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Onsite Wastewater Research Funding - Texas Model

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ABSTRACT.

Research is important for progress in onsite wastewater industry, however, funding a strong research program is quite challenging. In late 1980s and early 1990s Texas State legislators debated and passed a law that required the state regulatory agency to award competitive grants and support applied research and demonstration projects regarding on-site wastewater treatment technology and systems for improving the quality of wastewater treatment and reducing the cost of providing wastewater treatment to consumers. The law was famously called the $10 research fee law which allowed the environmentally agency to fund research and demonstration projects for two decades, from 1992 to 2012. In Texas, onsite wastewater systems are defined as systems for the disposal of domestic sewage, excluding liquid waste resulting from the processes used in industrial and commercial establishments that is located on the site where the sewage is produced; and produces not more than 5,000 gallons of waste a day. Texas has a sunset policy that requires each law to be renewed after 20 years or if not renewed the law is sunset, i.e., abolished. The $10 research fee law was not in 2013and research funding stopped. But the state continued to collect the $10 fee from the local permitting entity and used the funds to support other activities unrelated to onsite wastewater. By 2013 Texas had a strong industry association called TOWA that got involved with the efforts to renew the research funding by lobbying state legislators and working with state academic institutions like Texas A&M , Baylor, Texas Tech, and a few others who had been funded during the 1992 to 2012 period. With the help from public and private entities, House Bill 2771 was proposed and passed in the 85th Legislative Session that renewed the requirement for the state regulatory agency to award competitive grants and support applied research and demonstration projects regarding on-site wastewater treatment technology and systems for improving the quality of wastewater treatment and reducing the cost of providing wastewater treatment to consumers. In this paper we will discuss the details of permitting program in Texas, how the $10 permit fee is collected and used to fund research and demonstration programs in Texas, and the progress made in this area since the renewal of the law in 2017. The audience discussion related to similar programs in their home-states will be part of the presentation in this session.

Keywords. Onsite Wastewater Systems, OSSF, Permitting, Research Funding, Texas

INTRODUCTION

Research is necessary for advancement and progression of any industry, including the onsite wastewater industry. However, funding a strong and sustained research program in the field of onsite wastewater treatment systems at a national or at a state level remains quite challenging. During mid-20th Century, the U. S. Environmental Protection Agency (US EPA) supported and funded several research and demonstration projects to advance the development of both conventional and alternative onsite wastewater treatment and effluent dispersal technologies. Findings from those research and demonstration projects were presented at eleven events between 1974 and 2007 organized by then called the American Society of Agricultural Engineer (ASAE). The events were called "National Symposium on Individual and Small Community Sewage Systems" and proceedings from each of these events contained valuable findings from research and demonstration projects conducted by various universities including Texas A&M. In the summer of 2005, the membership of ASAE voted to change the name of the Society to American Society of Agricultural and Biological Engineering (ASABE) to reflect the evolution of the profession since its formation in 1907. While some of the Proceedings and papers included are still available from the ASABE Publication website (https://elibrary.asabe.org/toc.asp) most of them have now become "historic documents." Lake of organized sustained funding for research in Onsite Industry is one of the reasons for not having a national clearinghouse to collect, process, and disseminate information on current research related to onsite wastewater systems and also for not having national symposium type events organized by ASABE.

Value of funding onsite wastewater research in a sustained manner at a state level was recognized by Texas state legislators in the late 1980s, mainly to support growing demand to develop onsite wastewater solutions for sites that were not suitable for conventional septic systems (Figure 1). Typically, population growth outside the sewer area relies on use of onsite wastewater systems, which in Texas are known as On-Site Sewage Facility or OSSF. During most of the 20th Century, homes and businesses build outside the public sewer area used some form of a conventional septic tank and drain- field system, which relies primarily on soil for treating wastewater. A septic tank functions as a primary treatment unit that separates solids (heavier material) and scum (lighter material) and produces primary quality effluent, typically known as septic tank effluent. A drain-field system composed of a gravel or an alternative media filled bio-filtration system installed typically a foot below ground in an aerobic soil horizon typically 2-3 feet deep. The aerobic soil below and around the drain-field function as a secondary treatment unit that removes most of the organic waste material by oxidation of septic tank effluent and produces secondary quality effluent generally suitable for discharge in groundwater. The Proceedings of the National (and International) Symposiums on Individual and Small Community Sewage Systems are filled with research and field studies documenting both successful and unsuccessful use of septic tank drain-field systems all over the United States. During the 10-year period from 2007 to 2016 the onsite wastewater subcommittee (NRES-262) was inactive in organizing technical sessions. However, the National Onsite Wastewater Recycling Association (NOWRA) continued to organize annual conferences and produce proceedings (www.nowar.org) to fill the knowledge-gap. Need for aerobic soil depth (at least five feet), relatively flat ground (< 5% slope), and large land-area (> 1 Acre per home) are the three primary limitations to use of a septic tank drain-field system for all development outside public sewer service area. These limitations gave rise to development and use of secondary and advanced secondary treatment units (also called aerobic treatment units) and alternative drain-field technologies (like drip, spray, and greenhouse systems). Since early 1980s research focus in onsite wastewater has shifted more towards design/evaluation of secondary and advanced secondary treatment concepts and advanced effluent dispersal systems.

