Board:
Allen Amsler, *Chairman*
Ann B. Kirol, DDS, *Secretary*
R. Kenyon Wells
Charles M. Joye II, P.E.
L. Clarence Batts, Jr.
David W. Gillespie, MD

South Carolina Board of Health and Environmental Control

Agenda
December 8, 2016

Call to Order – 10:00 a.m., Board Room (#3420)
South Carolina Department of Health and Environmental Control
2600 Bull Street, Columbia, S.C.

1. Minutes of November 10, 2016, meeting

2. Administrative Orders and Consent Orders issued by Environmental Affairs

3. Administrative Orders, Consent Orders and Sanction Letters issued by Health Regulation

4. Proposed Amendment of Regulation 61-16, Minimum Standards for Licensing Hospitals and Institutional General Infirmaries, Legislative Review is required

5. Public Hearing and Request for Final Approval - Proposed Amendments of Regulation 61-92, Underground Storage Tank Control Regulations, State Register Document No. 4706, Legislative Review is required

6. Public Hearing and Request for Final Approval - Proposed Amendment of Regulation 61-33, Drycleaning Facility Restoration Regulations, State Register Document No. 4705, Legislative Review is required

7. Public Hearing and Request for Final Approval - Proposed Amendment of Regulation 61-22, The Evaluation of School Employees for Tuberculosis, State Register Document No. 4704, Legislative Review is required

8. Placement of Furanyl Fentanyl into Schedule I for Controlled Substances

9. Staff Recommendation - Wave Dissipation System

10. Agency Affairs

Executive Session (if needed)

Adjournment

Note: The next scheduled meeting of the S.C. Board of Health and Environmental Control will be Thursday, January 5, 2017.

SUMMARY SHEET
BOARD OF HEALTH AND ENVIRONMENTAL CONTROL
December 8, 2016

_____ ACTION/DECISION

__X__ INFORMATION

I. **TITLE:** Administrative and Consent Orders issued by Environmental Affairs.

II. **SUBJECT:** Administrative and Consent Orders issued by Environmental Quality Control (EQC) and Ocean and Coastal Resource Management (OCRM) during the period October 1, 2016 – October 31, 2016.

III. **FACTS:** For the period of October 1, 2016, through October 31, 2016, Environmental Affairs issued sixty-three (63) Consent Orders with total assessed civil penalties in the amount of $120,858.00.

Bureau and Program Area	Administrative Orders	Assessed Penalties	Consent Orders	Assessed Penalties
Land and Waste Management				
UST Program	0	0	4	$6000.00
Aboveground Tanks	0	0	0	0
Infectious Waste	0	0	1	$6,900.00
Hazardous Waste	0	0	0	0
Solid Waste	0	0	1	$2,700.00
Mining	0	0	1	$2,000.00
SUBTOTAL	0	0	7	$17,600.00
Water				
Recreational Water	0	0	29	$23,305.00
Drinking Water	0	0	3	$4,400.00
Water Pollution	0	0	2	$5,853.00
SUBTOTAL	0	0	34	$33,558.00
Air Quality				
SUBTOTAL	0	0	3	$51,500.00
Environmental Health Services				
SUBTOTAL	0	0	19	$18,200.00
OCRM				
SUBTOTAL	0	0	0	0
TOTAL	**0**	**0**	**63**	**$120,858.00**

Submitted by:

Myra C. Reece
Director of Environmental Affairs

ENVIRONMENTAL AFFAIRS ENFORCEMENT REPORT
BOARD OF HEALTH AND ENVIRONMENTAL CONTROL
December 8, 2016

BUREAU OF LAND AND WASTE MANAGEMENT

Underground Storage Tank Enforcement

1) Order Type and Number: Consent Order 16-0227-UST
Order Date: October 25, 2016
Individual/Entity: **Penske Truck Leasing Co., LP**
Facility: Penske Truck Leasing Co., LP
Location: 520 Frampton Street
Anderson, SC
Mailing Address: Route 10 Green Hills
P.O. Box 7635
Reading, Pennsylvania 19603
County: Anderson
*Previous Orders: None
Permit/ID Number: 00386
Violations Cited: The State Underground Petroleum Environmental Response Bank Act of 1988 (SUPERB Act), S.C. code Ann. § 44-2-10 *et seq*. (2002 and Supp. 2014); and South Carolina Underground Storage Tank Control Regulation, 7 S.C. Code Ann. Regs. 61-92.280.20(c)(1)(ii) (Supp 2012).

Summary: Penske Truck Leasing Co., LP (Individual/Entity) owns and operates underground storage tanks (USTs) located in Anderson, South Carolina. On August 16, 2016, the Department conducted a routine inspection. The Individual/Entity has violated the South Carolina Underground Storage Tank Control Regulation as follows: failed to maintain overfill prevention devices, in that, a stick was in the drop tube shut off valve at the time of the inspection.

Action: The Individual/Entity is required to pay a civil penalty in the amount of one thousand dollars **($1,000.00)**. All violations were corrected prior to the issuance of the Order.

2) Order Type and Number: Consent Order 16-0221-UST
Order Date: October 18, 2016
Individual/Entity: **DR Oil, LLC**
Facility: DR Oil, LLC
Location: 201 South Jeffries Boulevard
Walterboro, SC 29488
Mailing Address: 305 Moore Street
Walterboro, SC 29488

County: Colleton
Previous Orders: None
Permit/ID Number: 02568
Violations Cited: State Underground Petroleum Environmental Response Bank Act of 1988 (SUPERB Act) (Supp. 2014) and the South Carolina Underground Storage Tank Control Regulation 61-92.280.20(c)(1)(ii) (2012).

Summary: DR Oil, LLC (Individual/Entity) owns and operates underground storage tanks (USTs) in Colleton County, South Carolina. On August 8, 2016, a routine compliance inspection was conducted. The Individual/Entity has violated the South Carolina Underground Storage Tank Control Regulations as follows: failed to equip an underground storage tank system with overfill protection.

Action: The Individual/Entity is required to pay a civil penalty in the amount of three thousand dollars **($3,000.00)**. All violations were corrected prior to the issuance of the Order.

3) Order Type and Number: Consent Order 16-0149-UST
Order Date: October 11, 2016
Individual/Entity: **Bob Brandi Stations, Inc.**
Facility: Pitt Stop 10
Location: 5901 Monticello Road
Columbia, SC 29204
Mailing Address: 279 Cedarcrest Drive
Lexington, SC 29072
County: Richland
Previous Orders: None
Permit/ID Number: 09742
Violations Cited: The State Underground Petroleum Environmental Response Bank Act of 1988 (SUPERB Act), S.C. Code Ann. § 44-2-10 *et seq.* (2002 and Supp. 2014); and the S.C. Underground Storage Tank Control Regulations, 7 S.C. Code Ann. Regs. 61-92, Section 280.20(c)(1)(ii).

Summary: Bob Brandi Stations, Inc. (Individual/Entity) owns and operates underground storage tanks (USTs) located in Columbia, South Carolina. On June 8, 2016, the Department conducted an inspection. The Individual/Entity has violated the SUPERB Act and the S.C. Underground Storage Tank Control Regulations as follows: failed to equip a permitted UST with spill and overfill prevention equipment, in that the kerosene UST did not have either a drop tube shutoff (DTSO) valve, ball float valve or high level audible alarm.

Action: The Individual/Entity is required to: pay a civil penalty in the amount of one thousand dollars **($1,000.00)**. All violations were corrected prior to the issuance of the Order.

4) Order Type and Number: Consent Order 16-0352-UST
Order Date: October 25, 2016
Individual/Entity: **Spinx Co Inc.**

Facility: Spinx 260
Location: 426 North Highway 52
Moncks Corner, SC 29461
Mailing Address: P.O. Box 8624
Greenville, SC 29604
County: Berkeley
Previous Orders: None
Permit/ID Number: 10425
Violations Cited: The State Underground Petroleum Environmental Response Bank Act of 1988 (SUPERB Act), S.C. Code Ann. § 44-2-10 *et seq.* (2002 and Supp. 2014); and the S.C. Underground Storage Tank Control Regulations, 7 S.C. Code Ann. Regs. 61-92, Section 280.20(c)(1)(ii).

Summary: Spinx Co Inc. (Individual/Entity) owns and operates underground storage tanks (USTs) located in Moncks Corner, South Carolina. On September 12, 2016, the Department conducted an inspection. The Individual/Entity has violated the SUPERB Act and the S.C. Underground Storage Tank Control Regulations as follows: failed to equip a permitted UST with spill and overfill prevention equipment, in that a stick was discovered in the Gasoline RUL UST, impeding operation of the overfill device.

Action: The Individual/Entity is required to: pay a civil penalty in the amount of one thousand dollars **($1,000.00)**. All violations were corrected prior to the issuance of the Order.

Infectious Waste Enforcement

5) Order Type and Number: Consent Order 16-06-IW
Order Date: October 25, 2016
Individual/Entity: **Palmetto Health**
Facility: Palmetto Health Baptist
Location: 1330 Taylor Street
Columbia, SC 29201
Mailing Address: Taylor at Marion Street
Columbia, SC 29220
County: Richland
Previous Orders: None
Permit/ID Number: SC40-0219G
Violations Cited: The S.C. Infectious Waste Management Act, S.C. Code Ann. §44-93-30(2002); and the South Carolina Infectious Waste Management Regulations, 8 S.C. Code Ann. Regs. 61-105 (Supp. 2010).

Summary: Palmetto Health (Individual/Entity) provides healthcare services at Palmetto Health Baptist located in Columbia, South Carolina, and is a registered generator of infectious waste. On April 28, 2016, the Department conducted an inspection of the facility. The Individual/Entity has violated the S.C. Infectious Waste Management Regulations as follows: failed to ensure that containers of infectious waste offered for transport offsite were labeled with the Department issued registration number; failed to ensure that containers of

infectious waste offered for transport offsite were labeled with the date the container was placed in storage or sent offsite, if not stored; failed to place, store, and maintain infectious waste before and during transport in a rigid or semi-rigid, leak resistant container which is impervious to moisture; failed to ensure that containers of infectious waste are sealed and closed tightly and securely when full by weight to prevent any discharge of the contents; failed to store infectious waste in containers that are appropriate for the type and quantity of waste and must be compatible with selected storage, transportation, and treatment processes; failed to store infectious waste in a manner and location which affords protection from animals, vectors, weather conditions, theft, vandalism and which minimizes exposure to the public; failed to label storage areas with the universal biohazard symbol sign; and, failed to disinfect any material or surface which came into contact with infectious waste prior to reuse.

Action: The Individual/Entity is required to: now and in the future, ensure compliance with the SC Infectious Waste Management Act and Regulations; and, pay a civil penalty in the amount of six thousand, nine hundred dollars (**$6,900.00**).

Solid Waste Enforcement

6) Order Type and Number: Consent Order 16-19-SW
Order Date: October 11, 2016
Individual/Entity: **Williamsburg County**
Facility: Williamsburg County Class Two Landfill
Location: 564 Old Gapway Road
Salters, SC
Mailing Address: P.O. Box 330
Kingstree, SC 29556
County: Williamsburg
Previous Orders: None
Permit/ID Number: 451001-1201
Violations Cited: South Carolina Solid Waste Policy and Management Act (2002), and, Solid Waste Management: Solid Waste Landfills and Structural Fill Regulation 61-107.19 (Supp. 2012).

Summary: Williamsburg County (Individual/Entity) operates a Class Two landfill located in Williamsburg County, South Carolina. Between April 19, 2016, and June 27, 2016, the Department conducted several routine inspections, observed and recorded the back working face had not been covered; the monitoring well pad was cracked; and the main working face had not been covered. The Individual/Entity has violated the South Carolina Solid Waste Policy and Management Act and the Solid Waste Management: Landfills and Structural Fill Regulation as follows: failed to cover all exposed waste material at least every 30 days with no less than six (6) inches of soil or other suitable material; and, failed to maintain monitoring well devices so that they perform to design specifications throughout the life of the monitoring program.

Action: The Individual/Entity is required to: ensure that the required six (6) inches of earthen material is placed over exposed waste at least every thirty (30) days; ensure that

monitoring wells are maintained; and, pay a civil penalty in the amount of two thousand, seven hundred dollars **($2,700,00)**.

Mining Enforcement

7) Order Type and Number: Consent Order 16-46-MSWM
Order Date: October 17, 2016
Individual/Entity: **County Line Investors, LLC**
Facility: Poplar Grove Mine
Location: County Line Road
Summerville, SC
Mailing Address: 2734 Perimeter Parkway, Bldg 100, Ste 370
Augusta, Georgia 30909
County: Dorchester
Previous Orders: None
Permit/ID Number: I-001678
Violations Cited: South Carolina Mining Act (2008 and Supp. 2015), and, South Carolina Mining Regulation (2012).

Summary: County Line Investors, LLC (Individual/Entity) operates a mine located in Summerville, South Carolina. On April 9, 2015, January 12, 2016, and May 12, 2016, the Department conducted compliance inspections of the Mine and observed and recorded on the inspection forms that the area of active mining was not included in the 51.2 acres to be affected or in the reclamation plan, but was in an area marked as Future Reserves. The Individual/Entity has violated the South Carolina Mining Act and the South Carolina Mining Regulation as follows: mined in an area designated as Future Reserves without modifying the Permit and Reclamation Plan to increase the affected acreage.

Action: The Individual/Entity is required to: cease and desist mining activities, other than reclamation and stormwater controls, in areas marked for Future Reserves until such time as modification has been approved by the Department; and, pay a civil penalty in the amount of two thousand dollars **($2,000.00)**.

BUREAU OF WATER

Recreational Water Enforcement

8) Order Type and Number: Consent Order 16-125-RW
Order Date: October 3, 2016
Individual/Entity: **Traditions at Old Carolina Homeowners' Association, Inc.**
Facility: Traditions at Old Carolina
Location: 4 Bridle Path Lane
Bluffton, SC 29910
Mailing Address: 12 Bridle Path Lane

	Bluffton, SC 29910
County:	Beaufort
Previous Orders:	None
Permit/ID Number:	07-1019B
Violations Cited:	S.C. Code Ann. Regs. 61-51(J)

Summary: Traditions at Old Carolina Homeowners' Association, Inc. (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 9, 2016, and July 15, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the grab lines on the life ring were broken; the facility address was not posted at the emergency notification device; the facility could not produce current valid documentation of pool operator certification; and, the bound and numbered log book was not maintained on a daily basis.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**.

9)	Order Type and Number:	Consent Order 16-126-RW
	Order Date:	October 3, 2016
	Individual/Entity:	**Preserve at Port Royal, LLC**
	Facility:	Preserve at Port Royal
	Location:	1 Preserve Avenue West Port Royal, SC 29935
	Mailing Address:	Same
	County:	Beaufort
	Previous Orders:	None
	Permit/ID Number:	07-1053B
	Violations Cited:	S.C. Code Ann. Regs. 61-51(J)
	Project Manager:	**Elaina Perez**

Summary: Preserve at Port Royal, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 6, 2016, and July 6, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: a ladder was not tight and secure; the gate did not self-close and latch; the foot rinse shower was not operating properly; the chlorine level was not within the acceptable range of water quality standards; only one "Shallow Water – No Diving Allowed" sign was posted; only one "No Lifeguard On Duty – Swim At Your Own Risk" sign was posted; and, the bound and numbered log book was not maintained on a daily basis.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**. The civil penalty has been paid.

10)	Order Type and Number:	Consent Order 16-127-RW

Order Date:	October 3, 2016
Individual/Entity:	**Planters Station Owners Association, Inc.**
Facility:	Planters Station
Location:	4105 Mineral Springs Road Lexington, SC 29072
Mailing Address:	Same
County:	Lexington
Previous Orders:	15-054-RW ($340.00)
Permit/ID Number:	32-132-1
Violations Cited:	S.C. Code Ann. Regs. 61-51(J)

Summary: Planters Station Owners Association, Inc. (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On May 31, 2016, and June 9, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the drinking water fountain was not operating properly; the foot rinse shower was not operating properly; the life ring did not have a permanently attached rope; the pool rules sign was not completely filled out; the bound and numbered log book was not maintained on a daily basis; the pool floor was dirty; the step edge tile stripe was not within one inch of the step edge; the pool equipment room was not locked; the chlorine level was not within the acceptable range of water quality standards; the main drain grates were not visible due to cloudy water; and, the disinfection equipment was not operating properly.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of one thousand, three hundred sixty dollars **($1,360.00)**.

11)

Order Type and Number:	Consent Order 16-128-RW
Order Date:	October 4, 2016
Individual/Entity:	**SCG 1600, LLC**
Facility:	Driftwood Hotel
Location:	1600 North Ocean Boulevard Myrtle Beach, SC 29577
Mailing Address:	Same
County:	Horry
Previous Orders:	None
Permit/ID Number:	26-105-1 & 26-472-1
Violations Cited:	S.C. Code Ann. Regs. 61-51(J)

Summary: SCG 1600, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of two pools. On June 3, 2016, and July 1, 2016, the pools were inspected and violations were issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the life ring rope was deteriorated; there was no emergency notification device on the first inspection, and the facility address was not posted at the emergency notification device on the second inspection; one of the pool rules sign was not completely filled out, and one of the pool rules signs was obstructed; there were no “Shallow Water – No Diving Allowed” signs posted on the first inspection of one of the pools, and only one “Shallow Water – No Diving Allowed”

sign was posted on the second inspection of the same pool; the current pool operator of record information was not posted to the public; the bound and numbered log book was not available for review; a ladder was not tight and secure; the gate did not self-close and latch; the lifeline with floats was not properly attached to the pool wall, and the lifeline floats were not properly spaced; there was no foot rinse shower; and, the chlorine level was not within the acceptable range of water quality standards.

Action: The Individual/Entity is required to: submit to the Department for approval a change order request form detailing the procedure to fill in or remove the pools; complete the work in accordance with the approve change order request form; contact Department staff to verify that the work has been completed; and, pay a **stipulated penalty** in the amount of one thousand three hundred sixty dollars (**$1,360.00**) should any requirement of the Order not be met.

12)	Order Type and Number:	Consent Order 16-129-RW
	Order Date:	October 14, 2016
	Individual/Entity:	**Town of Quinby**
	Facility:	Quinby Recreation Complex
	Location:	600 Clark Road Quinby, SC 29506
	Mailing Address:	Same
	County:	Florence
	Previous Orders:	None
	Permit/ID Number:	21-015-1
	Violations Cited:	S.C. Code Ann. Regs. 61-51(J)

Summary: The Town of Quinby (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On July 11, 2016, and July 22, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: a ladder was missing bumpers; the pool floor and walls were dirty; there was algae on the pool walls; the deck was not clean; there was debris in the skimmer baskets; the drinking water fountain was not operating properly; the chlorine and pH levels were not within the acceptable range of water quality standards; the lifeline floats were not properly spaced; and, the bound and numbered log book was not maintained on a daily basis.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**. The civil penalty has been paid.

13)	Order Type and Number:	Consent Order 16-130-RW
	Order Date:	October 14, 2016
	Individual/Entity:	**Cobblestone Village Apartments, LLC**
	Facility:	Cobblestone Village Apartments
	Location:	900 Brookstone Way Summerville, SC 29483
	Mailing Address:	P.O. Box 9846

	Greensboro, NC 27429
County:	Dorchester
Previous Orders:	None
Permit/ID Number:	18-1040B
Violations Cited:	S.C. Code Ann. Regs. 61-51(J)

Summary: Cobblestone Village Apartments, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 10, 2016, and June 28, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: a handrail was not tight and secure; the gate did not self-close and latch; there was no toilet paper in the women's bathroom; non pool-related items were stored in the equipment room; the main drain grates were not visible; the life ring did not have a permanently attached rope; the emergency notification device was not operating; the facility address was not posted at the emergency notification device; and, the bound and numbered log book was not maintained on a daily basis.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**. The civil penalty has been paid. The Individual/Entity submitted a corrective action plan and corrected the deficiencies.

14)	Order Type and Number:	Consent Order 16-131-RW
	Order Date:	October 14, 2016
	Individual/Entity:	**Bolton Landing Apartments, LLC**
	Facility:	Bolton Landing Apartments
	Location:	1450 Bluewater Way
		Charleston, SC 29414
	Mailing Address:	Same
	County:	Charleston
	Previous Orders:	None
	Permit/ID Number:	10-1184B
	Violations Cited:	S.C. Code Ann. Regs. 61-51(J)

Summary: Bolton Landing Apartments, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On May 25, 2016, and July 7, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the gate did not self-close and latch; the drinking water fountain was not operating properly; the chlorine level was not within the acceptable range of water quality standards; the life ring did not have a permanently attached rope; the pool rules sign did not have all of the required rules and was not completely filled out; and, a ladder was missing bumpers.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**. The civil penalty has been paid. The Individual/Entity submitted a corrective action plan and corrected the deficiencies.

15) Order Type and Number: Consent Order 16-132-RW
Order Date: October 14, 2016
Individual/Entity: **River Landing Apartments, LLC**
Facility: River Landing
Location: 200 River Landing Boulevard
Myrtle Beach, SC 29579
Mailing Address: 201 North Elm Street
Greensboro, NC 27401
County: Horry
Previous Orders: None
Permit/ID Number: 26-1068B
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: River Landing Apartments, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 23, 2016, and July 5, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: ladders were missing bumpers; the chlorine and pH levels were not within the acceptable range of water quality standards; the cyanuric acid level was above the water quality standards acceptable limit; and, the facility address was not posted at the emergency notification device.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**. The civil penalty has been paid. The Individual/Entity submitted a corrective action plan and corrected the deficiencies.

16) Order Type and Number: Consent Order 16-133-RW
Order Date: October 14, 2016
Individual/Entity: **Remington Forest Condominium Owners Association, Inc.**
Facility: Remington Forest
Location: 1398 B Cassidy Court
Mt. Pleasant, SC 29464
Mailing Address: Same
County: Charleston
Previous Orders: None
Permit/ID Number: 10-1116B
Violations Cited: S.C. Code Ann. Regs. 61-51(J) & 61-51(K)(1)c

Summary: Remington Forest Condominium Owners Association, Inc. (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 27, 2016, and August 4, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain; and, on June 28, 2016, the pool was inspected and a violation was issued for re-opening prior to receiving Department approval. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the emergency notification device was not operational; the chlorine level was not within the

acceptable range of water quality standards; the cyanuric acid level was above the water quality standards acceptable limit; and, the pool was re-opened prior to receiving Department approval.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of seven hundred sixty-five dollars **($765.00)**.

17) Order Type and Number: Consent Order 16-134-RW
Order Date: October 14, 2016
Individual/Entity: **Canaan Pointe Limited Partnership**
Facility: Canaan Pointe Apartments
Location: 310 Canaan Road
Spartanburg, SC 29306
Mailing Address: Same
County: Spartanburg
Previous Orders: None
Permit/ID Number: 42-186-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Canaan Pointe Limited Partnership (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 15, 2016, and July 21, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: a ladder was missing bumpers; the gate did not self-close and latch; the chlorine level was not within the acceptable range of water quality standards; the emergency notification device was not operational, the pool rules sign was faded and was not completely filled out; and, the bound and numbered log book was not available for review.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**. The civil penalty has been paid. The Individual/Entity submitted a corrective action plan and corrected the deficiencies.

18) Order Type and Number: Consent Order 15-135-RW
Order Date: October 25, 2016
Individual/Entity: **Navkaar Investment Corporation, LLC**
Facility: Holiday Inn Express-Fort Mill
Location: 1655 Carolina Place Drive
Fort Mill, SC 29708
Mailing Address: 200 Chalfont Lane
Columbia, SC 29229
County: York
Previous Orders: None
Permit/ID Number: 46-1167B
Violations Cited: S.C. Code Ann. Regs. 61-51(B)(2)

Summary: Navkaar Investment Corporation, LLC (Individual/Entity) owns and is responsible for the proper construction of a pool. On August 30, 2016, the Individual/Entity contacted Department staff and requested a piping inspection for the pool. At that time, Department staff determined that a permit to construct had not been issued. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: failed to obtain a permit to construct from the Department prior to the commencement of the construction of the pool.

Action: The Individual/Entity is required to: pay a civil penalty in the amount of one hundred dollars **($100.00)**. On September 8, 2016, Department staff issued Recreational Waters Construction Permit No. 46-1167B for the construction of the pool.

19) Order Type and Number: Consent Order 16-136-RW
Order Date: October 14, 2016
Individual/Entity: **Southland Circle, LLC**
Facility: Americas Best Value Inn
Location: 125 Sloane Garden Road
Spartanburg, SC 29316
Mailing Address: Same
County: Spartanburg
Previous Orders: None
Permit/ID Number: 42-202-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Southland Circle, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 6, 2016, and July 13, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: there was debris in the skimmer baskets; there were non-pool related items stored in the equipment room; the chlorine level was not within the acceptable range of water quality standards; and, the bound and numbered log book was not maintained on a daily basis.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**.

20) Order Type and Number: Consent Order 16-137-RW
Order Date: October 24, 2016
Individual/Entity: **Mehta, LLC**
Facility: Quality Inn
Location: 499 Piney Grove Road
Columbia, SC 29210
Mailing Address: Same
County: Lexington
Previous Orders: None
Permit/ID Number: 32-128-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Mehta, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 15, 2016, and July 21, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: a section of the perimeter fencing had openings greater than four inches; the step edge tile stripe was not within one inch of the step edge; one of the "No Lifeguard On Duty – Swim At Your Own Risk" signs was damaged and one of the "No Lifeguard On Duty – Swim At Your Own Risk" signs did not have the correct sized lettering; the pool walls were dirty; the deck was not clean and clear of hazards; the water level was too high; the gate did not self-close and latch; the chlorine level was not within the acceptable range of water quality standards; both of the "Shallow Water – No Diving Allowed" signs were damaged; and, the bound and numbered log book was not maintained on a daily basis.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**. The civil penalty has been paid.

21) Order Type and Number: Consent Order 16-138-RW
Order Date: October 24, 2016
Individual/Entity: **Ghanshyam, Corp.**
Facility: Quality Inn
Location: 719 Bypass 25 North East
Greenwood, SC 29646
Mailing Address: Same
County: Greenwood
Previous Orders: 13-158-DW ($400.00)
Permit/ID Number: 24-013-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Ghanshyam, Corp. (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 20, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the deck had uneven sharp edges; the gate did not self-close and latch; there was no drinking water fountain; there was no foot rinse shower; the pH level was not within the acceptable range of water quality standards; the life ring did not have a permanently attached rope and was not properly hung in its designated location; the shepherd's crook was missing a bolt; the "No Lifeguard On Duty – Swim At Your Own Risk" signs did not have the correct sized lettering or wording; and, the bound and numbered log book was not maintained on a daily basis.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**.

22) Order Type and Number: Consent Order 16-139-RW
Order Date: October 24, 2016

Individual/Entity: **Kirtan Hospitality, Inc.**
Facility: Holiday Inn Express & Suites
Location: 110 Birchtree Drive
Greenwood, SC 29649
Mailing Address: Same
County: Greenwood
Previous Orders: None
Permit/ID Number: 24-051-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Kirtan Hospitality, Inc. (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 3, 2016, and July 22, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: algae was present on the pool walls; the pool furniture was not at least four feet from the pool edge; there was debris in the skimmer baskets; the drinking water fountain was not operating properly; the foot rinse shower was not operating properly; the chlorine and pH levels were not within the acceptable range of water quality standards; the main drain grates were not in place; the life ring was not properly hung in its designated location; the emergency notification device was not operational; the bound and numbered log book was not maintained on a daily basis; and, the recirculation and filtration system was leaking.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**.

23) Order Type and Number: Consent Order 16-140-RW
Order Date: October 24, 2016
Individual/Entity: **G6 Hospitality Property, LLC**
Facility: Motel 6
Location: 105 Jones Road
Spartanburg, SC 29303
Mailing Address: Same
County: Spartanburg
Previous Orders: None
Permit/ID Number: 42-145-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: G6 Hospitality Property, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On May 31, 2016, and July 18, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: a ladder was missing step treads; the chlorine and pH levels were not within the acceptable range of water quality standards; the "Shallow Water – No Diving Allowed" signs did not have the correct sized lettering or the correct wording; the "No Lifeguard On Duty – Swim At Your Own Risk" signs did not have the correct sized lettering or the correct wording; the bound and numbered log book was not available for review on the first inspection and was not maintained on a daily basis on the second inspection; the disinfection equipment was not

operating; there were chlorine sticks in the skimmer baskets on the first inspection and there was debris in the skimmer baskets on the second inspection; and, the current pool operator of record information was not posted to the public.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**. The Individual/Entity submitted a corrective action plan and corrected the deficiencies.

24) Order Type and Number: Consent Order 16-141-RW
Order Date: October 25, 2016
Individual/Entity: **9 Marina, LLC**
Facility: Days Inn Hilton Head
Location: 9 Marina Side Drive
Hilton Head Island, SC 29928
Mailing Address: Same
County: Beaufort
Previous Orders: 15-107-RW ($680.00)
Permit/ID Number: 07-379-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: 9 Marina, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 7, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: a skimmer was missing a weir; the life ring was missing beckets; the pool rules sign was not completely filled out; the facility could not produce current valid documentation of pool operator certification; the bound and numbered log book was not maintained on a daily basis; and, there were chlorine sticks in the skimmer baskets.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**.

25) Order Type and Number: Consent Order 16-142-RW
Order Date: October 26, 2016
Individual/Entity: **Mid Carolina Club, Inc.**
Facility: Mid Carolina Country Club
Location: 3593 Kibler Bridge Road
Prosperity, SC 29127
Mailing Address: Same
County: Newberry
Previous Orders: None
Permit/ID Number: 36-025-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Mid Carolina Club, Inc. (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 30, 2016, and August 4, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the pool floor and walls were not clean; the skimmers were missing weirs; there was no drinking water fountain; the "Shallow Water – No Diving Allowed" signs did not have the appropriate wording; only one "No Lifeguard On Duty – Swim At Your Own Risk" sign was posted; the current pool operator of record information was not posted to the public; there were chlorine sticks in the skimmer baskets; some of the depth marker tiles were broken; the deck was uneven with sharp edges; the chlorine level was not within the acceptable range of water quality standards; and, the pool rules sign was not legible.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**. The civil penalty has been paid.

26) Order Type and Number: Consent Order 16-143-RW
Order Date: October 28, 2016
Individual/Entity: **Blackstock Hotel, LLC**
Facility: Comfort Suites
Location: 458 West Blackstock Road
Spartanburg, SC 29301
Mailing Address: Same
County: Spartanburg
Previous Orders: None
Permit/ID Number: 42-1072D
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Blackstock Hotel, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a spa. On June 24, 2016, and July 29, 2016, the spa was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the cyanuric acid level was above the water quality standards acceptable limit; the chlorine level was not within the acceptable range of water quality standards; the spa rules sign was faded and was not completely filled out; and, the current pool operator of record information was not posted to the public.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**. The civil penalty has been paid.

