I. Principal Investigator: Dr. Sergio M. Abit Jr.

II. Project Title: The Oklahoma Onsite Wastewater Treatment Professional Education Program

III. Descriptors: Onsite Wastewater, Septic Systems

IV. Start Date: 04/1/2015

V. End Date: Extended to March 31, 2017

VI. Problem:

Oklahoma is among states that extensively use onsite wastewater treatment systems (OWTS) or septic systems. In fact, over the past four years, 56 % of new single-detached houses built in the state had OWTS. In Oklahoma, onsite septic systems have to treat an estimated 180 million gallons of wastewater daily. Human health and environmental problems could happen if this sizeable amount of domestic wastewater is improperly treated and dispersed.

Septic system-related problems usually stem from one or a combination of the following reasons: 1) the inappropriate system is installed in an area, 2) the system is improperly installed and 3) the system is misused and improperly maintained. These reasons suggest that various stakeholders play a role in making sure that installed systems function effectively and thus the need to educate and/or train and re-train homeowners, installers, inspectors and government regulators, home builders, realtors, maintenance providers, *etc*. about septic systems.

Despite the widespread utilization of OWTS in our state, Oklahoma is unfortunately among the few states in the Union that does not have a comprehensive lineup of courses or training/demonstration modules related to OWTS. The lack of an OWTS professional education program in Oklahoma has resulted in shortfalls in addressing critical training and re-training needs of OWTS practitioners, regulators, and other stakeholders in the state.

VII. Objectives:

The extension program is designed to address the training and professional continuing education needs of the OWTS industry in the State of Oklahoma.

Specific Objectives:

Specific project objectives are:

1. To organize an inaugural Oklahoma Onsite Wastewater Conference.
2. To develop and pilot-test an onsite wastewater training curriculum.
3. To establish an Onsite Wastewater Training and Demonstration Facility in Stillwater, OK.

VIII. Methodology:

Project 1: Oklahoma Onsite Wastewater Conference

1. A Conference Organizing Committee was organized. This was composed of representatives from the Oklahoma Cooperative Extension Service (OCES), Oklahoma Department of Environmental Quality (ODEQ), Indian Health Services (IHS) and The Cherokee Nation.
2. The committee deliberated and determined the conference theme, session topics and keynote speaker/speakers, and planned-out the program of the event.
3. Invitations to speakers, sponsors and exhibitors were prepared and sent.
4. Applications for Continuing Education Units (CEUs) were filed with the Oklahoma State Department of Health (OSDH) and the ODEQ.
5. Dissemination of conference information were done by email, mailed-out invitations and online –via the OSU non-agricultural soils website, the Oklahoma Water Resources Center Website, the Dept. of Plant and Soil Sciences websites. Information was also relayed to certified installers and soil profilers through the various DEQ-ECLS offices.
6. A survey among participants was performed to gain feedback about the inaugural conference. The collected feedback was considered during the planning of the 2nd conference.

Project 2: Development and Testing of an Onsite Wastewater Training Curriculum:

1. Curriculum mapping was performed. This was participated by representatives from OCES, ODEQ, Oklahoma Certified Installers Association (OCIA), IHS and the Cherokee Nation. During the curriculum mapping exercise, participants were able to identify training/course gaps and come up a list of priority courses/modules that need to be developed.
2. Course materials were mainly developed by the OCES State Specialists. Some of the materials were developed in collaboration with ODEQ personnel or members of the OCIA. Course materials prepared were reviewed by collaborators for editing and to gather comments and suggestions. Lecture slides and notes or extension factsheets for each course were prepared.
3. Course materials (mainly the slides) developed were tested by delivering (via extension lecture) to targeted groups of stakeholders. Based on feedback of the participants, the materials were improved.
4. When applicable, recorded modules of certain courses were prepared. Efforts to develop recorded modules will continue to be pursued beyond the effective timeline of this project.

