Final Report
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For Texas On-Site Sewage Facility (OSSF) Research Contract #582-21-10767

Aerobic Treatment Units in the Real World (Sampling and New Data)

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Table of Contents

List of Figures

List of Tables

Executive summary

In November of 2021, the Texas Commission on Environmental Quality funded Texas A&M AgriLife Research to carry out an On-Site Sewage Facility (OSSF) research project under the Texas OSSF Research Grant Program (TOGP) solicitation No. 582-21-10767. Texas A&M AgriLife Research's (AgriLife) Water Science Laboratory at the Blackland Research and Extension Center in Temple prepared and submitted a proposal addressing Research Topic 2.3.3 "Aerobic Treatment Units (ATU) in the Real World (Sampling and New Data)". Upon contract award, AgriLife, under the guidance of the TOGP Advisory Committee and TCEQ Project Manager, designed the sampling and documentation procedures required to carry out the research. A total of 104 real-world, operating ATUs (50 residential and 54 non-residential) were located, documented, accessed, and sampled through the help and assistance of state regulators, private service providers, and ATU owners between 4 February and 20 October 2023. Nineteen different ATU manufacturers are represented in the dataset. AgriLife personnel visited each ATU, made observations and field measurements, documented conditions in both written and photographic formats, and collected effluent samples for laboratory analysis. Data collected at each ATU location included the date sampled, system type (residential or non-residential), facilities served (home, business, etc.), square footage and number of bedrooms or design capacity of facilities served, ATU manufacturer, ATU size, year installed, system maintainer (owner or service provider), overall system condition, riser lid condition, pump-tank sludge condition, surface description (i.e., evidence of sewage surfacing), effluent disposal method, disinfection type (if present), free and total chlorine concentration (for surface disposal systems), 5-day biochemical oxygen demand, and total suspended solids. Ten percent (10%) of samples were further analyzed for nitrogen forms and oil & grease. Five-day Biochemical Oxygen (BOD_5) and Total Suspended Solids (TSS) concentrations were considered acceptable (i.e., <65 mg/L) for 85% of the Residential ATUs sampled. Residual chlorine levels were considered acceptable (i.e., >0.1 mg/L) for 42% of measured Residential ATUs. BOD_5 and TSS concentrations were considered acceptable (i.e., <65 mg/L) for 88% of the Non-Residential ATUs sampled. Residual chlorine levels were considered acceptable (i.e., >0.1 mg/L) for 73% of measured Non-Residential ATUs. Results are presented here in tabular form and stored in electronic spreadsheet/database formats.

Introduction and background

On April 29, 2021, the Texas Commission on Environmental Quality (TCEQ) invited applications for eligible On-Site Sewage Facility (OSSF) research projects under the Texas OSSF Research Grant Program's (TOGP) grant solicitation No. 582-21-10767. Texas A&M AgriLife Research's (AgriLife) Water Science Laboratory at the Blackland Research and Extension Center in Temple prepared and submitted a proposal addressing Research Topic 2.3.3 - Aerobic Treatment Units in the Real World (Sampling and New Data). The specific language found in the grant solicitation is shown in Figure 1. The proposal was selected for funding and a contract was established between TCEQ and AGRILIFE in November of 2021.

> 2.3.3 Aerobic Treatment Units in the Real World (Sampling and New Data)
>
> Residential and non-residential locations utilize on-site sewage facilities to treat and dispose of wastewater throughout much of Texas. Permit records indicate aerobic treatment units (ATUs) are the most commonly used wastewater treatment method. A real-world field study is needed to determine if the minimum treatment requirements as found in 30 TAC § 285.91(4), are being achieved. Grab samples shall be taken from the pump tank. Samples shall be tested using standardized laboratory methods specific to wastewater. Results shall include those items specified in 30 TAC § 285.91(4) (chlorine residual, 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), Fecal coliform bacteria) and a wider screening for pathogens of public health significance. These results shall be presented in the units of measure as found in 30 TAC § 285.91(4). Samples may also be tested for fats, oil, and grease (sic) (FOG), metals, total nitrogen, phosphorus, and/or pH but these shall not be the focus of the study. Results shall include who maintains the on-site sewage facility (owner or maintenance provider).

Figure 1 - TCEQ research grant solicitation #582-21-10767 language describing eligible research topics.

A TOGP Committee Meeting was organized and held at the Texas A&M RELLIS Campus on September 12, 2021. Twenty-four people representing academia, the onsite wastewater industry, and TCEQ-OSSF officials met to discuss funded projects. Based on the ensuing discussion and input from meeting participants, several guidance recommendations were given in addition to gathering basic water quality data. The recommendations included collection of a wide range of ATU manufacturers to obtain a representative data set, documenting sludge condition in the pump tank, documenting surface conditions (i.e., if any sewage surfacing), and documenting lid restraint conditions. A request was made to document these conditions in both written and photographic formats. The following project objectives were defined.

1. Identify at least 50 residential ATU systems and collect one-time grab samples
2. Identify at least 50 non-residential ATU systems and collect one-time grab samples
3. Document system manufacturer, size, age, and design capacity
4. Document general condition, sludge level (pump tank), disposal method (surface, sub)
5. Photograph system (overall, pump tank, sludge meter, anomalies, etc.)
6. Analyze grab samples for 5-day biochemical oxygen demand, total suspended solids in a certified laboratory, and residual chlorine (in field, if chlorinator present)
7. Prepare a database (Excel or Access) containing all observations
8. Prepare progress reports and a final summary report describing all results and findings

The following report presents the ATU documentation methodology that was followed, the data collected, summary statistics with general observations, and some recommendations.

Aerobic Treatment Units (ATU) in the Real World

ATU selection, access, and privacy

AgriLife relied heavily upon the cooperation and help from local authorities and service providers to identify and access real-world, operating ATUs for documentation. The Williamson County OSSF Team was able to provide the addresses, design specifications, and obtain permission from owners to access more than 35 non-residential ATUs. Several service providers in the Temple-Belton and Bryan-College Station areas were able to provide design specifications and access to non-residential (i.e., commercial) ATUs and private residential ATUs during routine maintenance or service call visits. Understanding the regulatory nature of the subject, the goal was not to assess the ATUs for non-conformance, enforcement, or punitive purposes but rather to gather information that would allow installers, maintenance providers, designers, and regulators to understand how ATUs are currently operating in the real-world to improve future system design, operation, and management. While documenting ATU conditions, AgriLife personnel or service providers informed ATU owners of any problems observed. The ATUs documented under this project were all located in Central Texas. Specific locations are not presented to preserve the privacy of the cooperating ATU owners. Each ATU system was assigned a sequential identification number from 1 to 104, following the general order in which they were collected or entered into the database.

Documentation methodology

AgriLife personnel relied upon a field worksheet (see Figure 2) to record physical conditions and chemical measurements when sampling ATUs. Field data were subsequently entered into an electronic spreadsheet (i.e., database) where additional information could be added and verified. The following fields were populated and are discussed individually.

Aerobic Treatment Unit Field Measuremer

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Project P1-a ATU - #582-22-10767

Date/Time	
Site Address	
Field Personnel	
Maintenance	
ATU Manufacturer and Size	
ATU Age	
Facilities Served	
Overall Condition	
Lid Condition	
Sewage Surfacing (Y/N)	
Sluge Accumulation	
Disinfection	
Chlorine, Free and Total (mg/L)	
Photos Taken (Y/N)	
Effluent Collection Point	
Field ID | Lab ID	
Additional Observations	

Figure 2 – ATU field data sheet used by AgriLife field personnel

Field Observations

Date and Time – The date and time of each ATU visit and sample collection was recorded for quality assurance and verification purposes. Effluent grab samples have a 48-hour holding time for both BOD_5 and TSS determination; all project samples were analyzed in a National Environmental Laboratory Accreditation Program (NELAP) certified contract laboratory facility (Aqua Tech Laboratories, LLC. Austin and Bryan, Texas). Sample collection date and time were required for chain-of-custody laboratory forms to ensure sample tracking and analytical quality control was met. Date and times were also used by AgriLife personnel during data entry for record verification (i.e., comparison between field sheet and laboratory reports).

Site Address – The address of each ATU was recorded to allow AgriLife personnel to obtain ATU specifications from regulator and/or service provider records. Each address was assigned a unique Identification (ID) number for reporting purposes. Addresses of individual ATUs are not presented to preserve the privacy of cooperating owners.

Field Personnel - This project relied upon half a dozen AgriLife personnel conducting field visits to document and collect ATU water samples. The person(s) making field observations and measurements were recorded to aid with verification during data entry (i.e., transposing written field records to electronic forms). This allowed data entry staff to discuss site visits with the person who conducted the field observations and clarify or augment details. Field personnel who collected measurements are not presented in the final data set.

Maintenance – Refers to who provides system maintenance, the system owner or a contract service provider. For this project, all residential ATUs were accessed through the assistance of service providers, and all were under service contract. Non-residential ATUs are regulated by TAC 285 and must use a commercial service provider, none were owner maintained. Maintenance provider (owner or service contract) is not presented in the final data set.

ATU Manufacturer and Size - The TOGP Advisory Committee requested that AgriLife access and document as wide a range as possible of ATUs currently operating in the real world. AgriLife relied upon the experience and knowledge of local regulators and service providers to locate ATUs for the study and all attempted to accommodate this request. In some cases where ATU manufacturer was not available from the cooperating entity records, AgriLife relied upon ATU

labeling in the field. ATU size was determined by two methods. When possible, service provider records were preferred and utilized. When not available, residential ATU size was estimated based on available on-line real estate records (i.e., home square footage and number of bedrooms) and consulting 30 TAC Chapter 285. When no information or reasonable estimate was available, the record was assigned "unknown".

ATU Age – ATU age for most entries was determined from regulator or service provider records. As with manufacturer and size, if no records were available from collaborator records, field labels were checked, if present. When no information or reasonable estimate was available, the record was assigned "unknown".

Facility Type – AgriLife field personnel recorded the ATU facilities served as either Residential or Non-residential. All Residential ATUs in this study were single-family homes. Non-Residential ATUs included churches, schools, commercial properties, and businesses.

Overall Condition – Judging the ATU overall condition was left to the discretion of AgriLife field personnel. The following general categories were assigned: Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.

Lid Condition – Riser lid condition was judged based upon observations of the pump tank lid when accessed for water quality sample collection (Figure 3). The lid condition was described as: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing. If the lid was not made of plastic, the condition was judged at the discretion of field personnel using the same categories.

Figure 3 - ATU pump tank riser lid missing two screws at ~8 and 9 o'clock positions.

Sludge (pump tank) – Sludge accumulation in the pump tank was examined to assess ATU effluent quality being disposed through surface or subsurface mechanisms (Figure 4). Sludge accumulation condition was described as: Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column.

Figure 4 - Visually evaluating sludge level in residential ATU pump tank with sludge sampler

Sewage surfacing – A visual inspection of the area around the ATU tanks and the effluent disposal area was made to discern the presence of leaks, overflows, or other problems leading to sewage surfacing. The record was marked as either yes or no.

Disposal Type – Field personnel marked the system as using either Surface or Subsurface effluent disposal. Service providers were able to help AgriLife personnel identify most system disposal methods. In a few cases, predominantly commercial, disposal type was determined from records.

Disinfection Type – AgriLife field personnel looked for the presence of chlorinator mechanisms on surface disposal systems. The record was categorized as either liquid, tablet, or none.

Free and Total Chlorine – Free chlorine and Total was measured for most residential and non-residential systems utilizing surface effluent disposal. Free and total chlorine was also measured on a number of subsurface systems for interest and comparison. Concentration was determined on-site at the time of water sample collection by AgriLife field personnel due to the volatile nature of chlorine. Measurements were made using a HACH DR300 Portable Colorimeter (HACH, Loveland, CO) using low-range DPD (N,N-diethyl-p-phenylenediamine) chemistry (Figure 6). Results are reported as milligrams per liter (mg/L) concentration.

Figure 5- Measuring chlorine on-site at a residential ATU

Effluent Sample Collection – Effluent water quality samples were collected from the ATU pump tank using a simple dip sampler (Figure 7). Field personnel attempted to take representative effluent samples by collecting from the middle of the water column in the ATU pump tank.

Figure 6- Collecting water quality sample from ATU pump tank.

Laboratory Analyses

BOD_5 – Five-day Biochemical Oxygen Demand (BOD_5) for all ATUs in this study was determined in a commercial laboratory (AquaTech, Austin and Bryan, TX). Samples were collected by AgriLife field personnel, preserved with ice, and delivered to the laboratory for analysis within the required 48-hour holding time. Results are reported as mg/L.

TSS - Total Suspended Solids (TSS) for all ATUs in this study was determined in a commercial laboratory (AquaTech, Austin and Bryan, TX). Samples were collected by AgriLife field personnel, preserved with ice, and delivered to the laboratory for analysis within the required 48-hour holding time. Results are reported as mg/L.

Individual ATU descriptions and measurement results

The following section presents all collected data in table and photographic form.

The ATU-ID and water quality values (i.e., Free and Total Chlorine, BOD_5 and TSS) in Table 1 are highlighted in blue to ease reading. Free Chlorine (i.e., residual chlorine) values that fall below the 30 TAC 30 Chapter 285 defined threshold of 0.1 mg/L in the pump tank (TCEC, 2017) are further highlighted in light orange. BOD_5 and TSS values that are above the30 TAC 30 Chapter 285 defined threshold for BOD_5 and TSS for single grab samples (i.e., 65 mg/L) are also highlighted in light orange.

Three photographs of each ATU site are presented. In general, each photographs set depicts a) the overall system, b) the pump tank, chlorinator, or other component or condition of interest, and c) pump tank sludge condition (i.e., clear tube-type sampler). Field crews took photographs at their discretion (i.e., judging most important characteristics to document photographically).

Table 1. ATU sample date, system and facility type, treatment design, make, size, field conditions, free and total chlorine, BOD_5, TSS and observations. Highlighted cells (orange) indicate values exceeding a treatment threshold.

