and Submit all Forms 10,20, & 50 MAY render the Bid or Proposal Non-Responsive**

own forces/organization. A Bidder/Proposer who desires to self-perform the sub-tasks of a contract must demonstrate good faith efforts if the goal has not been met. ☐ **Sub-Contractors were not prohibited from submitting bids/proposals and were solicited on work typically self-performed by the prime.** ☐ **Qualifying Remarks w/Documents**

- (7) Segmented the portions of the work to be performed by SLBEs in order to increase the likelihood that the goals will be met. This includes, where appropriate, breaking out contract work items into economically feasible units (quantities/scale) to facilitate SLBE participation, even when the Bidder/Proposer might otherwise prefer to perform these work items with its own forces. ☐ **Sub-Contractors could bid on their own choice of work or trade without restriction to a pre-determined portion.**☐ **Sub-Contractors were not prohibited from submitting bids/proposals and were solicited on work typically self-performed by the prime.** ☐ **See enclosed comments.**☐ **Qualifying Remarks**
- (8) Made efforts to assist interested SLBEs in obtaining bonding, lines of credit, or insurance as required by the City or contractor. ☐ **See enclosed documentation on initiatives undertaken and methods to accomplish.** ☐ **Qualifying Remarks**
- (9) Made efforts to assist interested SLBEs in obtaining necessary equipment, supplies, materials, or related assistance or services, including participation in an acceptable mentor-protégé program. ☐ **See enclosed documentation of initiatives and/or agreements.** ☐ **Qualifying Remarks**
- (10) Effectively used the services of the City and other organizations that provide assistance in the recruitment and placement of SLBEs.  
☐ **See enclosed documentation of services engaged.** ☐ **Overview (attached) of tactical actions and resources employed toward recruitment**

**Note:** Any unsolicited information in support of your Bid/RFP Compliance must accompany your submittal. ☐ **Identify Information Submitted**



**Participation Plan: Guidance for Complying with Good Faith Efforts Outreach (page 3 of 3 )**

- (1) All firms on the SLBE Goal Setting List must be solicited and documentation provided for email, fax, letters, phone calls, and other methods of outreach/communication with the listed firms. The DMI Solicited and DMI-Utilized forms must be completed for all firms solicited and all firms utilized. Other opportunities for subcontracting should be explored to attain participation. May consult Tampa EBO Office and/or research the online Data Management Business System Directory for Tampa certified SLBE firms.
- (2) Solicitation of SLBEs, via written or electronic notification, should provide specific information on the services needed, where plans can be reviewed and assistance offered in obtaining these, if required. Solicitations should be sent a minimum of a week (i.e. 5 city business days or more) before the bid/proposal date. Actual copies of the bidder's solicitation containing their scope-specific instructions should be provided.
- (3) With any quotes received, a follow-up should be made when needed to confirm detail scope of work. For any SLBE low quotes rejected, an explanation shall be provided detailing negotiation efforts.
- (4) If a low bid SLBE is rejected or deemed unqualified the contractor must provide an explanation and supporting documentation for this decision.
- (5) Prime shall break down portions of work into economical feasible opportunities for subcontracting. The SLBE directory may be useful in identifying additional subcontracting opportunities and certified firms not listed in the "SLBE Goal Setting Firms Contact List."
- (6) Contractor shall not preclude SLBEs from bidding on any part of work, even if the Contractor may desire to self-perform aspects of the work.
- (7) Contractor shall avoid relying solely on subcontracting those scopes of work where SLBE availability is not sufficient to attain pre-determined goals; including RFP/RFQ solicitations, all of which require GFECF compliance to achieve sub-consultant participation.
- (8) In its solicitations, the Bidder should offer assistance to SLBEs in obtaining bonding, insurance, et cetera, if required of subcontractors by the City or Prime Contractor.
- (9) In its solicitation, the Bidder should offer assistance in obtaining equipment for a specific job to SLBEs, if needed. This includes mobilization where applicable.
- (10) Contractor should use the services offered by such agencies as the Small Business Development Center (SBDC) @ University South Fla.; SBDC @ Hillsborough County Entrepreneur Collaborative Center; Hillsborough NAACP Empowerment Center; Hillsborough County Economic Development Department DM/DWBE/SBE Program and Prospera-Hispanic Business Assoc. to name a few for the recruitment and placement of available SLBEs.