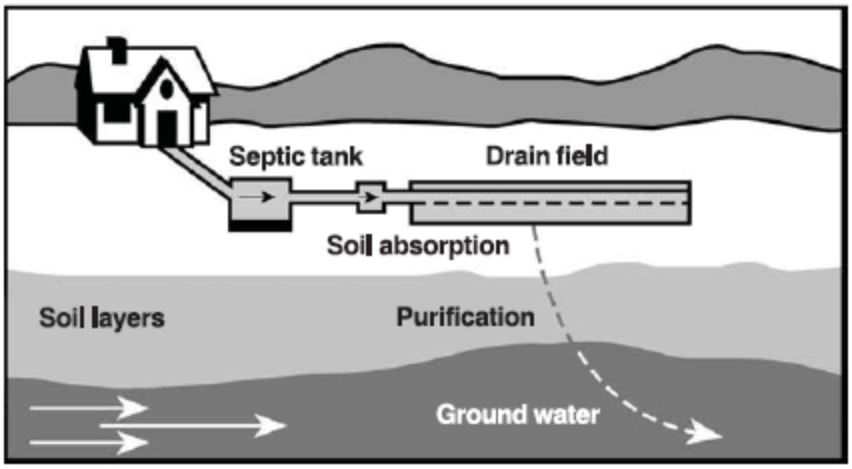

Figure 1. Conventional septic tank and drain-field system (US EPA 2002).

OSSF PROGRAM @ TAMU

Since the early 1990s, Texas A&M AgriLife Extension and the Department of Biological and Agricultural Engineering faculty and staff have successfully operated an OSSF program to provide science-based information, education, and training on the technologies available for treating and reusing wastewater onsite so Texans can make informed decisions when selecting, operating, and maintaining their onsite wastewater treatment and reuse systems. The program was originally developed by Dr. Bruce Lesiker who lead the program till he retired from the department in Fall 2010. The program was managed by Ryan Gerlich for 4 years until Dr. Anish Jantrania joined the department in Fall 2014.

Since 2015, the program has kept track of the number of on-site systems in each county. In the coastal zone AgriLife has mapped the location of these systems. Based on the dataset, density maps have been prepared which show the increase in the number of OSSFs and the trend in the increase (Figure 2). The reason behind adding the inventory and mapping activities in the program was the fact that this information is typically needed for supporting and justifying research activities. On-site systems are always an easy target to blame for surface and/or groundwater pollution and to conduct a field research to determine impact of on-site systems on environment it is important to know where these systems are located and all other information useful for conducting a successful field research. This information is also helpful to identify and support future research needs to continually improved use of on-site systems.