ATU - ID	1	2	3	4	5
Sample Date	24-Feb-2023	24-Feb-2023	30-Mar-2023	30-Mar-2023	30-Mar-2023
System Type	Residential	Residential	Residential	Residential	Residential
Facility Type	Single Family Home	Single Family Home	Single Family Home	Single Family Home	Single Family Home
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	3472-4	3282-4	2559-3	825-2	3696-5
ATU Make	Pro Flo	Clearstream	Aqua Safe	Solar Aerobic	Aqua Safe
ATU Size	500	600	500	500	500
Year Installed	2015	2015	2003	2001	2001
Overall Condition	Fair	Good	Poor	Good	Good
Lid Condition	Good	Good	Poor	Good	Good
Sludge (pump tank)	Excellent	Poor	Poor	Excellent	Excellent
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Surface	Surface	Surface	Surface	Surface
Disinfection Type	Liquid	Liquid	Liquid	Liquid	Liquid
Free Chlorine (mg/L)	NA	NA	NA	NA	NA
Total Chlorine (mg/L)	0.20	0.30	>2.0	0.10	0.40
BOD_5 (mg/L)	70	9	32	1	2
TSS (mg/L)	81	17	444	8	7
Additional Observations		One spray head worn, ants around air pump	Mobile home, chlorine meter over range		No photos available

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 1 – Photographs of ATU systems 1 through 5. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	6	7	8	9	10
Sample Date	30-Mar-2023	30-Mar-2023	30-Mar-2023	13-Apr-2023	13-Apr-2023
System Type	Residential	Residential	Residential	Non-Residential	Non-Residential
Facility Type	Single Family Home	Single Family Home	Single Family Home	RV Park	RV Park
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	3830-4	1647-3	1040-2	Unavailable	Unavailable
ATU Make	Clearstream	Jet	Aqua Klear	Pro Flo	Solar Aerobic
ATU Size	500	500	500	1500	1500(x2)
Year Installed	2019	2007	2010	2014	2019
Overall Condition	Fair	Poor	Fair	Fair	Poor
Lid Condition	Good	Poor	Broken	Good	Good
Sludge (pump tank)	Poor	Poor	Fair	Good	Fair
Sewage surfacing	No	Yes	No	No	No
Effluent Disposal	Surface	Surface	Surface	Surface	Surface
Disinfection Type	Liquid	None	Liquid	Liquid	Liquid
Free Chlorine (mg/L)	NA	NA	NA	NA	NA
Total Chlorine (mg/L)	0.07	0.03	0.07	0.50	0.02
BOD_5 (mg/L)	5	42	8	215	155
TSS (mg/L)	16	40	11	1530	473
Additional Observations		Aeration, 2 sprinklers, and lid broken. Wet. Needs pumping.	Sprinkler heads broken, Age unknown, estimated		Unkept, ants everywhere

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

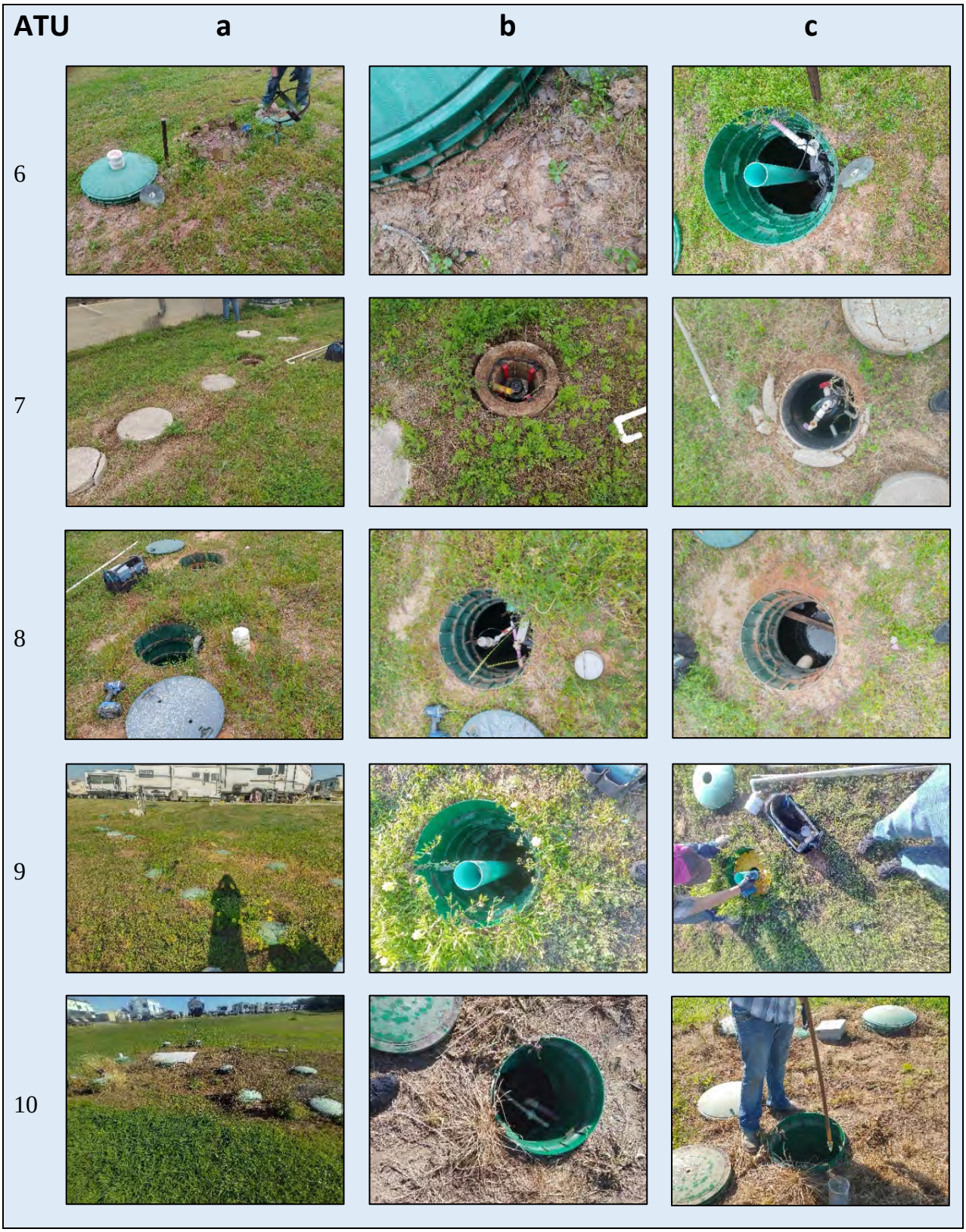

Plate 2 – Photographs of ATU systems 6-10. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	11	12	13	14	15
Sample Date	13-Apr-2023	13-Apr-2023	13-Apr-2023	13-Apr-2023	3-May-2023
System Type	Non-residential	Non-residential	Non-residential	Non-residential	Residential
Facility Type	Gas Station	School	Gas Station	School	Single Family Home
Treatment Design (Residential) ft² - # Bedroom (Non-Residential) Capacity	Unknown	42 persons @ 20 gpd + 2 washers @ 177 gpd	Unknown	86 persons @ 12 gpd, 1040 max gpd	3501-5
ATU Make	Solar Aerobic	Clearstream	Solar Aerobic	Solar Aerobic	Delta
ATU Size	1500	750	1500	1500	500
Year Installed	2019	2019	2020	2021	2009
Overall Condition	Fair	Fair	Fair	Good	Fair
Lid Condition	Good	Fair	Good	Good	
Sludge (pump tank)	Good	Excellent	Fair	Fair	Poor
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Surface	Unknown	Unknown	Surface	Surface
Disinfection Type	Tablet	Unknown	Unknown	Unknown	Liquid
Free Chlorine (mg/L)	NA	NA	NA	NA	NA
Total Chlorine (mg/L)	0.19	0.33	0.18	0.34	0.62
BOD_5 (mg/L)	34	28	57	19	3
TSS (mg/L)	124	20	53	17	14
Additional Observations	Average, some ants, not as severe; pothole	Less than avg, ants, grass a little long	Overgrown, lots of grass, ant covered	Good, clean, no insects around	Chlorine present but may not be dispensing, Somewhat dirty, ants.

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 3. Photographs of ATU systems 11 through 15. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	16	17	18	19	20
Sample Date	3-May-2023	3-May-2023	3-May-2023	3-May-2023	3-May-2023
System Type	Residential	Residential	Residential	Residential	Non-residential
Facility Type	Single Family Home	Single Family Home	Single Family Home	Single Family Home	Office building
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	1756-2	3151-3	4500-6	2400-2	5 emp @ 20 gpd and restrooms - 10.75 persons @ 4 gpd
ATU Make	Solar Aerobic	Pro Flo	Southern	Solar Aerobic	Clearstream
ATU Size	500	500	500	500	500
Year Installed	2019	2001	1997	2019	2022
Overall Condition	Fair	Fair	Good	Poor	Good
Lid Condition	Good	Good	Good	Good	Good
Sludge (pump tank)	Good	Excellent	Poor	Poor	Excellent
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Unknown	Surface	Surface	Surface	Surface
Disinfection Type	Unknown	Liquid	Liquid	Liquid	Liquid
Free Chlorine (mg/L)	NA	n NA	NA	NA	NA
Total Chlorine (mg/L)	1.30	0.12	0.01	NA	0.18
BOD_5 (mg/L)	ND	34	5	512	30
TSS (mg/L)	8	687	12	5240	48
Additional Observations	Ants all around, especially in aerator		Too turbid for measurements	Too turbid for chlorine measurement, many ants	Business. Well maintained. Alarm float bad (fixed).

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 4 – Photographs of ATU systems 16 through 20. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	21	22	23	24	25
Sample Date	3-May-2023	17-May-2023	17-May-2023	17-May-2023	17-May-2023
System Type	Residential	Residential	Residential	Residential	Residential
Facility Type	Single Family Home	Single Family Home	Single Family Home	Single Family Home	Single Family Home
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	2048-2	3729-5	3282-4	4003-4	4785-5
ATU Make	Hydro-Action	Southern	Clearstream	Clearstream	Clearstream
ATU Size	500	500	600	600	600
Year Installed	2002	2006	2008	2016	2016
Overall Condition	Fair	Good	Fair	Good	Good
Lid Condition	Poor	Good	Good	Good	Good
Sludge (pump tank)	Fair	Good	Good	Excellent	Fair
Sewage surfacing	No	No	Yes	No	No
Effluent Disposal	Surface	Surface	Surface	Surface	Unknown
Disinfection Type	Liquid	Liquid	Liquid	Good	Good
Free Chlorine (mg/L)	NA	NA	NA	NA	NA
Total Chlorine (mg/L)	0.30	0.25	0.20	0.05	0.17
BOD_5 (mg/L)	5	39	12	3	5
TSS (mg/L)	14	29	10	13	14
Additional Observations			Wet around tanks, ants everywhere	Very well-kept	Well-kept

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 5. Photographs of ATU systems 21 through 25. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	26	27	28	29	30
Sample Date	17-May-2023	17-May-2023	17-May-2023	17-May-2023	1-Aug-2023
System Type	Residential	Residential	Residential	Residential	Non-residential
Facility Type	Single Family Home	Single Family Home	Single Family Home	Single Family Home	RV Park
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	4288-5	2975-3	4764-5	4583-5	Unknown
ATU Make	Aqua Klear	Southern	Clearstream	Clearstream	Solar Aerobic
ATU Size	600	500	600	600	1500
Year Installed	2011	2005	2015	2016	2019
Overall Condition	Poor	Poor	Fair	Good	Good
Lid Condition	Poor	Fair	Good	Good	Good
Sludge (pump tank)	Poor	Poor	Good	Good	Fair
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Surface	Surface	Surface	Surface	Surface
Disinfection Type	Liquid	Tablet	Liquid	Liquid	Liquid
Free Chlorine (mg/L)	NA	NA	NA	NA	0.3
Total Chlorine (mg/L)	0.12	0.12	0.43	0.14	0.5
BOD_5 (mg/L)	6	23	55	17	16
TSS (mg/L)	7	10	216	33	8
Additional Observations	Sprinkler system needs repair, excessive sludge	Aeration tank in critical condition			Well-kept

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

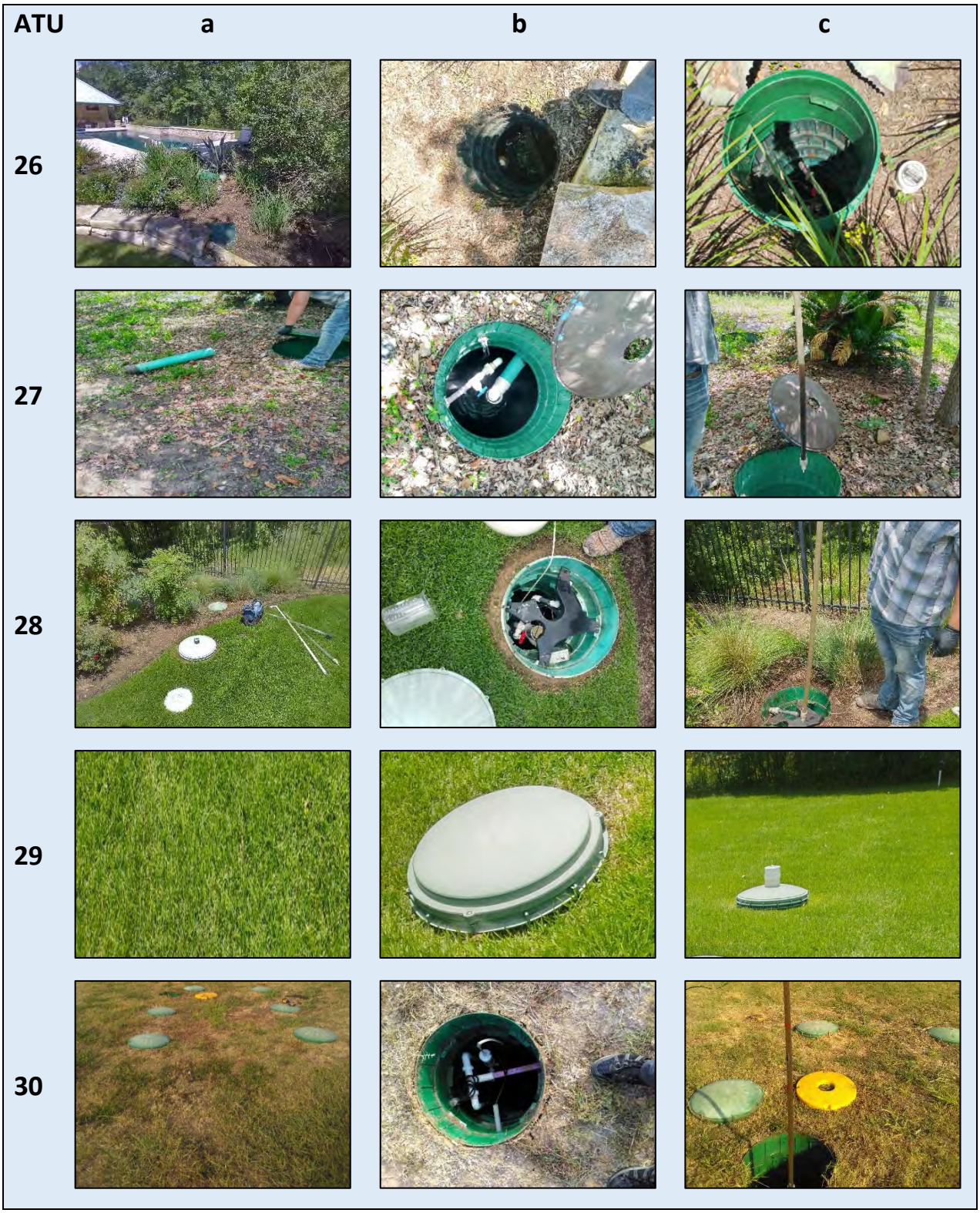

Plate 6. Photographs of ATU systems 26 through 30. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	31	32	33	34	35
Sample Date	1-Aug-2023	1-Aug-2023	1-Aug-2023	1-Aug-2023	1-Aug-2023
System Type	Non-residential	Non-residential	Non-residential	Non-residential	Non-residential
Facility Type	RV Park	Church	Daycare	RV Park	Office building
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	Unknown	Unknown	Unknown	30 RVs @ 40 gpd + 5 apts. @ 100 gpd + 2 washers @ 200 gpd + 60 ppl @ 8 gpd = 2580	5 employees @ 20 gpd
ATU Make	Pro Flo	Solar Aerobic	Solar Aerobic	Southern	Aqua Safe
ATU Size	1500	1500	1500	1500(x2)	500
Year Installed	2005	2019	2021	2008	2005
Overall Condition	Poor	Good	Unknown	Good	Good
Lid Condition	Good	Good	Unknown	Good	Fair
Sludge (pump tank)	Poor	Fair	Fair	Excellent	Good
Sewage surfacing	Yes	No	Unknown	No	No
Effluent Disposal	Surface	Surface	Surface	Subsurface	Unknown
Disinfection Type	Liquid	Liquid	Liquid	None	Unknown
Free Chlorine (mg/L)	0.14	0.27	0.13	0.40	0.22
Total Chlorine (mg/L)	0.16	0.20	0.08	0.22	0.21
BOD_5 (mg/L)	47	ND	15	31	44
TSS (mg/L)	144	9	15	24	9
Additional Observations	Aerator alarm was on, chips covering lid, vegetation high, overflow	Aerator malfunction		Aeration tank not receiving full air flow	Meat plant, well kept