27) Order Type and Number: Consent Order 16-144-RW
Order Date: October 28, 2016
Individual/Entity: **Preserve at Port Royal, LLC**
Facility: Preserve at Port Royal
Location: 1 Preserve Avenue West
Port Royal, SC 29935

Mailing Address: 5425 Peachtree Parkway
Norcross, GA 30092
County: Beaufort
Previous Orders: None
Permit/ID Number: 07-1097B
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Preserve at Port Royal, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 3, 2016, and July 6, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: a handrail was not tight and secure; the chlorine level was not within the acceptable range of water quality standards; and, only one "Shallow Water – No Diving Allowed" sign was posted.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**.

28) Order Type and Number: Consent Order 16-145-RW
Order Date: October 28, 2016
Individual/Entity: **Jai Jala, Inc.**
Facility: Days Inn Cheraw
Location: 820 Market Street
Cheraw, SC 29520
Mailing Address: Same
County: Chesterfield
Previous Orders: None
Permit/ID Number: 13-010-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Jai Jala, Inc. (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 30, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the foot rinse shower was not operating properly; there was no drinking water fountain; the pH level was not within the acceptable range of water quality standards; the life ring was too short; the emergency notification device was not accessible; the pool rules sign was not completely filled out; there were no "Shallow Water – No Diving Allowed" signs posted; there were no "No Lifeguard On Duty – Swim At Your Own Risk" signs posted; the facility could not produce current valid documentation of pool operator certification; and, the bound and numbered log book was not available for review.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of three hundred forty dollars **($340.00)**.

29) Order Type and Number: Consent Order 16-146-RW

Order Date: October 28, 2016
Individual/Entity: **Greenville Multifamily Partners, LLC**
Facility: Hampton Inn Beaufort
Location: 660 Halton Road
Greenville, SC 29607
Mailing Address: Same
County: Greenville
Previous Orders: None
Permit/ID Number: 23-292-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Greenville Multifamily Partners, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On May 24, 2016, and June 30, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the gate did not self-close and latch; the chlorine and pH levels were not within the acceptable range of water quality standards; the pool rules sign was not completely filled out; the facility could not produce current valid documentation of pool operator certification; and, the bound and numbered log book was not maintained on a daily basis.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**.

30) Order Type and Number: Consent Order 16-147-RW
Order Date: October 31, 2016
Individual/Entity: **Grand Harbor Club, LLC**
Facility: Retreat at Grand Harbor
Location: 300 Abercrombie Pointe
Ninety Six, SC 29666
Mailing Address: Same
County: Greenwood
Previous Orders: None
Permit/ID Number: 24-1008B
Violations Cited: S.C. Code Ann. Regs. 61-51(J) & 61-51(K)(1)(c)

Summary: Grand Harbor Club, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 6, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain; and, on June 24, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain and for re-opening prior to receiving Department approval. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: there was debris in the skimmer baskets; the gate did not self-close and latch; the foot rinse shower was not operating properly; the chlorine and pH levels were not within the acceptable range of water quality standards; the main drain grates were not visible due to cloudy water; the emergency notification device was not operational; the log book was not properly bound and numbered; the automatic controller was not operable; and, the pool was operating prior to receiving Department approval.

Action: The Individual/Entity is required to: keep the pool closed until the deficiencies have been corrected; submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of one thousand, twenty dollars **($1,020.00)**. The civil penalty has been paid.

31) Order Type and Number: Consent Order 16-148-RW
Order Date: October 28, 2016
Individual/Entity: **The Courtyard II at Myrtle Beach Homeowner's Association, Inc.**
Facility: Courtyard II at Myrtle Beach
Location: 755 Burcale Road
Myrtle Beach, SC 29579
Mailing Address: Same
County: Horry
Previous Orders: None
Permit/ID Number: 26-927-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: The Courtyard II at Myrtle Beach Homeowner's Association, Inc. (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 2, 2016, August 1, 2016, and September 9, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the lifeline floats were not properly spaced; a ladder was not tight and secure; the gate did not self-close and latch; there was no drinking water fountain; the chlorine and pH levels were not within the acceptable range of water quality standards; the cyanuric acid level was above the water quality standards acceptable limit; and, the life ring rope was too short.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of two thousand, forty dollars **($2,040.00)**.

32) Order Type and Number: Consent Order 16-149-RW
Order Date: October 31, 2016
Individual/Entity: **Fernlakes Homeowner's Association, Inc.**
Facility: Fernlakes
Location: Fernlakes Drive
Bluffton, SC 29910
Mailing Address: 2 Corpus Christi Place, Suite 302
Hilton Head Island, SC 29928
County: Beaufort
Previous Orders: None
Permit/ID Number: 07-473-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Fernlakes Homeowner's Association, Inc. (Individual/Entity) owns and is

responsible for the proper operation and maintenance of a pool. On June 10, 2016, and July 18, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: a ladder was missing bumpers; a skimmer was missing a weir; the chlorine level was not within the acceptable range of water quality standards; only one "Shallow Water – No Diving Allowed" sign was posted; only one "No Lifeguard On Duty – Swim At Your Own Risk" sign was posted; and, the facility could not produce current valid pool operator of record certification.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**.

33) Order Type and Number: Consent Order 16-151-RW
Order Date: October 31, 2016
Individual/Entity: **JHM Pelham Road Hotel, LLC**
Facility: Fairfield Inn
Location: 48 Fisherman Lane
Greenville, SC 29072
Mailing Address: 115 The Parkway
Greenville, SC 29615
County: Greenville
Previous Orders: None
Permit/ID Number: 23-503-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: JHM Pelham Road Hotel, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On July 7, 2016, and August 3, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: only one "Shallow Water – No Diving Allowed" sign was posted; the chlorine level was not within the acceptable range of water quality standards; and, only one "No Lifeguard On Duty - Swim At Your Own Risk" sign was posted.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**. The civil penalty has been paid. The Individual/Entity submitted a corrective action plan and corrected the deficiencies.

34) Order Type and Number: Consent Order 16-152-RW
Order Date: October 31, 2016
Individual/Entity: **Mitul Enterprises, L.P.**
Facility: Econo Lodge
Location: 2227 Boundary Street
Beaufort, SC 29902
Mailing Address: Same
County: Beaufort

Previous Orders: None
Permit/ID Number: 07-312-1
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Mitul Enterprises, L.P. (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 1, 2016, and July 8, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the lifeline floats were not properly spaced; a ladder was missing bumpers; the pool walls were not clean; the pH level was not within the acceptable range of water quality standards; and, the bound and numbered log book was not maintained on a daily basis.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**.

35) Order Type and Number: Consent Order 16-153-RW
Order Date: October 31, 2016
Individual/Entity: **Lennar Carolinas, LLC**
Facility: Carolina Reserve
Location: 1052 Wallace Lake Road
Fort Mill, SC 29707
Mailing Address: Same
County: Lancaster
Previous Orders: None
Permit/ID Number: 29-1038B
Violations Cited: S.C. Code Ann. Regs. 61-51(J)

Summary: Lennar Carolinas, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On June 9, 2016, and June 27, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the handrail did not reach the bottom step; a light in the pool wall was not in its niche; the pH level was not within the acceptable range of water quality standards; the pool rules sign was not completely filled out; only one "No Lifeguard On Duty – Swim At Your Own Risk" sign was posted; the facility could not produce current valid documentation of pool operator certification; the log book was not properly bound and was not maintained on a daily basis; and, there were chlorine sticks in the skimmer baskets.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of six hundred eighty dollars **($680.00)**.

36) Order Type and Number: Consent Order 16-154-RW
Order Date: October 31, 2016
Individual/Entity: **RMP, LLC**
Facility: Comfort Inn
Location: 1201 Highway 17 North

	Surfside Beach, SC 29575
Mailing Address:	Same
County:	Horry
Previous Orders:	None
Permit/ID Number:	26-P74-1
Violations Cited:	S.C. Code Ann. Regs. 61-51(J)

Summary: RMP, LLC (Individual/Entity) owns and is responsible for the proper operation and maintenance of a pool. On May 31, 2016, July 1, 2016, and July 25, 2016, the pool was inspected and a violation was issued for failure to properly operate and maintain. The Individual/Entity has violated the Public Swimming Pools Regulation as follows: the water level was too low; and, the chlorine and pH levels were not within the acceptable range of water quality standards.

Action: The Individual/Entity is required to: submit a corrective action plan and schedule of implementation to address the deficiencies; and, pay a civil penalty in the amount of two thousand, forty dollars **($2,040.00)**.

Drinking Water Enforcement

37)

Order Type and Number:	Consent Order 16-052-DW
Order Date:	October 4, 2016
Individual/Entity:	**Town of Kingstree**
Facility:	Town of Kingstree
Location:	401 North Longstreet Street Kingstree, SC 29556
Mailing Address:	Same
County:	Williamsburg
Previous Orders:	None
Permit/ID Number:	4510002
Violations Cited:	S.C. Code Ann. Regs. 61-58.7

Summary: The Town of Kingstree (Individual/Entity) owns and is responsible for the proper operation and maintenance of a public water system (PWS). On July 26, 2016, the PWS was inspected and rated needs improvement for failure to properly operate and maintain. The Individual/Entity has violated the State Primary Drinking Water Regulations as follows: the well houses and the chlorine tank rooms were not locked or did not have the ability to be locked to prevent unauthorized access; documentation of valve locations and valve maintenance was incomplete; the leak detection and repair program provided did not detail what materials are used to repair leaks found within the system; and, the water audit provided was incomplete.

Action: The Individual/Entity is required to: correct the deficiencies; and, pay a **stipulated penalty** in the amount of four thousand dollars (**$4,000.00**) should any requirement of the Order not be met.

38) Order Type and Number: Consent Order 16-053-DW
Order Date: October 25, 2016
Individual/Entity: **Agracel, Inc.**
Facility: Agracel Owings Logistics Center
Location: 291 Professional Park Road
Clinton, SC 29325
Mailing Address: P.O. Box 1107
Effingham, IL 62401
County: Laurens
Previous Orders: None
Permit/ID Number: 30727-WS
Violations Cited: S.C. Code Ann. Regs. 61-58.1.K(1)

Summary: Agracel, Inc. (Individual/Entity) owns and is responsible for the proper operation of a drinking water distribution system to serve the Agracel Owings Logistics Center (Site). On August 5, 2016, the Site was inspected and it was determined that the distribution system had been placed into operation without obtaining written approval to operate from the Department. The Individual/Entity has violated the State Primary Drinking Water Regulations as follows: failed to obtain written approval to operate from the Department prior to placing a drinking water distribution system into operation.

Action: The Individual/Entity is required to: pay a civil penalty in the amount of one thousand dollars (**$1,000.00**). On September 8, 2016, the Department issued final approval to place the drinking water distribution system into operation. The civil penalty has been paid.

39) Order Type and Number: Consent Order 16-054-DW
Order Date: October 27, 2016
Individual/Entity: **Colt Farms, Inc.**
Facility: Colt Farms
Location: 640 Anderson Road
Wagener, SC 29164
Mailing Address: Same
County: Aiken
Previous Orders: None
Permit/ID Number: None
Violations Cited: S.C. Code Ann. Regs. 61-58.1.B &
61-58.1.K(1)

Summary: Colt Farms, Inc. (Individual/Entity) owns and is responsible for the proper construction, installation, and operation of a public water system to serve Colt Farms (Site). On August 16, 2016, the Site was inspected and it was determined that an unpermitted public supply well was being used to serve the Site, which was originally permitted and installed as an irrigation well. The Individual/Entity has violated the State Primary Drinking Water Regulations as follows: failed to obtain a permit to construct from the Department prior to the construction of a public supply well and failed to obtain written approval to operate from the Department prior to placing the newly constructed public supply well into operation.

Action: The Individual/Entity is required to: submit a complete application, with the associated fee, and obtain the required Small Business Water System Construction Permit to install a public supply well to serve the Site; complete the construction of the public supply well in accordance with the permit and obtain written approval to operate the public supply well; submit a written request for the intended use of the irrigation well located at the Site; pay a civil penalty in the amount of three thousand four hundred dollars (**$3,400.00**); and, pay a stipulated penalty in the amount of three thousand four hundred dollars ($3,400.00) should any requirement of the Order not be met.

Water Pollution Enforcement

40) Order Type and Number: Consent Order 16-034-W
Order Date: October 4, 2016
Individual/Entity: **City of Spartanburg**
Facility: Duke Power Park Clearing/Rail Trail Park
Location: Old Glendale Road
Spartanburg, SC 29302
Mailing Address: P.O. Box 1749
Spartanburg, SC 29304
County: Spartanburg
Previous Orders: None
Permit/ID Number: SCR 10W409
Violations Cited: Pollution Control Act, S.C. Code Ann. § 48-1-90(A)(1) and 110(d)(Supp. 2015), Water Pollution Control Permits S.C. Code Ann. Regs. 24 S.C. Code Ann. Regs. 61-9.122.21(a) and 122.41(a) (2011).

Summary: The City of Spartanburg (Individual/Entity) is responsible for land disturbing activity located in Spartanburg County, South Carolina. On June 20, 2016, the Department forwarded inspection findings notifying the Individual/Entity of deficiencies and unsatisfactory conditions at the Site. The Individual/Entity has violated the Pollution Control Act and Water Pollution Control Permit Regulations as follows: failed to comply with the conditions of its National Pollutant Discharge Elimination System (NPDES) permit and discharged sediment into the environment in a manner other than in compliance with its NPDES permit

Action: The Individual/Entity is required to: submit a corrective action plan to address the deficiencies, or, submit a Notice of Termination certifying that final stabilization has been achieved in accordance with the NPDES permit; and, pay a civil penalty in the amount of four thousand, four hundred and fifty-three dollars **($4,453.00)**.

41) Order Type and Number: Consent Order 16-035-W
Order Date: October 25, 2016
Individual/Entity: **Town of Jefferson**
Facility: Town of Jefferson WWTF
Location: SC Hwy. 265

Jefferson, SC 29718
Mailing Address P.O. Box 306
Jefferson, SC 29718
County: Chesterfield
Previous Orders: None
Permit/ID Number: NPDES permit SC0024767
Violations Cited: Pollution Control Act, S.C Code Ann § 48-1-110(d) (Supp. 2015), Water Pollution Control Permits, 3 S.C. Code Ann. Regs. 61-9.122.41(a)(1) (2011), and National Pollutant Discharge Elimination System Permit Number SC0024767.

Summary: The Town of Jefferson (Individual/Entity) owns and is responsible for the proper operation and maintenance of the Town of Jefferson Wastewater Treatment Facility, located in Chesterfield County, South Carolina. On April 12, 2016, a Notice of Violation was issued as a result of Discharge Monitoring Reports received by the Department. The Individual/Entity has violated the Pollution Control Act, Water Pollution Control Permits Regulation and National Pollutant Discharge Elimination System (NPDES) permit SC0024767 as follows: failed to comply with effluent discharge limits of its NPDES permit for Escherichia Coli (E. Coli).

Action: The Individual/Entity is required to: submit a corrective action plan to address the deficiencies; conduct a comprehensive maintenance, operation and management (CMOM) audit of the wastewater collection system (WWCS); submit an action plan addressing identified deficiencies; and, pay a civil penalty in the amount of one thousand, four hundred dollars **($1,400.00)**.

BUREAU OF AIR QUALITY

42) Order Type and Number: Consent Order 16-031-A
Order Date: October 25, 2016
Individual/Entity: **SantoLubes Manufacturing LLC**
Facility: SantoLubes Manufacturing LLC
Location: 2155 W. Croft Circle
Spartanburg, SC 29302
Mailing Address: P.O. Box 6740
Spartanburg, SC 29304
County: Spartanburg
Previous Orders: 11-049-A ($7,800); 15-016-A ($4,000)
Permit/ID Number: 2060-0029
Violations Cited: U.S. Environmental Protection Agency Regulations at 40 CFR Part 68, and 5 South Carolina Code Ann. Regs. 61-62.68, Chemical Accident Prevention Provisions

Summary: SantoLubes Manufacturing LLC (Individual/Entity) manufactures synthetic oils and other specialty chemicals. On April 14, 2015, the Department conducted a comprehensive inspection. The Individual/Entity violated U.S. EPA Regulations at 40 CFR and

South Carolina Air Pollution Control Regulations as follows: failed to maintain data used to estimate population and environmental receptors potentially affected by a release; failed to address in its PSI, the following elements pertaining to the technology of the process: process chemistry; maximum intended inventory; safe upper and lower limits for such items as temperatures, pressures, flows or compositions; and an evaluation of the consequences of deviations; failed to address in its PSI, the following elements pertaining to the equipment in the process: electrical classification; relief system design and design basis; ventilation system design; design codes and standards employed; and safety systems; failed to address in its PHA, stationary source siting and a qualitative evaluation of a range of the possible safety and health effects of failure of controls; failed to document that it resolved the recommendations from the PHA team in a timely manner, and failed to demonstrate that it communicated the actions resulting from the PHA to operating, maintenance and other employees whose work assignments are in the process and who may be affected by the recommendations or actions; failed to address in its written operating procedures both temporary operations and emergency shutdown, including conditions for an emergency shutdown and the assignment of shutdown responsibility to qualified operators; failed to demonstrate that it trained each employee involved in maintaining the on-going integrity of process equipment; failed to document that it inspected and tested process equipment as required by the 112(r) Regulations; failed to certify that it evaluated compliance with the applicable provisions for compliance audits conducted on October 19, 2010, and September 24, 2013; failed to develop a written plan regarding the implementation of employee participation requirements; and, failed to obtain and evaluate information regarding the contract owner or operator's safety performance and programs when selecting a contractor, and periodically evaluate the performance of the contract owner or operator.

Action: The Individual/Entity is required to: maintain all applicable information required for offsite consequence analyses; maintain all applicable documentation for its PSI and PHA; maintain records of written operating procedures that include all required elements and information; maintain all applicable training documentation; maintain all applicable documentation required by the mechanical integrity procedures; maintain certifications for future compliance audits; obtain and evaluate information regarding the contract owner or operator's safety performance and programs, and periodically evaluate the performance of the contract owner or operator in fulfilling their obligations; submit to the Department documentation required by the regulations; and, pay a civil penalty in the amount of fourteen thousand dollars **($14,000.00)**.

43)	Order Type and Number:	Consent Order 16-032-A
	Order Date:	October 31, 2016
	Individual/Entity:	**Patel & Pournaras, LLC**
	Facility:	Keenan Building, 6 Story Building, and 3 Story Building
	Location:	1310 Lady Street and 1224 Sumter Street Columbia, SC 29201
	Mailing Address:	P.O. Box 12383 Columbia, SC 29211
	County:	Richland
	Previous Orders:	None
	Permit/ID Number:	None

Violations Cited: U.S. Environmental Protection Agency ("EPA") Regulations at 40 CFR 61, National Emission Standards for Hazardous Air Pollutants, Subpart M, National Emission Standard for Asbestos, and 7 South Carolina Code Ann. Regs. 61-86.1, Standards of Performance for Asbestos Projects

Summary: Patel & Pournaras, LLC (Individual/Entity) owns three inter-connected mixed use commercial buildings located at 1310 Lady Street and 1224 Sumter Street in Columbia, South Carolina (Site). The Individual/Entity contracted multiple contractors to perform various renovation activities at the Site. On May 12, 2014, May 13, 2014, May 14, 2014, October 30, 2014, March 6, 2015, and March 9, 2015, the Department conducted investigations at the Site. The Individual/Entity violated U.S. EPA and South Carolina Standards of Performance for Asbestos Projects as follows: failed to conduct an asbestos building inspection prior to the start of a renovation; failed to adhere to notification and licensing requirements for NESHAP-sized and Minor asbestos abatement projects; and, failed to adhere to work practice requirements for NESHAP-sized and Minor asbestos abatement projects including preparation, removal, clean-up, disposal, and air monitoring.

Action: The Individual/Entity is required to: comply with Federal and State Standards of Performance for Asbestos Projects including but not limited to: ensuring that a current and complete building inspection is performed prior to any renovation activity; ensuring that notification, licensing, and fee payment requirements are completed; ensuring that all persons engaged in an asbestos project involving RACM, or ACM rendered regulated, are licensed to do so by the Department; ensuring that a company hired to remove RACM, or ACM rendered regulated, is a Department-licensed asbestos abatement contractor; and ensuring compliance with all applicable work practice, disposal, and air monitoring requirements for any asbestos project; and, pay a civil penalty in the amount of seventeen thousand, five hundred dollars **($17,500.00)** in installments.

Additional Information: The length of time between the initial inspection and the execution of the Consent Order was due to the on-going violations at the Site. The Department and the Individual/Entity entered into a tolling agreement to waive the statute of limitations.

44) Order Type and Number: Consent Order 16-033-A
Order Date: October 31, 2016
Individual/Entity: **Demolition and Environmental Companies LLC**
Facility: Asbestos Projects – Ashley Shores; Broad Street; Charleston Airport
Location: 3819 Ashley Shores Drive, North Charleston, SC; 310 Broad Street, Charleston, SC; 6500 International Blvd., North Charleston, SC
Mailing Address: P.O. Box 61900
North Charleston, SC 29419
County: Charleston
Previous Orders: None
Permit/ID Number: CO-000424
Violations Cited: U.S. Environmental Protection Agency ("EPA") Regulations at 40 CFR 61, National Emission Standards for Hazardous Air Pollutants

(NESHAP), Subpart M, National Emission Standard for Asbestos, and 7 South Carolina Code Ann. Regs. 61-86.1, Standards of Performance for Asbestos Projects

Summary: Demolition and Environmental Companies LLC (Individual/Entity), is a Department licensed asbestos abatement contractor who engaged in regulated asbestos projects at the Ashley Shores Townhouse development (Ashley Shores Site), the Sergeant Jasper apartment building (Broad Street Site), and the Charleston Airport Exterior Wall Concourse A (Charleston Airport Site). The Department conducted inspections at the Sites on October 21, 2014, March 23, 2015, and August 21, 2015. The Individual/Entity violated U.S. EPA and South Carolina Standards of Performance for Asbestos Projects as follows: failed to ensure that each worker employed at the project site met the applicable training and licensing requirements; failed to ensure that at least one licensed supervisor remains inside the regulated work area while abatement of RACM was being conducted; failed to construct a proper decontamination enclosure; failed to ensure that a thorough and complete asbestos building inspection was performed prior to commencement of renovation or demolition activities; failed to comply with applicable work practice requirements for a NESHAP project, including preparation, removal, cleanup, and disposal of all RACM; failed to ensure that areas exceeding clearance standards were re-cleaned using wet methods and HEPA vacuuming; failed to ensure that all asbestos-containing waste material was properly contained in sealed, leak-tight containers; failed to ensure no release of visible emissions during preparation, removal, or cleanup; and, failed to ensure that the sequence of wet cleaning and vacuuming is repeated until no visible residue can be observed at the Charleston Airport Site.

Action: The Individual/Entity is required to: comply with all requirements of Subpart M and regulation 61-86.1, including but not limited to: ensuring that a current and complete building inspection is performed prior to any renovation or demolition activity; ensuring that each worker employed at the project site meets the applicable training and licensing requirements prior to engaging in a regulated asbestos project; ensuring that at least one licensed supervisor remains inside the regulated work area while abatement of RACM is being conducted; and, ensuring compliance with all applicable work practice, disposal, and air monitoring requirements for any asbestos project; and, pay a civil penalty in the amount of twenty thousand dollars **($20,000.00)**, payable in ten equal payments.

BUREAU OF ENVIRONMENTAL HEALTH SERVICES

45)	Order Type and Number:	Consent Order 2015-206-04-012
	Order Date:	October 4, 2016
	Individual/Entity:	**Golden Crown Restaurant**
	Facility:	Golden Crown Restaurant
	Location:	300 Whitman Avenue Florence, SC 29501
	Mailing Address:	Same
	County:	Florence
	Previous Orders:	2014-206-04-030 ($500.00)
	Permit Number:	21-206-02474
	Violations Cited:	S.C. Code Ann. Regs. 61-25

Summary: Golden Crown Restaurant (Individual/Entity) is a restaurant located in Florence, South Carolina. The Department conducted inspections on August 10, 2015, and August 1, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of one thousand, two hundred dollars **($1,200.00)**.

46) Order Type and Number: Consent Order 2016-206-03-040
Order Date: October 4, 2016
Individual/Entity: **Flaming Grill**
Facility: Flaming Grill
Location: 115 Afton Court
Columbia, SC 29212
Mailing Address: Same
County: Lexington
Previous Orders: None
Permit Number: 32-206-06518
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Flaming Grill (Individual/Entity) is a restaurant located in Columbia, South Carolina. The Department conducted inspections on April 25, 2016, May 4, 2016, and June 9, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of one thousand, two hundred dollars **($1,200.00)**.

47) Order Type and Number: Consent Order 2015-206-06-113
Order Date: October 4, 2016
Individual/Entity: **S A Guerry & Son**
Facility: S A Guerry & Son
Location: 16 Twins Road
Kingstree, SC 29556
Mailing Address: Same
County: Williamsburg
Previous Orders: None
Permit Number: 45-206-00405
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: S A Guerry & Son (Individual/Entity) is a convenience store located in Kingstree, South Carolina. The Department conducted inspections on September 29, 2015,

October 19, 2015, November 24, 2015, December 7, 2015, and December 15, 2015. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods; failed to provide soap and paper towels at the hand sinks; and failed to ensure sewage was disposed of through an approved wastewater system.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of two thousand dollars **($2,000.00)**.

48) Order Type and Number: Consent Order 2016-206-02-009
Order Date: October 4, 2016
Individual/Entity: **Bake and Cook Thai Restaurant**
Facility: Bake and Cook Thai Restaurant
Location: 405 College Avenue, Unit 260
Clemson, SC 29631
Mailing Address: Same
County: Pickens
Previous Orders: None
Permit Number: 39-206-01890
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Bake and Cook Thai Restaurant (Individual/Entity) is a restaurant located in Clemson, South Carolina. The Department conducted inspections on December 10, 2015, and February 2, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to clean the food contact surfaces of equipment between working with raw foods and ready-to-eat foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

49) Order Type and Number: Consent Order 2016-208-04-001
Order Date: October 5, 2016
Individual/Entity: **Lee Central High School**
Facility: Lee Central High School
Location: 1800 Wisacky Road
Bishopville, SC 29010
Mailing Address: Same
County: Lee
Previous Orders: None
Permit Number: 31-208-00135
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Lee Central High School (Individual/Entity) operates a school cafeteria located in Bishopville, South Carolina. The Department conducted an inspection on April 20, 2015, May 3, 2016, and May 12, 2016. The Individual/Entity violated the South Carolina Retail

Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of one thousand, two hundred dollars **($1,200.00)**.

50) Order Type and Number: Consent Order 2016-206-06-029
Order Date: October 13, 2016
Individual/Entity: **Kobe Express**
Facility: Kobe Express
Location: 1610 Highway 17 South, Suite F
Surfside Beach, SC 29515
Mailing Address: Same
County: Horry
Previous Orders: None
Permit Number: 26-206-12521
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Kobe Express (Individual/Entity) is a restaurant located in Surfside Beach, South Carolina. The Department conducted inspections on July 21, 2015, and February 17, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to store foods in a manner to prevent cross contamination.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

51) Order Type and Number: Consent Order 2016-206-03-037
Order Date: October 17, 2016
Individual/Entity: **Chapala Mexican Restaurant**
Facility: Chapala Mexican Restaurant
Location: 7001 St. Andrews Road
Irmo, SC 29212
Mailing Address: Same
County: Lexington
Previous Orders: None
Permit Number: 32-206-06110
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Chapala Mexican Restaurant (Individual/Entity) is a restaurant located in Irmo, South Carolina. The Department conducted inspections on June 9, 2015, and April 5, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to store foods in a manner to prevent cross contamination.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

52) Order Type and Number: Consent Order 2016-206-07-004
Order Date: October 17, 2016
Individual/Entity: **La Hacienda of Mt. Pleasant, Inc.**
Facility: La Hacienda of Mt. Pleasant, Inc.
Location: 3050 South Morgans Point Road
Mount Pleasant, SC 29466
Mailing Address: Same
County: Charleston
Previous Orders: None
Permit Number: 10-206-08703
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: La Hacienda of Mt. Pleasant, Inc. (Individual/Entity) is a restaurant located in Mount Pleasant, South Carolina. The Department conducted inspections on July 23, 2015, and January 21, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

53) Order Type and Number: Consent Order 2016-206-05-004
Order Date: October 17, 2016
Individual/Entity: **Country Inn & Suites**
Facility: Country Inn & Suites
Location: 731 Citadel Drive
Orangeburg, SC 29118
Mailing Address: Same
County: Orangeburg
Previous Orders: None
Permit Number: 38-206-02556
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Country Inn & Suites (Individual/Entity) operates a breakfast buffet located in Orangeburg, South Carolina. The Department conducted inspections on June 24, 2016, and June 30, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

54) Order Type and Number: Consent Order 2016-206-08-020
Order Date: October 17, 2016
Individual/Entity: **Luthers**
Facility: Luthers
Location: 910 Bay Street
Beaufort, SC 29902
Mailing Address: Same
County: Beaufort
Previous Orders: None
Permit Number: 07-206-01997
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Luthers (Individual/Entity) is a restaurant located in Beaufort, South Carolina. The Department conducted inspections on July 14, 2015, and May 25, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

55) Order Type and Number: Consent Order 2016-206-07-031
Order Date: October 17, 2016
Individual/Entity: **High Cotton of Charleston**
Facility: High Cotton of Charleston
Location: 199 East Bay Street
Charleston, SC 29403
Mailing Address: 434 King Street
Charleston, SC 29403
County: Charleston
Previous Orders: None
Permit Number: 10-206-09637
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: High Cotton of Charleston (Individual/Entity) is a restaurant located in Charleston, South Carolina. The Department conducted inspections on June 2, 2016, and June 8, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to ensure cooked time/temperature control for safety foods were cooled within 6 hours to 41 degrees F.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

56) Order Type and Number: Consent Order 2016-206-03-014
Order Date: October 18, 2016
Individual/Entity: **Los Mariachis**
Facility: Los Mariachis
Location: 1217 Highway 9 Bypass West
Lancaster, SC 29720
Mailing Address: Same
County: Lancaster
Previous Orders: None
Permit Number: 29-206-00839
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Los Mariachis (Individual/Entity) is a restaurant located in Lancaster, South Carolina. The Department conducted inspections on February 16, 2016, and April 18, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to ensure employees washed their hands between tasks or working with foods, prior to donning gloves.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

57) Order Type and Number: Consent Order 2015-206-04-011
Order Date: October 18, 2016
Individual/Entity: **Mickey's Restaurant**
Facility: Mickey's Restaurant
Location: 114 Maple Street
Pageland, SC 29728
Mailing Address: Same
County: Chesterfield
Previous Orders: None
Permit Number: 13-206-01072
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Mickey's Restaurant (Individual/Entity) is a restaurant located in Pageland, South Carolina. The Department conducted inspections on March 12, 2015, and February 25, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

58) Order Type and Number: Consent Order 2016-206-07-035
Order Date: October 20, 2016
Individual/Entity: **Pan Super Buffet**

Facility: Pan Super Buffet
Location: 9970 Dorchester Road, Unit A
Summerville, SC 29485
Mailing Address: Same
County: Dorchester
Previous Orders: 2015-206-07-046 ($800.00)
Permit Number: 18-206-07403
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Pan Super Buffet (Individual/Entity) is a restaurant located in Summerville, South Carolina. The Department conducted an inspection on June 2, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of six hundred dollars **($600.00)**.