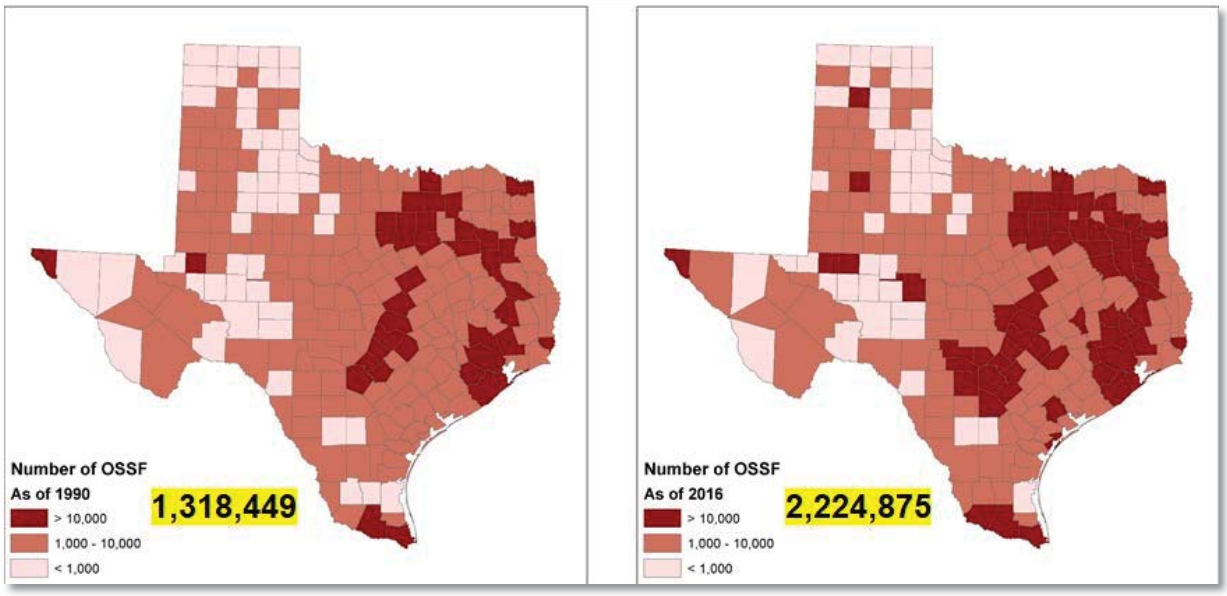

Figure 2. Onsite system density map of Texas as of 1990 (left) and as of 2016 (right). This information was compiled from 1990 Census data and permitting data from TCEQ.

The TCEQ Regulations for OSSF (TCEQ RG-472, 2017) offers eight choices for land-based dispersal of treated effluent, which allows an OSSF designer to find an onsite wastewater solution for any given soil and site condition (AgriLife Extension, 2005). Each permit application indicates which one of the following eight system is installed under that permit: 1) Standard drainfield, 2) Low-pressure distribution, 3) Subsurface drip, distribution, 4) Spray distribution (for secondary-quality effluent and disinfection only), 5) Mound system, 6) ET bed, 7) Soil substitution drainfield, and 8)Pumped effluent drainfield. Note that the minimum treatment level for using spray system is Texas is secondary with disinfection. For subsurface dispersal, minimum treatment level is primary (septic tank) on sites that meet all the regulatory requirements.

Figure 2 shows the trend in types of dispersal systems used in Texas since the early 1990s. Spray distribution following an aerobic treatment unit (ATU) with effluent disinfection is typically used on properties with limited soil and site conditions for subsurface dispersal. Since mid-1990s, use of ATU and spray system has become prevalent in Texas as shown in Figure 2, accounting for about half of the total increase in the number of on-site systems in Texas. From 2014, consistently more permits have been issued for installation of ATU Spray system compared to some form of a septic tank drain-field system. At the end of year 2018, almost 370,000 ATU Spray systems are in use, most of them serving individual homes where homeowners are responsible for ensuring their operation and ongoing maintenance. The increased use in ATU has developed interest in funding research program both to assess the impact of low-flow fixture and to study their ability for producing reuse quality effluent. Paper number 2000715 presents more details on currently funded research programs at the Texas A&M AgriLife OSSF research center.

FUNDING OF ON-SITE WASTEWATER RESEARCH IN TEXAS

In 1989, the 71st Legislative Session in Texas, the Legislators successfully pass a bill to amend the Title 5 Chapter 367 of the Health and Safety Code giving the authority to the local permitting entities to "collect a $10 fee for each on-site wastewater treatment permit application processed." The bill also required the Texas Commission on Environmental Quality (TCEQ, the state regulatory agency) to "support applied research and demonstration projects" related to use of on-site wastewater treatment technology and systems. This was the beginning of a sustained funding process for supporting a state level effort in Texas that advanced use of aerobic treatment technologies in the state.