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 7. Photographs of ATU systems 31 through 35. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	36	37	38	39	40
Sample Date	7-Aug-2023	7-Aug-2023	7-Aug-2023	7-Aug-2023	7-Aug-2023
System Type	Residential	Residential	Residential	Residential	Residential
Facility Type	Single Family Home	Single Family Home	Single Family Home	Single Family Home	Single Family Home
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	4228-4	3752-4	2656-4	3086-4	3019-4
ATU Make	Clearstream	Clearstream	Aqua Safe	Clearstream	Clearstream
ATU Size	600	750	500	600	600
Year Installed	2015	2014	1997	2014	2016
Overall Condition	Good	Good	Good	Good	Good
Lid Condition	Good	Good	Good	Good	Good
Sludge (pump tank)	Poor	Good	Good	Excellent	Fair
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Surface	Surface	Unknown	Surface	Subsurface
Disinfection Type	Liquid	Unknown	Unknown	Liquid	None
Free Chlorine (mg/L)	0.16	0.26	0.02	NA	NA
Total Chlorine (mg/L)	0.12	0.18	0.05	NA	NA
BOD_5 (mg/L)	92	6	9	69	ND
TSS (mg/L)	22	7	7	24	ND
Additional Observations	Well-kept, Aerator rebuild was conducted	Aerobic & trash tank cover not visible due to plant cover	Sprinkler system problem, reset 6 times	Effluent color prevented Cl measurement, well kept	Drip irrigation system

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 8. Photographs of ATU systems 36 through 40. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	41	42	43	44	45
Sample Date	7-Aug-2023	7-Aug-2023	7-Aug-2023	29-Aug-2023	29-Aug-2023
System Type	Residential	Residential	Non-residential	Non-residential	Non-residential
Facility Type	Single Family Home	Single Family Home	Office building	RV Park	RV Park
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	3125-4	2254-2	25 occupants @ 4 gpd	20 RV spaces @ 50 gpd each	101 RV spaces @ 40 gpd each
ATU Make	Solar Aerobic	Clearstream	Clearstream	Aqua Aire	Aqua Aire
ATU Size	600	500	600	1500	1500(x6)
Year Installed	2018	2022	2019	2017	2020
Overall Condition	Good	Good	Good	Good	Good
Lid Condition	Good	Good	Good	Good	Good
Sludge (pump tank)	Poor	Good	Good	Excellent	Excellent
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Surface	Surface	Surface	Sub-Surface	Surface
Disinfection Type	Liquid	Liquid	Unknown	None	Liquid
Free Chlorine (mg/L)	0.00	0.16	0.06	NA	0.02
Total Chlorine (mg/L)	0.00	0.40	0.02	NA	0.36
BOD_5 (mg/L)	36	ND	15	34	22
TSS (mg/L)	17	ND	21	27	55
Additional Observations	Vegetation needs maintenance	Grass well-kept	Air compressor failure, needs ant control	Grass in drip field green, Beehive in effluent water meter box	RV park system with 101 spaces

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 9. Photographs of ATU systems 41 through 45. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	46	47	48	49	50
Sample Date	8-Aug-23	8-Aug-23	8-Aug-23	13-Sep-23	13-Sep-23
System Type	Non-residential	Non-residential	Non-residential	Residential	Residential
Facility Type	Church	Convenience store	Church	Single Family Home	Single Family Home
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	400 persons @ 8 gal each, flow equalized @ 345 gpd	100 customers @ 8 gpd each	244 attendees @ 4 GPD each	2525-3	1416-3
ATU Make	NuWater	Microfast	Aqua Aire	Clearstream	Nayadic
ATU Size	1000	1500	1500	500	500
Year Installed	2021	2018	2020	2013	1977
Overall Condition	Good	Good	Good	Good	Fair
Lid Condition	Good	Good	Good	Excellent	Excellent
Sludge (pump tank)	Excellent	Excellent	Excellent	Excellent	Good
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Sub-Surface	Sub-Surface	Sub-Surface	Surface	Surface
Disinfection Type	None	None	None	Liquid	None
Free Chlorine (mg/L)	NA	NA	NA	0.06	0.05
Total Chlorine (mg/L)	NA	NA	NA	0.05	0.04
BOD_5 (mg/L)	37	651	35	8	28
TSS (mg/L)	22	160	10	32	14
Additional Observations	Church	Gas station/ convenience store	Church - new system		Owner adds bleach down drain, recently pumped, steel lid.

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

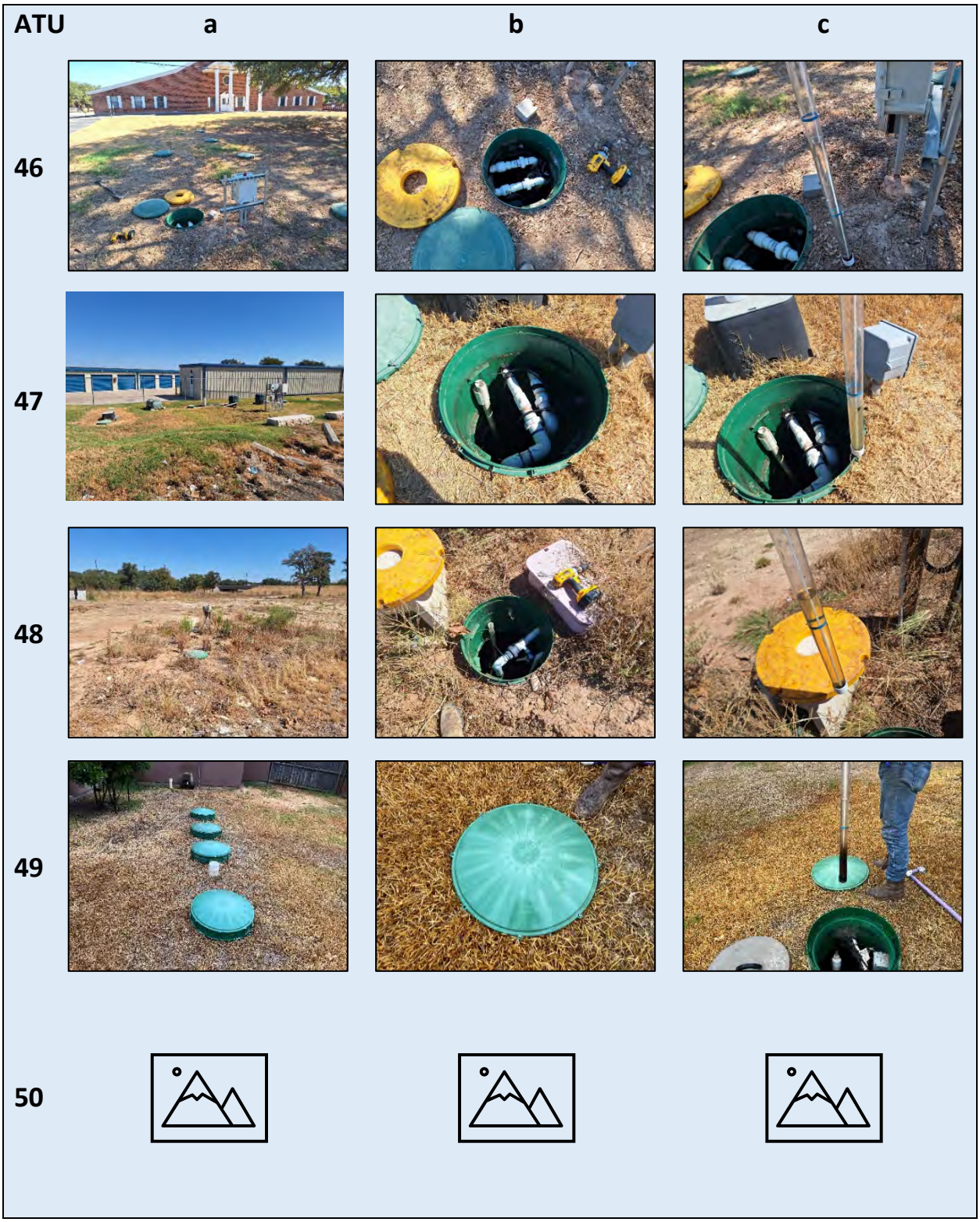

Plate 10. Photographs of ATU systems 46 through 50. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	51	52	53	54	55
Sample Date	13-Sep-23	13-Sep-23	13-Sep-23	22-Sep-23	22-Sep-23
System Type	Residential	Residential	Residential	Non-residential	Non-residential
Facility Type	Single Family Home	Single Family Home	Single Family Home	Office building	Warehouse business
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	2355-4	4012-4	1200-3	100 dog kennels @ 8 gpd, 12 emp @ 8 gpd, 1 restroom @ 160 gpd	70 employees @ 8 gpd each
ATU Make	Nu Water	Multi Flo	Unknown	Aqua Safe	Aqua Aire
ATU Size	500	500	500	1500	1500
Year Installed	2022	1999	2008	2021	2020
Overall Condition	Good	Fair	Fair	Good	Good
Lid Condition	Good	Excellent	Excellent	Good	Good
Sludge (pump tank)	Excellent	Fair	Good	Good	Good
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Surface	Subsurface	Surface	Subsurface	Subsurface
Disinfection Type		None	Liquid	None	None
Free Chlorine (mg/L)	0.04	0.04	0.01	0.04	0.12
Total Chlorine (mg/L)	0.09	0.16	0.02	0.01	0.23
BOD_5 (mg/L)	5	<3	5	542	21
TSS (mg/L)	1	3	7	238	22
Additional Observations		Concrete lid, secure	Mobile home, owner had not added bleach in 6 months	Dog kennel business	Warehouse offices

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 11. Photographs of ATU systems 51 through 55. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	56	57	58	59	60
Sample Date	22-Sep-23	22-Sep-23	22-Sep-23	27-Sep-23	27-Sep-23
System Type	Non-residential	Non-residential	Non-residential	Residential	Residential
Facility Type	Storage facility and shops	Storage facility and shops	Storage facility and shops	Single Family Home	Single Family Home
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	<50 employees & customers @ 8 gpd each	<50 employees &customers @ 8 gpd each	<50 employees & customers @ 8 gpd each	4586-5	2345-4
ATU Make	Pro Flo	Pro Flo	Pro Flo	Nayadic	Nu Water
ATU Size	500	500	500	600	500
Year Installed	2021	2021	2021	2004	2021
Overall Condition	Good	Good	Good	Good	Excellent
Lid Condition	Fair	Good	Good	Poor	Excellent
Sludge (pump tank)	Fair	Good	Excellent	NA	Excellent
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Subsurface	Subsurface	Subsurface	Surface	Surface
Disinfection Type	None	None	None	Tablet	Liquid
Free Chlorine (mg/L)	0.16	0.08	0.12	0.01	0.08
Total Chlorine (mg/L)	0.19	0.31	0.25	0.00	0.09
BOD_5 (mg/L)	27	22	4	181	4
TSS (mg/L)	10	20	5	49	11
Additional Observations	Shops and storage	Shops and storage	Shops and storage	Deep pump tank could not reach bottom. Cl tablets present.	Service call but system was fine.

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 12. Photographs of ATU systems 56 through 60. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	61	62	63	64	65
Sample Date	27-Sep-23	27-Sep-23	27-Sep-23	27-Sep-23	27-Sep-23
System Type	Residential	Residential	Residential	Residential	Residential
Facility Type	Single Family Home	Single Family Home	Single Family Home	Single Family Home	Single Family Home
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	1350-3	1536-3	2255-4	3151-4	2579-4
ATU Make	Nu Water	Nayadic	Multi Flo	Aqua Safe	Nayadic
ATU Size	500	500	500	500	500
Year Installed	2011	2013	2011	2022	2003
Overall Condition	Good	Good	Fair	Good	Fair
Lid Condition	Fair	Good	Good	Good	Good
Sludge (pump tank)	Poor	Excellent	Fair	Excellent	Poor
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Surface	Surface	Surface	Surface	Surface
Disinfection Type	Tablet	Tablet	Liquid	Liquid	Tablet
Free Chlorine (mg/L)	0.11	0.01	0.05	0.04	0.13
Total Chlorine (mg/L)	0.15	0.00	0.07	0.13	0.07
BOD_5 (mg/L)	17	51	1	6	14
TSS (mg/L)	24	10	6	3	30
Additional Observations	Tablets present in chlorine system	Chlorine tablets present in system	Floats too high. No liquid chlorine in tank.	New home w/ old/rebuilt ATU. Liquid chlorine tank missing.	Older home. Tablets observed in chlorine system