Project 3: Onsite Wastewater Training and Demonstration Facility

1. A consultation meeting attended by representatives from the OCES, ODEQ and OCIA was organized to gather ideas and suggestion concerning materials, equipment or system mock-ups to install at the facility.
2. Deliberations on the targeted use, the equipment to be installed and layout were also performed.
3. Approval to use a prime location at the OSU Botanic garden for the purpose of establishing the training/demonstration facility was secured.
4. Efforts were done to drum-up support from the manufacturers and installers.
5. A local installer was tapped to perform the earth-working and installation of various systems. The rest of the installation and construction activities were performed by the State Specialist, graduate students and student assistants. Representatives of companies who donated equipment were also present during the installation.

Add-On Project: Production of water-related videos for use in outreach activities

1. This was the focus of the latest extension that ended on March 31, 2017.
2. The subject of the videos were identified in a deliberation-meeting attended by the Senior Producer of the DASNR Media Productions, the Director of the Oklahoma Water Resources Center and the OCES State Specialist for Onsite Wastewater Treatment Systems.
3. DASNR Media Productions of the Ag. Communications Services was tasked at producing the videos.
4. Links to the videos produced are be hosted on the Water Center Website. They will also be used in various outreach activities of OCES and the Oklahoma Water Resources Center.

IX. Executed Activities, Output and Feedback

Project 1: Oklahoma Onsite Wastewater Conference

Conference Details:

Inaugural Oklahoma Onsite Wastewater Conference

October 9, 2015 at the Wes Watkins Center, Stillwater, OK.

Theme: *Forging Collaborations*

Sessions:

- Three Plenary Lectures
- 12 Break-out Sessions

Exhibitors/Sponsors:

- Eight Exhibitors
- Three Sponsors

Total number of participants: 148

Judging from the targets (see below) we set for this conference, the conference was a big success.

Target 1: Gather participants from various stakeholder groups.

- 148 participants attended the conference. See distribution in Figure 1.
- The participants represented the various major players stakeholders in the OWTS industry in Oklahoma including:
  - Regulators
  - Certified Installers
  - Soil profilers and engineers
  - Representatives of the Native American Nations
  - Sanitarians
  - Extension Educators
  - System suppliers and manufacturers

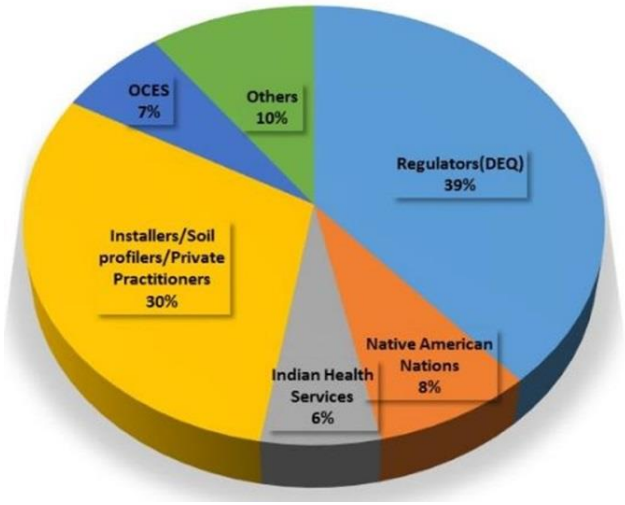

Figure 1. Distribution of conference participants.

Target 2: Provide information that caters to the needs of various stakeholders.

- The plenary lectures talked about ***Soil-based Decisions*** and ***Alternative Systems***. These are topics that are timely and relevant to all stakeholders.
- Breakout session topics targeted the issues relevant to various stakeholders.
    - Examples:
        - Basic Rules about septic system
        - Installer Safety
        - Inspection of septic systems
        - System Maintenance
        - Alternative Systems

Target 3: Encourage conversation of various stakeholders

- Ample time and opportunities were given to participants to have conversations and visit with one another regarding common issues

Target 4: Earn some residual income as a seed money for a succeeding conference

- Enough conference income was generated to pay for travel of invited speakers and for the conference venue for a 2nd Oklahoma Onsite Wastewater Conference.

Target 5: Provide Continuing Education Units (CEUs) for licensed soil profilers, sanitarians and installers:

- The conference counts for 4 hours of CEUs for professionals who have ODEQ and OSHD licenses or certifications.

