

Recreational Vehicle (RV) Park Research



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Summary and goal:

This project addresses Topic 2.3.1 of the 2023 Texas Onsite Grant Program (TOGP) Request for Grant Applications (RFGA), Recreational Vehicle (RV) Research. According to the Texas Commission on Environmental Quality (TCEQ), there have been an increasing number of basic public and environmental health challenges, compliance issues, system design, installation, and maintenance issues, as well as operational expenses, and full or partial system malfunctions associated with RV Park on-site sewage facilities (OSSF). The regulated community and regulators throughout Texas need basic RV Park OSSF operational information to determine ways to improve the quality OSSF systems in Texas RV parks and reduce consumer costs, over OSSF infrastructure service life, by avoiding over-sizing, or under-sizing, of any given OSSF, including wastewater reuse systems. The general goal of the project is to collect and analyze real-world RV park OSSF data to assist with operation, maintenance, and design and of future OSSF systems.

Objectives:

- 1) Compare the influent and effluent of 8 selected RV OSSF systems to determine differences in 5-day Biochemical Oxygen Demand (BOD₅) and Total Suspended Solids (TSS) concentrations.

- 2) Determine if selected RV OSSF system effluent meets requirements found in 30 TAC 285.32(e) and 285.91(4) shown in Tables 1 and 2.

Table 1. OSSF effluent standards from 30 Texas Administrative Code §285.32(e)

Parameter	30-day average	Seven-day average	Daily Maximum	Single Grab
Biochemical Oxygen Demand (BOD)	20 mg/l	30 mg/l	45 mg/l	65 mg/l
Carbonaceous Biochemical Oxygen Demand (CBOD)	15 mg/l	25 mg/l	40 mg/l	60 mg/l
Total Suspended Solids (TSS)	20 mg/l	30 mg/l	45 mg/l	65 mg/l
pH (standard units)	6.0 - 9.0	-	-	-

Note: The 30-day average is the average of all 30-day averages, and seven-day average is the average of all seven-day averages over the length of the testing period. Also note that the information provided for the pH range is not specific to any average or maximum value, so it is represented with a range in the table.

Table 2. Testing and reporting standards from 30 Texas Administrative Code §285.91(4).

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

Monitoring and sampling design:

- Eight RV Park OSSF systems will be selected by AgriLife and approved by TCEQ.
- Influent and effluent grab samples will be collected twice per week for 12-weeks for each OSSF system with a goal of 48 samples per system.
- Influent samples will be analyzed for BOD₅, TSS, and pH (Table 3).
- Effluent samples will be analyzed for CBOD₅, TSS, and pH (Table 3).
- Sample analyses will be conducted in an accredited laboratory.
- Sample pH (and chlorine, if system uses surface application) will be measured in the field at the time of sample collection due to volatility.
- Daily and weekly system flow will be recorded using available water flow meters.
- Occupancy records will be collected from the park management.

Table 3. Monitoring parameters for RV research.

Parameter	Units
Influent, 5-day biochemical oxygen demand (BOD ₅)	mg/L, lbs per day
Effluent, 5-day carbonaceous biochemical oxygen demand (CBOD ₅)	mg/L, lbs per day
Influent and effluent, Total Suspended Solids (TSS)	mg/L, lbs per day
Influent and effluent, pH	standard units
Effluent, Residual free chlorine (if surface application)	mg/L
Flow (as available, influent or effluent)	gpd (gallons per day)
Daily number of guests (for each day flow is measured)	Days

Analysis:

- The statistical difference between influent and effluent constituent (i.e., BOD₅/CBOD₅ and TSS) concentrations will be compared using standard t-tests.
- One sample t-tests will be used to determine if “RV park OSSF are meeting state requirements for discharge” as specified by 30 Texas Administrative Code §285.32(e) including the 30-day average of 20/15 mg/L, 7-day average of 30/25 mg/L, daily maximum of 45/40 mg/L, and single grab sample of 65/60 mg/L CBOD₅/TSS, respectively and §285.91(4) residual free chlorine, if surface applied.

Deliverables:

- 1) RV park OSSF data sets in spreadsheet and/or relational database format.
- 2) Quarterly progress reports and a final report describing all results and findings.