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

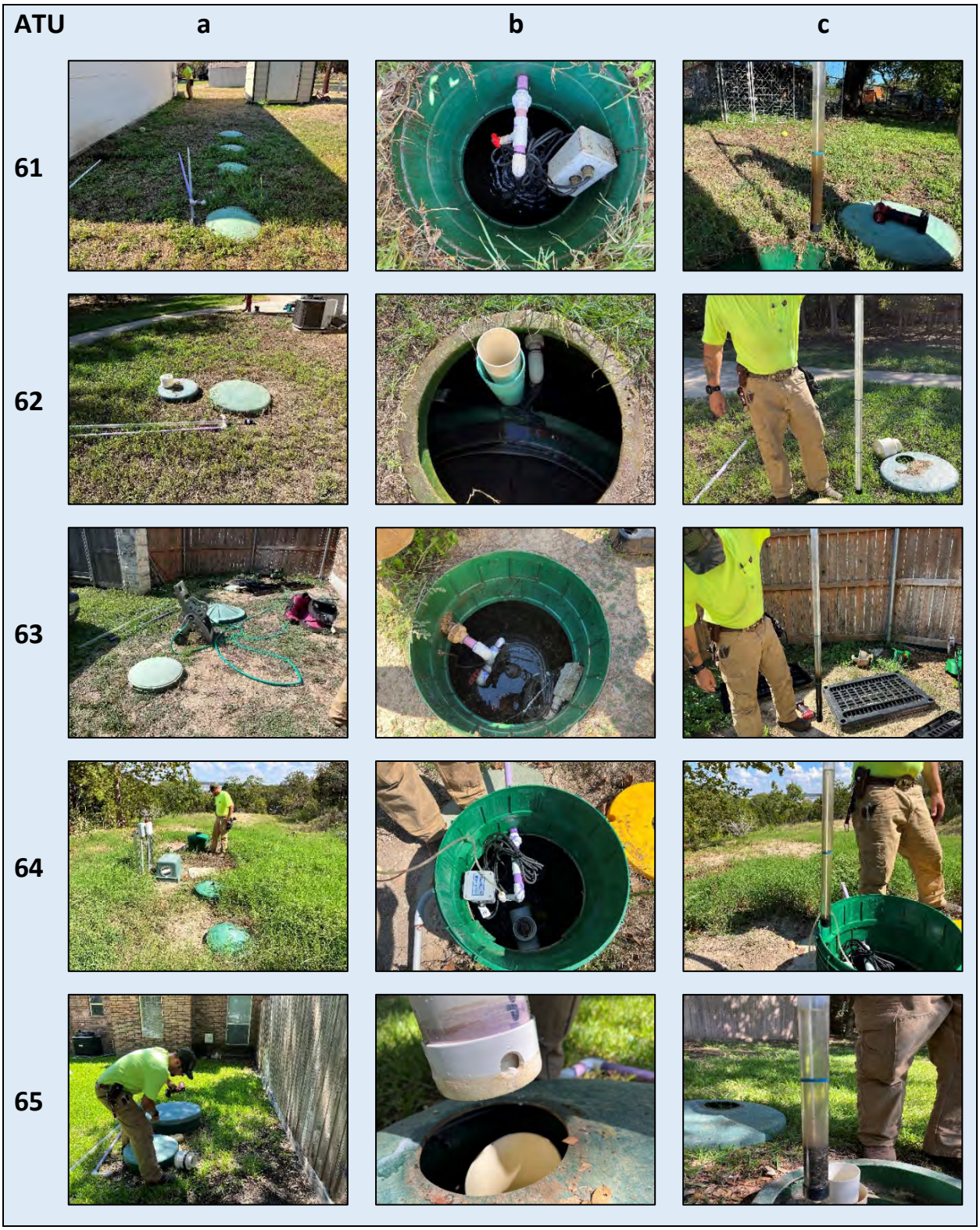

Plate 13. Photographs of ATU systems 61 through 65. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	66	67	68	69	70
Sample Date	27-Sep-23	28-Sep-23	28-Sep-23	28-Sep-23	28-Sep-23
System Type	Residential	Non-residential	Non-residential	Non-residential	Non-residential
Facility Type	Single Family Home	Storage facility and shops	Storage facility and shops	Storage facility and shops	Storage facility and shops
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	4517-4	<50 employees & customers @ 8 gpd each	<50 employees & customers @ 8 gpd each	<50 employees & customers @ 8 gpd each	<50 employees & customers @ 8 gpd each
ATU Make	Norweco	Pro Flo	Pro Flo	Pro Flo	Pro Flo
ATU Size	600	500	500	500	500
Year Installed	2006	2021	2021	2021	2021
Overall Condition	Poor	Good	Good	Good	Good
Lid Condition	Poor	Good	Good	Good	Good
Sludge (pump tank)	Excellent	Fair	Fair	Good	Good
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Surface	Subsurface	Subsurface	Subsurface	Subsurface
Disinfection Type	Liquid	None	None	None	None
Free Chlorine (mg/L)	0.01	0.17	0.08	0.08	0.26
Total Chlorine (mg/L)	0.06	0.09	0.22	0.16	0.29
BOD_5 (mg/L)	16	588	28	22	3
TSS (mg/L)	8	32	21	5	4
Additional Observations	Makeshift float tree, aerator not working, alarm was turned off.				

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 14. Photographs of ATU systems 66 through 70. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	71	72	73	74	75
Sample Date	28-Sep-23	4-Oct-23	4-Oct-23	4-Oct-23	4-Oct-23
System Type	Non-residential	Non-residential	Non-residential	Residential	Residential
Facility Type	School	Church	Church	Single Family Home	Single Family Home
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	Unknown	Unknown	Unknown	1248-3	3136-4
ATU Make	Hoot	Nayadic	Hydro-Action	Nu Water	Hoot
ATU Size	5000	500	500	500	500
Year Installed	2006	1997	1997	2012	2013
Overall Condition	Good	Good	Good	Good	Good
Lid Condition	Excellent	Good	Excellent	Fair	Fair
Sludge (pump tank)	Excellent	Fair	Excellent	Excellent	Good
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Subsurface	Surface	Surface	Surface	Surface
Disinfection Type	None	Tablet	Tablet	Liquid	Tablet
Free Chlorine (mg/L)	NA	0.07	0.19	0.11	0.22
Total Chlorine (mg/L)	NA	0.09	0.19	0.16	0.25
BOD_5 (mg/L)	64	13	12	12	15
TSS (mg/L)	18	7	6	7	43
Additional Observations	Large system, pumped in Jan, has 4 blowers 1 not working	Small church – system 1	Small church - system 2		

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

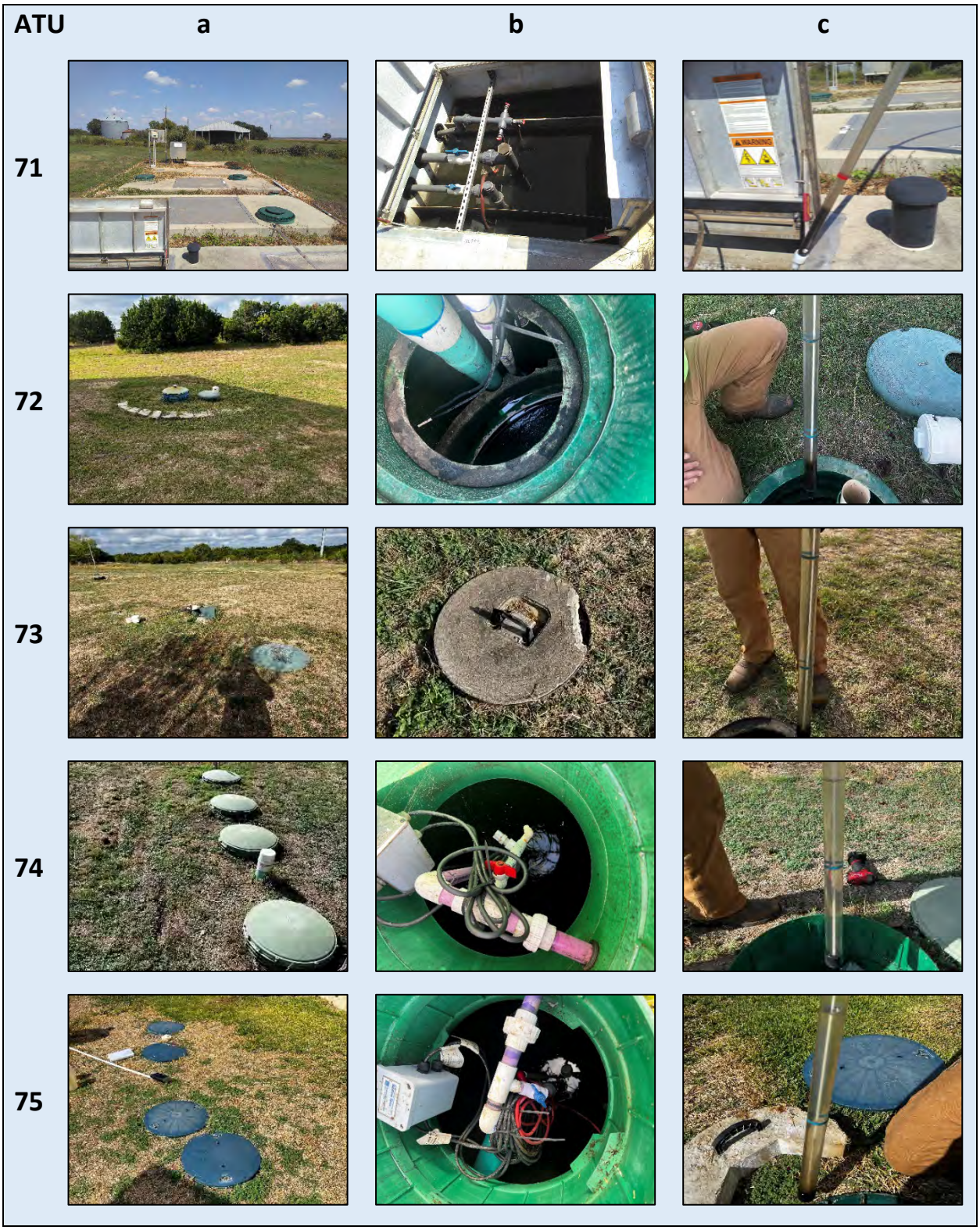

Plate 15. Photographs of ATU systems 71 through 75. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	76	77	78	79	80
Sample Date	4-Oct-23	4-Oct-23	4-Oct-23	4-Oct-23	4-Oct-23
System Type	Residential	Residential	Non-residential	Non-residential	Non-residential
Facility Type	Single Family Home	Single Family Home	Office Building	Warehouse Business	Office Building
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	3691-4	3292-4	25-30 employees @ 10 GPD each	33 office emp @ 8 gpd, 27 warehouse emp @ 12 gpd and 4 cust @ 4 gpd each	Unknown
ATU Make	Nu Water	Hoot	Driptech	Aqua Aire	Pro Flo
ATU Size	600	500	1000	1000	500
Year Installed	2018	2020	2021		2022
Overall Condition	Good	Good	Good'	Good	Good
Lid Condition	Excellent	Poor	Good	Poor	Good
Sludge (pump tank)	Fair	Excellent	Excellent	Excellent	Excellent
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Surface	Surface	Sub-Surface	Sub-Surface	Surface
Disinfection Type	Liquid	Liquid	None	None	Tablet
Free Chlorine (mg/L)	0.21	0.18	0.00	0.09	0.18
Total Chlorine (mg/L)	0.42	0.29	0.00	0.10	0.65
BOD_5 (mg/L)	1	ND	52	2	ND
TSS (mg/L)	2	2	17	2	2
Additional Observations			Small business building	Drip field well maintained, ground shifting around tanks	New system, just installed, parts still under construction

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 16. Photographs of ATU systems 76 through 80. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	81	82	83	84	85
Sample Date	11-Oct-23	11-Oct-23	11-Oct-23	11-Oct-23	11-Oct-23
System Type	Residential	Residential	Non-residential	Non-residential	Non-residential
Facility Type	Single Family Home	Single Family Home	Office Building	Office Building	Office Building
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	400-1	2581-3	Office with 10 employees – 168 gpd	11 emp @ 8 gpd, 7 warehouse emp @ 12 gpd	13 emp @ 8 gpd, 8 warehouse emp @ 12 gpd each
ATU Make	Clearstream	Unknown	Aqua Aire	Aqua Aire	Aqua Aire
ATU Size	500	500	500	500	500
Year Installed	2017	2014	2016	2022	2022
Overall Condition	Poor	Good	Fair	Good	Good
Lid Condition	Good	Good	Good	Good	Good
Sludge (pump tank)	Poor	Excellent	Excellent	Excellent	Excellent
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Surface	Surface	Sub-Surface	Sub-Surface	Sub-Surface
Disinfection Type	Liquid	Liquid	None	None	None
Free Chlorine (mg/L)	0.09	0.08	0.02	0.07	0.07
Total Chlorine (mg/L)	0.23	0.10	0.04	0.08	0.11
BOD_5 (mg/L)	102	9	51	6	2
TSS (mg/L)	263	8	6	3	ND
Additional Observations	Tiny Home service call - system odor and effluent pump fail.	Well maintained, Bleach present in system	System appears to service 3 buildings. Strong H2S odor	System appears to service 2 buildings. Well maintained	

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

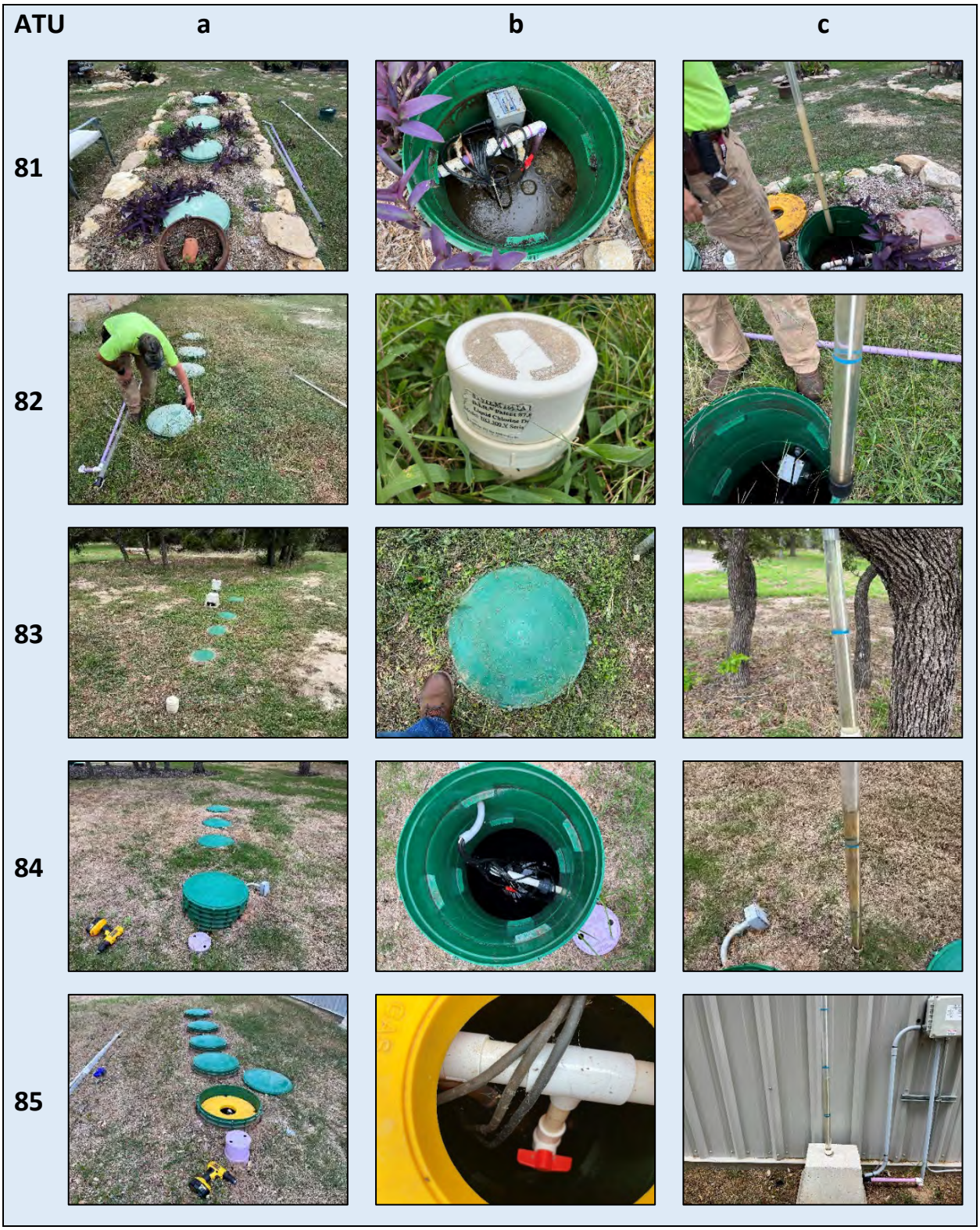

Plate 17. Photographs of ATU systems 81 through 85. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	86	87	88	89	90
Sample Date	11-Oct-23	11-Oct-23	17-Oct-23	17-Oct-23	17-Oct-23
System Type	Non-residential	Non-residential	Non-residential	Non-residential	Non-residential
Facility Type	Warehouse business	Warehouse business	Dog kennel business	Dog kennel business	Convenience store
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	2 residents @ >180 GPD	40 employees @ 8gpd, 4 public users @ 4 gpd	2 kennels @ 560 GPD total	Dorm for 5 trainers @ 300 GPD total & 2 office staff @ 4 GPD each	Max 1000 gpd with 300 gpd of high strength
ATU Make	Aqua Aire	Aqua Aire	Jet	Jet	Jet
ATU Size	500	600	1000	1500	1500
Year Installed	2016	2021	2014	2014	2016
Overall Condition	Good	Good	Good	Good	Fair
Lid Condition	Good	Fair	Good	Good	Poor
Sludge (pump tank)	Good	Good	Fair	Excellent	Excellent
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Sub-Surface	Sub-Surface	Surface	Surface	Sub-Surface
Disinfection Type	None	None	Liquid	Liquid	None
Free Chlorine (mg/L)	0.09	0.08	0.07	0.12	0.02
Total Chlorine (mg/L)	0.15	0.10	0.20	0.13	0.03
BOD_5 (mg/L)	25	15	33	5	33
TSS (mg/L)	20	6	53	3	7
Additional Observations	Storage business office with 1 restroom	Two businesses in 1 building. Well maintained	Dog kennel, chlorinator tank appears empty	Dog kennel, chlorinator tank appears empty	Fair, risers buried by fire ant mounds