59) Order Type and Number: Consent Order 2016-206-07-040
Order Date: October 26, 2016
Individual/Entity: **Inn at Middleton Place**
Facility: Inn at Middleton Place
Location: 4290 Ashley River Road
Charleston, SC 29414
Mailing Address: Same
County: Dorchester
Previous Orders: None
Permit Number: 18-206-00966
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Inn at Middleton Place (Individual/Entity) operates a restaurant located in Charleston, South Carolina. The Department conducted inspections on July 1, 2015 and June 27, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

60) Order Type and Number: Consent Order 2015-206-06-065
Order Date: October 26, 2016
Individual/Entity: **Pool Side Grill**
Facility: Pool Side Grill
Location: 100 North Beach Blvd.
North Myrtle Beach, SC 29582

Mailing Address: Same
County: Horry
Previous Orders: None
Permit Number: 26-206-12385
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Pool Side Grill (Individual/Entity) is a restaurant located in North Myrtle Beach, South Carolina. The Department conducted inspections on August 11, 2015, and August 8, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

61) Order Type and Number: Consent Order 2016-206-01-027
Order Date: October 26, 2016
Individual/Entity: **Roy's Diner**
Facility: Roy's Diner
Location: 1527 S. Main St.
Anderson, SC 29624
Mailing Address: Same
County: Anderson
Previous Orders: None
Permit Number: 04-206-00956
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Roy's Diner (Individual/Entity) is a restaurant located in Anderson, South Carolina. The Department conducted inspections on May 26, 2015, and May 23, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

62) Order Type and Number: Consent Order 2016-206-01-029
Order Date: October 26, 2016
Individual/Entity: **Holiday Inn Express & Suites**
Facility: Holiday Inn Express & Suites
Location: 107 Interstate Blvd.
Anderson, SC 29622
Mailing Address: Same
County: Anderson
Previous Orders: None

Permit Number: 04-206-03840
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Holiday Inn Express & Suites (Individual/Entity) operates a breakfast buffet located in Anderson, South Carolina. The Department conducted inspections on June 9, 2015, and May 4, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of eight hundred dollars **($800.00)**.

63) Order Type and Number: Consent Order 2016-206-01-025
Order Date: October 26, 2016
Individual/Entity: **Sake Zen**
Facility: Sake Zen
Location: 4403 Clemson Blvd.
Anderson, SC 29621
Mailing Address: None
County: Anderson
Previous Orders: None
Permit Number: 04-206-04187
Violations Cited: S.C. Code Ann. Regs. 61-25

Summary: Sake Zen (Individual/Entity) is a restaurant located in Anderson, South Carolina. The Department conducted inspections on April 15, 2016, April 18, 2016, August 24, 2016, and August 26, 2016. The Individual/Entity violated the South Carolina Retail Food Establishment Regulation as follows: failed to maintain proper holding temperatures of time/temperature control for safety foods; failed to store foods in a manner to prevent cross contamination; and failed to ensure employees washed hands after points of possible contamination.

Action: The Individual/Entity is required to: operate and maintain the facility in accordance with the requirements of all applicable regulations, including S.C. Regs. 61-25; and, pay a civil penalty in the amount of one thousand, six hundred dollars **($1,600.00)**.

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[*] Unless otherwise specified, "Previous Orders" as listed in this report include orders issued by Environmental Affairs Programs within the last five (5) years.

SUMMARY SHEET
SOUTH CAROLINA BOARD OF HEALTH AND ENVIRONMENTAL CONTROL

December 8, 2016

( ) ACTION/DECISION

(X) INFORMATION

I. **TITLE:** Health Regulation Administrative and Consent Orders.

II. **SUBJECT:** Health Regulation Administrative Orders, Consent Orders, and Emergency Suspension Orders for the period of October 1, 2016, through October 31, 2016.

III. **FACTS:** For the period of October 1, 2016, through October 31, 2016, Health Regulation reports one (1) Administrative Order with no assessed monetary penalties.

Health Regulation Bureau	Health Care Facility, Provider or Equipment	Administrative Orders	Consent Orders	Emergency Suspension Orders	Assessed Penalties
Health Facilities Licensing	Community Residential Care Facilities	1	0	0	$0

Approved By:

Shelly Bezanson Kelly
Director of Health Regulation

HEALTH REGULATION ENFORCEMENT REPORT
SOUTH CAROLINA BOARD OF HEALTH AND ENVIRONMENTAL CONTROL

December 8, 2016

Bureau of Health Facilities Licensing

Facility Type	Total # of Beds or Participants	Total # of Licensed Facilities in South Carolina
Community Residential Care Facilities	17,684	465

1. Miles Residential Care (CRCF) – Columbia, SC

Investigation: The Department visited Miles Residential Care ("Miles") numerous times to conduct routine inspections that the Department conducts on all CRCFs, including: general inspections, resident care focused inspections, kitchen and sanitation inspections, fire and life safety inspections, as well as follow-up inspections as warranted. Most recently, the Department visited Miles on June 15, 2016, to conduct a follow-up inspection.

Violations: Based upon the inspections, conducted between January 16, 2014, and June 15, 2016, the Department cited Miles for one hundred forty-one (141) violations of Regulation 61-84, which included fifty-six (56) Class I violations, seventy-two (72) Class II violations and thirteen (13) Class III violations of Regulation 61-84. Specifically, Miles was cited one (1) time for violating 61-84, Section 202.C, by failing to allow individuals authorized by S.C. law access to all properties and areas, objects, and records of Miles; three (3) times for violating 61-84, Section 202.D, by failing to submit timely acceptable POCs to ROVs which described alleged regulatory violations; two (2) times for violating 61-84, Section 401, by failing to have available for review a policy and procedure addressing each section of Regulation 61-84; one (1) time for violating 61-84, Section 501.D, by providing supervision to three children of a staff member who was not the owner of the facility; one (1) time for violating 61-84, Section 501.E, by failing to have available for review accurate and current information for three staff members, to include at least address, phone number, and personal/work/training background; one (1) time for violating 61-84, Section 503.C, by failing to maintain documentation to ensure that the facility met minimum staff-to-resident ratios prescribed by Regulation 61-84 Section 503.B.1 and B.2; three (3) times for violating 61-84, Section 504.A, by failing to have documentation of inservice training available for review and by failing to ensure that documented inservice training was signed by the staff member receiving the training and/or the individual providing the training; two (2) times for violating 61-84, Section 504.A.3, by failing to have documentation of current annual staff training in the management/care of persons with contagious and/or communicable disease available for review; two (2) times for violating 61-84, Section 504.A.4, by failing to have documentation of staff training or current annual staff training in medication management available for review; two (2) times for violating 61-84, Section 504.A.5, by failing to have documentation of staff training or current annual staff training in specific person care available for review; two (2) times for violating 61-84, Section 504.A.6, by failing to have documentation of staff training or current annual staff training in the use of restraints; two (2) times for violating 61-84, Section 504.A.7, by failing to have documentation of current annual staff training in OSHA standards regarding blood-borne pathogens available for review; one (1) time for violating 61-84, Section 504.A.8, by failing to have documentation of staff training in cardiopulmonary resuscitation for designated staff members available for review; two (2) times for violating 61-84, Section 504.A.9, by failing to have documentation of staff training and

current annual staff training in confidentiality of resident information and records available for review; one (1) time for violating 61-84, Section 504.A.10, by failing to have documentation of current annual staff training in the *Bill of Rights for Long-Term Care Facilities*, S.C. Code Ann. Sections 44-81-10 *et seq.*, available for review; one (1) time for violating 61-84, Section 504.A.10, and once for Section 504.A.11, by failing to have documentation of staff training or current annual staff training in fire response available for review; one (1) time for violating 61-84, Section 504.A.11 and once time for Section 504.A.12, by failing to have documentation of staff training or current annual staff training in emergency procedures and disaster preparedness available for review; two (2) times for violating 61-84, Section 701.A, by failing to maintain an organized record for residents of the facility; three (3) times for violating 61-84, Section 701.B.2, by failing to have orders from a physician or other authorized healthcare provider for residents' diets available for review; two (2) times for violating 61-84, Section 701.B.6, by failing to ensure that notes of observation were documented in residents' records at least monthly; five (5) times for violating 61-84, Section 701.B.10, by failing to ensure that residents' records included a photograph of the resident and by failing to ensure that residents' photographs were dated and no more than twenty-four months old; three (3) times for violating 61-84, Section 702, by failing to have residents' written assessments available for review and by failing to ensure that a resident's written assessment was signed by the staff member conducting the assessment; six (6) times for violating 61-84, Section 703.A, by failing to have residents' ICPs available for review, by failing to ensure residents' ICPs were developed within seven days of residents' admissions, and by failing to ensure the Facility reviewed residents' ICPs at least semi-annually and/or revised residents' ICPs as changes in the residents' needs occurred; two (2) times for violating 61-84, Section 703.B.1, by failing to ensure that residents' ICPs described the needs of the resident, including the activities of daily living for which the residents required assistance; one (1) time for violating 61-84, Section 703.B.5, by failing to ensure that a resident's ICP described the resident's nutritional needs; one (1) time for violating 61-84, Section 703.C, by failing to ensure that a resident's ICP included specific goal-related objectives of the resident and the methods for achieving the objectives and meeting the needs in measurable terms with expected achievement dates; one (1) time for violating 61-84, Section 704.F, by failing to maintain the record of a discharged resident in an inactive/closed file; two (2) times for violating 61-84, Section 901.A, by failing to have documentation of a written agreement between a resident, and/or his/her responsible party and the Facility and by failing to ensure that the written agreement for a resident was signed and dated by the resident and/or the resident's responsible party; two (2) times for violating 61-84, Section 901.A.2, by failing to ensure that the facility's agreement with a resident disclosed the fees for all care, services, and/or equipment provided by the facility and by failing to ensure that a resident's written agreement with the facility was updated upon any changes; one (1) time for violating 61-84, Section 901.A.3, by failing to ensure that the facility's agreements with residents included advanced notice requirements to change the fee amounts; one (1) time for violating 61-84, Section 901.A.4, by failing to ensure that the facility's agreements with a resident included a refund policy to include when monies are to be forwarded to the resident upon discharge, transfer, or relocation; one (1) time for violating 61-84, Section 901.C, by failing to ensure care and services were provided in accordance with orders from a physician or other authorized healthcare provider; one (1) time for violating 61-84, Section 902.G, by failing to ensure an accurate accounting of residents' personal monies, including an accounting of monies given to the residents, purchases by the facility on behalf of the resident, and/or monies paid to the facility for care and services; four (4) times for violating 61-84, Section 902.H, by failing to have documentation of a report of the balance of residents' finances being provided to the residents on at least a quarterly basis; one (1) time for violating 61-84, Section 903.E, by failing to ensure that the facility's posted activity schedule included the times and locations of activities and by failing to ensure the facility's posted activity schedule was for the current month; one (1) time for violating 61-84, Section 1001.H, by failing to have a grievance/complaint procedure to be exercised on behalf of residents to enforce the residents' Bill of Rights; two (2) times for violating 61-84, Section 1101.A, by failing to have available for review documentation of residents' physical examinations completed within thirty (30) days prior to admission and annually thereafter; two (2) times for violating 61-84, Section 1101.B, by failing to have documentation of a two-step tuberculin

skin test for two residents available for review; one (1) time for violating 61-84, Section 1201.A, by failing to ensure that residents' medications prescribed by a physician or other authorized healthcare provider were available for administration; two (2) times for violating 61-84, Section 1201.B, by failing to ensure that applicable reference materials published within the previous three (3) years were available at the facility; three (3) times for violating 61-84, Section 1205.A, by failing to ensure that a resident's medication had a label with the required contents and by failing to ensure that medications with damaged and/or illegible labels were returned to the pharmacy for re-labeling or disposal; three (3) times for violating 61-84, Section 1205.B, by failing to have documentation available for review of an on-site review of the facility's medication program by a pharmacist on at least a quarterly basis and by failing to ensure that medications were kept in original containers; two (2) times for violating 61-84, Section 1206.A, by failing to ensure that expired medications for residents were not stored with residents' current medications and by failing to ensure that medications were properly stored and safeguarded to prevent access by unauthorized persons; one (1) time for violating 61-84, Section 1206.C, by failing to ensure that the facility's records of controlled substances were maintained in sufficient detail to enable an accurate reconciliation; two (2) times for violating 61-84, Section 1206.F, by failing to ensure that medications were stored in a locked cabinet/compartment in rooms occupied by residents who were not authorized by a physician or other authorized healthcare provider to self-administer medications; two (2) times for violating 61-84, Section 1303, by failing to ensure that food equipment and utensils were properly cleaned, sanitized and stored in accordance with Regulation 61-25; one (1) time for violating 61-84, Section 1306.A, by failing to ensure that menus were readily available and posted in one or more conspicuous places in a public area of the facility; one (1) time for violating 61-84, Section 1306.B, by failing to maintain records of menus as served for at least thirty (30) days; one (1) time for violating 61-84, Section 1309.A, by failing to have liquid or powdered soap dispensers available at each food service handwash sink; one (1) time for violating 61-84, Section 1403, by failing to have a written plan to be implemented to assure the continuation of essential resident support services for such reasons as power outage, water shortage, or in the event of absence from work of any portion of the workforce resulting from inclement weather or other causes; one (1) time for violating 61-84, Section 1502, by failing to ensure that fire protection and suppression systems were properly maintained in accordance with codes adopted by the South Carolina Building Codes Council and South Carolina State Fire Marshal; two (2) times for violating 61-84, Section 1504.A, by failing to have documentation available for review of fire drills conducted quarterly for all shifts; one (1) time for violating 61-84, Section 1601.A and four (4) times for violating Section 1601, by failing to ensure that the facility's structure and component parts and equipment were properly maintained; one (1) time for violating 61-84, Section 1702.B, by failing to have completed documentation of an annual tuberculosis risk assessment in accordance with CDC guidelines; five (5) times for violating 61-84, Section 1703, by failing to keep the facility free from vermin and offensive odors; three (3) times for violating 61-84, Section 1703.A.1, by failing to ensure that each specific area of the facility was cleaned; two (2) times for violating 61-84, Section 1705.A, by failing to ensure that the facility's pets had received required inoculations from a veterinarian; one (1) time for violating 61-84, Section 1705.C, by allowing pets in the facility's kitchen and in the facility's dining room during times when food was being prepared and/or served; two (2) times for violating 61-84, Section 1706.B.3, by failing to ensure that soiled linens and clothing were stored in enclosed/covered containers; one (1) time for violating 61-84, Section 1801.A, by failing to have documentation of a written quality improvement program available for review; one (1) time for violating 61-84, Section 2103, by failing to ensure window treatments provided privacy in a bathroom; one (1) time for violating 61-84, Section 2201.A, by failing to ensure fire extinguishers were installed in accordance with NFPA No. 10; one (1) time for violating 61-84, Section 2206.B, by failing to ensure "No Smoking" signs were conspicuously posted in areas where oxygen was being dispensed or stored; one (1) time for violating 61-84, Section 2207.A, by failing to maintain the facility free of fire hazards or impediments to fire prevention; one (1) time for violating 61-84, Section 2403.A and two (2) times for violating Section 2301.B, by failing to ensure water at hot water faucets accessible to residents registered at least one hundred (100) degrees F, but did not exceed one hundred twenty (120) degrees F; one (1) time for violating 61-84, Section 2403.A,

by failing to ensure the exit sign at facility's front door was electrically-illuminated; one (1) time for violating 61-84, Section 2404.C, by failing to ensure that the facility's emergency lights were operational; one (1) time for violating 61-84, Section 2505.B, by failing to provide ground-fault interrupter protection at the receptacle the washer was plugged into; one (1) time for violating 61-84, Section 2601.C and one (1) time for a violation of Section 2501.B, by failing to maintain a temperature between seventy-two (72) and seventy-eight (78) degrees F. in resident areas; one (1) time for violating 61-84, Section 2602.A.1, by failing to furnish residents' beds with moisture-proof covers; one (1) time for violating 61-84, Section 2602.C, by placing beds in locations not designated as resident room areas; two (2) times for violating 61-84, Section 2604.C, by failing to ensure a sanitary individualized method of drying hands was available at each lavatory and by allowing communal use of bar soap; one (1) time for violating 61-84, Section 2604.F, by failing to ensure privacy was provided at toilets and bathtubs/showers; one (1) time for violating 61-84, Section 2604.K, by failing to maintain a supply of toilet tissue in each bathroom; one (1) time for violating 61-84, Section 2604.M, by failing to implement a method that distinguishes linen assignment and discourages common usage of bath towels and washcloths; one (1) time for violating 61-84, Section 2611.A, by failing to have adequate storage areas for equipment and supplies; one (1) time for violating 61-84, Section 2705.J, by failing to ensure all resident room doors had closures; one (1) time for violating 61-84, Section 2714.B, by failing to provide an NFPA-approved automatic sprinkler system to a storage area that exceeded one hundred (100) square feet.

Enforcement Action: By Administrative Order executed October 10, 2016, the Department revoked the license issued to Betty A. and Louis B. Miles to operate Miles Residential care as a CRCF. On October 20, 2016, the Board of Health and Environmental Control ("the Board") received Miles's request for final review ("RFR"), which was within the fifteen (15) days allowed for filing an RFR. However, the filing fee of one hundred dollars ($100.00) was not received within the fifteen (15) days and, therefore, on November 14, 2016, the Board returned Miles's RFR unprocessed.

Prior Sanctions: Previously, by Consent Order (CO-HL-08-2012) executed February 5, 2013, the Department imposed a twenty-one thousand five hundred dollar ($21,500) monetary penalty against Miles Residential Care for initial and repeat violations of Regulation 61-84.

(x) ACTION/DECISION
( ) INFORMATION

MEMORANDUM

Date: December 8, 2016

To: Board of the S.C. Department of Health and Environmental Control

From: Health Regulation

Re: Notice of Proposed Regulation amending R.61-16, Minimum Standards for Licensing Hospitals and Institutional General Infirmaries.

I. Introduction

The Bureau of Health Facilities Licensing proposes the attached Notice of Proposed Regulation of amending R.61-16, Minimum Standards for Licensing Hospitals and Institutional General Infirmaries for publication in the December 23, 2016, State Register. Legal authority for this amendment resides in S.C. Code Sections 44-7-110 through 44-7-394, which requires the Department to establish and enforce basic standards for the licensure, maintenance, and operation of health facilities and services to ensure the safe and adequate treatment of persons served in this state, and S.C. Code Section 44-41-70(a), which incorporates hospital certification as a requirement for the performance of abortions. In accordance with S.C. Code Section 1-23-120, General Assembly review is required.

II. Facts

1. The amendments to R.61-16 incorporate provisions allowing dietitians to prescribe diets and other dietary services; incorporate new requirements of S.C. Code Sections 44-41-410 through 480 relating to the provision of abortion services; incorporate existing inspection and construction fees; and incorporate new requirements relating to safe havens.

2. Pursuant to S.C. Code Section 1-23-110(A)(1) a Notice of Drafting (NOD) for the amendment was published in the State Register September 23, 2016. Following publication of the NOD, the Department received two (2) comments. The South Carolina Academy of Nutrition and Dietetics commented in support of the changes made to regulatory requirements regarding dietitians. Drs. Annibale and Cahill from MUSC Children's Hospital submitted comments in support of perinatal regulations promulgated in 2015.

3. The Department held a regulation development meeting with the South Carolina Hospital Association on August 30, 2016. This meeting gave Department representatives an opportunity to meet with stakeholders prior to the publication of the NOD to discuss updates to R.61-16.

III. Request for Approval

The Bureau of Health Facilities Licensing respectfully requests the Board to grant approval of the attached Notice of Proposed Regulation for publication in the December 23, 2016, State Register.

Gwen C. Thompson
Chief
Bureau of Health Facilities Licensing

Shelly Bezanson Kelly, J.D.
Director
Health Regulation

Attachments:

A. Notice of Proposed Regulation
B. Notice of Drafting published in the September 23, 2016, State Register

ATTACHMENT A

STATE REGISTER NOTICE OF PROPOSED REGULATION
FOR REGULATION 61-16, Minimum Standards for Licensing Hospitals and Institutional General Infirmaries

December 8, 2016

Document No. _____
DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
CHAPTER 61
Statutory Authority: 1976 Code Sections 44-7-110 through 44-7-394 and 44-41-10(d)

Regulation 61-16, Minimum Standards for Licensing Hospitals and Institutional General Infirmaries

Preamble:

The Department of Health and Environmental Control is proposing amendments to Regulation 61-16. These amendments are necessary to incorporate recent changes in state law as well as changes to current practices and standards. The amendment will incorporate provisions allowing dietitians to prescribe diets and other dietary services; incorporate requirements of S.C. Code Sections 44-41-410 through -480 relating to the provision of abortion services; incorporate existing inspection and construction fees; and incorporate new safe haven requirements. Legislative review of this amendment is required.

A Notice of Drafting was published in the State Register on September 23, 2016.

Section-by-Section Discussion of Proposed Amendments:

TABLE OF CONTENTS

The table of contents was updated to reflect amended sections.

Section 61-16.101. Definitions
The definition of 101.G Dietitian has been redefined as an individual who is currently licensed as a dietitian by the South Carolina Department of Labor, Licensing and Regulation.

Section 61-16.201. License Requirements
Section 201.E was amended to delete an unnecessary statutory reference and to require that a hospital shall comply with Chapter 41 of Title 44 of the S.C. Code of Laws. Former Section 201.G was relocated to new Section 201.H. Section 201.G (formerly 202) was amended to require that annual license fees include any outstanding inspection fees.

Section 61-16.202. Licensing Fees
Section 202 has been deleted and moved to Section 201.G.

Section 61-16.202. Exceptions to Licensing Standards (formerly 61-16.203)
Section 202 (formerly 203) was renumbered to adjust the codification.

Section 61-16.302. Inspections and Investigations

New Section 302.F was added to delineate inspection fees the Department is authorized to collect pursuant to S.C. Code Section 44-7-270.

Section 61-16.1303. Providing a Safe Haven for Abandoned Babies
Section 1303.A was amended to require that facilities accept infants not more than sixty (60) days old, pursuant to a statutory change.

Section 61-16.1505. Diets
Section 1505 introductory paragraph was amended to include dietitians. Section 1505.A was amended to require that diets be prescribed, dated and signed or authenticated by the physician or dietitian. New Section 1505.F was added to allow facility policy to permit a dietitian to order or prescribe patient diets, including therapeutic diets; order laboratory tests to monitor the effectiveness of diets; and/or make subsequent modifications to patient diets based on lab results, if permitted by the facility's policies.

Section 61-16.1903. Submission of Plans
New Section 1903.D was added to require the licensee to pay inspection fees during the construction phase of a project. A Construction Inspection Fees table was added to clearly delineate the required construction inspection fees.

Notice of Public Hearing and Opportunity for Public Comment:

Interested persons may submit written comments on the proposed regulation by writing to Gwen C. Thompson by mail at Bureau of Health Facilities Licensing, South Carolina Department of Health and Environmental Control, 2600 Bull Street, Columbia, SC 29201; by facsimile at (803) 545-4212; or by e-mail at HealthRegComm@dhec.sc.gov. Comments may also be submitted electronically on the Public Comments for Health Regulations page at the following address: http://www.scdhec.gov/Agency/RegulationsAndUpdates/PublicComments/. To be considered, comments must be received no later than 5:00 p.m. on January 23, 2017, the close of the public comment period. Comments received shall be submitted in a Summary of Public Comments and Department Responses for the Board of Health and Environmental Control's consideration at the public hearing.

Interested persons may also make oral and/or written comments on the proposed amendments of R.61-16 at a public hearing to be conducted by the Board of Health and Environmental Control at its regularly scheduled meeting on February 9, 2017. The Board will conduct the public hearing in the Board Room, Third floor, Aycock Building of the Department of Health and Environmental Control at 2600 Bull Street, Columbia, South Carolina 29201. The Board meeting commences at 10:00 a.m. at which time the Board will consider items on its agenda in the order presented. The order of presentation for public hearings will be noted in the Board's agenda published by the Department twenty-four (24) hours in advance of the meeting at the following address: http://www.scdhec.gov/Agency/docs/AGENDA.PDF. Persons desiring to make oral comments at the hearing are asked to limit their statements to five minutes or less and, as a courtesy, are asked to provide written copies of their presentation for the record. Due to admittance procedures at the DHEC Building, all visitors should enter through the Bull Street entrance and register at the front desk.

Copies of the proposed amendments for public comment as published in the State Register on December 23, 2016, may be obtained online in the DHEC Regulation Development Update at http://www.scdhec.gov/Agency/RegulationsAndUpdates/RegulationDevelopmentUpdate/. Click on the Health Facilities Regulations topic and scan down to the proposed amendments of R.61-16. A copy can also be obtained by contacting Gwen Thompson at the above address or by email at thompsgw@dhec.sc.gov.

Preliminary Fiscal Impact Statement:

Implementation of this regulation will not require additional resources. There is no anticipated additional cost by the Department or state government due to any inherent requirements of this regulation. There are no external costs anticipated.

Statement of Need and Reasonableness:

The following is based on an analysis of the factors listed in 1976 Code Section 1-23-115(C)(1)-(3) and (9)-(11):

DESCRIPTION OF REGULATION: R.61-16, Minimum Standards for Licensing Hospitals and Institutional General Infirmaries.

Purpose: The purpose of these amendments to R.61-16 is to update statutory requirements recently enacted by the General Assembly. These amendments include incorporation of provisions allowing dietitians to prescribe diets and other dietary services; new requirements of S.C. Code Sections 44-41-410 through -480 relating to the provision of abortion services; adding existing inspection and construction fees; and new requirements relating to safe havens.

Legal Authority: 1976 Code Sections 44-7-110 through 44-7-394 and 44-41-70(a)

Plan for Implementation: Copies of the regulation will be available electronically on the South Carolina Legislature website and the Department regulation development website (http://www.scdhec.gov/Agency/RegulationsAndUpdates/RegulationDevelopmentUpdate). Printed copies will be available for a fee from the Department's Freedom of Information Office.

DETERMINATION OF NEED AND REASONABLENESS OF THE PROPOSED REGULATION BASED ON ALL FACTORS HEREIN AND EXPECTED BENEFITS:

These amendments are necessary to incorporate recent statutory changes for abortion services and safe haven requirements. Additionally, the amendments incorporate provisions allowing dietitians to prescribe diets and other dietary services, and incorporate existing inspections and construction fees.

DETERMINATION OF COSTS AND BENEFITS:

Implementation of these amendments will not require additional resources. There is no anticipated additional cost to the Department or state government due to any inherent requirements of these amendments. There are no anticipated additional costs to the regulated community. Amendments to R.61-16 update statutory requirements enacted by the General Assembly, update requirements for dietitians, and incorporate existing inspection and construction fees.

UNCERTAINTIES OF ESTIMATES:

None.

EFFECT ON ENVIRONMENT AND PUBLIC HEALTH:

The amendments to R.61-16 seek to support the Department's goals relating to the protection of public health through the anticipated benefits highlighted above. There is no anticipated effect on the environment.

DETRIMENTAL EFFECT ON THE ENVIRONMENT AND PUBLIC HEALTH IF THERE REGULATION IS NOT IMPLEMENTED:

There is no anticipated detrimental effect on the environment. If the revision is not implemented, the regulation will be maintained in its current form without realizing the benefits of the amendments herein.

Statement of Rationale:

The Department of Health and Environmental Control is proposing amending Regulation 61-16. These amendments are necessary to incorporate recent changes in state law as well as changes to current practices and standards. The amendments will incorporate provisions allowing dietitians to prescribe diets and other dietary services; incorporate requirements of S.C. Code Sections 44-41-410 through -480 relating to the provision of abortion services; incorporate existing inspection and construction fees; and incorporate new safe haven requirements.

Text:

Deleted text is ~~stricken~~
New text is <u>underlined.</u>

61-16. Minimum Standards for Licensing Hospitals and Institutional General Infirmaries.

Revise Section 200 of Table of Contents to read:
TABLE OF CONTENTS

SECTION 200. LICENSE REQUIREMENTS AND FEES
201. License Requirements.
~~202. Licensing Fees.~~
~~203~~<u>202</u>. Exceptions to Licensing Standards.

Revise Section 61-16.101.G to read:

G. Dietitian: An individual who is ~~registered by the Commission on Dietetic Registration~~<u>currently licensed as a dietitian by the South Carolina Department of Labor, Licensing and Regulation</u>.

Revise Section 61-16.201 to read:
Section 201. License Requirements.

A. No person, private or public organization, political subdivision, or governmental agency shall establish, operate, maintain, or represent itself (advertise or market) as a hospital or institutional general infirmary in South Carolina without first obtaining a license from the Department. Admission of patients or the provision of care, treatment, and/or services to patients prior to the effective date of licensure is a violation of S.C. Code Ann. Section 44-7-260(A) (1976, as amended). (I)

B. A license shall be effective for a period of time specified by the Department.

C. A new facility, or one that has not been continuously licensed under these or prior standards, shall not admit patients until permission is granted by the Department.

D. Hospitals that provide services to patients requiring skilled nursing care must maintain a separate license for the areas where the services are provided.

E. Upon receipt of a written request from the hospital authorities to the Department requesting such certification, any general hospital having a current license to operate may be certified as a suitable facility for the performance of abortions. ~~(Section 44-41-10(d) of the S.C. Code of Laws of 1976.)~~A hospital shall comply with Chapter 41 of Title 44 of the S.C. Code of Laws. (I)

F. Applicants for a license shall file application under oath on a form and frequency specified by the Department. An application shall be signed/authenticated by the owner, if an individual or partnership; or in the case of a corporation, by two of its officers; or in the case of a governmental unit, by the head of the governmental department having jurisdiction over it. The application shall set forth the full name and address of the facility for which the license is sought and of the owner in case his address is different from that of the facility; the names of persons in control thereof and such additional information as the Department may require, including affirmative evidence of ability to comply with reasonable standards, rules and regulations as may be lawfully prescribed. No proposed hospital shall be named nor may an existing hospital have its name changed to the same or similar name as a hospital licensed in the State.

~~G. A facility shall request issue of an amended license, by application to the Department prior to any of the following circumstances:~~

~~1. Change of ownership by purchase or lease;~~

~~2. Change of facility's name;~~

~~3. Addition or replacement of beds (an inspection will be required prior to issuance of license);~~

~~4. Deletion of beds; or~~

~~5. Reallocation of types of beds as shown on license.~~

G. Licensing Fees. The initial and annual license fee shall be ten dollars ($10.00) per licensed bed. Annual license fees must also include any outstanding inspection fees. Such fees shall be made payable by check or credit card to the Department.

H. A facility shall request issue of an amended license, by application to the Department prior to any of the following circumstances:

1. Change of ownership by purchase or lease;

2. Change of facility's name;

3. Addition or replacement of beds (an inspection will be required prior to issuance of license);

4. Deletion of beds; or

5. Reallocation of types of beds as shown on license.

Delete Section 61-16.202 entirely:
~~Section 202. Licensing Fees.~~

~~Each applicant shall pay a license fee prior to issuance of a license. The annual license fee shall be $10.00 per licensed bed. Such fee shall be made payable by check or credit card to the Department and is not refundable.~~

Revise Section 61-16.203 to read:
Section ~~203~~202. Exceptions to Licensing Standards.