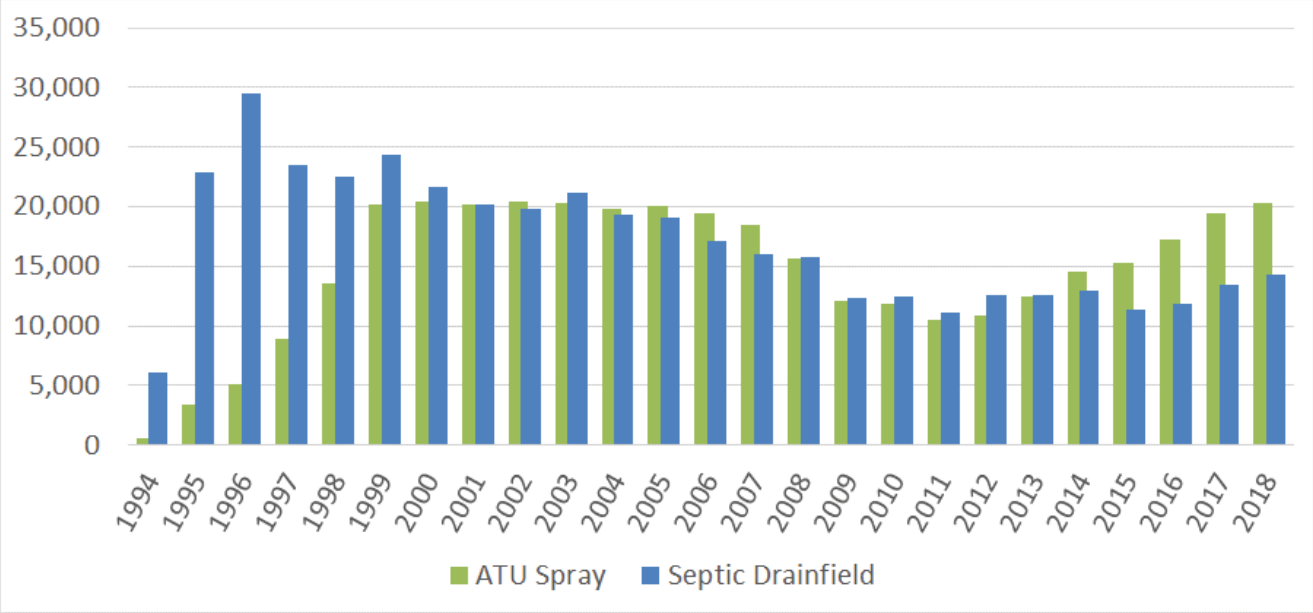

Figure 2: Trend showing increasing use of ATU Spray in Texas since mid-1990s. *Y-axis shows the number of permits issued in Texas and X-axis is the Year.*

1990 Census data indicated approximately 1.3 million on-site wastewater systems being used in Texas, majority of which were conventional septic tank drain-field systems. Since 1995, TCEQ started reporting the number of permits issued for installation of On-Site Sewage Facilities (OSSFs) based on the information they collected from the local permitting entities. Thus, there is a data-gap for about four years, from 1991 to 1994 for which we do not have accurate count of OSSF in Texas. Note that in Texas there are 254 counties and there are more than 350 local permitting entities. While the fee charged to a private home/business owner varies by local permitting entity, each entity sends $10 per permit processed to TCEQ on a monthly or quarterly basis.

TCEQ regulatory guidance document explains in detail what is the $10 fee is and how is the fee assessed and collected (TCEQ RG-078, 2003). The research grant program was run by the On-Site Wastewater Treatment Research Council, members of which were appointed by the Governor. Under the sunset policy, every ten to twenty years all the laws are required to be renewed in Texas and if not renewed they automatically sunset, i.e., expire. The Health and Safety Code that authorized formation of the Research Council sunset in 2011 and was not renewed, thus ending the funding for research programs, but not ending the collection of $10 fees by TCEQ. Our dataset indicates that approximately 600,000 permits were issued during the twenty years, generating about $6M research funds, which was funded more than 30 research projects in 20 years. One of the funded projects helped to establish an OSSF training and demonstration center on what is now called the RELLIS Campus in Bryan, TX (Fig. 3).