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 18. Photographs of ATU systems 86 through 90. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	91	92	93	94	95
Sample Date	17-Oct-23	18-Oct-23	18-Oct-23	18-Oct-23	18-Oct-23
System Type	Non-residential	Non-residential	Non-residential	Non-residential	Non-residential
Facility Type	Convenience store	RV Park	RV Park	Warehouse business	Church
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	Max 240 gpd with 120 gpd high strength	30 RVs @ 50 gals per unit	30 RVs @ 50 gals per unit	12 employees @ 12 GPD each	300 seats with 5 emp. 900 gpd treatment.
ATU Make	Aqua Aire	Aqua Aire	Aqua Aire	Pro Flo	Aqua Aire
ATU Size	800	1500	1500	500	1500
Year Installed	2017	2018	2018	2022	2021
Overall Condition	Fair	Good	Good	Excellent	Fair
Lid Condition	Fair	Fair	Good	Good	Good
Sludge (pump tank)	NA	Fair	Good	Good	Good
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Sub-Surface	Sub-Surface	Surface	Surface	Sub-Surface
Disinfection Type	None	None	Liquid	None	Liquid
Free Chlorine (mg/L)	0.02	0.06	0.39	0.33	0.10
Total Chlorine (mg/L)	0.03	0.07	0.38	0.41	0.27
BOD_5 (mg/L)	350	41	38	10	ND
TSS (mg/L)	50	12	47	13	ND
Additional Observations	Convenience Store, heavily used, odor present			Neatest system seen. Astroturf around risers. Very clean	Church, needs maintenance

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 19. Photographs of ATU systems 91 through 95. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	96	97	98	99	100
Sample Date	19-Oct-23	19-Oct-23	19-Oct-23	19-Oct-23	19-Oct-23
System Type	Non-residential	Non-residential	Non-residential	Non-residential	Non-residential
Facility Type	School	Convenience store	Office Building	Office Building	Church
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	210 students & 14 staff @ 12 GPD each	Unknown	20 employees @ 5 gpd	10 employees @ 10 gpd	<40 people per week. Bathroom & washing machine
ATU Make	ProFlo	Solar Aerobic	Solar Aerobic	Pro Flo	Clearstream
ATU Size	1500	1500(x2)	500	600	Unknown
Year Installed	2022	2019	2018	2016	Unknown
Overall Condition	Good	Good	Good	Good	Good
Lid Condition	Fair	Good	Good	Fair	Poor
Sludge (pump tank)	Fair	Excellent	Good	Good	Excellent
Sewage surfacing	No	No	No	No	No
Effluent Disposal	Surface	Surface	Sub-surface	Sub-surface	Unknown
Disinfection Type	Liquid	Liquid	None	Tablet	Unknown
Free Chlorine (mg/L)	0.23	0.19	NA	0.25	0.18
Total Chlorine (mg/L)	0.20	0.06	NA	0.13	.0.22
BOD_5 (mg/L)	2	17	6	13	1
TSS (mg/L)	2	9	4	6	1
Additional Observations	Some exposed electrical wiring on pump alarm	Convenience store/gas station with small restaurant			

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

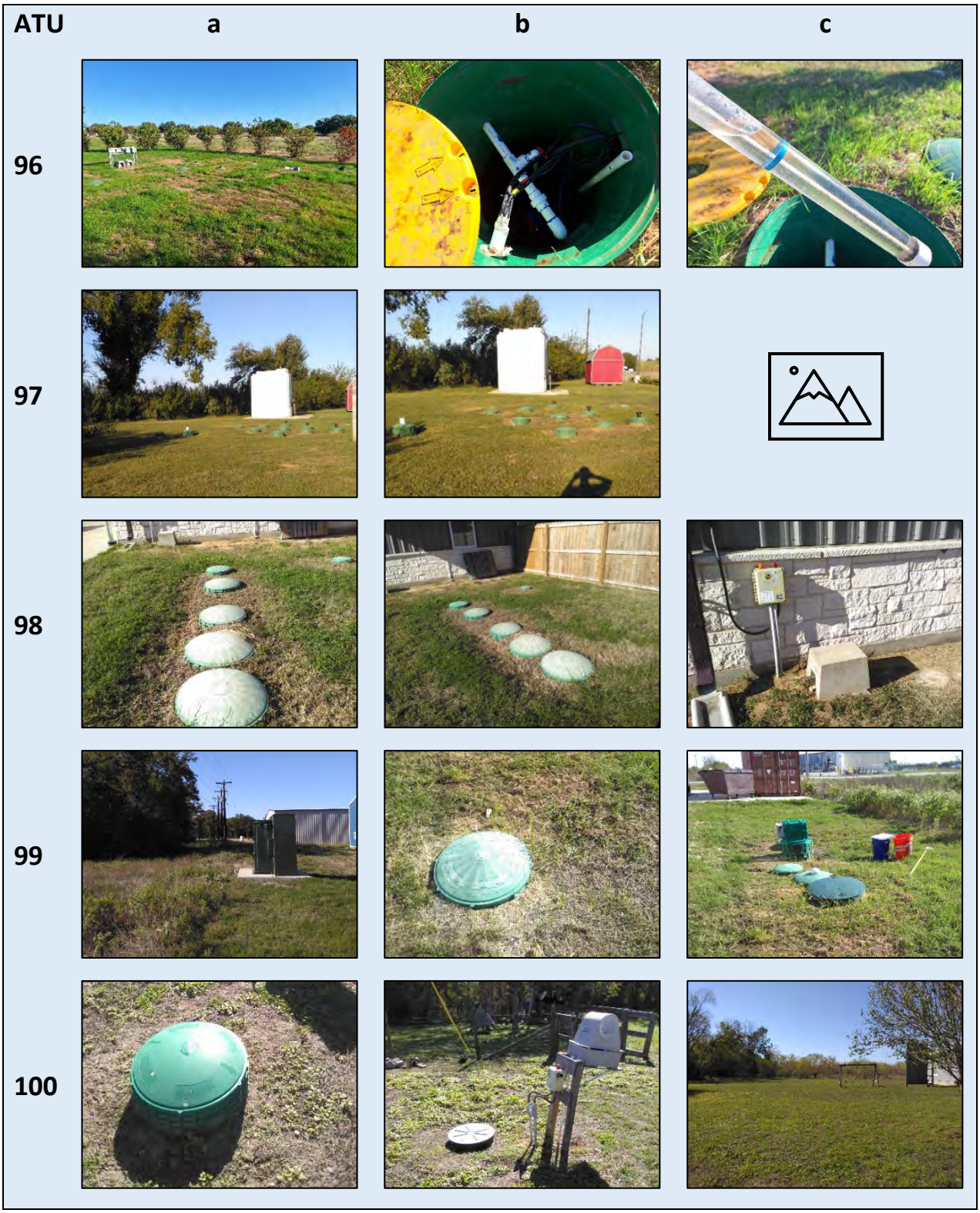

Plate 20. Photographs of ATU systems 96 through 100. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Table 1 - Continued

ATU - ID	101	102	103	104
Sample Date	20-Oct-23	20-Oct-23	18-Oct-23	18-Oct-23
System Type	Residential	Residential	Non-residential	Non-residential
Facility Type	Single Family Home	Single Family Home	Private event center	Warehouse/Offices
Treatment Design (Residential) ft^2 - # Bedroom (Non-Residential) Capacity	3197-4	3127-4	429 GPD for special events for <150 people up to 4 days in a row	80 office employees @ 8 GPD each
ATU Make	Nu Water	Aqua Aire	Aqua Safe	Aqua Safe
ATU Size	500	500	500(x2)	1200
Year Installed	2022	2013	2015	2015
Overall Condition	Excellent	Good	Poor	Poor
Lid Condition	Good	Good	Poor	Fair
Sludge (pump tank)	Excellent	Excellent	NA	NA
Sewage surfacing	No	No	No	Yes
Effluent Disposal	Surface	Surface	Sub-surface	Sub-surface
Disinfection Type	Liquid	Liquid	None	None
Free Chlorine (mg/L)	0.21	0.16	NA	NA
Total Chlorine (mg/L)	0.28	0.16	NA	NA
BOD_5 (mg/L)	11	ND	NA	NA
TSS (mg/L)	4	6	NA	NA
Additional Observations	Service call with float problem and high water alarm		System in complete disarray. Riser on influent trash tank completely destroyed.	Pump tank lid under 2-3" of water, did not try to open. Disposal field has large area of standing water.

N.B. - *Overall condition:* Subject to judgement of field personnel. Excellent – no discernable problems, Good – functioning with minor problem(s), Fair – functioning with major problem(s), Poor – major malfunctioning or failing system.
Lid condition: Excellent – secure with all fasteners present, including safety screw, Good – secure with all fasteners present but safety screw missing, Fair – secure with most fasteners present, Poor – more than 50% of fasteners missing or, if not plastic, broken
Sludge (pump tank) – Excellent – clear with no visible sludge present, Good – visible sludge <~5% of total water column, Fair – visible sludge <~25% of total water column, Poor – visible sludge >~25% of total water column

Plate 21. Photographs of ATU systems 101 through 104. Designations a, b, and c generally show a) overall system, b) pump tank, chlorinator, or lid condition or other anomaly, and c) sludge condition (if available).

Additional data

AgriLife analyzed ~10% of collected water samples for extra constituents including ammonia nitrate/nitrite, total Kjeldahl nitrogen, and oil & grease. Nine ATUs (3 Residential and 6 Non-Residential) were measured for nitrogen forms. Ten ATUs (5 Residential and 5 Non-Residential) were analyzed for oil and grease (Tables 2 and 3).

Table 2. Additional ATU data collected: nitrogen forms.

ATU - ID	9	10	11	12	13
Date Sampled	13-Apr-2023	13-Apr-2023	13-Apr-2023	13-Apr-2023	13-Apr-2023
Category (Residential, Non-Residential)	Non-residential	Non-residential	Non-residential	Non-residential	Non-residential
Facilities Served	RV Park	RV Park	Gas Station	School	Gas Station
Square foot (Residential) or Design Capacity (Non-Residential)	Unknown	Unknown	Unknown	42 per. @ 20 gpd + 2 washers @ 177 gpd	Unknown
ATU Make	Pro Flo	Solar Aerobic	Solar Aerobic	ClearStream	Solar Aerobic
Size	1500	1500(x2)	1500	750	1500
Year installed	2014	2019	2019	2019	2020
Overall condition	Fair	Poor	Fair	Fair	Fair
Ammonia-N (mg/L)	33.6	59.2	12.7	4.11	33.8
Nitrate/Nitrite – N (mg/L)	15	5.5	0.98	0.95	80
TKN – N (mg/L)	49.7	64.5	12.5	4.58	20.3

Table 2. Continued

ATU - ID	20	18	19	21
Date Sampled	3-May-2023	3-May-2023	3-May-2023	3-May-2023
Category (Residential, Non-Residential)	Non-residential	Residential	Residential	Residential
Facilities Served	Office building	Single Family Home	Single Family Home	Single Family Home
Square foot (Residential) or Design Capacity (Non-Residential)	5 emp. @ 20 gpd and 10.75 per. Per day restroom @ 4 gpd	4500-6	2400-2	2048-2
ATU Make	Clearstream	Southern	Solar Aerobic	Hydro-Action
Size	500	500	500	500
Year installed	2022	1997	2019	2002
Overall condition	Good	Good	Poor	Fair
Ammonia-N (mg/L)	1.34	16.9	61.9	0.23
Nitrate/Nitrite – N (mg/L)	82	0.02	0.15	11
Total Kjeldahl Nitrogen – N (mg/L)	ND	20.7	156	1.17

N.B. – ND indicates “Non Detect”

Table 3. Additional ATU data collected: oil & grease.

ATU - ID	30	31	32	33	34
Date Sampled	1-Aug-2023	1-Aug-2023	1-Aug-2023	1-Aug-2023	1-Aug-2023
Category (Residential, Non-Residential)	Non-residential	Non-residential	Non-residential	Non-residential	Non-residential
Facilities Served	RV Park	RV Park	Church	Daycare	RV Park
Square foot (Residential) or Design Capacity (Non-Residential)	Unknown	Unknown	Unknown	Unknown	30 RVs @ 40 gpd + 5 apts @ 100 gpd + 2 washers @ 200 gpd + 60 ppl @ 8 gpd = 2580
ATU Make	Solar Aerobic	ProFlo	Solar Aerobic	Solar Aerobic	Southern
Size	1500	1500	1500	1500	1500(x2)
Year installed	2019	2005	2019	2021	2008
Overall condition	Good	Poor	Good		Good
Oil and Grease	ND	3.9	ND	ND	ND

N.B. – ND indicates “Non Detection”.