The Department reserves the right to make exceptions to these standards where it is determined that the health and welfare of the community requires the services of the facility. When an "exception" applies to an existing facility, it will continue to meet the standards in effect at the time it was licensed.

Add Section 61-16.302.F to read:
Section 302. Inspections and Investigations.

F. In accordance with S.C. Code Section 44-7-270, the Department may charge a fee for inspections. The fee for initial and biennial routine inspections shall be four hundred fifty dollars ($450.00) plus ten dollars ($10.00) per licensed bed. The fee for initial unit increase or service modification is two hundred fifty dollars ($250.00) plus ten dollars ($10.00) per licensed bed. The fee for follow-up inspections shall be two hundred fifty dollars ($250.00) plus ten dollars ($10.00) per licensed bed.

Revise Section 61-16.1303.A to read:
Section 1303. Providing a Safe Haven for Abandoned Babies.

Facilities and outpatient facilities shall:

A. Accept temporary physical custody of an infant ~~under thirty days of age~~not more than sixty (60) days old who is voluntarily left by a person who does not express an intent to return for the infant and the circumstances create a reasonable belief that a person does not intend to return for the infant.

Revise Section 61-16.1505 to read:
Section 1505. Diets.

Diets shall be prepared in conformance with ~~physicians'~~ orders of a physician or, if permitted by the facility's policies, a dietitian. A current diet manual shall be readily available to attending physicians, food and nutrition service personnel, ~~and~~ nursing personnel, and dietitians.

A. Diets shall be prescribed, dated and signed~~/~~ or authenticated by the physician or dietitian.

B. Facilities with patients in need of special or therapeutic diets shall provide for such diets.

C. Notations shall be made in the medical record of diet served, counseling or instructions given, as identified by patient and/or nutritional assessment and patient's tolerance of the diet.

D. Diets shall be planned, written, prepared and served with consultation from a dietitian.

E. Persons responsible for diets shall have sufficient knowledge of food values in order to make substitutions when necessary. All substitutions made on the master menu shall be documented.

F. Nothing in this regulation shall be read or interpreted to prohibit a facility's policies from allowing a dietitian to:

1. Order or prescribe patient diets, including therapeutic diets;

2. Order laboratory tests to monitor the effectiveness of dietary plans and orders; and/or

3. Make subsequent modifications to patient diets based on the results of laboratory tests.

Revise Section 61-16.1903 to read:
Section 1903. Submission of Plans.

A. When construction is contemplated either for new buildings, additions or major alterations or replacement to existing buildings, buildings being licensed for the first time, buildings changing license type, or facilities increasing occupant load/licensed capacity, plans and specifications shall be submitted to the Department for review. Final plans and specifications shall be prepared by an architect and/or engineer registered in South Carolina and shall bear their seals and signatures. Architectural plans shall also bear the seal of a South Carolina registered architectural corporation. These submissions shall be made in at least three stages: schematic, design development, and final. All plans shall be drawn to scale with the title, stage of submission and date shown thereon. Any construction changes from the approved documents shall be approved by the Department. Construction work shall not commence until a plan approval has been received from the Department. During construction the owner shall employ a registered architect and/or engineer for supervision and inspections. The Department shall conduct periodic inspections throughout each project.

B. When alterations are contemplated that are new construction, or projects with changes to the physical plant of a licensed facility which has an effect on: the function, use or accessibility of an area; structural integrity; active and passive fire safety systems (including kitchen equipment such as exhaust hoods or equipment required to be under the said hood); door, wall and ceiling system assemblies; exit corridors; Increase the occupant load/licensed capacity; and projects pertaining to any life safety systems, require preliminary drawings and specifications, accompanied by a narrative completely describing the proposed work, shall be submitted to the Department Cosmetic changes utilizing paint, wall covering, floor covering, etc., that are required to have a flame-spread rating or other safety criteria shall be documented with copies of the documentation and certifications, kept on file at the facility and made available to the Department.

C. All subsequent addenda, change orders, field orders, and documents altering the Department review must be submitted. Any substantial deviation from the accepted documents shall require written notification, review and re-approval from the Department.

D. The licensee shall pay the following inspection fees during the construction phase of the project. The plan inspection fee is based on the total estimated cost of the project whether new construction, an addition, or a renovation. The fees are detailed in the table below.

Construction Inspection Fees	
Plan Inspection	
Total Project Cost	**Fee**
< $10,001.00	$750
$10,001 - $100,000	$1,500
$100,001 - $500,000	$2,000
> $500,000	$2,500 plus $100 for each additional $100,000 in project cost

Site Inspection	
50% Inspection	$500
80% Inspection	$500
100% Inspection	$500

ATTACHMENT B
STATE REGISTER NOTICE OF DRAFTING

DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
CHAPTER 61
Statutory Authority: 1976 Code Sections 44-7-110 through 44-7-394 and 444110(d)

Notice of Drafting:

The Department of Health and Environmental Control proposes to amend Regulation 61-16, Minimum Standards for Licensing Hospitals and Institutional General Infirmaries. Interested persons may submit written comments to Gwen C. Thompson, Bureau Chief, Bureau of Health Facilities Licensing, South Carolina Department of Health and Environmental Control, 2600 Bull Street, Columbia, South Carolina 29201 or via email at HealthRegComm@dhec.sc.gov. Comments may also be submitted electronically at the following address: http://www.scdhec.gov/Agency/RegulationsAndUpdates/PublicComments/, under the Notice of Drafting for R.61-16. To be considered, all comments must be received no later than 5:00pm, October 24, 2016, the close of the comment period.

Synopsis:

The Department of Health and Environmental Control proposes to amend Regulation 61-16. The amendment will incorporate qualified prescribers, including dietitians, for diets; incorporate requirements of S.C. Code Section 44-41-410 relating to the provision of abortion services; incorporate existing inspection and construction fees; incorporate safe haven requirements; and may revise licensing requirements. The amendment may also revise construction requirements to align with current codes and standards.

The Department may also include stylistic changes, which may include corrections for clarity and readability, grammar, punctuation, definitions, references, codification and overall improvement of the text of the regulation. Legislative review of this amendment is required.

SUMMARY SHEET
BOARD OF HEALTH AND ENVIRONMENTAL CONTROL
December 8, 2016

(X) ACTION
( ) INFORMATION

I. TITLE: Public Hearing before the Board and Consideration for Final Approval
Proposed Amendments of Regulation 61-92, *Underground Storage Tank Control Regulations*
State Register Document No. 4706

Legislative review is required.

II. SUBJECT: Request for Finding of Need and Reasonableness Pursuant to S.C. Code Ann. 1-23-111.
III. FACTS:

1. Pursuant to S.C. Code Ann. 44-2-10 et. seq., the South Carolina Department of Health and Environmental Control (Department) proposes amending Regulation 61-92, *Underground Storage Tank Control Regulations,* Part 280. This amendment will focus on adopting the federal underground storage tank (UST) requirements of 40 CFR Part 280, effective October 13, 2015, and revising portions of R. 61-92, Part 280 pertaining to compliance requirements of the Underground Storage Tank Control Regulations. The Department proposes to reorganize the regulations for clarity and consistency with the format of the revised federal regulation, along with other stylistic changes to improve the overall quality of the Regulation.

2. Pursuant to S.C. Code Ann. 1-23-120(A), proposed amendments of R.61-92, require legislative review.

3. The Department initiated the statutory process to amend R. 61-92 by publication of a Notice of Drafting in the *State Register* on April 22, 2016. Notice of Drafting was also published in the DHEC *Regulation Development Update* online. The public comment period ended on May 23, 2016. The Department received no comments during the drafting comment period for the Notice of Drafting. A copy of the Notice of Drafting is submitted as Attachment F.

4. The Department hosted outreach meetings for stakeholders - UST facility owners and operators, petroleum industry members, equipment contractors, environmental consultants, small businesses, local governments, and environmental groups - to provide an opportunity to share their ideas and concerns. Meetings were conducted at 2600 Bull Street, Columbia on May 16, June 13, July 11, August 15, and August 29 of 2016. The Department considered all input from those attending.

5. A Summary of Proposed Revisions and Text of the Proposed Amendments of R.61-92 are submitted as Attachments B and C.

6. Pursuant to the Department's internal review policy, all appropriate Department personnel have reviewed the proposed amendments prior to seeking Board approval to public notice them.

7. The Board granted approval on October 13, 2016 to publicly notice the proposed amendment. Pursuant to S.C. Code Ann. 1-23-110(A)(3), the Department published a Notice of Proposed Regulation containing the text and notice of opportunity for public comment in the *State Register* on October 28, 2016 as Document No. 4706 (see Excerpt of Notice of Proposed Regulation in Attachment E). The Notice of Proposed Regulation was also published on the Department's website in the *DHEC Regulation*

Development Update. The publication of the Notice of Proposed Regulation provided opportunity for interested parties to offer input on the proposed regulation by submitting written comments during a public comment period and/or by commenting at the public hearing before the Board scheduled for December 8, 2016. The Department received two emails with comments. A summary of these comments and the Department's responses are provided in Attachment D.

8. The Department requests the Board conduct a public hearing pursuant to S.C. Code Ann. 1-23-111 and find for the need and reasonableness of the proposed amendments to R.61-92.

IV. ANALYSIS:

The proposed amendments to S.C. Code Regs. Ann. 61-92, Part 280 will focus on adopting the revised federal underground storage tank (UST) requirements of 40 CFR Part 280 effective October 13, 2015, and revising portions of R. 61-92, Part 280 pertaining to compliance requirements of the UST Control Regulations. The Department proposes to reorganize the regulations for clarity and consistency with the format of the revised federal regulation, along includes other stylistic changes to improve the overall quality of the Regulation.

See the Statement of Need and Reasonableness submitted as Attachment A.

V. RECOMMENDATION:

The Department recommends the Board find for the need and reasonableness of the proposed regulation and approve it for submission to the General Assembly for review.

Daphne Neel
Chief
Bureau of Land & Waste Management

Myra C. Reece
Director
Environmental Affairs

Attachments

A. Statement of Need and Reasonableness
B. Summary of Proposed Revisions
C. Text of Proposed Amendments
D. Summary of Public Comments and Responses
E. Excerpt from *State Register* Notice of Proposed Regulation, published October 28, 2016
F. *State Register* Notice of Drafting, published April 22, 2016

ATTACHMENT A
Statement of Need and Reasonableness and Rationale
Regulation 61-92, Underground Storage Tank Control Regulations
December 8, 2016

This Statement of Need and Reasonableness and Rationale was determined by staff analysis pursuant to S.C. Code Ann. 1-23-115(C)(1)-(3) and (9)-(11).

DESCRIPTION OF REGULATION:

Purpose: Pursuant to S.C. Code Ann. 44-2-10 et seq., the South Carolina Department of Health and Environmental Control (Department) proposes to amend South Carolina Regulation 61-92, *Underground Storage Tank Control Regulations*, Part 280. This amendment will focus on adopting the federal underground storage tank (UST) requirements of 40 CFR Part 280 effective October 13, 2015, and revising portions of R.61-92, Part 280 pertaining to compliance requirements of the UST Control Regulations. The Department proposes to reorganize the regulations for clarity and consistency with the format of the revised federal regulation, and includes other stylistic changes proposed to improve the overall quality of the regulation.

Legal Authority: 1976 Code Section 44-2-10 et. seq.

Plan for Implementation: The proposed amendments will take effect upon approval by the S.C. General Assembly, and publication in the State Register. An electronic copy of R.61-92, which includes these latest amendments, will be published on the Department's *Regulation Development Update* website at: http://www.scdhec.gov/Agency/RegulationsAndUpdates/RegulationDevelopmentUpdate/. At this site, click on the Land & Waste Management category and scroll down to R.61-92. Subsequently, the amended regulation will be published on the S.C. Legislature website in the Code of Regulations. Printed copies will be made available at cost by request through the DHEC Freedom of Information Office.

DETERMINATION OF NEED AND REASONABLENESS OF THE PROPOSED REGULATION BASED ON ALL FACTORS HEREIN AND EXPECTED BENEFITS:

The proposed amendments are needed to realize the following anticipated benefits:

1. The Department proposes to adopt the federal underground storage tank (UST) requirements of 40 CFR Part 280 effective October 13, 2015 that are not in existing R.61-92. This will demonstrate that the Department operates a program that is no less stringent than the federal requirements.

2. The Department proposes to incorporate new federal UST requirements of 40 CFR Part 280 while maintaining existing R.61-92 requirements.

3. The Department proposes to revise portions of R.61-92 by incorporating state-specific changes to enhance or clarify regulations. The revisions seek to ensure releases from USTs are minimized, protect human health and the environment, and reduce the financial liability on the State Underground Petroleum Environmental Response Bank (SUPERB) Account and the SUPERB Financial Responsibility Fund as it pertains to assessment, corrective action, and third party liability claims for petroleum releases from UST systems.

4. The Department proposes to reorganize the regulations for clarity and consistency with the format of the revised federal regulation and include other stylistic changes to improve the overall quality of the Regulation.

The above amendments are reasonable to realize the above benefits because they provide an efficient procedure without any anticipated cost increase, provide clear standards and criteria for the regulated community, and support Department goals.

DETERMINATION OF COSTS AND BENEFITS:

There are no anticipated cost increases to the State or permittees in complying with the proposed amendments specific to South Carolina. The changes are as follows: compatibility notification when changing tank contents from unregulated to regulated products, notification change for delivery prohibition, clarification of the definition for chief financial officer, notification to the Department on letters of credit, and change in acceptable location of the certificate of financial responsibility. Though the above variables prevent putting forth an exact cost number applicable to all permittees, the proposed amendments will benefit the regulated community by ensuring that releases from underground storage tanks are minimized, protecting human health and the environment, especially near environmentally sensitive and critical areas, and reducing the financial liability on the State Underground Petroleum Environmental Response Bank (SUPERB) Account and the SUPERB Financial Responsibility Fund as it pertains to assessment, corrective action, and third party liability claims for petroleum releases from UST systems.

The federal amendments include the following: removal of deferrals for airport hydrant systems and field constructed tanks, release detection for new and existing USTs supplying emergency generators, closure if internal lining not repairable, notification of ownership changes, record-keeping requirements for groundwater and vapor monitoring for release detection, release report timing changes, removal of allowance for ball float vent valves in new installations and no longer allowed if not repairable, notification of product compatibility, testing requirements for release detection monitoring equipment, testing requirements for containment sumps, testing requirement for overfill devices, testing requirement for overfill protection (spill buckets), addition of walkthrough compliance inspections by owners and operators, secondary containment requirement on all new installed underground tanks and piping, under dispenser containment required for all newly installed dispensers. Costs associated with these amendments may occur when permittees are required to upgrade existing UST systems, install new systems, upgrade monitoring equipment, or educate staff on new inspection requirements. Though the above variables prevent putting forth an exact cost number applicable to all permittees, implementation of the amendments will benefit the regulated community by ensuring that releases from underground storage tanks are minimized, protecting human health and the environment, especially near environmentally sensitive and critical areas, and reducing the financial liability on the State Underground Petroleum Environmental Response Bank (SUPERB) Account and the SUPERB Financial Responsibility Fund as it pertains to assessment, corrective action, and third party liability claims for petroleum releases from UST systems.

Federal amendments, such as walkthrough inspections, overfill/spill prevention equipment inspections, and containment sump testing may not have a one-time (up front) cost associated, but there may be a reoccurring operation and maintenance cost. Other amendments, such as the performance of site assessments for sites using vapor or groundwater monitoring for release detection, elimination of flow restrictors in vent lines for all new tanks and when overfill prevention equipment is replaced, operability tests of release detection equipment, will incur a one-time cost without continued operation and maintenance costs.

UNCERTAINTIES OF ESTIMATES:

There are no uncertainties of estimates relative to the costs to the State or permittees.

EFFECT ON ENVIRONMENT AND PUBLIC HEALTH:

The proposed amendments to R.61-92 seek to support the Department's goals relating to protection of public health and the environment through the anticipated benefits highlighted above. There is no anticipated effect on the environment.

DETRIMENTAL EFFECT ON THE ENVIRONMENT AND PUBLIC HEALTH IF THE REGULATION IS NOT IMPLEMENTED:

If the amendment is not implemented, the result would be less protective measures for human health and the environment from potential petroleum contamination.

Statement of Rationale:

The Department proposes to amend R.61-92, *Underground Storage Tank Control Regulations*, Part 280. This amendment focus on adopting the federal UST requirements of 40 CFR Part 280 effective October 13, 2015, and revising portions of R.61-92, Part 280 pertaining to compliance requirements of the State UST Control Regulations. The Department proposes to reorganize the regulations for clarity and consistency with the format of the revised federal regulation, to include other stylistic changes to improve the overall quality of the Regulation.

ATTACHMENT B
Summary of Proposed Revisions to
Regulation 61-92, Underground Storage Tank Control Regulations
December 8, 2016

SECTION CITATION/EXPLANATION OF CHANGE:

Correct the statutory authority under the title of the regulation in the text.
Stylistic changes are proposed to improve the overall quality of the Regulation.
Throughout the document, the words "ground-water" and "ground water" are being changed to "groundwater".
Throughout the document, the words "storm-water" and "stormwater" are being changed to "storm water".
Throughout the document, where needed, punctuation and capitalization errors were corrected.
Throughout the document, where needed, sections were renumbered to standardize the codification.

TABLE OF CONTENTS
The table was revised to reflect the proposed amendments.

SUBPART A
In Subpart A, the following wording was removed from heading "Interim Prohibition" and replaced with "Installation Requirements for Partially Excluded UST Systems".

61-92.280.10 Applicability
Section was revised to adopt federal requirements requiring all owners of airport hydrant fuel distribution systems and UST systems with field-constructed tanks to meet requirements of Subpart K. Section 61-92.280.10 was also revised to adopt federal requirements requiring all owners of UST systems that store fuel solely for use by emergency power generators to meet the release detection requirements previously deferred from Subpart D.
In 280.10(a), "and" was added and the following was removed, "(d), and (e)" and "Any UST system listed in paragraph (c) of this section must meet the requirements of Section 280.11."
The remainder of the paragraph revisions adopted only federal wording.
In 280.10(b), the word, "Exclusions" adopted from federal wording.
In 280.10(c), "Deferrals", "and", "any of the following types of UST systems" were removed and "Partial Exclusions" and, "J, and K of this part" were added from federal wording.
In 280.10(c)(1), "not covered under paragraph (b)(2) of this section" and "Aboveground storage tanks associated with; (i) Airport hydrant fuel distribution systems regulated under subpart K of this part; and (ii) UST systems with field-constructed tanks regulated under subpart K of this part;" were added from federal wording. Formatting change to match federal wording added a "(3)" and the word "and".
The existing (3) was moved to (4) and revised to match federal wording by removing "3" and adding "4", removing "regulated" and inserting "licensed", removing "under" and inserting "and subject to Nuclear Regulatory Commission requirements regarding design and quality criteria, including but not limited to", "part" and removing "Appendix A".
The following was removed, "(4) Airport Hydrant fuel distribution systems; and (5) UST systems with field-constructed tanks. (d) Deferrals. Subpart D does not apply to any UST system that stores fuel solely for use by emergency power generators."
Existing paragraph 280.10(e) was changed by removing "e" and inserting "d".

61-92.280.11 Installation Requirements for Partially Excluded UST Systems
In heading Section 280.11, “INTERIM PROHIBITION” and “DEFERRED” were removed and “INSTALLATION REQUIREMENTS” and “PARTIALLY EXCLUDED” was inserted.
Section was revised to remove outdated industry standards and include the current industry standards and recommended practices by nationally recognized organizations.

61-92.280.12 Definitions
All definitions were indexed using letters for clarity. Some definitions were revised to better match the statutory definition.

The definition for "class A operator" was added to match the federal regulations.

The definition for "class B operator" was added to match the federal regulations.

The definition for "class C operator" was added to match the federal regulations.

The definition for "containment sump" was added to match the federal regulations.

The definition for "critical area" was revised to clarify beaches and beach/dune systems. Also, the reference to the office of Ocean and Coastal Resource Management Regulations was deleted and "which is the area from the mean high-water mark to the setback line as determined by Section 48-39-280" was added for clarification.

The definition for "dispenser" was added to match the federal regulations.

The definition for "dispenser system" was added to match the federal regulations.

The definition for "flow-through process tank" was revised to change the last word from “products” to "process" to match the federal regulations.

The definition for "motor fuel" was revised to match the federal regulation.

The definition for “navigable waters” was revised to include Department determination of the definition by adding, “or”, “.2.C” for clarity and “Navigability shall be determined by the Department”.

The definition for "person" was revised to match the statutory definition at S.C. Code Ann. 44-2-20(13) and to correct a typographical error printed in the Notice of Proposed Rulemaking, by deleting “d” from the end of “purpose”.

The definition for “regulated substance” was revised in paragraph 1 to remove the wording “the Comprehensive Environmental Response Comprehension and Liability Act” because “CERCLA” was previously defined and “RCRA” was added to clarify “subtitle C” verbiage. In paragraph 2 “and petroleum products” was added and the remainder was removed for clarity.

The definition for "release detection" was revised to include "a leak has occurred" to match the federal regulations.

The definition for "repair" was revised to match the federal regulations to explain what a repair means.

The definition for "replace" was revised to include federal regulations with existing state regulations. Pursuant to public comment, the Department clarified the wording to be consistent with other provisions of the State UST Control Regulations that state “more than 25 percent.”

The definition for "secondary containment" was revised to match the federal regulations and include minor changes for clarity from SC to explain design must contain any leak from components within the containment area.

The definition for “solid waste disposal act” was added for clarity with respect to RCRA.

The definition for "training program" was added to match the federal regulation.

The definition for "under dispenser containment" was revised to match the federal regulation to clarify it is considered as containment.

The definition for "underground storage tank" was revised to include necessary portions of the federal regulations and to match existing contents of the SUPERB statute.

61-92.280.20 Performance Standards for New UST Systems

Section was revised to include wording to match the federal regulations and existing trigger dates from South Carolina for secondary containment requirements on new or replaced tanks and/or piping installations. Throughout the section, all “note to paragraph” paragraphs were amended to remove outdated industry standards and include the current industry standards and recommended practices by nationally recognized organizations. Where needed, all sections were renumbered to standardize the codification.

In paragraph (c), added “transfer” from the federal regulation to clarify the “operator” mentioned is in reference to the delivery driver. Added wording to match the federal regulations to no longer allow owners and operators to install or replace overfill prevention using a vent line flow restrictor (ball-float vent valve) on new or existing UST systems. Added wording to match federal regulations to require periodic testing for spill and overfill equipment.

In paragraph (d), deleted the word “new” to denote drop tube requirements are for all UST systems, not just new ones.

In paragraph (e), replaced “all tanks and piping” with “The UST system” to match federal regulation.

In paragraph (f), added wording to match federal regulation reference to another paragraph for clarity.

In paragraph (g), added all new wording to match federal regulation in reference to under dispenser containment requirements.

In paragraph (h), adopted wording from existing current regulation paragraph (g) and revised to delete the reference to require UST tanks and piping to be secondarily contained if installed within 1,000 feet of public water supply system. Wording added to match federal regulation to provide deferral of Subpart D for European suction piping. All wording removed from existing paragraph (h) requiring tanks and piping within 100 feet of a public water supply well, coastal zone critical area, or state navigable waters. The revised regulation will require all new UST tanks and piping to be secondarily contained.

61-92.280.21 Upgrading of Existing UST Systems

Includes the federal regulation requirements for owners and operators to permanently close any UST system that has not met the new performance standards or has not been upgraded. This section does not apply to airport hydrant systems and field-constructed tanks. Federal wording included to require owners and operators with internal lining to permanently close tanks if liner cannot be repaired. Section adds industry codes of practice per federal requirements.

61-92.280.22 Notification Requirements
Amended all paragraphs of this section, where needed, wording revised to match federal regulation requirements for addition of current codes of practice and requirement of owners to notify the Department when they have assumed ownership with minor revisions from SC for reporting on proper forms approved by the Department.

61-92.280.23 New Tanks-permits required
In paragraph (a), replaced “construction” with “installation” for standardization with current permit applications.
In paragraph (b), revised current regulation to properly describe “permit to operate” for standardization and to utilize current terminology used on Department forms. Changed paragraph reference to encompass all required sections for properly completing application for permit to operate.
In paragraphs (e)-(l), all references to delivery prohibition were deleted and moved to Section 280.26.
61-92.280.24 Testing
In paragraph (a), revised current regulation wording to incorporate proper industry standards and manufacturer protocols for secondary containment equipment to be consistent with federal regulatory requirements.
In paragraphs (b) and (c), removed “hydrostatically” and added “functionality” to incorporate federal regulatory testing requirements. (…“tightness” refers to tank and line testing, “functionality” refers to release detection equipment testing that is not containment, thus not tested for tightness).
In paragraph (d), added state revisions for reporting on forms approved by the Department.

61-92.280.25 Secondary containment required
Revised section heading to match all other section headings to incorporate the word “Section”.
In paragraph (a) changed "shall" to "must".
In paragraphs (a) and (b), changed section reference from “g” to “h” to reflect proper section where secondary containment reference is located.

61-92.280.26 Delivery Prohibition (formerly 61-92.280.23)
Section was created to allow relocation of the requirements for delivery prohibition from former Section 280.23.
In paragraph (a), added “required secondary containment is not installed; or” to ensure where secondary containment is required the Department has authority to prevent deliveries for ensuring compliance.
In paragraph (c), added “alleged” to properly reflect wording on Department issued forms. Inserted “components” for clarity that as all metal components that routinely contain product must be protected from corrosion.
In paragraph (d), added similar wording from (a)(6) to clarify Department's authority to impose delivery prohibition for other conditions that may threaten the public or the environment.
In paragraph (e), paragraph references were changed because of delivery prohibition section relocation. In paragraph (e)(2), to clarify why DP sites are listed on the website, for notification of owner/operator and supplier.
In paragraph (f), added wording on how the Department will notify owner/operator about delivery prohibition implementation.
In paragraph (g), added wording on how the Department will notify owner/operator and the supplier about delivery prohibition implementation.
In note to Section 280.26, added reference to new section location for standardization.

61-92.280.30 Spill and overfill control
Section revised to remove outdated industry standards and include current codes of practice to match federal regulation.

61-92.280.31 Operation and maintenance of corrosion protection
Section revised to adopt federal wording requiring tank owners to permanently close tanks if corrosion protection is not maintained in accordance with this section or if the UST system undergoes a change-in-service.
In note to paragraph (b), revised to remove outdated industry standards and include current codes of practice to match federal regulation.

61-92.280.32 Compatibility
Section revised to adopt federal wording requiring tank owners to notify of changes in service to alternative fuels (greater than 10% ethanol or greater than 20% biodiesel).
In note to Section 280.32, revised to remove outdated industry standards, update name of current code of practice and include current codes of practice to match federal regulation.

61-92.280.33 Repairs allowed
In note to paragraph (a) revised to standardize the codification and, where needed, revised wording and include current codes of practice to match federal regulation requirements with minor state change for reporting on Department approved forms.
In paragraph (c), changed "fiberglass" to "non-corrodible" to match federal wording and inserted state clarification wording for additional reference.
In paragraph (d), revised per federal requirements by adding testing requirements following repairs.
In note to paragraph (d) revised to standardize the codification and, where needed, revised wording and include current codes of practice to match federal regulation requirements.
In paragraph (e), minor state change for reporting on Department approved forms.
In paragraph (f), revised paragraph by adding federal wording to meet federal and state specific to require testing on Department approved forms.
In paragraph (g), added federal wording to match federal regulation.

61-92.280.34 Reporting and recordkeeping
Section revised to include state wording requiring owners/operators to provide access to all UST equipment at inspection, document testing results done in conjunction with proper repairs allowed, and in paragraphs where needed, renumbered to standardize the codification.
Where needed throughout section, federal wording inserted to match federal regulation for notification purposes.
In paragraph (b)(4), inserted state wording "and testing results" to document that the testing was completed properly.

61-92.280.35 Periodic testing of spill prevention equipment and containment sumps used for interstitial monitoring of piping and periodic inspection of overfill prevention equipment
Amended section to delete and move all references of Operator Training to Subpart J to match codification of federal regulation. All wording revised to provide variation in testing frequency for spill prevention, secondary containment, and overfill prevention equipment to match federal regulation.

61-92.280.36 Periodic operation and maintenance walkthrough inspections
Section revised to adopt federal wording requiring owners to complete walkthrough inspections.
Adding state revisions from state revisions for reporting on forms approved by the Department.

61-92.280.40 General requirements for all UST systems
In paragraph (a), per federal requirements, removed existing wording to include all UST systems.
In paragraph (a)(3), revised to include current codes of practice and match federal regulation
and added state revisions for reporting on forms approved by the Department.
In paragraph (a)(4), moved existing wording from (a)(3) and revised to match federal regulation.

In paragraph (b), revised wording to match federal regulation references.
In paragraph (c), all existing wording and table removed to match federal regulation.
Moved and revised existing wording from paragraph (d) to (c) and revised to match the federal regulation.

61-92.280.41 Requirements for petroleum UST systems
Where needed, paragraphs were renumbered to standardize the codification and revised to match federal regulation.
Adopted federal requirements for interstitial monitoring.
Removed state wording allowing monthly inventory control as a release detection method.

61-92.280.42 Requirements for hazardous substance UST systems
Where needed, paragraphs were renumbered to standardize the codification and revised to match federal regulation.
Adopted federal language to clarify the existing requirement for interstitial monitoring on hazardous substance systems.
Revised wording for "release" to "leak" to match federal regulations.

61-92.280.43 Methods of release detection for tanks
Throughout section, where needed, the word “release” was replaced with “leak” to match federal wording and follow changes in definition to match federal regulation.
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

In paragraph (a) revised state wording for clarity that inventory control is no longer a valid release detection method since being phased out in 2008.
In note to paragraph (a), revised to reflect name change when code of practice updated to match federal regulation.
In paragraph (b), outdated state wording and table removed to reflect phase out of larger tanks no longer allowed to do manual tank gauging as stand-alone monthly monitoring for tanks larger than 550 gallons.
In paragraph (d), revised to remove state wording and added federal wording to explain standard and continuous modes of leak detection utilizing tank gauges to match federal regulation.
In paragraphs (e)(6) and (f)(7) revised regulation to clarify requirement for all owners using groundwater and vapor monitoring as release detection to conduct a onetime site assessment at the time of permitting or within one year of the regulation effective date.
Added federal wording to clarify statistical inventory reconciliation method.

61-92.280.44 Methods of release detection for piping
In paragraph (a), inserted reference from previous section where federal regulation imposed new testing requirements for leak detection equipment.
In paragraph (c), inserted reference from previous section where federal regulation refers to tank monthly monitoring may be used for monthly monitoring (0.2 gallon per hour) on piping if the method is capable of piping monitoring.
Added federal wording to clarify statistical inventory reconciliation method.

61-92.280.45 Release detection recordkeeping
Throughout the section, removed outdated state wording and federal wording inserted to match the federal regulation.
In paragraph (a), inserted federal wording requiring site assessment reports must be retained as long as groundwater monitoring or vapor monitoring methods are used for monthly leak detection.