Even though, the funding for research program ended in Fall of 2011, the $10 fee collection from localities remained in effect, which caused for concerns among both the private and public sector groups interested in research based information to advance the field of on-site wastewater treatment. Texas has a strong wastewater industry association called TOWA (Texas Onsite Wastewater Association, www.txowa.org) that championed efforts to renew the research funding by lobbying state legislators and working with state academic institutions like Texas A&M, Baylor, Texas Tech, and a few others who had been funded during the 1992 to 2012 period. With the help from public and private entities, House Bill 2771 was proposed and passed in the 85th Legislative Session that renewed the requirement for the state regulatory agency to award competitive grants and support applied research and demonstration projects regarding on-site wastewater treatment technology and systems for improving the quality of wastewater treatment and reducing the cost of providing wastewater treatment to

consumers (Texas Legislative Online, House Bill 2771, 2017). Starting September 1, 2017 TCEQ reinstate the account to collect the $10 per permit fee and allocate most of the funds to support the research projects. Note that the State Health and Safety Code allows the state agency to charge "administrative and facility support costs" to the fees collected, thus a portion of $10 is kept by the agency, the exact amount is not known.

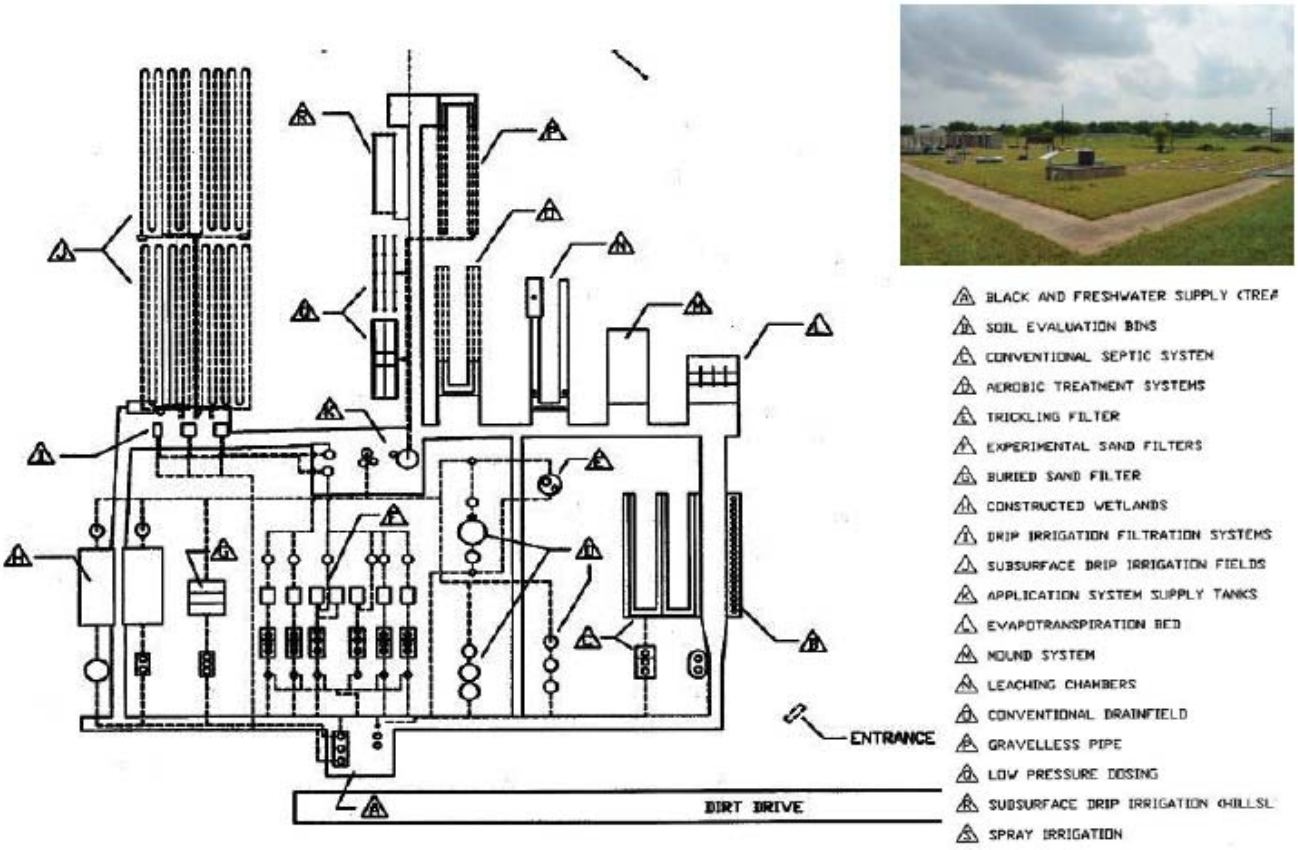

Figure 3: TAMU OSSF Training and Demonstration Center located on the RELLIS Campus in Bryan, TX.