Table 3. Continued

ATU - ID	36	37	38	39	40
Date Sampled	7-Aug-2023	7-Aug-2023	7-Aug-2023	7-Aug-2023	7-Aug-2023
Category (Residential, Non-Residential)	Residential	Residential	Residential	Residential	Residential
Facilities Served	Single Family Home	Single Family Home	Single Family Home	Single Family Home	Single Family Home
Square foot (Residential) or Design Capacity (Non-Residential)	4228-4	3752-4	2656-4	3086-4	3019-4
ATU Make	Clearstream	Clearstream	Aqua Safe	Clearstream	Clearstream
Size	600	750	500	600	600
Year installed	2015	2014	1997	2014	2016
Overall condition	Good	Good	Good	Good	Good
Oil and Grease	ND	ND	ND	5.4	ND

N.B. – ND indicates “Non Detect”.

ATU summary statistics and recommendations

AgriLife sampled a total of 104 ATUs representing 18 known manufacturers and one unknown manufacturer (Table 4). The most numerous ATU type sampled was Clearstream (18) followed by Aqua Aire (15) and ProFlo (15). Sampling of the remaining 15 ATU manufacturer brands ranged between 1 and 8 examples each.

Table 4. ATU manufacturer/brand and number of systems sampled.

Manufacturer/Brand	Number Sampled
Clearstream	18
Aqua Aire	15
ProFlo	15
Solar Aerobic	13
Aqua Safe	8
NuWater	7
Nayadic	5
Jet	4
Southern	4
Hoot	3
AquaKlear	2
Hydro-Action	2
Multi-Flo	2
Delta	1
Driptech	1
MicroFAST	1
Unknown	3
Total	104

The data was examined to determine if the minimum treatment requirements as found in 30 TAC § 285.91(4) were being achieved (see Table 5). Table 6 summarizes the pump tank BOD_5, TSS, and residual (i.e., free) chlorine average, maximum, minimum, and median values separated by Residential and Non-residential types for ATU systems evaluated in this study. These are further divided into BOD_5 and TSS values above and below 65 mg/L and residual chlorine values above

and below 0.1 mg/L in the pump tank. Laboratory BOD_5 and TSS values reported as Non-Detect (ND) or "< a value" were considered zero, or the value, for this basic summary. Chlorine was selected over Fecal Coliform testing to manage project time and cost expenditures. Total chlorine was measured instead of residual chlorine (i.e., free chlorine) for ATU-IDs 1-29 due to a misinterpretation of TAC rule language (i.e., total vs. residual vs. free). Both total and residual chlorine was measured for most ATU-IDs 30-102, including systems with subsurface disposal.

Of the 50 Residential ATUs evaluated by AgriLife, the average age was 12 years. Forty-four (85%) of sampled systems met the effluent BOD_5 threshold (<65 mg/L) for grab samples (of these, 5 were reported as ND and one as <3 mg/L). Eight systems (15%) were above the BOD_5 65 mg/L threshold. The average BOD_5 for systems below 65 mg/L was 13 mg/L while those above was 171 mg/L. TSS results for Residential ATUs was similar with 44 systems (85%) <65 mg/L (2 reported as ND) and 6 systems (15%) >65 mg/L. The average TSS for systems below the threshold was 14 mg/L while those above was 1155 mg/L. Acceptable residual (i.e., free) chlorine concentrations (>0.1 mg/L) were met by 11 of 26 surface effluent disposal systems measured (42%) while 15 systems (58%) fell below the required concentration. The average residual chlorine concentration for measured systems above the threshold was 0.17 mg/L and the average residual chlorine concentration for measured systems below the threshold was 0.04 mg/L. Interestingly, residual chlorine levels in 8 of 23 sub-surface disposal systems measured (35%), without chlorinators, were above 0.1 mg/L.

A total of 54 Non-Residential ATU systems were evaluated by AgriLife and had an average age of 6 years. Two Non-Residential ATUs were not sampled for water quality due to inaccessibility (see ATU-IDs 103 and 104). Forty-six (88%) of the Non-Residential systems measured had a BOD_5 value below (i.e., met) the required 65 mg/L threshold and averaged 22 mg/L. The 6 above the threshold (12%) averaged 417 mg/L. TSS values for Non-Residential ATUs were similar; 46 systems (88%) were below the 65 mg/L threshold and averaged 16 mg/L while the six systems that were above the threshold averaged 445 mg/L. Required residual chlorine concentrations (>0.1 mg/L) were met by 11 of 15 surface effluent disposal systems measured (73%) while 4 systems (26%) fell below the required concentration. The average residual chlorine concentration for measured systems above the threshold was 0.22 mg/L and the average residual chlorine concentration for measured systems below the threshold was 0.06 mg/L.

Additional measurements of nitrogen forms and oil & grease were conducted on ~10% of collected water quality samples and are summarized in Table 6. Three Residential samples were analyzed for ammonia nitrogen (NH3-N), nitrate/nitrite nitrogen (NO3O2-N), and total Kjeldahl nitrogen (TK-N) which averaged 26.3 mg/L, 3.7 mg/L, and 59.3 mg/L, respectively. Five residential samples were analyzed for oil and grease (O&G), four of which were Non-Detects (ND) and averaged 1.1 mg/L. Five Non-Residential samples were analyzed NH_3-N, NO_3O_2-N, and TK-N which averaged 22.2 mg/L, 3.7 mg/L, and 59.3 mg/L, respectively. Five Non-Residential samples were analyzed for O&G, four of which were ND, and averaged 0.8 mg/L.

Table 5. TAC 285.91(4) Table IV. Required Testing and Reporting.

Type and Size of Treatment Unit	Testing Frequency	Required Tests	Minimum Acceptable Test Results
Any Treatment Method in Conjunction with Surface Application	At least once every four months	One BOD_5 and TSS Grab Sample Per Year (non-single-family residences only) Total Chlorine Residual or Fecal Coliform at Each Required Test	BOD_5 and TSS Grab Samples Not To Exceed 65 mg/l 0.1 mg/l Residual in Pump Tank or Fecal Coliform Not To Exceed 200 MPN/100 ml (CFU/100 ml)
Any Secondary Treatment System	At least once every four months	None	None
Non Standard	Permit Specific	Permit Specific	Permit Specific

Table 6. ATU summary statistics for Residential and Non-Residential systems sampled including number of samples (n), average, maximum, minimum, and median values for ATU age, BOD_5 and TSS greater than 65 mg/L and less than 65 (mg/L) and residual (i.e., free) chlorine (Cl_F) greater than 0.1 mg/L and less than 0.1 mg/L. All results are presented in milligrams per liter (mg/L).

	Age (Years)	BOD_5<65 (mg/L)	BOD_5>65 (mg/L)	TSS<65 (mg/L)	TSS>65 (mg/L)	Cl_F>0.1 (mg/L)	Cl_F<0.1 (mg/L)
Residential							
n	50	44	6	44	6	11	15
Average	12	13	171	14	1155	0.17	0.04
max	46	55	512	49	5240	0.26	0.09
min	1	0	69	0	81	0.11	0.00
median	10	7	97	10	354	0.16	0.04
Non- Residential							
n	52	46	6	46	6	11	4
Average	6	22	417	16	445	0.22	0.06
max	26	64	651	55	1530	0.39	0.07
min	1	0	155	0	124	0.12	0.02
median	4	22	446	10	199	0.19	0.07

N.B. – Thresholds for BOD_5 and TSS (65 mg/L) and residual chlorine (0.1 mg/L) from TAC 285.91(4) Table IV. Required Testing and Reporting. Non Detect (ND) values were considered zero for these summary statistics.

Table 7. ATU summary statistics for additional water quality constituents for Residential and Non-Residential systems sampled including number of samples (n), average, maximum, minimum, and median values for ammonia nitrogen (NH3-N), nitrite-nitrate nitrogen (NO_3/NO_2-N), total Kjeldahl nitrogen (TK-N), and oil and grease (O&G). All results are presented in milligrams per liter (mg/L).

	NH_3-N (mg/L)	NO_3/NO_2-N (mg/L)	TK-N (mg/L)	O&G (mg/L)
Residential				
n	3	3	3	5
Average	26.3	3.7	59.3	1.1
max	61.9	11.0	156.0	5.4
min	0.2	0.0	1.2	0.0
median	16.9	0.15	20.7	0.0
Non-Residential				
n	6	6	6	5
Average	22.2	33.9	20.4	0.8
max	59.2	82.0	64.5	3.0
min	1.3	1.0	0.0	0.0
median	12.7	5.5	12.5	0.0

N.B. Non Detect (ND) values were considered zero for these summary statistics.

Recommendations

- Establish standardized categories and ranking levels for ATU subjective observations (i.e., overall condition, lid condition, sludge condition, etc.).
- Establish standard ATU photographic documentation procedures for content (general layout, pump tank, sludge, etc.), format (portrait vs. landscape), and number (how many).
- Refine language describing chlorine requirement in TAC rules to avoid confusion regarding total vs. residual chlorine. TAC 285.91(4) Table IV. Required Testing and Reporting refers to Total Residual and Residual Chlorine when referring to free chlorine. Residual, or free, chlorine is not bound and is available for disinfection.
- Collect, maintain, and make available to the public a database of both residential and non-residential ATU containing similar information presented in this report.

References

TCEQ (Texas Commission on Environmental Quality). (2017). RG-472. On-Site Sewage Facility Rules Compilation. Austin, TX. 156 pg.

Acknowledgements

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APPENDIX 1 – Commercial laboratory results

General Definitions:

LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MDL	The Method Detection Limit is the lowest theoretical value that is statistically different from zero for a specific method, taking into account all preparation steps and instrument settings.
QC	Quality Control
RPD	Relative Percent Difference.

Lab analyte.analyteNotes codes:

A-01	RM is optional; run accepted based on passing blanks, duplicates and sample histories.
A-01a	
A-01b	
BOD-02	The RPD between the highest and lowest value used for result calculation in the sample dilution series is greater than the method-specified 30%.
BOD-03	Review of the data indicates that the sample exhibits a toxic effect. Results are potentially biased low.
C-02	Result confirmed by re-analysis.
G-01	Sample added to an analytical run already in progress.
J	Analyte detected below the SQL but above the MDL.
Ratio	The ratio results are outside normal parameters. The results fall within the established acceptable laboratory variance.
TKN-N	
TKN-R	
Visual	Visual inspection done to confirm analytical results.

ATU-ID	Sample.Wrk	Analysis.Batch	Sample.SampleName	Sample.Sampled	Analyte.Analyte	Analyte.tResult	Analyte.RptUnits	Analyte.AnalyteNotes
1	G006920	M157221	Real World ATU - Effluent - Sample 1	2/24/2023 9:45	BOD (5 day)	70	mg/L	
2	G006920	M157244	Real World ATU - Effluent - Sample 2	2/24/2023 10:15	BOD (5 day)	9	mg/L	
3	G011058	M158848	Real World ATU - Effluent - Sample 1	3/30/2023 9:10	BOD (5 day)	32	mg/L	
4	G011058	M158849	Real World ATU - Effluent - Sample 2	3/30/2023 10:20	BOD (5 day)	1	mg/L	C-02
5	G011058	M158849	Real World ATU - Effluent - Sample 3	3/30/2023 9:30	BOD (5 day)	2	mg/L	
6	G011058	M158849	Real World ATU - Effluent - Sample 5	3/30/2023 11:30	BOD (5 day)	5	mg/L	
7	G011058	M158849	Real World ATU - Effluent - Sample 6	3/30/2023 12:07	BOD (5 day)	42	mg/L	C-02
8	G011058	M158849	Real World ATU - Effluent - Sample 7	3/30/2023 13:10	BOD (5 day)	8	mg/L	
9	G012004	M159456	Real World ATU - Commercial - Sample 1	4/13/2023 9:00	BOD (5 day)	215	mg/L	
10	G012004	M159456	Real World ATU - Commercial - Sample 2	4/13/2023 9:40	BOD (5 day)	155	mg/L	
11	G012004	M159456	Real World ATU - Commercial - Sample 3	4/13/2023 10:15	BOD (5 day)	34	mg/L	BOD-02
12	G012004	M159456	Real World ATU - Commercial - Sample 4	4/13/2023 11:05	BOD (5 day)	28	mg/L	
13	G012004	M159456	Real World ATU - Commercial - Sample 5	4/13/2023 11:42	BOD (5 day)	57	mg/L	
14	G012004	M159455	Real World ATU - Effluent - Sample 1	4/13/2023 12:35	BOD (5 day)	19	mg/L	
15	G013845	M160400	Real World ATU - Effluent - Sample 1	5/3/2023 9:20	BOD (5 day)	3	mg/L	C-02
16	G013845	M160400	Real World ATU - Effluent - Sample 2	5/3/2023 9:56	BOD (5 day)	ND	mg/L	
17	G013845	M160400	Real World ATU - Effluent - Sample 3	5/3/2023 10:30	BOD (5 day)	34	mg/L	
18	G013845	M160400	Real World ATU - Commercial - Sample 2	5/3/2023 11:09	BOD (5 day)	5	mg/L	
19	G013845	M160400	Real World ATU - Commercial - Sample 1	5/3/2023 11:45	BOD (5 day)	512	mg/L	
20	G013845	M160400	Real World ATU - Commercial - Sample 3	5/3/2023 12:30	BOD (5 day)	30	mg/L	
21	G013845	M160400	Real World ATU - Commercial - Sample 4	5/3/2023 13:24	BOD (5 day)	5	mg/L	
22	G016688	M161068	Real World ATU - Effluent - Sample 1	5/17/2023 9:10	BOD (5 day)	39	mg/L	
23	G016688	M161068	Real World ATU - Effluent - Sample 2	5/17/2023 10:06	BOD (5 day)	12	mg/L	
24	G016688	M161068	Real World ATU - Effluent - Sample 3	5/17/2023 10:37	BOD (5 day)	3	mg/L	C-02
25	G016688	M161068	Real World ATU - Effluent - Sample 4	5/17/2023 11:17	BOD (5 day)	5	mg/L	
26	G016688	M161068	Real World ATU - Effluent - Sample 5	5/17/2023 11:50	BOD (5 day)	6	mg/L	
27	G016688	M161069	Real World ATU - Commercial - Sample 1	5/17/2023 12:12	BOD (5 day)	23	mg/L	
28	G016688	M161069	Real World ATU - Commercial - Sample 2	5/17/2023 12:30	BOD (5 day)	55	mg/L	C-02
29	G016688	M161069	Real World ATU - Commercial - Sample 3	5/17/2023 13:17	BOD (5 day)	17	mg/L	
30	G023717	M164570	Real World ATU - Effluent - Sample 4	8/1/2023 8:45	BOD (5 day)	16	mg/L	
31	G023717	M164570	Real World ATU - Effluent - Sample 5	8/1/2023 9:40	BOD (5 day)	47	mg/L	G-01
32	G023717	M164570	Real World ATU - Effluent - Sample 6	8/1/2023 10:28	BOD (5 day)	ND	mg/L	
33	G023717	M164570	Real World ATU - Effluent - Sample 7	8/1/2023 12:15	BOD (5 day)	15	mg/L	
34	G023717	M164570	Real World ATU - Effluent - Sample 1	8/1/2023 12:52	BOD (5 day)	31	mg/L	
35	G023717	M164570	Real World ATU - Effluent - Sample 8	8/1/2023 13:30	BOD (5 day)	44	mg/L	
36	G026434	M164936	Real World ATU - Effluent - Sample 1	8/7/2023 9:30	BOD (5 day)	92	mg/L	
37	G026434	M164936	Real World ATU - Effluent - Sample 2	8/7/2023 10:20	BOD (5 day)	6	mg/L	
38	G026434	M164936	Real World ATU - Effluent - Sample 3	8/7/2023 10:50	BOD (5 day)	9	mg/L	
39	G026434	M164936	Real World ATU - Effluent - Sample 4	8/7/2023 11:40	BOD (5 day)	69	mg/L	Visual