In paragraph (b), inserted federal wording requiring results of sampling, testing, or monitoring be maintained for a year or another reasonable time determined by the Department to standardize the records keeping timeframe.

61-92.280.50 Reporting of suspected releases
The reporting requirement of 72 hours for owners and operators to report suspected releases was revised to 24 hours to match the federal regulations.
Throughout the section, outdated state wording concerning inventory control was removed.
Federal wording concerning reporting of suspected releases was added to clarify existing state regulations.

61-92.280.51 Investigations due to off-site impacts
No changes.

61-92.280.52 Release investigation and confirmation steps
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.
In paragraph (b), inserted state wording requiring test results be submitted in a format as directed by the Department.

61-92.280.53 Reporting and cleanup of spills and overfills
The reporting requirement of 72 hours for owners and operators to report suspected releases was revised to 24 hours to match the federal regulations.
Note to paragraph (a) was added to meet the federal regulation and existing note to section was deleted to match federal regulation.

61-92.280.60 General
No changes.

61-92.280.61 Initial response
Section was revised from a requirement of 72 hours for owners and operators to respond to a suspected release to 24 hours to match the federal regulations.

61-92.280.62 Initial abatement measures and site check
Throughout the section, changes to grammar were made to remove state wording and insert wording to match federal regulation requirements.

61-92.280.63 Initial site characterization
Throughout the section, changes to grammar were made to remove state wording and insert wording to match federal regulation requirements.

61-92.280.64 Free product removal
Throughout the section, changes for punctuation to remove state wording and insert wording to match federal regulation requirements.

61-92.280.65 Investigations for soil and groundwater cleanup
Throughout the section, changes to grammar were made to remove state wording and insert wording to match federal regulation requirements.

61-92.280.66 Corrective action plan
Throughout the section, changes to grammar were made to remove state wording and insert wording to match federal regulation requirements.

61-92.280.67 Public participation
No changes.

61-92.280.70 Temporary closure
In paragraph (a), added federal wording to include airport hydrant systems and field-constructed tanks
Federal wording is added to remove release detection operation and maintenance testing and inspections when UST systems are empty.
Federal wording is added to remove spill and overfill operation and maintenance testing and inspections when UST systems are empty.

61-92.280.71 Permanent closure and changes-in-service
Removed state wording and inserted federal wording to match federal regulation.
Added state wording to require owners and operators to notify the Department in writing of their intent to permanently close, make a change-in-service, replace piping or dispenser. This was added to ensure that the Department can provide adequate compliance assistance.
In paragraph (c), state wording added to clarify that a change in service also includes swiching from non-regulated substance to regulated substance.
In note to section, updated current code of practice titles, removed outdated codes of practice, and inserted new ones to match the federal regulation.

61-92.280.72 Assessing the site at closure and change-in-service
Throughout the section, changes to grammar and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.73 Applicability to previously closed UST systems
Throughout the section, changes to grammar to match federal regulation requirements.

61-92.280.74 Closure records
Throughout the section, changes to grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.
State wording revised “mailing” to “submitting” to allow for other forms of document transfer to the Department.

61-92.280.90 Applicability
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.91 Compliance dates
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.92 Definition of terms
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.
Paragraph (c) was revised to expand the definition of Chief Financial Operator with excerpt derived directly from EPA guidance, “Financial Responsibility For Underground Storage Tanks: A Reference Manual”.

Paragraph (t) added to match federal regulation for clarity on the word, “termination” as it pertains to financial responsibility and substitute coverage.

61-92.280.93 Amount and scope of required financial responsibility
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.94 Allowable mechanisms and combinations of mechanisms
Throughout the section, changes for punctuation, renumbering, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.95 Financial test of self-insurance
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.96 Guarantee
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.97 Insurance and risk retention group coverage
Throughout the section, changes for punctuation, grammar and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.98 Surety bond
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.99 Letter of credit
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.
State wording added to paragraph (b) to require banks to notify the Department (in addition to owners and operators) prior to cancelation of a letter of credit. This addition will assist the Department to ensure that owners and operators maintain financial responsibility.

61-92.280.100 Use of state-required mechanism (Reserved)
No changes.

61-92.280.101 State fund or other state assurance
Throughout the section, changes to grammar and revisions made to remove state wording to match federal regulation requirements.

61-92.280.102 Trust fund
Throughout the section, changes for grammar were made.

61-92.280.103 Standby trust fund
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal regulation requirements.
Insert state wording to clarify the statement is only applicable to standby trust agreements.

61-92.280.104 Local government bond rating test
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.105 Local government financial test
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.106 Local government guarantee
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.107 Local government fund
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.108 Substitution of financial assurance mechanisms by owner or operator
Throughout the section, changes for grammar made.

61-92.280.109 Cancellation or nonrenewal by a provider of financial assurance
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.
State wording added to require a provider of financial assurance to notify the Department prior to cancellation or failure to renew an assurance mechanism. This addition will help the Department to ensure that owners and operators maintain financial responsibility.

61-92.280.110 Reporting by owner or operator
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.111 Recordkeeping
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.
In paragraph (b)(8), state wording removed to no longer require owners and operators to maintain proof of financial responsibility on site. Owners and operators will be allowed to maintain proof of financial responsibility on file whether it be on site or at a remote location. Change was made to revert back to the federal requirement to alleviate the paperwork burden on the owner/operator.
Added state revisions for reporting on forms approved by the Department.
Revised state wording on certificate of financial responsibility form for clarity.

61-92.280.112 Drawing on financial assurance mechanisms
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

61-92.280.113 Release from the requirements
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements.
Section was revised to remove requirement for owners and operators to maintain financial responsibility after a tank has undergone a change-in-service.

61-92.280.114 Bankruptcy or other incapacity of owner or operator or provider of financial assurance
Throughout the section, changes for grammar made.

61-92.280.115 Replenishment of guarantees, letters of credit, or surety bonds
Throughout the section, changes for grammar, and revisions made to remove state wording to match federal regulation requirements.

61-92.280.116 Suspension of enforcement (Reserved)
No changes.

61-92.280.200 Definitions
Throughout the section, changes for punctuation, grammar, and revisions made to remove state wording and insert federal wording to match federal regulation requirements including reference to new subparts.

61-92.280.210 Participation in management
Throughout the section, changes for grammar, and revisions made to insert federal wording to match federal regulation requirements.

61-92.280.220 Ownership of an underground storage tank or underground storage tank system or facility or property on which an underground storage tank or underground storage tank system is located
Throughout the section, changes for grammar made.

61-92.280.230 Operating an underground storage tank or underground storage tank system
Throughout the section, changes to grammar and revisions made to remove state wording and insert federal wording to match federal regulation requirements.

SUBPART J Operator Training
Subpart renamed to match federal regulation location for operator training requirements.

61-92.280.240 General requirement for all UST systems
Throughout the section, changes for punctuation, grammar, renumbering, and revisions made to insert state wording for development of supplemental training for new regulation requirements to reduce the burden on operators for ease of compliance, and insert federal wording to meet new federal regulation requirements.

61-92.280.241 Designation of Class A, B, and C operators
Throughout the section, insert federal wording to meet new federal regulation requirements.

61-92.280.242 Requirements for operator training
Throughout the section, revisions made to insert federal wording to meet new federal regulation requirements. State wording inserted “as approved by the Department” in reference to Class A, B, & C operator training requirements.
In paragraph (a), inserted state wording to include “as approved by the Department” in reference to Class B operator training requirements.
In paragraph (b), inserted state wording to include “as approved by the Department” in reference to Class B operator training requirements.
In paragraph (b)(2), inserted “state” and “and” for clarification of what B operator is required to know and what skills are needed to comply.

61-92.280.243 Timing of operator training
Throughout the section, revisions made to insert federal wording to meet new federal regulation requirements.

61-92.280.244 Retraining
Throughout the section, changes made to insert state wording to provide Department ability to approve external operator training programs to be used in SC and adding federal wording to meet new federal regulation requirements.
Addition of state wording to clarify the timeliness of supplemental training requirements.

61-92.280.245 Documentation
Throughout the section, revisions made to insert federal wording to meet new federal regulation requirements.

SUBPART K UST Systems with Field-Constructed Tanks and Airport Hydrant Fuel Distribution Systems
Subpart created to match federal regulation location for new requirements on previously deferred UST systems.

61-92.280.250 Definitions
Insert federal wording to meet new federal regulation requirements.

61-92.280.251 General requirements
Insert federal wording to meet new federal regulation requirements.
Addition of state wording to reference EPA form or form approved by the Department.

61-92.280.252 Additions, exceptions, and alternatives for UST systems with field-constructed tanks and airport hydrant systems
Insert federal wording to meet new federal regulation requirements.
In paragraph (d)(2)(iv), inserted state wording, “perform”, to provide clarification in reference to the method mentioned as a requirement. “Perform” was added to be consistent with previous paragraphs from the federal regulation.

SUBPART L Variances - Violations and Penalties - Appeals
Subpart created to relocate previously existing Subpart J

61-92.280.300 Variances
No changes.

61-92.280.301 Violations and penalties
No changes.

61-92.280.302 Appeals
No changes.

ATTACHMENT C
Text of Proposed Amendments to
Regulation 61-92, Underground Storage Tank Control Regulations
Statutory Authority: 1976 Code Section 44-2-10 et.seq.

December 8, 2016

Text of Proposed Amendment to Regulation 61-92 for Public Comment:

Legend: Underlined text = new text.
~~Strikeout text~~ = text being deleted

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PART 280
TECHNICAL STANDARDS AND CORRECTIVE ACTION REQUIREMENTS FOR OWNERS AND OPERATORS OF UNDERGROUND STORAGE TANKS (UST)

SUBPART A
Program Scope and ~~Interim Prohibition~~Installation Requirements for Partially Excluded UST Systems

SECTION 280.10. APPLICABILITY.

(a) The requirements of this ~~P~~part apply to all owners and operators of an UST system as defined in Section 280.12 (pp) and (rr) except as otherwise provided in paragraphs (b)~~,~~ and (c)~~, (d), and (e)~~ of this section.

(1) Previously deferred UST systems. Airport hydrant fuel distribution systems, UST systems with field-constructed tanks, and UST systems that store fuel solely for use by emergency power generators must meet the requirements of this part as follows:

(i) Airport hydrant fuel distribution systems and UST systems with field-constructed tanks must meet the requirements in Subpart K of this part.

(ii) UST systems that store fuel solely for use by emergency power generators installed on or before May 23, 2008 must meet the Subpart D requirements on or before [T*hree years from Effective Date*].

(iii) UST systems that store fuel solely for use by emergency power generators installed after May 23, 2008 must meet all applicable requirements of this part at installation.

(2) Any UST system listed in paragraph (c) of this section must meet the requirements of Section 280.11.

(b) Exclusions. The following UST systems are excluded from the requirements of this ~~P~~part:

(1) Any UST system holding hazardous wastes listed or identified under Subtitle C of the Solid Waste Disposal Act, or a mixture of such hazardous waste and other regulated substances.

(2) Any wastewater treatment tank system that is part of a wastewater treatment facility regulated under Section 402 or 307(b) of the Clean Water Act.

(3) Equipment or machinery that contains regulated substances for operational purposes such as hydraulic lift tanks and electrical equipment tanks.

(4) Any UST system whose capacity is 110 gallons or less.

(5) Any UST system that contains a de minimis concentration of regulated substances.

(6) Any emergency spill or overflow containment UST system that is expeditiously emptied after use.

(c) ~~Deferrals~~Partial Exclusions. Subparts B, C, D, E, ~~and~~ G, J, and K of this part do not apply to ~~any of the following types of UST systems~~:

(1) Wastewater treatment tank systems not covered under paragraph (b)(2) of this section;

(2) Aboveground storage tanks associated with:

(i) Airport hydrant fuel distribution systems regulated under Subpart K of this part; and

(ii) UST systems with field-constructed tanks regulated under Subpart K of this part;

(3) Any UST systems containing radioactive material that are regulated under the Atomic Energy Act of 1954 (42 U.S.C. 2011 and following); and

(~~3~~4) Any UST system that is part of an emergency generator system at nuclear power generation facilities ~~regulated~~licensed by the Nuclear Regulatory Commission ~~under~~and subject to Nuclear Regulatory Commission requirements regarding design and quality criteria, including but not limited to 10 CFR Part 50~~ Appendix A;~~.

~~(4) Airport Hydrant fuel distribution systems; and~~

~~(5) UST systems with field-constructed tanks.~~

~~(d) Deferrals. Subpart D does not apply to any UST system that stores fuel solely for use by emergency power generators.~~

(~~e~~d) No person may place regulated substances and no owner or operator may cause regulated substances to be placed into an UST system for which the owner or operator does not hold a currently valid registration or permit.

SECTION 280.11. ~~INTERIM PROHIBITION~~INSTALLATION REQUIREMENTS FOR ~~DEFERRED~~PARTIALLY EXCLUDED UST SYSTEMS.

(a) ~~No person may~~Owners and operators must install an UST system listed in Section 280.10(c)(1), (3), or (4)~~ for the purpose of~~ storing regulated substances ~~unless the UST system~~ (whether of single- or double- wall construction) that meets the following requirements:

(1) Will prevent releases due to corrosion or structural failure for the operational life of the UST system;

(2) Is cathodically protected against corrosion, constructed of non-corrodible material, steel clad with a non-corrodible material, or designed in a manner to prevent the release or threatened release of any stored substance; and

(3) Is constructed or lined with material that is compatible with the stored substance.

(b) Notwithstanding paragraph (a) of this section, an UST system without corrosion protection may be installed at a site that is determined by a corrosion expert not to be corrosive enough to cause it to have a release due to corrosion during its operating life. Owners and operators must maintain records that demonstrate compliance with the requirements of this paragraph for the remaining life of the tank.

[Note to paragraphs (a) and (b)~~:~~. ~~The National Association of Corrosion Engineers Standard RP-02-85, "Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems," may be used as guidance for complying with~~

~~paragraph (b) of this section.~~ The following codes of practice may be used as guidance for complying with this section:

(A) NACE International Standard Practice SP 0285, "External Corrosion Control of Underground Storage Tank Systems by Cathodic Protection";

(B) NACE International Standard Practice SP 0169, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems";

(C) American Petroleum Institute Recommended Practice 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems"; or

(D) Steel Tank Institute Recommended Practice R892, "Recommended Practice for Corrosion Protection of Underground Piping Networks Associated with Liquid Storage and Dispensing Systems".]

SECTION 280.12. DEFINITIONS.

(a) "Aboveground release" means any release to the surface of the land or to surface water. This includes, but is not limited to, releases from the ~~above-ground~~aboveground portion of an UST system and aboveground releases associated with overfills and transfer operations as the regulated substance moves to or from an UST system.

(b) "Ancillary equipment" means any devices including, but not limited to, such devices as piping, fittings, flanges, valves, and pumps used to distribute, meter, or control the flow of regulated substances to and from an UST.

(c) "Belowground release" means any release to the subsurface of the land and to ~~ground water~~groundwater. This includes, but is not limited to, releases from the belowground portions of an underground storage tank system and belowground releases associated with overfills and transfer operations as the regulated substance moves to or from an underground storage tank.

(d) "Beneath the surface of the ground" means beneath the ground surface or otherwise covered with earthen materials.

(e) "Cathodic protection" is a technique to prevent corrosion of a metal surface by making that surface the cathode of an electrochemical cell. For example, a tank system can be cathodically protected through the application of either galvanic anodes or impressed current.

(f) "Cathodic protection tester" means a person who can demonstrate an understanding of the principles and measurements of all common types of cathodic protection systems as applied to buried or submerged metal piping and tank systems. At a minimum, such persons must have education and experience in soil resistivity, stray current, structure-to-soil potential, and component electrical isolation measurements of buried metal piping and tank systems.

(g) "CERCLA" means the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended.

(h) "Class A operator" means the individual who has primary responsibility to operate and maintain the UST system in accordance with applicable requirements established by the Department. The Class A

operator typically manages resources and personnel, such as establishing work assignments, to achieve and maintain compliance with regulatory requirements.

(i) “Class B operator” means the individual who has day-to-day responsibility for implementing applicable regulatory requirements established by the Department. The Class B operator typically implements in-field aspects of operation, maintenance, and associated recordkeeping for the UST system.

(j) “Class C operator” means the individual responsible for initially addressing emergencies presented by a spill or release from an UST system. The Class C operator typically controls or monitors the dispensing or sale of regulated substances.

(k) "Coastal zone" means all coastal waters and submerged lands seaward to the State's jurisdictional limits and all lands and waters in the counties of the State which contain any one or more of the critical areas. These counties are Beaufort, Berkeley, Charleston, Colleton, Dorchester, Horry, Jasper, and Georgetown.

(l) “Community Water System (CWS)” means a public water system that serves at least 15 service connections used by year-round residents of the area served by the system; or regularly serves at least 25 year-round residents. The following are included as part of the community water system:

(~~a~~1) The wellhead for groundwater and/or intake point(s) for surface water;

(~~b~~2) Collection, treatment, storage, and distribution facilities that are part of the community water system; and

(~~c~~3) The piping distribution system that delivers the water to the community.

(m) "Compatible" means the ability of two or more substances to maintain their respective physical and chemical properties upon contact with one another for the design life of the tank system under conditions likely to be encountered in the UST.

(n) "Connected piping" means all underground piping including valves, elbows, joints, flanges, and flexible connectors attached to a tank system through which regulated substances flow. For the purpose~~s~~ of determining how much piping is connected to any individual UST system, the piping that joins two UST systems should be allocated equally between them.

(o) "Consumptive use" with respect to heating oil means consumed on the premises.

(p) “Containment Sump” means a liquid-tight container that protects the environment by containing leaks and spills of regulated substances from piping, dispensers, pumps and related components in the containment area. Containment sumps may be single walled or secondarily contained and located at the top of tank (tank top or submersible turbine pump sump), underneath the dispenser (under-dispenser containment sump), or at other points in the piping run (transition or intermediate sump).

(q) "Corrosion expert" means a person who, by reason of thorough knowledge of the physical sciences and the principles of engineering and mathematics acquired by a professional education and related practical experience, is qualified to engage in the practice of corrosion control on buried or submerged metal piping systems and metal~~s~~ tanks. Such a person must be accredited or certified as being qualified by the National Association of Corrosion Engineers or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metal piping systems and metal tanks.

(r) "Critical area" means any of the following: (1) coastal waters, (2) tidelands, ~~or~~ (3) beaches; or (4) beach/dune systems~~,~~ ~~as defined by the Office of Ocean and Coastal Resource Management Regulations~~ which is the area from the mean high-water mark to the setback line as determined by Section 48-39-280.

(s) "Department" means the South Carolina Department of Health and Environmental Control.

(t) "Dielectric material" means a material that does not conduct direct electrical current. Dielectric coatings are used to electrically isolate UST systems from the surrounding soils. Dielectric bushings are used to electrically isolate portions of the UST system (e.g., tank from piping).

(u) “Dispenser” means equipment located aboveground that dispenses regulated substances from the UST system.

(v) “Dispenser system” means the dispenser and the equipment necessary to connect the dispenser to the underground storage tank system.

(w) "Electrical equipment" means underground equipment that contains dielectric fluid that is necessary for the operation of equipment such as transformers and buried electrical cable.

(x) "Excavation zone" means the volume containing the tank system and backfill material bounded by the ground surface, walls, and floor of the pit and trenches into which the UST system is placed at the time of installation.

(y) "Existing tank system" means a tank system used to contain an accumulation of regulated substances or for which installation has commenced on or before December 22, 1988. Installation is considered to have commenced if:

(~~a~~1) ~~t~~The owner or operator has obtained all federal, state, and local approvals or permits necessary to begin physical construction of the site or installation of the tank system; and if,

(~~b~~2)(~~1~~i) ~~e~~Either a continuous on-site physical construction or installation program has begun; or,

(~~2~~ii) ~~t~~The owner or operator has entered into contractual obligations-which cannot be cancelled or modified without substantial loss-for physical construction at the site or installation of the tank system to be completed within a reasonable time.

(z) "Farm tank" is a tank located on a tract of land devoted to the production of crops or raising animals, including fish, and associated residences and improvements. A farm tank must be located on the farm property. "Farm" includes fish hatcheries, rangeland and nurseries with growing operations.

(aa) "Flow-through process tank" is a tank that forms an integral part of a production process through which there is a steady, variable, recurring, or intermittent flow of materials during the operation of the process. Flow-through process tanks do not include tanks used for the storage of materials prior to their introduction into the production process or for the storage of finished products or by-products from the production ~~products~~process.

(bb) "Free product" refers to a regulated substance that is present as a nonaqueous phase liquid (e.g., liquid not dissolved in water.)

(cc) "Gathering lines" means any pipeline, equipment, facility, or building used in the transportation of oil or gas during oil or gas production or gathering operations.

(dd) "Hazardous substance UST system" means an underground storage tank system that contains a hazardous substance defined in Section 101(14) of ~~T~~the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (but not including any substance regulated as a hazardous waste under subtitle C) or any mixture of such substances and petroleum, and which is not a petroleum UST system.

(ee) "Heating oil" means petroleum that is No. 1, No. 2, No. 4-light, No. 4-heavy, No. 5-light, No. 5-heavy, and No. 6 technical grades of fuel oil; other residual fuel oils (including Navy Special Fuel Oil and Bunker C); and other fuels when used as substitutes for one of these fuel oils. Heating oil is typically used in the operation of heating equipment, boilers, or furnaces.

(ff) "Hydraulic lift tank" means a tank holding hydraulic fluid for a closed-loop mechanical system that uses compressed air or hydraulic fluid to operate lifts, elevators, and other similar devices.

(gg) “Interstitial space” means the opening formed between the inner and outer wall of an UST system with double-walled construction or the opening formed between the inner wall of a containment sump and the UST system component that it contains.

(hh) "Liquid trap" means sumps, well cellars, and other traps used in association with oil and gas production, gathering, and extraction operations (including gas production plants), ~~and~~ for the purpose of collecting oil, water, and other liquids. These liquid traps may temporarily collect liquids for subsequent disposition or reinjection into a production or pipeline stream, or may collect and separate liquids from a gas stream.

(ii) "Maintenance" means the normal operational upkeep to prevent an underground storage tank system from releasing product.

(jj) "Motor fuel" means ~~petroleum or~~ a ~~petroleum-based substance that is~~complex blend of hydrocarbons typically used in the operation of a motor engine, such as motor gasoline, aviation gasoline, No. 1 or No. 2 diesel fuel, or any ~~grade of gasohol, and is typically used in the operation of a motor engine~~blend containing one or more of these substances (for example: motor gasoline blended with alcohol).

(kk) "Navigable waters" means those waters which are now navigable, or have been navigable at any time, or are capable of being rendered navigable by the removal of accidental obstructions, by rafts of lumber or timber or by small pleasure or sport fishing boats. Navigability is defined in R.19-450.2.C, Permits for Construction in Navigable Waters. Navigability shall be determined by the Department.

(ll) "New tank system" means a tank system that will be used to contain an accumulation of regulated substances and for which installation has commenced after December 22, 1988. (See also "Existing Tank System").

(mm) "Noncommercial purposes” with respect to motor fuel means not for resale.

(nn) "On the premises where stored" with respect to heating oil means UST systems located on the same property where the stored heating oil is used.

(oo) "Operational life" refers to the period beginning when installation of the tank system has commenced until the time the tank system is properly closed under Subpart G.

(pp) "Operator" means any person in control of, or having responsibility for~~,~~ the daily operation of the UST system.

(qq) "Overfill release" is a release that occurs when a tank is filled beyond its capacity, resulting in a discharge of the regulated substance to the environment.

(rr) "Owner" means:

(~~a~~1) ~~i~~In the case of an UST system in use on November 8, 1984, or brought into use after that date, a person who owns an UST system used for storage, use, or dispensing of regulated substances;~~ or~~

(~~b~~2) iIn the case of any UST system in use before November 8, 1984, but no longer in use on that date, a person who owned such an UST immediately before the discontinuation of its use; or

(~~c~~3) ~~a~~A person who has assumed legal ownership of the UST ~~system~~ through the provisions of a contract of sale or other legally binding transfer of ownership.

(ss) "Person" means an individual, ~~trust, firm, joint stock company, federal agency,~~partner, corporation organized or united for a business purpose, or a governmental agency~~ corporation, state, municipality, commission, political subdivision of a state, or any interstate body. "Person" also includes a consortium, a joint venture, a commercial entity, and the United States Government~~.

(tt) "Petroleum UST system" means an underground storage tank system that contains petroleum or a mixture of petroleum with de minimis quantities of other regulated substances. Such systems include those containing motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils.

(uu) "Pipe" or "Piping" means a hollow cylinder or tubular conduit that is constructed of non-earthen materials.

(vv) "Pipeline facilities (including gathering lines)" are new and existing pipe rights-of-way and any associated equipment, facilities, or buildings.

(ww) “Potable Drinking Water Well” means any hole (dug, driven, drilled, or bored) that extends into the earth until it meets groundwater which:

(~~a~~1) Supplies water for a non-community public water system, or

(~~b~~2) Otherwise supplies water for household use (consisting of drinking, bathing, and cooking, or other similar uses).

(~~c~~3) Such wells may provide water to entities such as a single-family residence, group of residences, businesses, schools, parks, campgrounds, and other permanent or seasonal communities.

(xx) "Regulated substance" means:

(~~a~~1) A~~ny~~ substance defined in Section 101(14) of ~~the Comprehensive Environmental Response, Compensation and Liability Act (~~CERCLA~~) of 1980 (~~, but not including any substance regulated as a hazardous waste under subtitle C~~)~~ of RCRA; and

(~~b~~2) Petroleum and petroleum products, including crude oil or any fraction thereof that is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).

(~~c~~3) The term "regulated substance" includes but is not limited to petroleum and petroleum-based substances comprised of a complex blend of hydrocarbons derived from crude oil through processes of separation, conversion, upgrading, and finishing, such as motor fuels, jet fuels, distillate fuel oils, residual fuel~~s~~ oils, lubricants, petroleum solvents, and used oils.

(yy) "Release" means any spilling, leaking, emitting, discharging, escaping, leaching or disposing from an UST into subsurface soils, ~~ground water~~groundwater, or surface water~~ or subsurface soils~~.

(zz) "Release detection" means determining whether a release of a regulated substance has occurred from the UST system into the environment or a leak has occurred into the interstitial space between the UST system and its secondary barrier or secondary containment around it.

(aaa) "Repair" means to restore to proper operating condition a tank, pipe, spill prevention equipment, overfill prevention equipment, corrosion protection equipment, release detection equipment or other UST system component that has caused a release of product from the UST system or has failed to function properly.

(bbb) "Replaced" means:

(1) For a tank—to remove a ~~UST system or UST system component~~tank and ~~to~~ install another ~~UST system or UST system component in its place~~tank.

(2) For piping—to remove more than 25 percent of piping and install other piping, excluding connectors, connected to a single tank. For tanks with multiple piping runs, this definition applies independently to each piping run.

(ccc) "Residential tank" is a tank located on property used primarily for dwelling purposes.

(ddd) "SARA" means the Superfund Amendments and Reauthorization Act of 1986.

(eee) "Secondary containment" or "secondarily contained" means an impervious layer of materials which is installed around a tank or system of tanks, so that any volume of regulated substances which may ~~be released~~leak from a tank will be prevented from contacting the environment outside said impervious layer for the period of time necessary to detect and recover released regulated substances. Materials or devices used to provide a secondary containment may include concrete, impervious liners, double-wall tanks or other materials or devices, singularly or in combination, which is approved by the Department.

The term "Secondary containment" or "secondarily contained" also means a release prevention and release detection system for a tank or piping. This system has an inner and outer barrier with an interstitial space that is monitored for leaks. This term includes containment sumps when used for interstitial monitoring of piping.

(fff) "Septic tank" is a water-tight covered receptacle designed to receive or process, through liquid separation or biological digestion, the sewage discharged from a building sewer. The effluent from such receptacle is distributed for disposal through the soil and settled solids and scum from the tank are pumped out periodically and hauled to a treatment facility.

(ggg) “Solid Waste Disposal Act” means the Solid Waste Disposal Act of 1965. The Resource Conservation and Recovery Act amended the requirements of the Solid Waste Disposal Act.

(hhh) "~~Storm water~~Storm water or wastewater collection system" means piping, pumps, conduits, and any other equipment necessary to collect and transport the flow of surface water run-off resulting from precipitation, or domestic, commercial, or industrial wastewater to and from retention areas or any areas where treatment is designated to occur. The collection of storm water and wastewater does not include treatment except where incidental to conveyance.

(iii) "Surface impoundment" is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials) that is not an injection well.

(jjj) "Tank" is a stationary device designed to contain an accumulation of regulated substances and constructed of non-earthen materials (e.g., concrete, steel, plastic) that provide structural support.

(kkk) “Training program” means any program that provides information to and evaluates the knowledge of a Class A, Class B, or Class C operator through testing, practical demonstration, or another approach acceptable to the Department regarding requirements for UST systems that meet the requirements of Subpart J of this part.

(lll) “Under~~-D~~dispenser ~~C~~containment” or “~~(~~UDC~~)~~” means ~~a component~~containment underneath a dispenser ~~that will~~system designed to prevent leaks from the dispenser and piping within or above the UDC from reaching soil or groundwater. Such containment must:

(~~a~~1) Be liquid-tight on its sides, bottom, and at any penetrations;

(~~b~~2) Be compatible with the substance conveyed by the piping; and

(~~c~~3) Allow for visual inspection and access to the components in the containment system and/or be monitored.

(mmm) "Underground area" means an underground room, such as a basement, cellar, shaft or vault, providing enough space for physical inspection of the exterior of the tank situated on or above the surface of the floor.

(nnn) "Underground release" means any belowground release.

(ooo) "Underground storage tank" or "UST" means any one or combination of tanks, ~~(~~including underground pipes connected ~~there~~to it~~) that~~, which is used to contain an accumulation of regulated substance~~s~~, and the volume of which ~~(including the volume of underground pipes connected thereto)~~ is ~~10~~ten percent or more beneath the surface of the ground. This term does not include any:

(~~a~~1) Farm or residential tank of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;

(~~b~~2) Tank~~s~~ used for storing heating oil for consumptive use on the premises where stored;

(~~c~~3) Septic tank;

(~~d~~4) Pipeline facility, ~~(~~including gathering line~~s)~~, regulated under~~:~~

~~(1) T~~ the Federal Natural Gas Pipeline Safety Act of 1968 ~~(49 U.S.C. App. 1671, et seq.),~~ or

~~(2) T~~ the Federal Hazardous Liquid Pipeline Safety Act of 1979 ~~(49 U.S.C. App. 2001, et seq.)~~, or

~~(3) Which is an intrastate~~ any pipeline facility regulated under state laws comparable to the provisions of these federal provisions of law ~~referred to in paragraph (d)(1) or (d)(2) of this definition~~;

(~~e~~5) Surface impoundment, pit, pond, or lagoon;

(~~f~~6) ~~Storm water~~Storm water or wastewater collection system;

(~~g~~7) Flow-through process tank;

(~~h~~8) Liquid trap or associated gathering lines directly related to oil or gas production and gathering operations; ~~or~~

(~~i~~9) Storage tank situated in an underground area ~~(~~, such as a basement, cellar, mineworking, drift, shaft, or tunnel~~)~~, if the petroleum storage tank is situated upon or above the surface of the floor~~.~~;

(10) Hydraulic lift reservoirs, such as for automobile hoists and elevators, containing hydraulic oil; or

~~The term "underground storage tank" or "UST" does not include~~(11) ~~a~~Any pipes connected to any tank which is described in ~~paragraphs~~subitems (~~a~~1) through (~~i~~10) of this definition.