TAMU's OSSF center was first inaugurated in 1995 and remained active for 15 years under Dr. Lesiker's leadership in conducting research and demonstration projects funded through the first round of $10 research fee program. For about five years between 2010 and 2015, the center was not used or maintained due to lack of proper funding. In Fall of 2015, with the supports from public and private sectors, the center was refurbished and re-inaugurated and now used for education, research, demonstration, and training activities related to on-site wastewater treatment and reuse technologies. To develop a sustained funding for the center, a fee structure was implemented for the use of the center in education, research, training, and demonstration. The fee structure is posted on the Texas A&M AgriLife OSSF website www.ossf.tamu.edu along with other information. Since 2017, the center has also been used for a five-week Research and Extension Experience for Undergraduate (REEU) project funded by National Institute for Food and Agriculture (NIFA), which offers hands-on research and extension activities related to reuse water quality (Jantrania and Munster, 2017). Thus, with the research funding support from both state and federal agencies, and with the fees collected from education and training activities, AgriLife is confident in its ability to operate the center on a sustained long-term basis and meet the demands for science-based information to advance onsite industry.

With the passage of the HB 2771 in the 85th Legislative Session, the $10 research fee funding program was reestablished by TCEQ starting Fall of 2017 and program is now called Texas On-Site Sewage Facility Grant Program (TOGP). Visit the TCEQ website https://www.tceq.texas.gov/permitting/ossf/ossf-grant-program for current information on this program. The On-Site Wastewater Research Council is now replaced by a six-member committee that makes the decision on research topics to be funded under the new $10 fee program. Early 2019 TOGP issued the first Request for Grant Applications (RFGA) for addressing four research topics: black water non-potable reuse, implementation of low pressure dose systems with various configurations, dosing versus non-dosing in aerobic treatment unit (ATU) designs, and adequacy of current ATU designs with higher strength wastewater. Texas A&M AgriLife submitted three proposals to address all four research topics logically grouped (wastewater reuse, low pressure dosing, ATU), and was awarded three research contracts in Fall 2019. Paper Number 2000715 gives details on these programs.

CONCLUSIONS

On-site wastewater systems are recognized as a permanent part of the nation's wastewater infrastructure, treating 20% to 25% of wastewater flow daily. Advancing the field of on-site wastewater treatment and reuse requires a strong and sustained funding for research and demonstration at a state, regional, and national level. In the absence of any formalized national and regional level funding programs for onsite systems, a state level funding program appears to be the one with the potential to make a significant impact for supporting sustained research efforts for advancement of onsite wastewater industry. Onsite wastewater treatment technologies have come a long-way from a conventional septic tank and drain-field to aerobic treatment, spray-field, and even membrane filtration for producing reuse water quality effluent onsite.

Texas offers a model framework for establishing a sustained long-term research funding mechanism using a small portion of permitting fee, such as $10 per permit application. Through this approach, Texas has demonstrated the possibilities for supporting research programs for two decades during the first round and restarting the funding after a short break. However, the main challenge with this model is the uncertainty associated with the number of permits issued every year, which appears to vary as much as +/- 30% in Texas from 1995 to 2018 period. Onsite systems permitting is typically done at a local level, thus keeping track of the number of permits issued on a regular basis is challenging. In Texas, $10 per permit fee collection by the state agency has allowed the state to track the number of permits as well as the type of onsite wastewater systems for which the permit was issued. Both data points are important in determining the research needs and supporting the research programs. As the demand for water increases, so is the interests in reusing wastewater for beneficial purpose. To advance the field of onsite wastewater from treatment to reuse, a sustained long-term research funding is needed. Texas has enjoyed some long-term success thanks to the that funding support which comes from the $10 per permit fee program.

We are interested in hearing from you the reader of this paper about the research funding approaches your state has taken and how that compares with the Texas Model. Please contact us via email with your input so that together we can make research funding for advancing onsite industry stronger and sustainable at the national level.

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