ATU-ID	Sample.Wrk	Analysis.Batch	Sample.SampleName	Sample.Sampled	Analyte.Analyte	Analyte.tResult	Analyte.RptUnits	Analyte.AnalyteNotes
40	G026434	M164936	Real World ATU - Effluent - Sample 5	8/7/2023 12:25	BOD (5 day)	ND	mg/L	
41	G026434	M164936	Real World ATU - Effluent - Sample 6	8/7/2023 13:25	BOD (5 day)	36	mg/L	Visual
42	G026434	M164937	Real World ATU - Effluent - Sample 7	8/7/2023 13:50	BOD (5 day)	ND	mg/L	Visual
43	G026434	M164937	Real World ATU - Effluent - Sample 8	8/7/2023 15:00	BOD (5 day)	15	mg/L	Visual
44	G029648	M165999	Real World ATU - Commercial - Sample 1	8/29/2023 9:30	BOD (5 day)	34	mg/L	Visual
45	G029648	M165999	Real World ATU - Commercial - Sample 2	8/29/2023 10:30	BOD (5 day)	22	mg/L	Visual
46	G030640	M166364	Wilco Com 3	9/8/2023 10:11	BOD (5 day)	37	mg/L	
47	G030641	M166364	Wilco Com 4	9/8/2023 11:07	BOD (5 day)	651	mg/L	
48	G030642	M166364	Wilco - COM - 5	9/8/2023 11:42	BOD (5 day)	35	mg/L	G-01
49	G026474	M166726	Real World ATU - Effluent - Sample 21	9/13/2023 9:30	BOD (5 day)	8	mg/L	
50	G026474	M166726	Real World ATU - Effluent - Sample 22	9/13/2023 10:00	BOD (5 day)	28	mg/L	
51	G026474	M166725	Real World ATU - Effluent - Sample 23	9/13/2023 10:30	BOD (5 day)	5	mg/L	Ratio
52	G026474	M166727	Real World ATU - Effluent - Sample 24	9/13/2023 11:00	BOD (5 day)	<3	mg/L	Ratio
53	G026474	M166727	Real World ATU - Effluent - Sample 25	9/13/2023 12:00	BOD (5 day)	5	mg/L	G-01
54	G032461	M167052	Wilco-com-06	9/22/2023 9:35	BOD (5 day)	542	mg/L	
55	G032461	M167052	Wilco-com-07	9/22/2023 10:18	BOD (5 day)	21	mg/L	
56	G032461	M167051	Wilco-com-08	9/22/2023 11:00	BOD (5 day)	27	mg/L	TKN-R
57	G032461	M167051	Wilco-com-09	9/22/2023 11:30	BOD (5 day)	22	mg/L	TKN-R
58	G032461	M167051	Wilco-com-10	9/22/2023 11:56	BOD (5 day)	4	mg/L	
59	G033117	M167383	Real World ATU - Effluent - Sample 8	9/27/2023 9:15	BOD (5 day)	181	mg/L	
60	G033117	M167384	Real World ATU - Effluent - Sample 9	9/27/2023 9:45	BOD (5 day)	4	mg/L	
61	G033117	M167382	Real World ATU - Effluent - Sample 10	9/27/2023 10:30	BOD (5 day)	17	mg/L	J
62	G033117	M167384	Real World ATU - Effluent - Sample 11	9/27/2023 10:45	BOD (5 day)	51	mg/L	
63	G033117	M167384	Real World ATU - Effluent - Sample 12	9/27/2023 11:30	BOD (5 day)	1	mg/L	
64	G033117	M167386	Real World ATU - Effluent - Sample 1	9/27/2023 12:30	BOD (5 day)	6	mg/L	
65	G033117	M167386	Real World ATU - Effluent - Sample 2	9/27/2023 13:15	BOD (5 day)	14	mg/L	
66	G033117	M167386	Real World ATU - Effluent - Sample 3	9/27/2023 14:00	BOD (5 day)	16	mg/L	
67	G033117	M167386	Real World ATU - Effluent - Sample 4	9/28/2023 9:15	BOD (5 day)	588	mg/L	
68	G033117	M167382	Real World ATU - Effluent - Sample 5	9/28/2023 9:50	BOD (5 day)	28	mg/L	
69	G033117	M167385	Real World ATU - Effluent - Sample 6	9/28/2023 10:15	BOD (5 day)	22	mg/L	
70	G033117	M167382	Real World ATU - Effluent - Sample 7	9/28/2023 10:40	BOD (5 day)	3	mg/L	
71	G026473	M167375	Real World ATU - Effluent - Sample 11	9/28/2023 14:30	BOD (5 day)	64	mg/L	
72	G034196	M167722	Real World ATU - Effluent - Sample 1	10/4/2023 9:30	BOD (5 day)	13	mg/L	
73	G034196	M167722	Real World ATU - Effluent - Sample 2	10/4/2023 10:00	BOD (5 day)	12	mg/L	
74	G034196	M167722	Real World ATU - Effluent - Sample 3	10/4/2023 10:45	BOD (5 day)	12	mg/L	
75	G034196	M167721	Real World ATU - Effluent - Sample 4	10/4/2023 11:15	BOD (5 day)	15	mg/L	
76	G034196	M167723	Real World ATU - Effluent - Sample 5	10/4/2023 11:45	BOD (5 day)	1	mg/L	
77	G034196	M167723	Real World ATU - Effluent - Sample 6	10/4/2023 12:30	BOD (5 day)	ND	mg/L	
78	G034196	M167723	Real World ATU - Effluent - Sample 7	10/4/2023 15:15	BOD (5 day)	52	mg/L	

ATU-ID	Sample.Wrk	Analysis.Batch	Sample.SampleName	Sample.Sampled	Analyte.Analyte	Analyte.tResult	Analyte.RptUnits	Analyte.AnalyteNotes
79	G034196	M167723	Real World ATU - Effluent - Sample 8	10/4/2023 16:30	BOD (5 day)	2	mg/L	
80	G034054	M167653	Wolfe TAMU Real World ATU	10/4/2023 14:45	BOD (5 day)	ND	mg/L	
81	G034931	M168034	Real World ATU - Effluent - Sample 1	10/11/2023 9:30	BOD (5 day)	102	mg/L	A-01
82	G034931	M168031	Real World ATU - Effluent - Sample 2	10/11/2023 10:15	BOD (5 day)	9	mg/L	BOD-02
83	G034931	M168031	Real World ATU - Effluent - Sample 3	10/11/2023 12:00	BOD (5 day)	51	mg/L	
84	G034931	M168031	Real World ATU - Effluent - Sample 4	10/11/2023 12:50	BOD (5 day)	6	mg/L	A-01a
85	G034931	M168030	Real World ATU - Effluent - Sample 5	10/11/2023 13:10	BOD (5 day)	2	mg/L	
86	G034931	M168029	Real World ATU - Effluent - Sample 6	10/11/2023 14:45	BOD (5 day)	25	mg/L	
87	G034931	M168030	Real World ATU - Effluent - Sample 7	10/11/2023 15:15	BOD (5 day)	15	mg/L	
88	G035578	M168212	Real World ATU - Effluent - Sample 1	10/17/2023 11:00	BOD (5 day)	33	mg/L	
89	G035578	M168211	Real World ATU - Effluent - Sample 2	10/17/2023 11:15	BOD (5 day)	5	mg/L	
90	G035578	M168211	Real World ATU - Effluent - Sample 3	10/17/2023 14:15	BOD (5 day)	33	mg/L	
91	G035578	M168212	Real World ATU - Effluent - Sample 4	10/17/2023 14:45	BOD (5 day)	350	mg/L	
92	G035951	M168367	Real World ATU - Effluent - Sample 5	10/18/2023 10:05	BOD (5 day)	41	mg/L	
93	G035951	M168369	Real World ATU - Effluent - Sample 8	10/18/2023 10:25	BOD (5 day)	38	mg/L	
94	G035951	M168369	Real World ATU - Effluent - Sample 10	10/18/2023 12:06	BOD (5 day)	10	mg/L	
95	G035951	M168367	Real World ATU - Effluent - Sample 11	10/18/2023 13:35	BOD (5 day)	ND	mg/L	BOD-02, BOD-03
96	G035951	M168368	Real World ATU - Effluent - Sample 6	10/19/2023 9:30	BOD (5 day)	2	mg/L	
97	G035471	M168379	Real World ATU - Effluent - Sample 1	10/19/2023 9:00	BOD (5 day)	17	mg/L	
98	G035471	M168380	Real World ATU - Effluent - Sample 2	10/19/2023 9:40	BOD (5 day)	6	mg/L	
99	G035471	M168380	Real World ATU - Effluent - Sample 3	10/19/2023 10:00	BOD (5 day)	13	mg/L	
100	G035471	M168380	Real World ATU - Effluent - Sample 4	10/19/2023 11:00	BOD (5 day)	1	mg/L	
101	G035960	M168371	Real World ATU Sample 7	10/20/2023 10:00	BOD (5 day)	11	mg/L	
102	G035960	M168371	Real World ATU Sample 9	10/20/2023 10:40	BOD (5 day)	ND	mg/L	
1	G006920	M157278	Real World ATU - Effluent - Sample 1	2/24/2023 9:45	Total Suspended Solids	81	mg/L	
2	G006920	M157278	Real World ATU - Effluent - Sample 2	2/24/2023 10:15	Total Suspended Solids	17	mg/L	
3	G011058	M158873	Real World ATU - Effluent - Sample 1	3/30/2023 9:10	Total Suspended Solids	444	mg/L	C-02
4	G011058	M158873	Real World ATU - Effluent - Sample 2	3/30/2023 10:20	Total Suspended Solids	8	mg/L	
5	G011058	M158873	Real World ATU - Effluent - Sample 3	3/30/2023 9:30	Total Suspended Solids	7	mg/L	C-02
6	G011058	M158873	Real World ATU - Effluent - Sample 5	3/30/2023 11:30	Total Suspended Solids	16	mg/L	
7	G011058	M158873	Real World ATU - Effluent - Sample 6	3/30/2023 12:07	Total Suspended Solids	40	mg/L	C-02
8	G011058	M158873	Real World ATU - Effluent - Sample 7	3/30/2023 13:10	Total Suspended Solids	11	mg/L	
9	G012004	M159608	Real World ATU - Commercial - Sample 1	4/13/2023 9:00	Total Suspended Solids	1530	mg/L	C-02, TKN-N
10	G012004	M159608	Real World ATU - Commercial - Sample 2	4/13/2023 9:40	Total Suspended Solids	473	mg/L	
11	G012004	M159608	Real World ATU - Commercial - Sample 3	4/13/2023 10:15	Total Suspended Solids	124	mg/L	
12	G012004	M159608	Real World ATU - Commercial - Sample 4	4/13/2023 11:05	Total Suspended Solids	20	mg/L	
13	G012004	M159608	Real World ATU - Commercial - Sample 5	4/13/2023 11:42	Total Suspended Solids	53	mg/L	
14	G012004	M159608	Real World ATU - Effluent - Sample 1	4/13/2023 12:35	Total Suspended Solids	17	mg/L	
15	G013845	M160424	Real World ATU - Effluent - Sample 1	5/3/2023 9:20	Total Suspended Solids	14	mg/L	

ATU-ID	Sample.Wrk	Analysis.Batch	Sample.SampleName	Sample.Sampled	Analyte.Analyte	Analyte.tResult	Analyte.RptUnits	Analyte.AnalyteNotes
16	G013845	M160424	Real World ATU - Effluent - Sample 2	5/3/2023 9:56	Total Suspended Solids	8	mg/L	
17	G013845	M160424	Real World ATU - Effluent - Sample 3	5/3/2023 10:30	Total Suspended Solids	687	mg/L	
18	G013845	M160424	Real World ATU - Commercial - Sample 2	5/3/2023 11:09	Total Suspended Solids	12	mg/L	
19	G013845	M160424	Real World ATU - Commercial - Sample 1	5/3/2023 11:45	Total Suspended Solids	5240	mg/L	
20	G013845	M160424	Real World ATU - Commercial - Sample 3	5/3/2023 12:30	Total Suspended Solids	48	mg/L	
21	G013845	M160424	Real World ATU - Commercial - Sample 4	5/3/2023 13:24	Total Suspended Solids	14	mg/L	
22	G016688	M161087	Real World ATU - Effluent - Sample 1	5/17/2023 9:10	Total Suspended Solids	29	mg/L	
23	G016688	M161087	Real World ATU - Effluent - Sample 2	5/17/2023 10:06	Total Suspended Solids	10	mg/L	
24	G016688	M161087	Real World ATU - Effluent - Sample 3	5/17/2023 10:37	Total Suspended Solids	13	mg/L	
25	G016688	M161087	Real World ATU - Effluent - Sample 4	5/17/2023 11:17	Total Suspended Solids	14	mg/L	
26	G016688	M161087	Real World ATU - Effluent - Sample 5	5/17/2023 11:50	Total Suspended Solids	7	mg/L	BOD-02
27	G016688	M161087	Real World ATU - Commercial - Sample 1	5/17/2023 12:12	Total Suspended Solids	10	mg/L	
28	G016688	M161118	Real World ATU - Commercial - Sample 2	5/17/2023 12:30	Total Suspended Solids	216	mg/L	
29	G016688	M161118	Real World ATU - Commercial - Sample 3	5/17/2023 13:17	Total Suspended Solids	33	mg/L	BOD-03, G-01
30	G023717	M164686	Real World ATU - Effluent - Sample 4	8/1/2023 8:45	Total Suspended Solids	8	mg/L	C-02
31	G023717	M164686	Real World ATU - Effluent - Sample 5	8/1/2023 9:40	Total Suspended Solids	144	mg/L	G-01
32	G023717	M164686	Real World ATU - Effluent - Sample 6	8/1/2023 10:28	Total Suspended Solids	9	mg/L	
33	G023717	M164686	Real World ATU - Effluent - Sample 7	8/1/2023 12:15	Total Suspended Solids	15	mg/L	
34	G023717	M164686	Real World ATU - Effluent - Sample 1	8/1/2023 12:52	Total Suspended Solids	24	mg/L	BOD-02
35	G023717	M164686	Real World ATU - Effluent - Sample 8	8/1/2023 13:30	Total Suspended Solids	9	mg/L	
36	G026434	M164989	Real World ATU - Effluent - Sample 1	8/7/2023 9:30	Total Suspended Solids	22	mg/L	
37	G026434	M164989	Real World ATU - Effluent - Sample 2	8/7/2023 10:20	Total Suspended Solids	7	mg/L	
38	G026434	M165020	Real World ATU - Effluent - Sample 3	8/7/2023 10:50	Total Suspended Solids	7	mg/L	G-01
39	G026434	M165020	Real World ATU - Effluent - Sample 4	8/7/2023 11:40	Total Suspended Solids	24	mg/L	Visual
40	G026434	M165020	Real World ATU - Effluent - Sample 5	8/7/2023 12:25	Total Suspended Solids	ND	mg/L	
41	G026434	M165020	Real World ATU - Effluent - Sample 6	8/7/2023 13:25	Total Suspended Solids	17	mg/L	
42	G026434	M165020	Real World ATU - Effluent - Sample 7	8/7/2023 13:50	Total Suspended Solids	ND	mg/L	
43	G026434	M165020	Real World ATU - Effluent - Sample 8	8/7/2023 15:00	Total Suspended Solids	21	mg/L	
44	G029648	M165982	Real World ATU - Commercial - Sample 1	8/29/2023 9:30	Total Suspended Solids	27	mg/L	
45	G029648	M165982	Real World ATU - Commercial - Sample 2	8/29/2023 10:30	Total Suspended Solids	55	mg/L	G-01
46	G030640	M166477	Wilco Com 3	9/8/2023 10:11	Total Suspended Solids	22	mg/L	
47	G030641	M166477	Wilco Com 4	9/8/2023 11:07	Total Suspended Solids	160	mg/L	
48	G030642	M166477	Wilco - COM - 5	9/8/2023 11:42	Total Suspended Solids	10	mg/L	
49	G026474	M166867	Real World ATU - Effluent - Sample 21	9/13/2023 9:30	Total Suspended Solids	32	mg/L	
50	G026474	M166867	Real World ATU - Effluent - Sample 22	9/13/2023 10:00	Total Suspended Solids	14	mg/L	G-01
51	G026474	M166867	Real World ATU - Effluent - Sample 23	9/13/2023 10:30	Total Suspended Solids	1	mg/L	
52	G026474	M166867	Real World ATU - Effluent - Sample 24	9/13/2023 11:00	Total Suspended Solids	3	mg/L	
53	G026474	M166867	Real World ATU - Effluent - Sample 25	9/13/2023 12:00	Total Suspended Solids	7	mg/L	
54	G032461	M167201	Wilco-com-06	9/22/2023 9:35	Total Suspended Solids	238	mg/L	