(ppp) "Upgrade" means the addition or retrofit of some systems such as cathodic protection, lining, or spill and overfill controls to improve the ability of an underground storage tank system to prevent the release of product.

(qqq) "UST system" or "Tank system" means an underground storage tank, connected underground piping, underground ancillary equipment, and containment system, if any.

(rrr) "Wastewater treatment tank" means a tank that is designed to receive and treat an influent wastewater through physical, chemical, or biological methods.

SUBPART B
UST Systems: Design, Construction, Installation, Notification and Permitting

SECTION 280.20. PERFORMANCE STANDARDS FOR NEW UST SYSTEMS.

In order to prevent releases due to structural failure, corrosion, or spills and overfills for as long as the UST system~~s~~ is used to store regulated substances, all owners and operators of new UST systems must obtain permits in accordance with Section 280.23 and meet the following requirements. In addition, tanks and piping installed or replaced after May 23, 2008 must be secondarily contained and use interstitial monitoring in accordance with Section 280.43(g). Secondary containment must be able to contain regulated substances leaked from the primary containment until they are detected and removed and prevent the release of regulated substances to the environment at any time during the operational life of the UST system. For cases where the piping is considered to be replaced, the entire piping run must be secondarily contained.

(a) Tanks. Each tank must be properly designed and constructed, and any portion underground that routinely contains product must be protected from corrosion, in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory as specified below:

(1) The tank is constructed of fiberglass-reinforced plastic; or

[Note~~:~~ to paragraph (a)(1). The following ~~industry~~ codes of practice may be used to comply with paragraph (a)(1) of this section:

(A) Underwriters Laboratories Standard 1316, "~~Standard for~~ Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures"; or

(B) Underwriter's Laboratories of Canada ~~CAN4~~ S615~~-M83~~, "Standard for Reinforced Plastic Underground Tanks for ~~Petroleum "; or American Society of Testing and Materials Standard D4021-86, "Standard Specification for Glass-Fiber-Reinforced Polyester Underground Petroleum Storage Tanks. Products~~Flammable and Combustible Liquids".]

(2) The tank is constructed of steel and cathodically protected in the following manner:

(i) The tank is coated with a suitable dielectric material;

(ii) Field-installed cathodic protection systems are designed by a corrosion expert;

(iii) Impressed current systems are designed to allow determination of current operating status as required in Section 280.31(c); and

(iv) Cathodic protection systems are operated and maintained in accordance with Section 280.31 or according to guidelines established by the Department; or

[Note~~:~~ to paragraph (a)(2). The following codes ~~and standards~~ of practice may be used to comply with paragraph (a)(2) of this section:

(A) Steel Tank Institute "~~Specification for~~ STI-P3® ~~System of~~ Specification and Manual for External Corrosion Protection of Underground Steel Storage Tanks";

(B) Underwriters Laboratories Standard 1746, "External Corrosion Protection Systems for Steel Underground Storage Tanks";

(C) Underwriters Laboratories of Canada ~~CAN4~~ S603~~-M85~~, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids," and ~~CAN4-G03.1-M85~~S603.1, "Standard for ~~Galvanic~~External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids," and ~~CAN4~~ S631~~-M84~~, "Standard for Isolating Bushings for Steel Underground Tanks Protected with ~~Coatings and Galvanic~~ External Corrosion Protection Systems"; ~~or~~

(D) ~~National Association of Corrosion Engineers Standard RP-02-85, "Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems," and Underwriters Laboratories Standard 58, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids."]~~Steel Tank Institute Standard F841, "Standard for Dual Wall Underground Steel Storage Tanks"; or

(E) NACE International Standard Practice SP 0285, “External Corrosion Control of Underground Storage Tank Systems by Cathodic Protection,’’ and Underwriters Laboratories Standard 58, ‘‘Standard for Steel Underground Tanks for Flammable and Combustible Liquids”.]

(3) The tank is constructed of ~~a~~ steel ~~fiberglass-reinforced plastic composite~~ and clad or jacketed with a non-corrodible material; or

[Note~~:~~ to paragraph (a)(3). The following ~~industry~~ codes of practice may be used to comply with paragraph (a)(3) of this section:

(A) Underwriters Laboratories Standard 1746, "External Corrosion Protection Systems for Steel Underground Storage Tanks~~,"~~ ~~or the Association for Composite Tanks ACT-100, "Specification for the Fabrication of FRP Clad Underground Storage Tanks."~~];

(B) Steel Tank Institute ACT–100® Specification F894, “Specification for External Corrosion Protection of FRP Composite Steel Underground Storage Tanks”;

(C) Steel Tank Institute ACT–100–U® Specification F961, “Specification for External Corrosion Protection of Composite Steel Underground Storage Tanks”; or

(D) Steel Tank Institute Specification F922, “Steel Tank Institute Specification for Permatank®”.]

(4) The tank is constructed of metal without additional corrosion protection measures provided that:

(i) The tank is installed at a site that is determined by a corrosion expert not to be corrosive enough to cause it to have a release due to corrosion during its operating life; and

(ii) Owners and operators maintain records that demonstrate compliance with the requirements of paragraph (a)(4)(i) of this section for the remaining life of the tank; or

(5) The tank construction and corrosion protection are determined by the Department to be designed to prevent the release or threatened release of any stored regulated substance in a manner that is no less protective of human health and the environment than paragraphs (a)(1) through (4) of this section.

(b) Piping. The piping that routinely contains regulated substances and is in contact with the ground must be properly designed, constructed, and protected from corrosion in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory as specified below:

(1) The piping is constructed of ~~fiberglass-reinforced plastic~~ a non-corrodible material; or

[Note~~:~~ to paragraph (b)(1). The following codes ~~and standards~~ of practice may be used to comply with paragraph (b)(1) of this section:

(A) Underwriters Laboratories ~~Subject~~ Standard 971, "~~UL Listed~~ Non~~-Metal~~metallic Underground Pipeing for Flammable Liquids"; or

(B) Underwriters Laboratories of Canada Standard ~~567~~ S660, "Standard for Nonmetallic Underground Pipeing ~~Connectors~~ for Flammable and Combustible Liquids~~and LP Gas~~"~~;~~.]

~~(C) Underwriters Laboratories of Canada Guide ULC-107, "Glass Fiber Reinforced Plastic Pipe and Fittings for Flammable Liquids"; and~~

~~(D) Underwriters Laboratories of Canada Standard CAN 4-S633-M81, "Flexible Underground Hose Connectors."]~~

(2) The piping is constructed of steel and cathodically protected in the following manner:

(i) The piping is coated with a suitable dielectric material;

(ii) Field-installed cathodic protection systems are designed by a corrosion expert;

(iii) Impressed current systems are designed to allow determination of current operating status as required in Section 280.31(c); and

(iv) Cathodic protection systems are operated and maintained in accordance with Section 280.31 or guidelines established by the Department; or

[Note~~:~~ to paragraph (b)(2). The following codes ~~and standards~~of practice may be used to comply with paragraph (b)(2) of this section:

(A) ~~National Fire Protection Association Standard 30, "Flammable and Combustible Liquids Code~~American Petroleum Institute Recommended Practice 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems";

(B) ~~American Petroleum Institute Publication 1615, "Installation of Underground Petroleum Storage Systems~~Underwriters Laboratories Subject 971A, "Outline of Investigation for Metallic Underground Fuel Pipe";

(C) ~~American Petroleum Institute Publication 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems~~Steel Tank Institute Recommended Practice R892, "Recommended Practice for Corrosion Protection of Underground Piping Networks Associated with Liquid Storage and Dispensing Systems";~~ and~~

(D) ~~National Association of Corrosion Engineers Standard RP-01-69, "Control of External Corrosion on Submerged Metallic Piping Systems."]~~NACE International Standard Practice SP 0169, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems"; or

(E) NACE International Standard Practice SP 0285, "External Corrosion Control of Underground Storage Tank Systems by Cathodic Protection".]

(3) The piping is constructed of metal without additional corrosion protection measures provided that:

(i) The piping is installed at a site that is determined by a corrosion expert to not be corrosive enough to cause it to have a release due to corrosion during its operating life; and

(ii) Owners and operators maintain records that demonstrate compliance with the requirements of paragraph (b)(3)(i) of this section for the remaining life of the piping; or

~~[Note: National Fire Protection Association Standard 30, "Flammable and Combustible Liquids Code"; and National Association of Corrosion Engineers Standard RP-01-69, "Control of External Corrosion on Submerged Metallic Piping Systems," may be used to comply with paragraph (b)(3) of this section.]~~

(4) The piping construction and corrosion protection are determined by the Department to be designed to prevent the release or threatened release of any stored regulated substance in a manner that is no less protective of human health and the environment than the requirements in paragraphs (b)(1) through (3) of this section.

(c) Spill and overfill prevention equipment.

(1) Except as provided in paragraphs (c)(2) and (3) of this section, to prevent spilling and overfilling associated with product transfer to the UST system, owners and operators must use the following spill and overfill prevention equipment:

(i) Spill prevention equipment that will prevent release of product to the environment when the transfer hose is detached from the fill pipe (for example, a spill catchment basin); and

(ii) Overfill prevention equipment that will:

(A) Automatically shut off flow into the tank when the tank is no more than 95 percent full; or

(B) Alert the transfer operator when the tank is no more than 90 percent full by restricting the flow into the tank or triggering a high-level alarm; or

(C) Restrict flow 30 minutes prior to overfilling, alert the transfer operator with a high level alarm one minute before overfilling, or automatically shut off flow into the tank so that none of the fittings located on top of the tank are exposed to product due to overfilling.

(2) Owners and operators are not required to use the spill and overfill prevention equipment specified in paragraph (c)(1) of this section if:

(i) Alternative equipment is used that is determined by the Department to be no less protective of human health and the environment than the equipment specified in paragraph (c)(1)(i) or (ii) of this section; or

(ii) The UST system is filled by transfers of no more than 25 gallons at one time.

(3) Flow restrictors used in vent lines may not be used to comply with paragraph (c)(1)(ii) of this section when overfill prevention is installed or replaced after [*Effective date*].

(4) Spill and overfill prevention equipment must be periodically tested or inspected in accordance with Section 280.35.

(d) Product transfer equipment. To decrease vapor emissions associated with product transfer to the UST system, all ~~new~~ UST systems must comply with the product transfer equipment requirements as follows:

(1) All tank systems installed after December 22, 1996, must be equipped with a drop tube that enters the top of the tank at the fill port and extends to within 6 inches of the bottom of the tank; or

(2) All tank systems installed before or on December 22, 1996, must be equipped with a drop tube that enters the top of the tank at the fill port and extends to within one foot of the tank bottom by December 22, 2001; or

(3) Tank systems used for the storage of used oils are not required to be equipped with a drop tube.

(e) Installation. ~~All tanks and piping~~The UST system must be properly installed in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory and in accordance with the manufacturer's instructions.

[Note~~:~~ to paragraph (e). Tank and piping system installation practices and procedures described in the following codes of practice may be used to comply with the requirements of paragraph (e) of this section:

(~~i~~A) American Petroleum Institute Publication 1615, "Installation of Underground Petroleum Storage System";~~ or~~

(~~ii~~B) Petroleum Equipment Institute Publication RP100, "Recommended Practices for Installation of Underground Liquid Storage Systems";~~ or~~

(~~iii~~C) ~~American~~ National Fire Protection Association Standard~~s Institute Standard B31.3, "Petroleum Refinery Piping," and American National Standards Institute Standard B31.4 "Liquid Petroleum Transportation Piping System~~ 30, "Flammable and Combustible Liquids Code" and Standard 30A, "Code for Motor Fuel Dispensing Facilities and Repair Garages~~.~~"; or

(D) Petroleum Equipment Institute Publication RP1000, "Recommended Practices for the Installation of Marina Fueling Systems".]

(f) Certification of installation. All owners and operators must ensure that one or more of the following methods of certification, testing, or inspection is used to demonstrate compliance with paragraph (e) of this section by providing a certification of compliance to the Department on the Permit to Operate application form in accordance with Section 280.23.

(1) The installer has been certified by the tank and piping manufacturers; or

(2) The installer has been certified or licensed by the Department; or

(3) The installation has been inspected and certified by a registered professional engineer with education and experience in UST system installation; or

(4) The installation has been inspected and approved by the Department; or

(5) All work listed in the manufacturer's installation checklists has been completed; or

(6) The owner and operator have complied with another method for ensuring compliance with paragraph (e) of this section that is determined by the Department to be no less protective of human health and the environment.

(g) Dispenser systems. Each UST system must be equipped with under-dispenser containment for any new dispenser system installed after May 23, 2008.

(1) A dispenser system is considered new when both the dispenser and the equipment needed to connect the dispenser to the underground storage tank system are installed at an UST facility. The equipment necessary to connect the dispenser to the underground storage tank system includes check valves, shear valves, unburied risers or flexible connectors, or other transitional components that are underneath the dispenser and connect the dispenser to the underground piping.

(2) Under-dispenser containment must be liquid-tight on its sides, bottom, and at any penetrations. Under-dispenser containment must allow for visual inspection and access to the components in the containment system or be periodically monitored for leaks from the dispenser system.

(~~g~~h) Effective ~~with the enactment of this regulation~~May 23, 2008, each new or replacement underground storage tank~~,~~ or piping ~~connected to any such new tank, that is within 1,000 feet of any existing community water system or any existing potable drinking water well~~ must be secondarily contained and monitored for leaks. In the case of a replacement of a previously installed underground storage tank or previously installed piping connected to the underground storage tank, the secondary containment and monitoring shall apply only to the specific underground storage tank or piping being replaced, not to other underground storage tanks and connected pipes comprising such system.

(1) In addition, each new or replacement motor fuel dispenser system ~~installed within 1,000 feet of any existing community water system or any existing potable drinking water well~~ must have under-dispenser containment. New or replaced piping associated with this installation must be secondarily contained.

(2) These requirements do not apply to repairs meant to restore an underground storage tank, pipe, or dispenser to operating condition except that when piping repairs over a consecutive 12-~~-~~month period constitute more than 25 percent of the piping by length, the entire piping run must be replaced with secondarily contained piping.

(3) In the case of dispenser replacement on suction piping systems that meet the requirements of Section 280.41(b)(~~2~~1)(ii)(~~i~~A) – through ~~v~~(E), this requirement does not apply if the replacement does not involve any connectors, risers, or piping below the union or check valve.

(4) Secondary containment systems shall be designed, constructed, installed and maintained to:

(~~1~~i) Contain regulated substances released from an UST system until they are detected and removed; and

(~~2~~ii) Prevent a release of regulated substances to the environment at any time during the operational life of the UST system; and

(~~3~~iii) Be monitored monthly for a release in accordance with Section 280.43-(g), except for suction piping that meets the requirements of Section 280.41(b)(1)(ii)(A) through (E). The requirements of this section also apply to new or replacement underground storage tank systems that serve emergency generators.

~~(h) Secondary containment required. All new tank systems which are installed within 100 feet of an existing water supply well, a coastal zone critical area, or state navigable waters, must install an approved method of secondary containment.~~

(i) Release detection. Release detection, conducted in accordance with Subpart D, must begin when regulated substances are introduced into the tank system. The owner/operator must notify the Department in writing prior to introducing a regulated substance into the tank system.

SECTION 280.21. UPGRADING OF EXISTING UST SYSTEMS.

Owners and operators must permanently close (in accordance with Subpart G of this part) any UST system that does not meet the new UST system performance standards in Section 280.20 or has not been upgraded in accordance with paragraphs (b) through (d) of this section. This does not apply to previously deferred UST systems described in Subpart K of this part and where an upgrade is determined to be appropriate by the Department.

(a) Alternatives allowed. ~~Not later than December 22, 1998, a~~All existing UST systems must comply with one of the following requirements:

(1) New UST system performance standards under Section 280.20;

(2) The upgrading requirements in ~~sections~~paragraphs (b) through (d) of this section; or

(3) Closure requirements under Subpart G of this ~~P~~part, including applicable requirements for corrective action under Subpart F of this part.

(b) Tank upgrading requirements. Steel tanks must be upgraded to meet one of the following requirements in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory:

(1) Interior lining. ~~A tank may be~~Tanks upgraded by internal lining ~~if~~ must meet the following:

(i) The lining ~~is~~was installed in accordance with the requirements of Section 280.33~~,~~; and

(ii) Within 10 years after lining, and every 5 years thereafter, the lined tank is internally inspected and found to be structurally sound with the lining still performing in accordance with original design specifications. If the internal lining is no longer performing in accordance with original design specifications and cannot be repaired in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory, then the lined tank must be permanently closed in accordance with Subpart G of this part.

(2) Cathodic protection. ~~A tank may be~~Tanks upgraded by cathodic protection ~~if the cathodic protection system~~ must meet~~s~~ the requirements of Section 280.20(a)(2)(ii), (iii), and (iv) and the integrity of the tank ~~is~~must have been ensured using one of the following methods:

(i) The tank ~~is~~was internally inspected and assessed to ensure that the tank ~~is~~was structurally sound and free of corrosion holes prior to installing the cathodic protection system; or

(ii) The tank ha~~s~~d been installed for less than 10 years and is monitored monthly for releases in accordance with Section 280.43(d) through (~~h~~i); or

(iii) The tank ha~~s~~d been installed for less ~~that~~than 10 years and ~~is~~was assessed for corrosion holes by conducting two (2) tightness tests that meet the requirements of Section 280.43(c). The first tightness test must ~~be~~have been conducted prior to installing the cathodic protection system. The second tightness test

must ~~be~~have been conducted between three (3) and six (6) months following the first operation of the cathodic protection system; or

(iv) The tank ~~is~~was assessed for corrosion holes by a method that is determined by the Department to prevent releases in a manner that is no less protective of human health and the environment than paragraphs (b)(2)(i) through (iii) of this section.

(3) Internal lining combined with cathodic protection. ~~A t~~Tanks ~~may be~~ upgraded by both internal lining and cathodic protection ~~if~~must meet the following:

(i) The lining ~~is~~was installed in accordance with the requirements of Section 280.33; and

(ii) The cathodic protection system meets the requirements of Section 280.20(a)(2)(ii), (iii), and (iv).

[Note~~:~~ to paragraph (b). The following historical codes ~~and standards~~of practice were listed as options for ~~may be used to~~ complying with paragraph (b) of this section:

(A) American Petroleum Institute Publication 1631, "Recommended Practice for the Interior Lining of Existing Steel Underground Storage Tanks";

(B) National Leak Prevention Association Standard 631, "Spill Prevention, Minimum 10 Year Life Extension of Existing Steel Underground Tanks by Lining Without the Addition of Cathodic Protection";

(C) National Association of Corrosion Engineers Standard RP-02-85, "Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems"; and

(D) American Petroleum Institute ~~Publication~~ Recommended Practice 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems~~.~~".]

[Note to paragraph (b)(1)(ii). The following codes of practice may be used to comply with the periodic lining inspection requirement of this section:

(A) American Petroleum Institute Recommended Practice 1631, “Interior Lining and Periodic Inspection of Underground Storage Tanks”;

(B) National Leak Prevention Association Standard 631, Chapter B “Future Internal Inspection Requirements for Lined Tanks”; or

(C) Ken Wilcox Associates Recommended Practice, “Recommended Practice for Inspecting Buried Lined Steel Tanks Using a Video Camera”.]

(c) Piping upgrading requirements. Metal piping that routinely contains regulated substances and is in contact with the ground must be cathodically protected in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory and must meet the requirements of Section 280.20(b)(2)(ii), (iii), and (iv).

[Note~~:~~ to paragraph (c). The codes ~~and standards~~of practice listed in the note following Section 280.20(b)(2) may be used to comply with this requirement.]

(d) Spill and overfill prevention equipment. To prevent spilling and overfilling associated with product transfer to the UST system, all existing UST systems must comply with ~~new~~ UST system spill and overfill prevention equipment requirements specified in Section 280.20(c).

(e) Product transfer equipment. To decrease vapor emissions associated with product transfer to the UST system, all existing UST systems must comply with product transfer equipment requirements as follows:

(1) All UST systems upgraded after December 22, 1996, must comply with the ~~new~~ UST system product transfer equipment requirements specified in Section 280.20(d)(1); or

(2) All UST systems upgraded before or on December 22, 1996, must be equipped with a drop tube that enters the top of the tank at the fill port and extends to within one foot of the tank bottom by December 22, 2001; or

(3) UST systems used for the storage of used oils are not required to be equipped with a drop tube.

(f) At least 30 days before beginning upgrading of existing UST systems to satisfy the requirements of Section 280.21, or within another reasonable time period determined by the Department, owners and operators must notify the Department of their intent to upgrade the UST system.

SECTION 280.22. NOTIFICATION REQUIREMENTS.

(a) ~~By~~After January 1, 1986, an~~y~~ owner of a tank storing or having stored regulated substances on or before January 1, 1986 ~~shall~~must notify the Department of the existence of such a tank specifying the type, location, storage capacity, age, and uses of such a tank (i.e., operational status at the time of notification) and of any known past failure(s) and corrective action taken as a result of the failure. The notification shall be made using EPA Form 7530-1 ~~or~~ , a Department ~~F~~form ~~DHEC 1917~~, or a Department approved form.

> [Note to paragraph (a). Owners and operators of UST systems that were in the ground on or after January 1, 1986, unless taken out of operation on or before January 1, 1974, were required to notify the Department in accordance with the Hazardous and Solid Waste Amendments of 1984, Public Law 98–616, on a form published by EPA on November 8, 1985 unless notice was given pursuant to section 103(c) of CERCLA. Owners and operators who have not complied with the notification requirements may use a Department approved form.]

(b) ~~For each underground storage tank taken out of operation after January 1, 1974, the owner of such tank shall, within 12 months after the date of enactment of these regulations (R.61-92), notify the Department of the existence of such tanks (unless the owner knows the tank subsequently was removed from the ground). The notification shall be made using EPA Form 7530-1 or Department Form DHEC-3856. The owner of a tank taken out of operation on or before January 1, 1974, shall not be required to notify the Department under this subsection.~~Within 30 days of acquisition, any person who assumes ownership of a regulated underground storage tank system, except as described in paragraph (a) of this section, must submit a notice of the ownership change to the Department on a Department form or a form approved by the Department, including all supporting documents required by the Department notification form.

(c) ~~Notice under Subparagraph (b) shall specify, to the extent known to the owner:~~

~~(1) The date the tank was taken out of operation;~~

~~(2) The age of the tank on the date taken out of operation;~~

~~(3) The capacity, type and location of the tank; and~~

~~(4) The type and quantity of substances left stored in such tank on the date taken out of operation.~~ Not later than [*Three Years from Effective Date*], all owners of previously deferred UST systems must submit a one-time notice of tank system existence to the Department, using EPA form 7530-1, a Department form, a Department approved form, or submitted in a format as approved by the Department in accordance with Section 280.22(c). Owners and operators of UST systems in use as of [*Effective Date*] must demonstrate financial responsibility at the time of submission of the notification form as required by Section 280.251.

(d) ~~Any owner which brings into operation an underground storage tank after the initial notification period specified under paragraph (a), shall notify the Department within 30 days using the procedures specified in paragraph (a) of this section~~Owners required to submit notices under paragraph (a) or (b) of this section must provide notices to the Department for each tank they own. Owners may provide notice for several tanks using one notification form, but owners who own tanks located at more than one place of operation must file a separate notification form for each separate place of operation.

(e) ~~Paragraphs (a) through (d) of this subsection shall not apply to tanks for which notice was given pursuant to Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.~~All owners and operators of new UST systems must certify in the notification form compliance with the following requirements:

(1) Installation of tanks and piping under Section 280.20(e);

(2) Cathodic protection of steel tanks and piping under Section 280.20(a) and (b);

(3) Financial responsibility under Subpart H of this part; and

(4) Release detection under Sections 280.41 and 280.42.

(f) ~~Upon receipt of an approvable notification from existing tank owners, the Department will store the notification information for the purpose of managing, and appropriately cross-referencing and indexing the data.~~All owners and operators of new UST systems must ensure that the installer certifies in the notification form that the methods used to install the tanks and piping complies with the requirements in section 280.20(e).

(g) Beginning January 1, 1986, any person who sells a tank intended to be used as an underground storage tank must notify the purchaser of such tank of the owner's notification obligations under paragraph (a) of this section. After January 1, 1986, any owner of an existing tank which has not notified ~~with~~the Department in accordance with this section shall be in violation of these regulations.

[Note to paragraph (g). The statement provided in appendix III of 40 CFR Part 280, when used on shipping tickets and invoices, may be used to comply with this requirement.]

(h) A regulated tank for which the Department has received an approvable notification is considered to be registered.

(i) The Department may issue, deny, revoke, suspend or modify the registration under such conditions as it may prescribe herein for the operation of any tank.

SECTION 280.23. NEW TANKS -- PERMITS REQUIRED.

(a) After January 1, 1986, all new tanks must be permitted. The person who proposes to install a new tank must apply for an ~~construction~~installation permit, on a form supplied by the Department or an approved substitute, and possess said permit prior to tank installation and shall meet the new tank design, construction, and installation requirements of Section 280.20.

(b) The person who proposes to place a new tank in operation must apply for a~~n~~ permit to operate~~ing permit~~, on a form supplied by the Department, and possess said permit prior to placing the tank in operation.

(1) The permit to operate application must certify compliance with the following requirements:

(i) Installation of tanks and piping under Sections 280.20(~~e~~c) through (h);

(ii) Cathodic protection of steel tanks and piping under Section 280.20(a) and (b);

(iii) Financial responsibility under Subpart H of this ~~P~~part;

(iv) Release detection under Sections 280.41 and 280.42; and

(v) Testing under Section 280.24.

(2) All owners and operators of new UST systems must ensure that the installer certifies in the permit to operate application form that the methods used to install the tanks and piping complies with the requirements in Section 280.20(e) and (f).

(3) Beginning October 24, 1988, any person who sells a tank intended to be used as an underground storage tank must notify the purchaser of such tank of the owner's permitting obligations under this section.

(c) After January 1, 1986, any person who installs or operates a new tank without receiving permits will be in violation of these regulations.

(d) The Department may issue, deny, revoke, suspend or modify permits under such conditions as it may prescribe for the operation of any tank.

~~(e) The Department may classify as ineligible for delivery, deposit, or acceptance of product an underground storage tank where the Department has determined:~~

~~(1) Required spill prevention equipment is not installed; or~~

~~(2) Required overfill protection equipment is not installed; or~~

~~(3) Required leak detection equipment is not installed; or~~

~~(4) Required corrosion protection equipment is not installed; or~~

~~(5) Other conditions the Department deems appropriate.~~

~~(f) When the Department determines that an underground storage tank or tanks should be classified as ineligible for delivery, deposit or acceptance of product under paragraph (e) of this section, the Department shall notify the owner/operator of the Department's intent to declare the tank(s) ineligible for delivery, deposit, or acceptance of product if the deficiency is not corrected within seven (7) calendar days.~~

~~(g) The Department may classify as ineligible for delivery, deposit, or acceptance of product an underground storage tank if the owner/operator of that tank has been issued a written warning or citation (notice of violation) under any of the following circumstances and the owner/operator has failed to take corrective action within 30 days :~~

~~(1) Failure to properly operate and/or maintain leak detection equipment; or~~

~~(2) Failure to properly operate and/or maintain spill, overfill, or corrosion protection equipment; or~~

~~(3) Failure to maintain financial responsibility; or~~

~~(4) Failure to protect a buried metal flexible connector from corrosion.~~

~~(h) When the Department determines that an underground storage tank or tanks should be classified as ineligible for delivery, deposit or acceptance of product under paragraph (g) of this section, the Department shall notify the owner/operator of the Department's intent to declare the tank(s) ineligible for delivery, deposit, or acceptance of product if the deficiency is not corrected within seven (7) calendar days~~

~~(i) When the out of compliance condition has not been corrected after the seven (7) calendar days established under paragraph (f) or (h) of this section, the Department will declare the tank ineligible for delivery, deposit, or acceptance of product and notify the owner/operator and supplier of the delivery prohibition.~~

~~(1) The notification of owner/operator and supplier of a delivery prohibition will be by at least two means of communication (for example: telephone, e-mail, facsimile, or messenger); and~~

~~(2) The Department will post the delivery prohibition notice on the Department's Tank Registry website; and~~

~~(3) The Department will affix a delivery prohibition notice to the fill port of the affected tank.~~

~~(j) It shall be illegal for any person to deliver, deposit, or accept product into a tank where the Department has imposed delivery prohibition and has notified the owner/operator and supplier of the delivery prohibition.~~

~~(k) When the owner/operator notifies the Department that the deficiency has been corrected and the Department has verified that the tank(s) is in compliance:~~

~~(1) The delivery prohibition will be lifted and the delivery prohibition notice will be removed from the tank fill port within two (2) working days (Monday – Friday) of the notification; and~~

~~(2) The Department will notify the owner/operator and the supplier that delivery to the tank may resume; and~~

~~(3) The delivery prohibition website posting will be cleared.~~

~~(l) The Department retains the discretion to decide whether to identify an underground storage tank as ineligible for delivery, deposit, or acceptance of product based on whether the prohibition is in the best interest of the public. In some cases, prohibition of delivery, deposit, or acceptance of product to an underground storage tank is not in the best interest of the public, even in the case of significant and/or sustained noncompliance (e.g., certain emergency generator underground storage tanks). In other cases, the Department may choose to classify an underground storage tank as ineligible to receive product but then authorize delivery in emergency situations such as natural disasters.~~

~~NOTE: Delivery Prohibition does not relieve the owner/operator from administrative enforcement actions due to the out of compliance condition(s).~~

(~~m~~e) Any person who plans to install a system of two or more tanks at the same location, may apply for one permit for that system of tanks.

SECTION 280.24. TESTING.

(a) During installation of tank systems, tanks, ~~and~~ piping, and secondary containment must be pneumatically and/or hydrostatically tested according to accepted industry standards and the manufacturers' installation instructions. During installation, ancillary equipment must be tested in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory and in accordance with the manufacturer's instructions.

(b) The Department may require the operator to ~~hydrostatically~~ test UST system components for tightness or functionality~~,~~ when accurate release detection system records have not been maintained as specified in Subpart D.

(c) The Department may require the operator to ~~hydrostatically~~ test UST system components for tightness or functionality~~,~~ when stored regulated substances and/or their vapors have been detected in neighboring structures, sewers, wells, or other on-or-off property locations.

(d) All test results must be documented using a Department form, a Department approved form, or submitted in a format as approved by the Department.

SECTION 280.25. SECONDARY CONTAINMENT REQUIRED.