Target 6: Organize a conference that is worth the time invested by the participants in attending the conference.

- Survey results indicate that the conference was "worth the time" of participants (see Table 1)

Table 1. Feedback from participants of the inaugural conference in 2015 (from survey right after the conference).

Survey Statement	Average Rating*
The plenary lectures were very informative.	4.5
The topics in the break-out sessions were relevant and useful.	4.3
This was a good venue for the conference	4.5
I liked the refreshments	4.5
I liked our lunch.	4.6
The conference was well-organized	4.7
The conference was worth my time	4.6

** 1- strongly disagree; 5-strongly agree; n= 82*

We held the 2nd Oklahoma Onsite Wastewater Conference November 10, 2016 at the Payne County Expo Center.

- 167 participants attended the 2nd conference. ***This translated to a ~13% increase in participants compared to the previous year***.
- Acting upon the suggestions of participants of the 2015 conference, we changed the venue and we slightly changed the format of the conference.
- The conference was approved for 4 hours of continuing education credits for sanitarians, environmental specialists, soil profilers and certified installers.
- A total of 11 exhibitors and/or sponsors joined this year's conference. Four new exhibitors attended the conference.
- The conference was well received by the participants as shown in Table 2.

Table 2. Feedback from participants of the inaugural conference in 2016 (from survey right after the conference).

Survey Statement	Average Rating*
The plenary lectures were very informative.	4.6
The topics in the break-out sessions were relevant and useful.	4.4
This was a good venue for the conference	4.3
I liked the refreshments	4.6
I liked our lunch.	4.7
The conference was well-organized	4.8
The conference was worth my time	4.6

- ** 1- strongly disagree; 5-strongly agree; n= 84*

Update:

The 3rd Annual Oklahoma Onsite Wastewater Conference will be held at the Wes Watkins Conference Center in Stillwater, Oklahoma on December 19, 2017. We are projecting a 50% increase in attendance (increase from 167 in 2016 to 250 in 2017).

Project 2: Development and Pilot-testing of an Onsite Wastewater Training Curriculum

The curriculum mapping process allowed us to identify courses/modules that need to be updated/revised or developed.

The curriculum mapping also enabled us to rank the needed courses according to priority (for course development or update) depending upon the following: the immediate need for the course, the availability of expertise to develop and deliver the course, the availability of the equipment/set-up needed in the effective delivery of the course.

Courses identified as top priority (below) were the main focus in this project.

Top priority for update/development

1. Septic System Rules and Ethical Standards –for regulators
2. Basic Septic System Rules that everybody should know about
3. Soils Module for Soil Profilers and Regulators
4. Soils Basics for Installers
5. How Aerobic Treatment Systems Work?
6. Basics about septic systems for:
    a. Certified Installers, Soil Profilers and Regulators
    b. Homeowners and Extension Educators
    c. Realtors
    d. Home builders
7. Basics of Septic System Maintenance for:
    a. Homeowners
    b. Extension Educators
8. System Inspection
9. Installer Safety

Second priority for update/development:

1. Conventional and ET/A system course for installers (update)
2. Pressure Dosing System course for installers (update)
3. Aerobic Treatment System course for installers (update)
4. Soil Texture Determination for Soil Profilers (update)
5. Alternative Systems and advanced designs (new)
6. Components, Electronics and Plumbing (new)
7. Engineering OWTS course (new)

Table 3: Summary of courses or modules identified and outputs developed.