ATU-ID	Sample.Wrk	Analysis.Batch	Sample.SampleName	Sample.Sampled	Analyte.Analyte	Analyte.tResult	Analyte.RptUnits	Analyte.AnalyteNotes
55	G032461	M167201	Wilco-com-07	9/22/2023 10:18	Total Suspended Solids	22	mg/L	G-01
56	G032461	M167170	Wilco-com-08	9/22/2023 11:00	Total Suspended Solids	10	mg/L	
57	G032461	M167201	Wilco-com-09	9/22/2023 11:30	Total Suspended Solids	20	mg/L	
58	G032461	M167201	Wilco-com-10	9/22/2023 11:56	Total Suspended Solids	5	mg/L	
59	G033117	M167503	Real World ATU - Effluent - Sample 8	9/27/2023 9:15	Total Suspended Solids	49	mg/L	
60	G033117	M167503	Real World ATU - Effluent - Sample 9	9/27/2023 9:45	Total Suspended Solids	11	mg/L	
61	G033117	M167503	Real World ATU - Effluent - Sample 10	9/27/2023 10:30	Total Suspended Solids	24	mg/L	
62	G033117	M167514	Real World ATU - Effluent - Sample 11	9/27/2023 10:45	Total Suspended Solids	10	mg/L	
63	G033117	M167514	Real World ATU - Effluent - Sample 12	9/27/2023 11:30	Total Suspended Solids	6	mg/L	
64	G033117	M167514	Real World ATU - Effluent - Sample 1	9/27/2023 12:30	Total Suspended Solids	3	mg/L	
65	G033117	M167514	Real World ATU - Effluent - Sample 2	9/27/2023 13:15	Total Suspended Solids	30	mg/L	
66	G033117	M167503	Real World ATU - Effluent - Sample 3	9/27/2023 14:00	Total Suspended Solids	8	mg/L	
67	G033117	M167503	Real World ATU - Effluent - Sample 4	9/28/2023 9:15	Total Suspended Solids	32	mg/L	
68	G033117	M167514	Real World ATU - Effluent - Sample 5	9/28/2023 9:50	Total Suspended Solids	21	mg/L	
69	G033117	M167503	Real World ATU - Effluent - Sample 6	9/28/2023 10:15	Total Suspended Solids	5	mg/L	
70	G033117	M167514	Real World ATU - Effluent - Sample 7	9/28/2023 10:40	Total Suspended Solids	4	mg/L	
71	G026473	M167526	Real World ATU - Effluent - Sample 11	9/28/2023 14:30	Total Suspended Solids	18	mg/L	
72	G034196	M167821	Real World ATU - Effluent - Sample 1	10/4/2023 9:30	Total Suspended Solids	7	mg/L	
73	G034196	M167821	Real World ATU - Effluent - Sample 2	10/4/2023 10:00	Total Suspended Solids	6	mg/L	
74	G034196	M167821	Real World ATU - Effluent - Sample 3	10/4/2023 10:45	Total Suspended Solids	7	mg/L	
75	G034196	M167821	Real World ATU - Effluent - Sample 4	10/4/2023 11:15	Total Suspended Solids	43	mg/L	
76	G034196	M167821	Real World ATU - Effluent - Sample 5	10/4/2023 11:45	Total Suspended Solids	2	mg/L	
77	G034196	M167821	Real World ATU - Effluent - Sample 6	10/4/2023 12:30	Total Suspended Solids	2	mg/L	
78	G034196	M167821	Real World ATU - Effluent - Sample 7	10/4/2023 15:15	Total Suspended Solids	17	mg/L	G-01
79	G034196	M167821	Real World ATU - Effluent - Sample 8	10/4/2023 16:30	Total Suspended Solids	2	mg/L	
80	G034054	M167699	Wolfe TAMU Real World ATU	10/4/2023 14:45	Total Suspended Solids	2	mg/L	BOD-02,G-01
81	G034931	M168121	Real World ATU - Effluent - Sample 1	10/11/2023 9:30	Total Suspended Solids	263	mg/L	
82	G034931	M168121	Real World ATU - Effluent - Sample 2	10/11/2023 10:15	Total Suspended Solids	8	mg/L	
83	G034931	M168121	Real World ATU - Effluent - Sample 3	10/11/2023 12:00	Total Suspended Solids	6	mg/L	
84	G034931	M168121	Real World ATU - Effluent - Sample 4	10/11/2023 12:50	Total Suspended Solids	3	mg/L	
85	G034931	M168121	Real World ATU - Effluent - Sample 5	10/11/2023 13:10	Total Suspended Solids	ND	mg/L	A-01b
86	G034931	M168121	Real World ATU - Effluent - Sample 6	10/11/2023 14:45	Total Suspended Solids	20	mg/L	
87	G034931	M168121	Real World ATU - Effluent - Sample 7	10/11/2023 15:15	Total Suspended Solids	6	mg/L	
88	G035578	M168326	Real World ATU - Effluent - Sample 1	10/17/2023 11:00	Total Suspended Solids	53	mg/L	
89	G035578	M168326	Real World ATU - Effluent - Sample 2	10/17/2023 11:15	Total Suspended Solids	3	mg/L	
90	G035578	M168326	Real World ATU - Effluent - Sample 3	10/17/2023 14:15	Total Suspended Solids	7	mg/L	
91	G035578	M168326	Real World ATU - Effluent - Sample 4	10/17/2023 14:45	Total Suspended Solids	50	mg/L	
92	G035951	M168448	Real World ATU - Effluent - Sample 5	10/18/2023 10:05	Total Suspended Solids	12	mg/L	
93	G035951	M168448	Real World ATU - Effluent - Sample 8	10/18/2023 10:25	Total Suspended Solids	47	mg/L	

ATU-ID	Sample.Wrk	Analysis.Batch	Sample.SampleName	Sample.Sampled	Analyte.Analyte	Analyte.tResult	Analyte.RptUnits	Analyte.AnalyteNotes
94	G035951	M168448	Real World ATU - Effluent - Sample 10	10/18/2023 12:06	Total Suspended Solids	13	mg/L	
95	G035951	M168448	Real World ATU - Effluent - Sample 11	10/18/2023 13:35	Total Suspended Solids	ND	mg/L	
96	G035951	M168448	Real World ATU - Effluent - Sample 6	10/19/2023 9:30	Total Suspended Solids	2	mg/L	
97	G035471	M168479	Real World ATU - Effluent - Sample 1	10/19/2023 9:00	Total Suspended Solids	9	mg/L	
98	G035471	M168479	Real World ATU - Effluent - Sample 2	10/19/2023 9:40	Total Suspended Solids	4	mg/L	C-02
99	G035471	M168479	Real World ATU - Effluent - Sample 3	10/19/2023 10:00	Total Suspended Solids	6	mg/L	
100	G035471	M168479	Real World ATU - Effluent - Sample 4	10/19/2023 11:00	Total Suspended Solids	1	mg/L	
101	G035960	M168531	Real World ATU Sample 7	10/20/2023 10:00	Total Suspended Solids	4	mg/L	
102	G035960	M168531	Real World ATU Sample 9	10/20/2023 10:40	Total Suspended Solids	6	mg/L	
9	G012004	M159571	Real World ATU - Commercial - Sample 1	4/13/2023 9:00	Ammonia as N	33.6	mg/L	C-02, TKN-R
10	G012004	M159571	Real World ATU - Commercial - Sample 2	4/13/2023 9:40	Ammonia as N	59.2	mg/L	J
11	G012004	M159571	Real World ATU - Commercial - Sample 3	4/13/2023 10:15	Ammonia as N	12.7	mg/L	
12	G012004	M159936	Real World ATU - Commercial - Sample 4	4/13/2023 11:05	Ammonia as N	4.11	mg/L	
13	G012004	M159571	Real World ATU - Commercial - Sample 5	4/13/2023 11:42	Ammonia as N	33.8	mg/L	
18	G013845	M160614	Real World ATU - Commercial - Sample 2	5/3/2023 11:09	Ammonia as N	16.9	mg/L	
19	G013845	M160614	Real World ATU - Commercial - Sample 1	5/3/2023 11:45	Ammonia as N	61.9	mg/L	
20	G013845	M160614	Real World ATU - Commercial - Sample 3	5/3/2023 12:30	Ammonia as N	1.34	mg/L	
21	G013845	M160614	Real World ATU - Commercial - Sample 4	5/3/2023 13:24	Ammonia as N	0.23	mg/L	
9	G012004	M159703	Real World ATU - Commercial - Sample 1	4/13/2023 9:00	Nitrate/Nitrite as N	15	mg/L	C-02
10	G012004	M159703	Real World ATU - Commercial - Sample 2	4/13/2023 9:40	Nitrate/Nitrite as N	5.5	mg/L	C-02
11	G012004	M159703	Real World ATU - Commercial - Sample 3	4/13/2023 10:15	Nitrate/Nitrite as N	0.98	mg/L	
12	G012004	M159703	Real World ATU - Commercial - Sample 4	4/13/2023 11:05	Nitrate/Nitrite as N	0.95	mg/L	
13	G012004	M159703	Real World ATU - Commercial - Sample 5	4/13/2023 11:42	Nitrate/Nitrite as N	80	mg/L	
18	G013845	M160433	Real World ATU - Commercial - Sample 2	5/3/2023 11:09	Nitrate/Nitrite as N	0.02	mg/L	
19	G013845	M160433	Real World ATU - Commercial - Sample 1	5/3/2023 11:45	Nitrate/Nitrite as N	0.15	mg/L	
20	G013845	M160433	Real World ATU - Commercial - Sample 3	5/3/2023 12:30	Nitrate/Nitrite as N	82	mg/L	
21	G013845	M160433	Real World ATU - Commercial - Sample 4	5/3/2023 13:24	Nitrate/Nitrite as N	11	mg/L	
9	G012004	M159769	Real World ATU - Commercial - Sample 1	4/13/2023 9:00	Total Kjeldahl Nitrogen as N	49.7	mg/L	
10	G012004	M159769	Real World ATU - Commercial - Sample 2	4/13/2023 9:40	Total Kjeldahl Nitrogen as N	64.5	mg/L	
11	G012004	M159769	Real World ATU - Commercial - Sample 3	4/13/2023 10:15	Total Kjeldahl Nitrogen as N	12.5	mg/L	
12	G012004	M159770	Real World ATU - Commercial - Sample 4	4/13/2023 11:05	Total Kjeldahl Nitrogen as N	4.58	mg/L	C-02
13	G012004	M159770	Real World ATU - Commercial - Sample 5	4/13/2023 11:42	Total Kjeldahl Nitrogen as N	20.3	mg/L	
18	G013845	M160564	Real World ATU - Commercial - Sample 2	5/3/2023 11:09	Total Kjeldahl Nitrogen as N	20.7	mg/L	
19	G013845	M160565	Real World ATU - Commercial - Sample 1	5/3/2023 11:45	Total Kjeldahl Nitrogen as N	156	mg/L	
20	G013845	M160738	Real World ATU - Commercial - Sample 3	5/3/2023 12:30	Total Kjeldahl Nitrogen as N	ND	mg/L	
21	G013845	M160738	Real World ATU - Commercial - Sample 4	5/3/2023 13:24	Total Kjeldahl Nitrogen as N	1.17	mg/L	
30	G023717	M164660	Real World ATU - Effluent - Sample 4	8/1/2023 8:45	Oil & Grease (HEM)	ND	mg/L	G-01
31	G023717	M164660	Real World ATU - Effluent - Sample 5	8/1/2023 9:40	Oil & Grease (HEM)	3.9	mg/L	

ATU-ID	Sample.Wrk	Analysis.Batch	Sample.SampleName	Sample.Sampled	Analyte.Analyte	Analyte.tResult	Analyte.RptUnits	Analyte.AnalyteNotes
32	G023717	M164660	Real World ATU - Effluent - Sample 6	8/1/2023 10:28	Oil & Grease (HEM)	ND	mg/L	BOD-02, BOD-03, G-01
33	G023717	M164660	Real World ATU - Effluent - Sample 7	8/1/2023 12:15	Oil & Grease (HEM)	ND	mg/L	
35	G023717	M164660	Real World ATU - Effluent - Sample 8	8/1/2023 13:30	Oil & Grease (HEM)	ND	mg/L	
36	G026434	M165008	Real World ATU - Effluent - Sample 1	8/7/2023 9:30	Oil & Grease (HEM)	ND	mg/L	
37	G026434	M165008	Real World ATU - Effluent - Sample 2	8/7/2023 10:20	Oil & Grease (HEM)	ND	mg/L	
38	G026434	M165008	Real World ATU - Effluent - Sample 3	8/7/2023 10:50	Oil & Grease (HEM)	ND	mg/L	
39	G026434	M165008	Real World ATU - Effluent - Sample 4	8/7/2023 11:40	Oil & Grease (HEM)	5.4	mg/L	G-01
40	G026434	M165008	Real World ATU - Effluent - Sample 5	8/7/2023 12:25	Oil & Grease (HEM)	ND	mg/L	Visual