(a) Secondary containment requirements contained in Section 280.20(~~g~~h) of this regulation ~~shall~~must apply to those UST systems located within 100 feet of an existing water supply well, a coastal zone critical area, or state navigable waters that also meet one of the following conditions:

(1~~.~~) The UST system fails to meet the Section 280.21 upgrading provisions; or

(2~~.~~) The UST system fails to meet the Substantial Compliance criteria found in SC Code Sections 44-2-40(A) and 44-2-50(A) of the SUPERB Act and evaluated in the Department Form (# 1556) based on the last three (3) consecutive annual inspections conducted by the Department.

(b) UST systems described in this Section shall meet the secondary containment requirements of Section 280.20(~~g~~h) or the closure requirements under Subpart G of this ~~P~~part (including applicable requirements for corrective action under Subpart F), no later than December 22, 2018. The requirements of Section 280.20(~~g~~h) shall also apply to any UST system determined to be described by Section 280.25(a) after December 22, 2018.

SECTION 280.26. DELIVERY PROHIBITION.

(a) The Department may classify as ineligible for delivery, deposit, or acceptance of product an underground storage tank where the Department has determined:

(1) Required spill prevention equipment is not installed; or

(2) Required overfill protection equipment is not installed; or

(3) Required leak detection equipment is not installed; or

(4) Required corrosion protection equipment is not installed; or

(5) Required secondary containment is not installed; or

(6) Other conditions the Department deems appropriate.

(b) When the Department determines that an underground storage tank or tanks should be classified as ineligible for delivery, deposit or acceptance of product under paragraph (a) of this section, the Department shall notify the owner/operator of the Department's intent to declare the tank(s) ineligible for delivery, deposit, or acceptance of product if the deficiency is not corrected within fifteen (15) calendar days.

(c) The Department may classify as ineligible for delivery, deposit, or acceptance of product an underground storage tank if the owner/operator of that tank has been issued a written warning or citation (notice of alleged violation) under any of the following circumstances and the owner/operator has failed to take corrective action within thirty (30) days:

(1) Failure to properly operate and/or maintain leak detection equipment; or

(2) Failure to properly operate and/or maintain spill, overfill, or corrosion protection equipment; or

(3) Failure to maintain financial responsibility; or

(4) Failure to protect metal components from corrosion.

(d) When the Department determines that an underground storage tank or tanks should be classified as ineligible for delivery, deposit or acceptance of product under paragraph (c) of this section, or for other conditions the Department deems appropriate, the Department shall notify the owner/operator of the Department's intent to declare the tank(s) ineligible for delivery, deposit, or acceptance of product if the deficiency is not corrected within fifteen (15) calendar days.

(e) When the out of compliance condition has not been corrected after the fifteen (15) calendar days established under paragraph (b) or (d) of this section, the Department will declare the tank ineligible for delivery, deposit, or acceptance of product and notify the owner/operator and supplier of the delivery prohibition.

(1) The notification of owner/operator of a delivery prohibition will be by at least two means of communication (for example: telephone, e-mail, facsimile, or messenger); and

(2) The Department will post the delivery prohibition notice on the Department's website for the notification of the owner/operator and supplier; and

(3) The Department will affix a delivery prohibition notice to the fill port of the affected tank(s).

(f) It shall be illegal for any person to deliver, deposit, or accept product into a tank where the Department has imposed delivery prohibition and has notified the owner/operator and supplier of the delivery prohibition via website or other means of communication as stated in paragraph (e).

(g) When the owner/operator notifies the Department that the deficiency has been corrected and the Department has verified that the tank(s) is in compliance:

(1) The delivery prohibition will be lifted and the delivery prohibition notice will be removed from the tank fill port within two (2) working days (Monday-Friday) of the notification; and

(2) The Department will notify the owner/operator and the supplier via website or other means of communication as stated in paragraph (e) that delivery to the tank(s) may resume; and

(3) The delivery prohibition website posting will be cleared.

(h) The Department retains the discretion to decide whether to identify an underground storage tank as ineligible for delivery, deposit, or acceptance of product based on whether the prohibition is in the best interest of the public. In some cases, prohibition of delivery, deposit, or acceptance of product to an underground storage tank is not in the best interest of the public, even in the case of significant and/or sustained noncompliance (e.g., certain emergency generator underground storage tanks). In other cases, the Department may choose to classify an underground storage tank as ineligible to receive product but then authorize delivery in emergency situations such as natural disasters.

[Note to Section 280.26. Delivery Prohibition does not relieve the owner/operator from administrative enforcement actions due to the out of compliance condition(s).]

SUBPART C
General Operating Requirements

SECTION 280.30. SPILL AND OVERFILL CONTROL.

(a) Owners and operators must ensure that releases due to spilling or overfilling do not occur. The owner and operator must ensure that the volume available in the tank is greater than the volume of product to be transferred to the tank before the transfer is made and that the transfer operation is monitored constantly to prevent overfilling and spilling.

[Note~~:~~ to paragraph (a). The transfer procedures described in National Fire Protection Association ~~Publication~~Standard 385, “Standard for Tank Vehicles for Flammable and Combustible Liquids” or ~~may be used to comply with paragraph (a) of this section. Further guidance on spill and overfill prevention appears in~~ American Petroleum Institute ~~Publication 1621, "Recommended Practice for Bulk Liquid Stock Control at Retail Outlets," and National Fire Protection Association Standard 30, "Flammable and Combustible Liquids Code~~ Recommended Practice 1007, “Loading and Unloading of MC 306/ DOT 406 Cargo Tank Motor Vehicles” may be used to comply with paragraph (a) of this section. Further guidance on spill and overfill prevention appears in American Petroleum Institute Recommended Practice 1621, ‘‘Bulk Liquid Stock Control at Retail Outlets."]

(b) The owner and operator must report, investigate, and clean up any spills and overfills in accordance with Section 280.53.

SECTION 280.31. OPERATION AND MAINTENANCE OF CORROSION PROTECTION.

All owners and operators of ~~steel~~metal UST systems with corrosion protection must comply with the following requirements to ensure that releases due to corrosion are prevented ~~for as long as~~until the UST system is ~~used to store regulated substances~~permanently closed or undergoes a change-in-service pursuant to Section 280.71:

(a) All corrosion protection systems must be operated and maintained to continuously provide corrosion protection to the metal components of that portion of the tank and piping that routinely contain regulated substances and are in contact with the ground.

(b) All UST systems equipped with cathodic protection systems must be inspected for proper operation by a qualified cathodic protection tester in accordance with the following requirements:

(1) Frequency. All cathodic protection systems must be tested within 6 months of installation and at least every 3 years thereafter or according to another reasonable time frame established by the Department; and

(2) Inspection criteria. The criteria that are used to determine that cathodic protection is adequate as required by this section must be in accordance with a code of practice developed by a nationally recognized association.

[Note to paragraph (b).~~: National Association of Corrosion Engineers Standard RP-02-85, "Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems," may be used to comply with paragraph (b)(2) of this section.~~] The following codes of practice may be used to comply with paragraph (b) of this section:

(A) NACE International Test Method TM 0101, “Measurement Techniques Related to Criteria for Cathodic Protection of Underground Storage Tank Systems”;

(B) NACE International Test Method TM 0497, “Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems”;

(C) Steel Tank Institute Recommended Practice R051, “Cathodic Protection Testing Procedures for STI–P3® USTs”;

(D) NACE International Standard Practice SP 0285, “External Control of Underground Storage Tank Systems by Cathodic Protection”; or

(E) NACE International Standard Practice SP 0169, “Control of External Corrosion on Underground or Submerged Metallic Piping Systems”.]

(c) UST systems with impressed current cathodic protection systems must also be inspected every 60 days to ensure the equipment is running properly.

(d) For UST systems using cathodic protection, records of the operation of the cathodic protection must be maintained (in accordance with Section 280.34) to demonstrate compliance with the performance standards in this section. These records must provide the following:

(1) The results of the last three inspections required in paragraph (c) of this section; and

(2) The results of testing from the last two inspections required in paragraph (b) of this section.

SECTION 280.32. COMPATIBILITY.

(a) Owners and operators must use an UST system made of or lined with materials that are compatible with the substance stored in the UST system.

(b) Owners and operators must notify the Department at least 30 days prior to switching to a regulated substance containing greater than 10 percent ethanol, greater than 20 percent biodiesel, or any other regulated substance identified by the Department. In addition, owners and operators with UST systems storing these regulated substances must meet one of the following:

(1) Demonstrate compatibility of the UST system (including the tank, piping, containment sumps, pumping equipment, release detection equipment, spill equipment, and overfill equipment). Owners and operators may demonstrate compatibility of the UST system by using one of the following options:

(i) Certification or listing of UST system equipment or components by a nationally recognized, independent testing laboratory for use with the regulated substance stored; or

(ii) Equipment or component manufacturer approval. The manufacturer's approval must be in writing, indicate an affirmative statement of compatibility, specify the range of biofuel blends the equipment or component is compatible with, and be from the equipment or component manufacturer; or

(2) Use another option determined by the Department to be no less protective of human health and the environment than the options listed in paragraph (b)(1) of this section.

(c) Owners and operators must maintain records in accordance with Section 280.34(b) documenting compliance with paragraph (b) of this section for as long as the UST system is used to store the regulated substance.

[Note~~:~~ to Section 280.32. ~~Owners and operators storing alcohol blends may use t~~The following code~~s to~~ of practice may be useful in complying with the requirements of this section:

~~(A)~~ American Petroleum Institute ~~Publication~~Recommended Practice 1626, "Storing and Handling Ethanol and Gasoline-Ethanol Blends at Distribution Terminals and ~~Service~~Filling Stations~~"; and~~"

~~(B) American Petroleum Institute Publication 1627, "Storage and Handling of Gasoline-Methanol/Cosolvent Blends at Distribution Terminals and Service Stations."~~]

SECTION 280.33. REPAIRS ALLOWED.

Owners and operators of UST systems must ensure that repairs will prevent releases due to structural failure or corrosion as long as the UST system is used to store regulated substances. The repairs must meet the following requirements:

(a) Repairs to UST systems must be properly conducted in accordance with a code of practice developed by a nationally recognized association or an independent testing laboratory.

[Note~~:~~ to paragraph (a). The following codes ~~and standards~~of practice may be used to comply with paragraph (a) of this section:

(A) National Fire Protection Association Standard 30, "Flammable and Combustible Liquids Code";

(B) American Petroleum Institute ~~Publication~~ Recommended Practice RP 2200, "Repairing ~~Crude Oil, Liquified Petroleum Gas, and Product~~ Hazardous Liquid Pipelines";

(C) American Petroleum Institute ~~Publication~~ Recommended Practice RP 1631, "~~Recommended Practice for the~~ Interior Lining and Periodic Inspection of ~~Existing Steel~~ Underground Storage Tanks"; ~~and~~

(D) National Fire Protection Association Standard 326, "Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair";

(E) National Leak Prevention Association Standard 631,~~"Spill Prevention, Minimum 10 Year Life Extension of Existing Steel~~ Chapter A, "Entry, Cleaning, Interior Inspection, Repair, and Lining of Underground Storage Tanks~~ by Lining Without the Addition of Cathodic Protection.~~";

(F) Steel Tank Institute Recommended Practice R972, "Recommended Practice for the Addition of Supplemental Anodes to STI-P3® Tanks";

(G) NACE International Standard Practice SP 0285, "External Control of Underground Storage Tank Systems by Cathodic Protection"; or

(H) Fiberglass Tank and Pipe Institute Recommended Practice T-95-02, "Remanufacturing of Fiberglass Reinforced Plastic (FRP) Underground Storage Tanks."]

(b) Repairs to fiberglass-reinforced plastic tanks may be made by the manufacturer's authorized representatives or in accordance with a code of practice developed by a nationally recognized association or an independent testing laboratory.

(c) Metal pipe sections and fittings that have released product as a result of corrosion or other damage must be replaced. ~~Fiberglass~~ Non-corrodible pipes and fittings may be repaired in accordance with the manufacturer's specifications. As required in Section 280.20(h), ~~S~~should the piping replacement or repair within a consecutive 12-month period constitute more than 25 percent of the piping by length, the entire piping run must be replaced with secondarily contained piping.

(d) Repair~~ed~~s to secondary containment areas of tanks and piping used for interstitial monitoring and to containment sumps used for interstitial monitoring of piping must have the secondary containment ~~be tightness~~ tested for tightness according to the manufacturer's instructions, a code of practice developed by a nationally recognized association or independent testing laboratory, or according to requirements established by the Department within 30 days following the date of completion of the repair. All test results must be documented using a Department form, a Department approved form, or submitted in a format as approved by the Department. All other repairs to tanks and piping must be tightness tested in

accordance with Sections 280.43(c) and 280.44(b) within 30 days following the date of the completion of the repair except as provided in paragraphs (d)(1) through (3), of this section:

(1) The repaired tank is internally inspected in accordance with a code of practice developed by a nationally recognized association or an independent testing laboratory; or

(2) The repaired portion of the UST system is monitored monthly for releases in accordance with a method specified in Section 280.43(d) through (~~h~~i); or

(3) Another test method is used that is determined by the Department to be no less protective of human health and the environment than those listed ~~above~~ in paragraphs (d)(1) and (2) of this section.

[Note to paragraph (d). The following codes of practice may be used to comply with paragraph (d) of this section:

(A) Steel Tank Institute Recommended Practice R012, "Recommended Practice for Interstitial Tightness Testing of Existing Underground Double Wall Steel Tanks"; or

(B) Fiberglass Tank and Pipe Institute Protocol, "Field Test Protocol for Testing the Annular Space of Installed Underground Fiberglass Double and Triple-Wall Tanks with Dry Annular Space";

(C) Petroleum Equipment Institute Recommended Practice RP1200, "Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities."]

(e) Within 6 months following the repair of any cathodically protected UST system, the cathodic protection system must be tested in accordance with Section 280.31(b) and (c) to ensure that it is operating properly. All test results must be documented using a Department form or a Department approved form, or submitted in a format as approved by the Department.

(f) ~~UST system owners and operators must maintain records of each repair for the remaining operating life of the UST system that demonstrate compliance with the requirements of this section~~ Within 30 days following any repair to spill or overfill prevention equipment, the repaired spill or overfill prevention equipment must be tested or inspected, as appropriate, in accordance with Section 280.35 to ensure it is operating properly. All test results must be documented using a Department form or a Department approved form, or submitted in a format as approved by the Department.

(g) UST system owners and operators must maintain records (in accordance with Section 280.34) of each repair until the UST system is permanently closed or undergoes a change-in-service pursuant to Section 280.71.

SECTION 280.34. REPORTING AND RECORDKEEPING.

Owners and operators of UST systems must cooperate fully with inspections, upon request, including but not limited to, providing access to all UST system components for visual inspection, monitoring and testing conducted by the Department, as well as requests for document submission, testing, and monitoring by the owner or operator pursuant to Section 9005 of Subtitle I of the ~~Resource Conservation and Recovery~~Solid Waste Disposal Act, as amended.

All test results required to be submitted to the Department must be documented using a Department form or a Department approved form, or submitted in a format as directed by the Department, and must demonstrate proper testing protocols, per manufacturer's guidelines, code of practice developed by a nationally recognized association or independent laboratory or other Department approved guidelines, were used.

(a) Reporting. Owners and operators must submit the following information to the Department:

(1) Notification for all UST systems (Section 280.22), which includes certification of installation for new UST systems (Section 280.20(f) and notification when any person assumes ownership of an UST system (Section 280.22(b));

(2) Notification prior to UST systems switching to certain regulated substances (Section 280.32(b));

(3) Reports of all releases including suspected releases (Section 280.50), spills and overfills (Section 280.53), and confirmed releases (Section 280.61);

(~~3~~4) Corrective actions planned or taken including initial abatement measures (Section 280.62), initial site characterization (Section 280.63), free product removal (Section 280.64), investigation of soil and ~~ground-water~~groundwater cleanup (Section 280.65), and corrective action plan (Section 280.66);

(~~4~~5) A notification before permanent closure or change-in-service (Section 280.71);

(~~5~~6) Documentation of all completed UST system upgrading (Section 280.21); and;

(~~6~~7) Results of site investigation on a form supplied by the Department or an approved substitute (Section 280.72).

(b) Recordkeeping. Owners and operators must maintain the following information:

(1) A corrosion expert's analysis of site corrosion potential if corrosion protection equipment is not used (Section 280.20(a)(4); Section 280.20(b)(3)).

(2) Documentation of operation of corrosion protection equipment (Section 280.31(d));

(3) Documentation of compatibility for UST systems (Section 280.32(c));

(4) Documentation of UST system repairs and testing results (Section 280.33(~~f~~g));

(5) Documentation of compliance for spill and overfill prevention equipment and containment sumps used for interstitial monitoring of piping (Section 280.35(c));

(6) Documentation of periodic walkthrough inspections (Section 280.36(b)).

(~~4~~7) ~~Recent~~Documentation of compliance with release detection requirements (Section 280.45); ~~and~~

(~~5~~8) Results of the site investigation conducted at permanent closure (Section 280.74)~~.~~; and

(~~6~~9) Documentation of ~~UST facility~~ operator ~~designation and~~ training (Section 280.~~35~~245).

(c) Availability and Maintenance of Records. Owners and operators must keep the records required either:

(1) At the UST site and immediately available for inspection by the Department; or

(2) At a readily available alternative site and be provided for inspection to the Department upon request.

(3) In the case of permanent closure records required under Section 280.74, owners and operators are also provided with the additional alternative of mailing closure records to the Department if they cannot be kept at the site or an alternative site as indicated ~~above.~~in paragraphs (c)(1) and (2) of this section.

SECTION 280.35. ~~OPERATOR TRAINING REQUIRED~~PERIODIC TESTING OF SPILL PREVENTION EQUIPMENT AND CONTAINMENT SUMPS USED FOR INTERSTITIAL MONITORING OF PIPING AND PERIODIC INSPECTION OF OVERFILL PREVENTION EQUIPMENT.

(a)~~ Not later than August 8, 2009, the Department shall develop an Operator Training Plan .~~ Owners and operators of UST systems with spill and overfill prevention equipment and containment sumps used for interstitial monitoring of piping must meet these requirements to ensure the equipment is operating properly and will prevent releases to the environment:

(1) Spill prevention equipment (such as a catchment basin, spill bucket, or other spill containment device) and containment sumps used for interstitial monitoring of piping must prevent releases to the environment by meeting one of the following:

(i) The equipment is double-walled and the integrity of both walls is periodically monitored at a frequency not less than the frequency of the walkthrough inspections described in Section 280.36. Owners and operators must begin meeting paragraph (a)(1)(ii) of this section and conduct a test within 30 days of discontinuing periodic monitoring of this equipment; or

(ii) The spill prevention equipment and containment sumps used for interstitial monitoring of piping are tested at least once every three years to ensure the equipment is liquid tight by using vacuum, pressure, or liquid testing in accordance with one of the following criteria:

(A) Requirements developed by the manufacturer (Note: Owners and operators may use this option only if the manufacturer has developed requirements);

(B) Code of practice developed by a nationally recognized association or independent testing laboratory; or

(C) Requirements determined by the Department to be no less protective of human health and the environment than the requirements listed in paragraphs (a)(1)(ii)(A) and (B) of this section.

(2) Overfill prevention equipment must be inspected at least once every three years. At a minimum, the inspection must ensure that overfill prevention equipment is set to activate at the correct level specified in Section 280.20(c) and will activate when regulated substance reaches that level. Inspections must be conducted in accordance with one of the criteria in paragraph (a)(1)(ii)(A) through (C) of this section.

[Note to paragraphs (a)(1)(ii) and (a)(2). The following code of practice may be used to comply with paragraphs (a)(1)(ii) and (a)(2) of this section: Petroleum Equipment Institute Publication RP1200, "Recommended Practices for the Testing and Verification

of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities".]

(b) ~~The training plan shall:~~ Owners and operators must begin meeting these requirements as follows:

(1) ~~Be developed in cooperation with tank owners and operators; and~~ For UST systems in use on or before [*Effective Date*], the initial spill prevention equipment test, containment sump test and overfill prevention equipment inspection must be conducted not later than [*Three Years from Effective Date*]. All results must be documented using a Department form or a Department approved form, or submitted in a format as approved by the Department.

(2) ~~Take into consideration training programs implemented by tank owners and tank operators; and~~For UST systems brought into use after [*Effective Date*], these requirements apply at installation. All results must be documented using a Department form or a Department approved form, or submitted in a format as approved by the Department.

~~(3) Be communicated to tank owners and operators; and~~

~~(4) Provide options for obtaining training; and~~

~~(5) Describe minimum curriculum standards and evaluation requirements for operator training.~~

(c) ~~Not later than two years from the publication date of the Department's Operator Training Plan, operator training is required for all operators of underground storage tank systems that meet the definition of "UST system" in Section 280.12, except for those underground storage tank systems identified in Section 280.10(b) and 280.10(c) as excluded or deferred underground storage tank systems. Three categories of operators must be trained:~~ Owners and operators must maintain records as follows (in accordance with Section 280.34) for spill prevention equipment, containment sumps used for interstitial monitoring of piping, and overfill prevention equipment:

(1) ~~Class A Operator - Persons having primary responsibility for on-site operation and maintenance of underground storage tank systems.~~ All records of testing or inspection must be documented using a Department form, a Department approved form, or submitted in a format as directed by the Department and maintained for three years; and

(2) ~~Class B Operator - Persons having daily on-site responsibility for the operation and maintenance of underground storage tank systems.~~ For spill prevention equipment and containment sumps used for interstitial monitoring of piping not tested every three years, documentation showing that the prevention equipment is double-walled and the integrity of both walls is periodically monitored must be maintained for as long as the equipment is periodically monitored.

~~(3) Class C Operator - Daily, on-site employees having primary responsibility for addressing emergencies presented by a spill or release from an underground storage tank system.~~

~~(d) Class A and B Operators shall be trained in facility-specific operation and maintenance and/or emergency response actions within 30 days of being designated as an operator at the UST facility.~~

~~(e) Once each month, Class B Operators shall validate that:~~

~~Each assigned facility has accomplished the required release detection monitoring;~~

~~Each assigned facility has the required release and equipment monitoring records;~~

~~Required equipment and system testing has been accomplished;~~

~~Unusual operating conditions or release detection system indications have been reported and investigated;~~

~~Routine operations and maintenance activities have been accomplished;~~

~~Spill, overfill, and corrosion protection systems are in place and operational;~~

~~Class C operators have been designated and trained.~~

~~(f) Class B Operators shall physically visit each assigned facility quarterly.~~

~~(g) Class C Operators shall be trained in facility specific emergency response actions before they assume responsibility for the UST facility.~~

~~(h) Operator Identification. Each facility will need at least one individual trained to perform the duties in each operator category (A, B, and C). At small facilities, one individual may handle all three duties. However, in the operation and maintenance structure at an underground storage tank facility that is part of a large store chain, open 24 hours, a number of persons may be designated to perform duties and responsibilities of operator classes A, B, and C.~~

~~(1) Not later than three months after the publication date of the Operator Training Plan, tank owners shall notify the Department of the number of operators in Operator Class A and Operator Class B for each UST facility. Not later than thirty days after Class A and Class B Operators complete appropriate operator training, tank owners will notify the department of the name, training completion date and training provider for each operator.~~

~~(i) The Department shall establish a registry of Class A and Class B operators to include facility responsibility, training completion date, and training provider.~~

~~(ii) The Department shall verify that training is current for Class A and Class B Operators during inspections at UST facilities.~~

~~(2) Tank owners shall designate in writing the Class C Operators for each facility and keep a copy of that designation on file at the facility.~~

~~(i) Tank owners shall be responsible for training Class C Operators.~~

~~(ii) Tank owners shall document training for Class C Operators and maintain a copy of that documentation on file at the facility.~~

~~(iii) The Department shall verify such documentation during inspections.~~

~~(i) Persons having primary responsibility and daily on-site operation and maintenance responsiblity of underground storage tank systems (Class A and/or Class B Operators) shall repeat relevant facility-specific training if the tank for which they have such responsibilities is determined to be out of compliance with the requirements of this regulation.~~

SECTION 280.36. PERIODIC OPERATION AND MAINTENANCE WALKTHROUGH INSPECTIONS.

(a) To properly operate and maintain UST systems, not later than [*Three years from effective date*] owners and operators must meet one of the following:

(1) Conduct a walkthrough inspection that, at a minimum, checks the following equipment as specified below:

(i) Every 30 days:

(A) Spill prevention equipment— visually check for damage; remove liquid or debris; check for and remove obstructions in the fill pipe; check the fill cap to make sure it is securely on the fill pipe; and, for double walled spill prevention equipment with interstitial monitoring, check for a leak in the interstitial area; and

(B) Release detection equipment— check to make sure the release detection equipment is operating with no alarms or other unusual operating conditions present; and ensure records of release detection testing are reviewed and current; and

(ii) Annually:

(A) Containment sumps—visually check for damage, leaks to the containment area, or releases to the environment; remove liquid (in contained sumps) or debris; and, for double walled sumps with interstitial monitoring, check for a leak in the interstitial area; and

(B) Hand held release detection equipment—check devices such as tank gauge sticks or groundwater bailers for operability and serviceability;

(2) Conduct operation and maintenance walkthrough inspections according to a standard code of practice developed by a nationally recognized association or independent testing laboratory that checks equipment comparable to paragraph (a)(1) of this section; or

[Note to paragraph (a)(2). The following code of practice may be used to comply with paragraph (a)(2) of this section: Petroleum Equipment Institute Recommended Practice RP 900, ‘‘Recommended Practices for the Inspection and Maintenance of UST Systems.”]

(3) Conduct operation and maintenance walkthrough inspections developed by the Department that checks equipment comparable to paragraph (a)(1) of this section.

(b) Owners and operators must maintain records (in accordance with Section 280.34) of operation and maintenance walkthrough inspections for one year. Records must include a list of each area checked, whether each area checked was acceptable or needed action taken, and a description of actions taken to correct an issue. All operation and maintenance walkthrough records must be documented using a Department form, a Department approved form, or submitted in a format as approved by the Department.

SUBPART D
Release Detection

SECTION 280.40. GENERAL REQUIREMENTS FOR ALL UST SYSTEMS.

(a) Owners and operators of ~~new and existing~~ UST systems must provide a method, or combination of methods, of release detection that:

(1) Can detect a release from any portion of the tank and the connected underground piping that routinely contains product;

(2) Is installed, calibrated, operated, and maintained in accordance with the manufacturer's instructions, including routine maintenance and service checks for operability or running condition; and

(3) Beginning on [*Three years from effective date*], is operated and maintained, and electronic and mechanical components are tested for proper operation, in accordance with one of the following: manufacturer's instructions; a code of practice developed by a nationally recognized association or independent testing laboratory; or requirements determined by the Department to be no less protective of human health and the environment than the two options listed in paragraphs (a)(1) and (2) of this section. A test of the proper operation must be performed at least annually, documented on a Department form, a Department approved form, or submitted in a format as approved by the Department and, at a minimum, as applicable to the facility, cover the following components and criteria:

(i) Automatic tank gauge and other controllers: test alarm; verify system configuration; test battery backup;

(ii) Probes and sensors: inspect for residual buildup; ensure floats move freely; ensure shaft is not damaged; ensure cables are free of kinks and breaks; test alarm operability and communication with controller;

(iii) Automatic line leak detector: test operation to meet criteria in Section 280.44(a) by simulating a leak;

(iv) Vacuum pumps and pressure gauges: ensure proper communication with sensors and controller; and

(v) Hand-held electronic sampling equipment associated with groundwater and vapor monitoring: ensure proper operation.

[Note to paragraph (a)(3). The following code of practice may be used to comply with paragraph (a)(3) of this section: Petroleum Equipment Institute Publication RP1200, "Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities."]

(4) Meets the performance requirements in Sections 280.43 ~~or~~, 280.44, or subpart K of this part, as applicable, with any performance claims and their manner of determination described in writing by the equipment manufacturer or installer. In addition, the methods ~~used after December 22, 1990, except for methods permanently installed prior to that date,~~ listed in Section 280.43(b), (c), (d), (h), and (i), Section 280.44(a) , (b), and subpart K of this part, must be capable of detecting the leak rate or quantity specified for that method in ~~Section 280.43(b), (c), and (d) or 280.44(a) and (b)~~ the corresponding section of the rule with a probability of detection of 0.95 and a probability of false alarm of 0.05.

(b) When a release detection method operated in accordance with the performance standards in Sections 280.43 ~~and~~, 280.44, or subpart K of this part indicates a release may have occurred, owners and operators must notify the Department in accordance with Subpart E of this part.

~~(c) Owners and operators of all UST systems must comply with the release detection requirements of this Subpart by December 22nd of the year listed in the following table:~~

~~SCHEDULE FOR PHASE-IN OF RELEASE DETECTION~~					
	~~YEAR WHEN RELEASE DETECTION IS REQUIRED (BY DECEMBER 22 OF THE YEAR INDICATED~~				
~~YEAR SYSTEM WAS INSTALLED~~	~~1989~~	~~1990~~	~~1991~~	~~1992~~	~~1993~~
~~BEFORE 1965 OR DATE UNKNOWN~~	~~RD~~	~~P~~			
~~1965-1969~~		~~P/RD~~			
~~1970-1974~~		~~P~~	~~RD~~		
~~1975-1979~~		~~P~~		~~RD~~	
~~1980-1988~~		~~P~~			~~RD~~
~~NEW TANKS (AFTER DECEMBER 22) IMMEDIATELY UPON INSTALLATION~~					

~~P = Must begin release detection for all pressurized piping in accordance with Sections 280.41(b) and 280.42(b)(4).~~

~~RD = Must begin release detection for tanks and suction piping in accordance with Sections 280.41(a), 280.41(b), and 280.42.~~

(~~d~~c) Any ~~existing~~ UST system that cannot apply a method of release detection that complies with the requirements of this ~~S~~subpart must complete the closure procedures in Subpart G ~~by the date on which release detection is required for that UST system under paragraph (c) of this section.~~ of this part. For previously deferred UST systems described in Subparts A and K of this part, this requirement applies after the effective dates described in Section 280.10(a)(1)(ii) and (iii) and Section 280.251(a).

SECTION 280.41. REQUIREMENTS FOR PETROLEUM UST SYSTEMS.

Owners and operators of petroleum UST systems must provide release detection for tanks and piping as follows:

(a) Tanks. Tanks must be monitored ~~at least every 30 days~~ for releases ~~using one of the methods listed in Section 280.43 (d) (i) except that~~ as follows:

(1) ~~UST systems that meet the performance standards in Sections 280.20 or 280.21, and the monthly inventory control requirements in Section 280.43(a) or (b) may use tank tightness testing (conducted in accordance with Section 280.43(c)) at least every 5 years until December 22, 2008, or until 10 years after the tank is installed or upgraded under Section 280.21(b), whichever is earlier;~~Tanks installed on or before May 23, 2008 must be monitored for releases at least every 30 days using one of the methods listed in Section 280.43(d) through (i) except that

~~(2) UST systems that do not meet the performance standards in Section 280.20 or 280.21 may use monthly inventory controls (conducted in accordance with Section 280.43(a) or (b) and annual tank tightness testing (conducted in accordance with Section 280.43(c)) until December 22, 1998 when the tank must be upgraded under Section 280.21 or permanently closed under Section 280.71;~~

~~(3)~~ ~~T~~tanks with capacity of 550 gallons or less may use ~~weekly~~manual tank gauging (conducted in accordance with Section 280.43(b)).