Course/Module	Duration	New or update	Slides			Notes/slides (N) or Factsheet (FS) or Flier (F)	Video
			Prepared	Tested	Revised		
Septic System Rules for Regulators	1.5 hour	update	✓	✓	✓	✓(N)	
Ethical Standards	30 mins	new	✓	✓	✓	✓ (N)	
Basic Septic System Rules that everybody should know about	35 mins	new	✓	✓	✓	FS being developed	
Soils Module for Soil Profilers and Regulators	5 hours	update	✓	✓	✓	✓(N)	
Soils Basics for Installers (contaminant fates in soils)	45 min	new	✓	✓	✓	✓(N)	✓
How aerobic treatment systems work?	45 min	update	✓	✓	✓	✓(FS)	✓
Basic septic systems approved in Oklahoma	30 min	new	✓	✓	✓	✓ (FS)	
Septic System Basics for Homeowners and Extension Educators	35 min	new	✓	✓	✓	✓ (FS)	✓
Septic System Basics for Realtors	35 min	new	✓	✓	✓	✓ (F)	
Septic System Basics for Homebuilders	35 min	new	✓	✓	✓	✓ (F)	
Keeping your septic system in working order: for Homeowners and Extension Educators	35 min	new	✓	✓	✓	✓ (FS)	✓
System Inspection	1 hour	new	✓	12/19/17		FS being developed	
Installer Safety	45 min	new	✓	✓	✓	(N)	

Project 3: Onsite Wastewater Training and Demonstration Facility

The training and demonstration facility will be used in educational efforts designed to:

- promote awareness about septic systems to the general public
- educate students and youth groups about onsite wastewater treatment systems (*what they are, how they work, and how are they maintaine*d)
- be used in courses related to certification, training and re-training of various stakeholders in the onsite septic system industry

Updates:

- The formal opening/ribbon-cutting event was held September 29, 2016. The opening program/ceremony was attended by people from the DEQ, OCIA, IHS and OSU.
- The following are installed at the training/demonstration facility:
    - Above-ground mock-ups of the trash tank, dispersal lines and trenches of a Conventional System and a Low Pressure Dosing System
    - Above-ground mock-up of a three-chamber Aerobic Treatment System connected to a spray dispersal system and a subsurface drip system.
    - Sample of a chamber system (Infiltrator®)
    - Above-ground reconstruction of the cross section of subsurface trench of a conventional system, a low pressure dosing system, an evapotranspiration/absorption (ET/A) system, and a chamber system.
- Since the construction was completed many people have been given guided tours at the site. These include OSU students, DEQ personnel and certified installers.
- 4-H members will be given a tour at the facility this summer.

Add-On Project: Production of water-related videos for use in outreach activities

Videos produced about water and water reuse will be used in various outreach activities of the Oklahoma Cooperative Extension Service and the Oklahoma Water Center.

Updates:

- A short video about the Onsite Wastewater Extension Program and the Oklahoma Onsite Wastewater Training Facility has been produced
- Production of an irrigation-related video is currently underway. Videos will be available at http://water.okstate.edu/library/videos.
- Other videos may cover the following topics:
    - Laws related to water reuse
    - Produced water and remediation of produced water
    - Municipal water reuse
    - Intro to wastewater/History of water conservation-related efforts in Oklahoma

X. Appendix

Appendix Figure 1. Pictures taken at the Inaugural Oklahoma Onsite Wastewater Conference at the Wes Watkins Center on October 9, 2015. Dr. David Lindbo giving the keynote talk (A); participants at the exhibits (B); breakout session about aerobic treatment systems (C) and the panel discussion (D).

Appendix Figure 2. Pictures taken at the 2nd Oklahoma Onsite Wastewater Conference at the Payne County Expo Center on November 10, 2016. Photo of the participants (A); Dr. Abit presiding the opening session (B); Dr. Anish Jantrania giving the keynote talk (C) participants with exhibitors (D).

Appendix Figure 3. Dr. Abit "testing" the materials developed for the module "Soils Basics for Installers" (A) and the "Installer Safety" module (B) to targeted audiences.

Appendix Figure 4. Map view of the location of the training/demonstration facility.

Appendix Figure 5. Pictures taken during the installation/construction of the Oklahoma Onsite Wastewater Training and Demonstration Facility. Initial layout of the trenches (A); graduate students laying-down the gravel (B); Installation of the tank donated by Clearstream (C) installation of the plastic composite tank donated by Infiltrator (D).

Appendix Figure 6. Pictures taken at the Oklahoma Onsite Wastewater Training and Demonstration Facility. Ribbon-cutting to officially open the facility (A); picture of the various systems (B); Above-ground representation and cross section of various types of trenches (C) Dr. Abit giving a guided tour of the demonstration facility (D).