(2) Tanks installed after May 23, 2008 must be monitored for releases at least every 30 days in accordance with Section 280.43(g).

(b) Piping. Underground piping that routinely contains regulated substances must be monitored for releases in a manner that meets one of the following requirements:

(1) Piping installed on or before May 23, 2008 must meet one of the following:

__(~~1~~i) Pressurized piping. Underground piping that conveys regulated substances underpressure must:

__(~~i~~A) Be equipped with an automatic line leak detector conducted in accordance with Section 280.44(a);

__(~~ii~~B) Have a line tightness test conducted in accordance with Section 280.44(b) or have monthly monitoring conducted in accordance with Section 280.44(c).

__(~~2~~ii) Suction piping. Underground piping that conveys regulated substances under suction must either have a line tightness test conducted at least every 3 years and in accordance with Section 280.44(b), or use a monthly monitoring method conducted in accordance with Section 280.44(c). No release detection is required for suction piping that is designed and constructed to-meet the following standards:

__(~~i~~A) The below-grade piping operates at less than atmospheric pressure;

__(~~ii~~B) The below-grade piping is sloped so that the contents of the pipe will drain back into the storage tank if the suction is released;

__(~~iii~~C) Only one check valve is included in each suction line;

__(~~iv~~D) The check valve is located directly below and as close as practical to the suction pump; and

__(~~v~~E) A method is provided that allows compliance with paragraphs (b)(~~2~~1)(ii)(B)- through (~~iv~~D) of this section to be readily determined.

(2) Piping installed or replaced after May 23, 2008 must meet one of the following:

(i) Pressurized piping must be monitored for releases at least every 30 days in accordance with Section 280.43(g) and be equipped with an automatic line leak detector in accordance with Section 280.44(a).

(ii) Suction piping must be monitored for releases at least every 30 days in accordance with Section 280.43(g). No release detection is required for suction piping that meets paragraphs (b)(1)(ii)(A)through (E) of this section.

SECTION 280.42. REQUIREMENTS FOR HAZARDOUS SUBSTANCE UST SYSTEMS.

Owners and operators of hazardous substance UST systems must provide ~~release detection~~containment that meets the following requirements and monitor these systems using Section 280.43(g) at least every 30 days:

(a) ~~Release detection at existing UST systems must meet the requirements for petroleum UST systems in Section 280.41. By December 22, 1998, all existing hazardous substance UST systems must meet the release detection requirements for new systems in paragraph (b) of this section.~~

~~(b) Release detection at new hazardous substance UST systems must meet the following requirements:~~

~~(1)~~ Secondary containment systems must be designed, constructed and installed to:

(~~i~~1) Contain regulated substances ~~released~~leaked from the ~~tank system~~primary containment until they are detected and removed;

(~~ii~~2) Prevent the release of regulated substances to the environment at any time during the operational life of the UST system; and

(~~iii~~3) Be checked for evidence of a release at least every 30 days.

[Note~~:~~ to paragraph (a). The provisions of 40 CFR 265.193, Containment and Detection of Releases, may be used to comply with these requirements for tanks installed on or before May 23, 2008.]

(~~2~~b) Double-walled tanks must be designed, constructed, and installed to:

(~~i~~1) Contain a ~~release~~leak from any portion of the inner tank within the outer wall; and

(~~ii~~2) Detect the failure of the inner wall.

(~~3~~c) External liners (including vaults) must be designed, constructed, and installed to:

(~~i~~1) Contain 100 percent of the capacity of the largest tank within its boundary;

(~~ii~~2) Prevent the interference of precipitation or ~~ground water~~groundwater intrusion with the ability to contain or detect a release of regulated substances; and

(~~iii~~3) Surround the tank completely (i.e., it is capable of preventing lateral as well as vertical migration of regulated substances).

(~~4~~d) Underground piping must be equipped with secondary containment that satisfies the requirements ~~of paragraph (b)(1)~~ of this section (e.g., trench liners, ~~jacketing of~~ double-walled pipe). In addition, underground piping that conveys regulated substances under pressure must be equipped with an automatic line leak detector in accordance with Section 280.44(a).

(~~5~~e) For hazardous substance UST systems installed on or before May 23, 2008 ~~O~~other methods of release detection may be used if owners and operators:

(~~i~~1) Demonstrate to the Department that an alternate method can detect a release of the stored substance as effectively as any of the methods allowed in Sections 280.43(b)~~-~~ through (~~h~~i) can detect a release of petroleum;

(~~ii~~2) Provide information to the Department on effective corrective action technologies, health risks, and chemical and physical properties of the stored substance, and the characteristics of the UST site; and,

—(~~iii~~3) Obtain approval from the Department to use the alternate release detection method before the installation and operation of the new UST system.

SECTION 280.43. METHODS OF RELEASE DETECTION FOR TANKS.

Each method of release detection for tanks used to meet the requirements of Section 280.41 must be conducted in accordance with the following:

(a) Inventory control. Inventory control is no longer considered an acceptable method of release detection. Product inventory control (or another test of equivalent performance) must be conducted monthly to detect a release of at least 1.0 percent of flow-through plus 130 gallons on a monthly basis in the following manner:

(1) Inventory volume measurements for regulated substance inputs, withdrawals, and the amount still remaining in the tank are recorded each operating day;

(2) The equipment used is capable of measuring the level of product over the full range of the tank's height to the nearest one-eighth of an inch;

(3) The regulated substance inputs are reconciled with delivery receipts by measurement of the tank inventory volume before and after delivery;

(4) Deliveries and measurements are made through a drop tube that extends to within one foot of the tank bottom;

(5) Product dispensing is metered and recorded within the local standards for meter calibration or an accuracy of 6 cubic inches for every 5 gallons of product withdrawn; and

(6) The measurement of any water level in the bottom of the tank is made to the nearest one-eighth of an inch at least once a month.

> [Note~~:~~ to paragraph (a). Practices described in the American Petroleum Institute ~~Publication~~Recommended Practice RP 1621, "~~Recommended Practice for~~ Bulk Liquid Stock Control at Retail Outlets," may be used, where applicable, as guidance in meeting the requirements of this paragraph (a).]

(b) Manual tank gauging. Manual tank gauging must meet the following requirements:

(1) Tank liquid level measurements are taken at the beginning and ending of a period of at least 36 hours during which no liquid is added to or removed from the tank;

(2) Level measurements are based on an average of two consecutive stick readings at both the beginning and ending of the period;

(3) The equipment used is capable of measuring the level of product over the full range of the tank's height to the nearest one-eighth of an inch;

(4) A ~~leak~~release is suspected and subject to the requirements of Subpart E if the variation between beginning and ending measurements exceeds the ten gallon weekly or five gallon monthly standards~~ in the following table:~~; and,

~~Nominal Tank Capacity~~	~~Weekly Standard (one test)~~	~~Monthly Standard~~
~~550 gallons or less~~	~~10 gallons~~	~~5 gallons~~
~~551-1,000 gallons~~	~~13 gallons~~	~~7 gallons~~
~~1,001-2,000 gallons~~	~~26 gallons~~	~~13 gallons~~

(5) Only tanks of 550 gallons or less nominal capacity may use this as the sole method of release detection. ~~Tanks of 551 to 2,000 gallons may use the method in place of manual inventory control in Section 280.43(a).~~ Tanks of greater than ~~2,000~~550 gallons nominal capacity may not use this method to meet the requirements of this subpart.

(c) Tank tightness testing. Tank tightness testing (or another test of equivalent performance) must be capable of detecting a 0.1 gallon per hour leak rate from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table.

(d) Automatic tank gauging. Equipment for automatic tank gauging that tests for the loss of product and conducts inventory control must meet the following requirements:

(1) The automatic product level monitor test can detect a 0.2 gallon per hour leak rate from any portion of the tank that routinely contains product; ~~and~~

(2) The automatic tank gauging equipment must meet the ~~I~~inventory control (or ~~an~~other test of equivalent performance) ~~is conducted in accordance with the~~ requirements of Section 280.43(a)~~.~~; and

(3) The test must be performed with the system operating in one of the following modes:

(i) In-tank static testing conducted at least once every 30 days; or

(ii) Continuous in-tank leak detection operating on an uninterrupted basis or operating within a process that allows the system to gather incremental measurements to determine the leak status of the tank at least once every 30 days.

(e) Vapor monitoring. Testing or monitoring for vapors within the soil gas of the excavation zone must meet the following requirements:

(1) The materials used as backfill are sufficiently porous (e.g., gravel, sand, crushed rock) to readily allow diffusion of vapors from releases into the excavation area;

(2) The stored regulated substance, or a tracer compound placed in the tank system, is sufficiently volatile (e.g., gasoline) to result in a vapor level that is detectable by the monitoring devices located in the excavation zone in the event of a release from the tank;

(3) The measurement of vapors by the monitoring device is not rendered inoperative by the ~~ground water~~groundwater, rainfall, or soil moisture or other known interferences so that a release could go undetected for more than 30 days;

(4) The level of background contamination in the excavation zone will not interfere with the method used to detect releases from the tank;

(5) The vapor monitors are designed and operated to detect any significant increase in concentration above background of the regulated substance stored in the tank system, a component or components of that substance, or a tracer compound placed in the tank system;

(6) In the UST excavation zone, the site is assessed in accordance with Section 280.45(a) to ensure compliance with the requirements in paragraphs (e)(1)- through (4) of this section and to establish the number and positioning of monitoring wells that will detect releases within the excavation zone from any portion of the tank that routinely contains product;

(7) Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering; and

(8) Monitoring wells shall be sealed from the ground surface to the top of the filter pack.

(f) ~~Ground-water~~Groundwater monitoring. Testing or monitoring for liquids on the ~~ground water~~groundwater must meet the following requirements:

(1) The regulated substance stored is immiscible in water and has a specific gravity of less than one;

(2) ~~Ground-water~~Groundwater is never more than 20 feet from the ground surface and the hydraulic conductivity of the soil(s) between the UST system and the monitoring wells or devices is not less than 0.01 cm/sec (e.g., the soil should consist of gravels, coarse to medium sands, coarse silts or other permeable materials);

(3) The slotted portion of the monitoring well casing must be designed to prevent migration of natural soils or filter pack into the well and to allow entry of regulated substance on the water table into the well under both high and low ~~ground-water~~groundwater conditions;

(4) Monitoring wells shall be sealed from the ground surface to the top of the filter pack;

(5) Monitoring wells or devices intercept the excavation zone or are as close to it as is technically feasible;

(6) The continuous monitoring devices or manual methods used can detect the presence of at least one-eighth of an inch of free product on top of the ~~ground-water~~groundwater in the monitoring wells;

(7) Within and immediately below the UST system excavation zone, the site is assessed in accordance with Section 280.45(a) to ensure compliance with the requirements in paragraphs (f)(1)- through (5) of this section and to establish the number and positioning of monitoring wells or devices that will detect releases from any portion of the tank that routinely contains product; and

(8) Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering.

(g) Interstitial monitoring. Interstitial monitoring between the UST system and a secondary barrier immediately around or beneath it may be used, but only if the system is designed, constructed and installed to detect a leak from any portion of the tank that routinely contains product and also meets one of the following requirements:

(1) For double-walled UST systems, the sampling or testing method can detect a ~~release~~leak through the inner wall in any portion of the tank that routinely contains product;

(2) For UST systems with a secondary barrier within the excavation zone, the sampling or testing method used can detect a ~~release~~leak between the UST system and the secondary barrier;

(i) The secondary barrier around or beneath the UST system consists of artificially constructed material that is sufficiently thick and impermeable (at least 10^{-6} cm/sec for the regulated substance stored) to direct a ~~release~~leak to the monitoring point and permit its detection;

(ii) The barrier is compatible with the regulated substance stored so that a ~~release~~leak from the UST system will not cause a deterioration of the barrier allowing a release to pass through undetected;

(iii) For cathodically protected tanks, the secondary barrier must be installed so that it does not interfere with the proper operation of the cathodic protection system;

(iv) The ~~ground water~~groundwater, soil moisture, or rainfall will not render the testing or sampling method used inoperative so that a release could go undetected for more than 30 days;

(v) The site is assessed to ensure that the secondary barrier is always above the ~~ground water~~groundwater and not in a 25-year flood plain, unless the barrier and monitoring designs are for use under such conditions; and,

(vi) Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering.

(3) For tanks with an internally fitted liner, an automated device can detect a ~~release~~leak between the inner wall of the tank and the liner, and the liner is compatible with the substance stored.

(h) ~~Statistical inventory reconciliation.~~ Statistical inventory reconciliation (SIR). Release detection methods based on the application of statistical principles to inventory data similar to those described in Section 280.43(a), must be conducted monthly and meet the following requirements:

(1) The method must be third party certified to satisfy the requirements of Section 280.43(i)(1);

(2) The methodology must specifically identify the results for each tank as "pass, fail, or inconclusive". The results report must also identify the threshold, minimum detection level, and ~~measured~~calculated leak rate for each tank evaluated;

(3) SIR results must be reported in a format designated by the Department; and

(4) A leak is suspected and subject to the requirements of Subpart E for any results other than "pass."

(5) Report a quantitative result with a calculated leak rate;

(6) Be capable of detecting a leak rate of 0.2 gallon per hour or a release of 150 gallons within 30 days; and

(7) Use a threshold that does not exceed one-half the minimum detectible leak rate.

(i) Other methods. Any other type of release detection method, or combination of methods, can be used if:

(1) It can detect a 0.2 gallon per hour leak rate or a release of 150 gallons within a month with a probability of detection of 0.95 and a probability of false alarm of 0.05; or

(2) The Department may approve another method if the owner and operator can demonstrate that the method can detect a release as effectively as any of the methods allowed in paragraphs (c)- through (~~i~~h) of this section. In comparing methods, the Department shall consider the size of release that the method can detect and the frequency and reliability with which it can be detected. If the method is approved, the owner and operator must comply with any conditions imposed by the Department on its use to ensure the protection of human health and the environment.

SECTION 280.44. METHODS OF RELEASE DETECTION FOR PIPING.

Each method of release detection for piping used to meet the requirements of Section 280.41 must be conducted in accordance with the following:

(a) Automatic line leak detectors. Methods which alert the operator to the presence of a leak by restricting or shutting off the flow of regulated substances through piping or triggering an audible or visual alarm may be used only if they detect leaks of 3 gallons per hour at 10 pounds per square inch line pressure within 1 hour. An annual test of the operation of the leak detector must be conducted in accordance with ~~the manufacturer's requirements~~Section 280.40(a)(3).

(b) Line tightness testing. A periodic test of piping may be conducted only if it can detect a 0.1 gallon per hour leak rate at one and one-half times the operating pressure.

(c) Applicable tank methods. Except as described in Section 280.41(a), ~~A~~any of the methods in Section 280.43(e)- through (i) may be used if they are designed to detect a release from any portion of the underground piping that routinely contains regulated substances.

SECTION 280.45. RELEASE DETECTION RECORDKEEPING.

All UST system owners and operators must maintain records in accordance with Section 280.34 demonstrating compliance with all applicable requirements of this ~~S~~subpart. These records must include the following:

(a) All written performance claims pertaining to any release detection system used, and the manner in which these claims have been justified or tested by the equipment manufacturer or installer, must be maintained for 5 years, or for another reasonable period of time determined by the Department, from the date of installation~~;~~. Not later than [*Effective Date*], records of site assessments required under Section 280.43(e)(6) and (f)(7) must be maintained for as long as the methods are used. Records of site assessments developed after [*Effective Date*] must be signed by a professional engineer or professional geologist, or equivalent licensed professional with experience in environmental engineering, hydrogeology, or other relevant technical discipline acceptable to the Department;

(b) The results of any sampling, testing, or monitoring must be maintained for at least one year, or for another reasonable period of time determined by the Department, except as follows:

(1) ~~For tank systems storing regulated substances, records must be maintained for at least 1 year, or for another reasonable period of time determined by the Department, except that the results of tank tightness testing conducted in accordance with Section 280.43(c) must be retained until the next test is conducted~~The results of annual operation tests conducted in accordance with Section 280.40(a)(3) must be maintained for three years. At a minimum, the results must list each component tested, indicate whether each component tested meets criteria in Section 280.40(a)(3) or needs to have action taken, and describe any action taken to correct an issue; ~~or~~

(2) The results of tank tightness testing conducted in accordance with Section 280.43(c) must be retained until the next test is conducted;

(~~2~~3) For tank systems temporarily closed, records for the most recent 12 months of operation must be maintained as follows:

(i) For one year after taking the system out of temporary closure status and returning regulated substances to the system; or

(ii) As required by Section 280.45(b)(~~3~~5) for systems subsequently permanently closed.

(4) The results of tank tightness testing, line tightness testing, and vapor monitoring using a tracer compound placed in the tank system conducted in accordance with Section 280.252(d) must be retained until the next test is conducted; and

(~~3~~5) For tank systems permanently closed, records for the most recent 12 months of operation must be maintained with the results of the site assessment required in Section 280.72 and maintained in accordance with the requirements of Section 280.74~~.~~; and

(c) Written documentation of all calibration, maintenance, and repair of release detection equipment permanently located on-site must be maintained for at least one year after the servicing work is completed, or for another reasonable time period determined by the Department. Any schedules of required calibration and maintenance provided by the release detection equipment manufacturer must be retained for 5 years from the date of installation.

SUBPART E
Release Reporting, Investigation, And Confirmation

SECTION 280.50. REPORTING OF SUSPECTED RELEASES.

Owners and operators of UST systems must report to the Department within ~~72~~24 hours and follow the procedures in Section 280.52 for any of the following conditions:

(a) The discovery by owners and operators or others of released regulated substances at the UST site or in the surrounding area (such as the presence of free product or vapors in soils, basements, sewer and utility lines, and nearby surface water).

(b) Unusual operating conditions observed by owners and operators (such as the erratic behavior of product dispensing equipment, the sudden loss of product from the UST system, ~~or~~ an unexplained presence of water in the tank, or liquid in the interstitial space of secondarily contained systems), unless: ~~system equipment is found to be defective but not leaking, and is immediately repaired or replaced; and~~

(1) The system equipment or component is found not to be releasing regulated substances to the environment;

(2) Any defective system equipment or component is immediately repaired or replaced; and

(3) For secondarily contained systems, except as provided for in Section 280.43(g)(2)(iv), any liquid in the interstitial space not used as part of the interstitial monitoring method (for example, brine filled) is immediately removed.

(c) Monitoring results, including investigation of an alarm, from a release detection method required under Sections 280.41 and 280.42 that indicate a release may have occurred unless:

(1) The monitoring device is found to be defective, and is immediately repaired, recalibrated or replaced, and additional monitoring does not confirm the initial result; ~~or~~

(2) ~~In the case of inventory control, a second month of data does not confirm the initial result.~~The leak is contained in the secondary containment and:

(i) Except as provided for in Section 280.43(g)(2)(iv), any liquid in the interstitial space not used as part of the interstitial monitoring method (for example, brine filled) is immediately removed; and

(ii) Any defective system equipment or component is immediately repaired or replaced;

(3) The alarm was investigated and determined to be a non-release event (for example, from a power surge or caused by filling the tank during release detection testing).

SECTION 280.51. INVESTIGATION DUE TO OFF-SITE IMPACTS.

When required by the Department, owners and operators of UST systems must follow the procedures in Section 280.52 to determine if the UST system is the source of off-site impacts. These impacts include the discovery of regulated substances (such as the presence of free product or vapors in soils, basements, sewer and utility lines, and nearby surface and drinking waters) that has been observed by the Department or brought to its attention by another party.

SECTION 280.52. RELEASE INVESTIGATION AND CONFIRMATION STEPS.

Unless corrective action is initiated in accordance with Subpart F, owners and operators must immediately investigate and confirm all suspected releases of regulated substances requiring reporting under Section 280.50 within 7 days, or another reasonable time period specified by the Department, using either the following steps or another procedure approved by the Department:

(a) System test. Owners and operators must conduct tests (according to the requirements for tightness testing in Sections 280.43(c) and 280.44(b)~~)~~, or as appropriate, secondary containment testing described in Section 280.33(d)).

(1) The test must ~~that~~ determine whether:

(i) ~~a~~A leak exists in that portion of the tank that routinely contains product, or the attached delivery piping, or both; or

(ii) A breach of either wall of the secondary containment has occurred.

(~~1~~2) If the system test confirms a leak into the interstice or a release, ~~O~~owners and operators must repair, replace, ~~or~~ upgrade, or close the UST system~~,~~. ~~and~~In addition, owners and operators must begin corrective action in accordance with Subpart F of this part if the test results for the system, tank, or delivery piping indicate that a ~~leak~~release exists.

(~~2~~3) Further investigation is not required if the test results for the system, tank, and delivery piping do not indicate that a ~~leak~~release exists and if environmental contamination is not the basis for suspecting a release.

(~~3~~4) Owners and operators must conduct a site check as described in paragraph (b) of this section if the test results for the system, tank, and delivery piping do not indicate that a ~~leak~~release exists but environmental contamination is the basis for suspecting a release.

(b) Site check. Owners and operators must measure for the presence of a release where contamination is most likely to be present at the UST site. In selecting sample types, sample locations, and measurement methods, owners and operators must consider the nature of the stored substance, the type of initial alarm or cause for suspicion, the type of backfill, the depth of ~~ground water~~groundwater, and other factors appropriate for identifying the presence and source of the release. Results of the site check, including but not limited to all items listed above, must be submitted in a format as approved by the Department.

(1) If the test results for the excavation zone or the UST site indicate that a release has occurred, owners and operators must begin corrective action in accordance with Subpart F of this part;

(2) If the test results for the excavation zone or the UST site do not indicate that a release has occurred, further investigation is not required.

SECTION 280.53. REPORTING AND CLEANUP OF SPILLS AND OVERFILLS.

(a) Owners and operators of UST systems must contain and immediately clean up a spill or overfill and report to the Department within ~~72~~24 hours and begin corrective action in accordance with Subpart F of this part in the following cases:

(1) Spill or overfill of petroleum that results in a release to the environment that exceeds 25 gallons or another reasonable amount specified by the Department, or that causes a sheen on nearby surface water; and

(2) Spill or overfill of a hazardous substance that results in a release to the environment that equals or exceeds its reportable quantity under CERCLA (40 CFR Part 302).

> [Note to paragraph (a). Pursuant to Sections 302.6 and 355.40 of this chapter, a release of a hazardous substance equal to or in excess of its reportable quantity must also be reported immediately (rather than within 24 hours) to the National Response Center under sections 102 and 103 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and to appropriate state and local authorities under Title III of the Superfund Amendments and Reauthorization Act of 1986.]

(b) Owners and operators of UST systems must contain and immediately clean up a spill or overfill of petroleum that is less than 25 gallons or another reasonable amount specified by the Department, and a spill or overfill of a hazardous substance that is less than the reportable quantity. If cleanup cannot be accomplished within ~~72~~24 hours owners and operators must immediately notify the Department.

~~[Note: A release of a hazardous substance equal to or in excess of its reportable quantity must also be reported immediately (rather than within 72 hours) to the National Response Center under Sections 102 and 103 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (40 CFR 302.6) and to appropriate state and local authorities under Title III of the Superfund Amendments and Reauthorization Act of 1986 (40 CFR 355.40).]~~

SUBPART F
Release Response and Corrective Action for UST Systems Containing Petroleum or Hazardous Substances

SECTION 280.60. GENERAL.

Owners and operators of petroleum or hazardous substance UST systems must, in response to a confirmed release from the UST system, comply with the requirements of this subpart except for USTs excluded under Section 280.10(b) and UST systems subject to RCRA Subtitle C corrective action requirements under Section 3004(u) of the Resource Conservation and Recovery Act, as amended.

SECTION 280.61. INITIAL RESPONSE.

Upon confirmation of a release in accordance with Section 280.52 or after a release from the UST system is identified in any other manner, owners and operators must perform the following initial response actions within ~~72~~24 hours of a release:

(a) Report the release to the Department (e.g., by telephone or electronic mail);

(b) Take immediate action to prevent any further release of the regulated substance into the environment; and

(c) Identify and mitigate fire, explosion, and vapor hazards.

SECTION 280.62. INITIAL ABATEMENT MEASURES AND SITE CHECK.

(a) Unless directed to do otherwise by the Department, owners and operators must perform the following abatement measures:

(1) Remove as much of the regulated substance from the UST system as is necessary to prevent further release to the environment;

(2) Visually inspect any aboveground releases or exposed belowground releases and prevent further migration of the released substance into surrounding soils and ~~ground water~~groundwater;

(3) Continue to monitor and mitigate any additional fire and safety hazards posed by vapors or free product that have migrated from the UST excavation zone and entered into subsurface structures (such as sewers or basements);

(4) Remedy hazards posed by contaminated soils that are excavated or exposed as a result of release confirmation, site investigation, abatement, or corrective action activities. If these remedies include treatment or disposal of soils, the owner and operator must comply with applicable state and local requirements;

(5) Measure for the presence of a release where contamination is most likely to be present at the UST site, unless the presence and source of the release have been confirmed in accordance with the site check required by Section 280.52(b) or the closure site assessment of Section 280.72(a). In selecting sample types, sample locations, and measurement methods, the owner and operator must consider the nature of the stored substance, the type of backfill, depth to ~~ground water~~groundwater and other factors as appropriate for identifying the presence and source of the release; and

(6) Investigate to determine the possible presence of free product, and begin free product removal as soon as practicable and in accordance with Section 280.64.

(b) Within 20 days after release confirmation, or within another reasonable period of time determined by the Department, owners and operators must submit a report to the Department summarizing the initial abatement steps taken under paragraph (a) of this section and any resulting information or data.

SECTION 280.63. INITIAL SITE CHARACTERIZATION.

(a) Unless directed to do otherwise by the Department, owners and operators must assemble information about the site and the nature of the release, including information gained while confirming the release or completing the initial abatement measures in Sections 280.60 and 280.61. This information must include, but is not necessarily limited to the following:

(1) Data on the nature and estimated quantity of release;

(2) Data from available sources and/or site investigations concerning the following factors: ~~s~~Surrounding populations, water quality, use and approximate locations of wells potentially affected by the release, subsurface soil conditions, locations of subsurface sewers, climatological conditions, and land use;

(3) Results of the site check required under Section 280.62(a)(5); and

(4) Results of the free product investigations required under Section 280.62(a)(6), to be used by owners and operators to determine whether free product must be recovered under Section 280.64.

(b) Within 45 days of release confirmation or another reasonable period of time determined by the Department, owners and operators must submit the information collected in compliance with paragraph (a) of this section to the Department in a manner that demonstrates its applicability and technical adequacy, or in a format and according to the schedule required by the Department.

SECTION 280.64. FREE PRODUCT REMOVAL.

At sites where investigations under Section 280.62(a)(6) indicate the presence of free product, owners and operators must remove free product to the maximum extent practicable as determined by the Department while continuing, as necessary, any actions initiated under Sections 280.61 through 280.63, or preparing for actions required under Sections 280.65 through 280.66. In meeting the requirements of this section, owners and operators must:

(a) Conduct free product removal in a manner that minimizes the spread of contamination into previously uncontaminated zones by using recovery and disposal techniques appropriate to the hydrogeologic conditions at the site, and that properly treats, discharges or disposes of recovery byproducts in compliance with applicable local, state, and federal regulations;

(b) Use abatement of free product migration as a minimum objective for the design of the free product removal system;

(c) Handle any flammable products in a safe and competent manner to prevent fires or explosions; and

(d) Unless directed to do otherwise by the Department, prepare and submit to the Department, within 45 days after confirming a release, a free product removal report that provides at least the following information:

(1) The name of the person(s) responsible for implementing the free product removal measures;

(2) The estimated quantity, type, and thickness of free product observed or measured in wells, boreholes, and excavations;

(3) The type of free product recovery system used;

(4) Whether any discharge will take place on-site or off-site during the recovery operation and where this discharge will be located;

(5) The type of treatment applied to, and the effluent quality expected from, any discharge;

(6) The steps that have been or are being taken to obtain necessary permits for any discharge; and

(7) The disposition of the recovered free product.

SECTION 280.65. INVESTIGATIONS FOR SOIL AND ~~GROUND WATER~~GROUNDWATER CLEANUP.

(a) In order to determine the full extent and location of soils contaminated by the release and the presence and concentrations of dissolved product contamination in the ~~ground water~~groundwater, owners and operators must conduct investigations of the release, the release site, and the surrounding area possibly affected by the release if any of the following conditions exist:

(1) There is evidence that ~~ground water~~groundwater wells have been affected by the release (e.g., as found during release confirmation or previous corrective action measures);

(2) Free product is found to need recovery in compliance with Section 280.64;

(3) There is evidence that contaminated soils may be in contact with ~~ground water~~groundwater (e.g., as found during conduct of the initial response measures or investigations required under Sections 280.60 through 280.64); and

(4) The Department requests an investigation, based on the potential effects of contaminated soil or ~~ground water~~groundwater on nearby surface water and ~~ground water~~groundwater resources.

(b) Owners and operators must submit the information collected under paragraph (a) of this section as soon as practicable or in accordance with a schedule established by the Department.

SECTION 280.66. CORRECTIVE ACTION PLAN.

(a) At any point after reviewing the information submitted in compliance with Sections 280.61 through 280.63, the Department may require owners and operators to submit additional information or to develop and submit a corrective action plan for responding to contaminated soils and ~~ground water~~groundwater. If a plan is required, owners and operators must submit the plan according to a schedule and format established by the Department. Alternatively, owners and operators may, after fulfilling the requirements of Sections 280.61 through 280.63, choose to submit a corrective action plan for responding to contaminated soil and ~~ground water~~groundwater. In either case, owners and operators are responsible for submitting a plan that provides for adequate protection of human health and the environment as determined by the Department, and must modify their plan as necessary to meet this standard.

(b) The Department will approve the corrective action plan only after ensuring that implementation of the plan will adequately protect human health, safety, and the environment. In making this determination, the Department should consider the following factors as appropriate:

(1) The physical and chemical characteristics of the regulated substance, including its toxicity, persistence, and potential for migration;

(2) The hydrogeologic characteristics of the facility and the surrounding area;

(3) The proximity, quality, and current and future uses of nearby surface water and ~~ground water~~groundwater;

(4) The potential effects of residual contamination on nearby surface water and ~~ground water~~groundwater;

(5) An exposure assessment; and

(6) Any information assembled in compliance with this subpart.

(c) Upon approval of the corrective action plan or as directed by the Department, owners and operators must implement the plan, including modifications to the plan made by the Department. They must monitor, evaluate, and report the results of implementing the plan in accordance with a schedule and in a format established by the Department.

(d) Owners and operators may, in the interest of minimizing environmental contamination and promoting more effective cleanup, begin cleanup of soil and ~~ground water~~groundwater before the corrective action plan is approved provided that they:

(1) Notify the Department of their intention to begin cleanup;

(2) Comply with any conditions imposed by the Department, including halting cleanup or mitigating adverse consequences from cleanup activities; and

(3) Incorporate these self-initiated cleanup measures in the corrective action plan that is submitted to the Department for approval.

SECTION 280.67. PUBLIC PARTICIPATION.

(a) For each confirmed release that requires a corrective action plan, the Department must provide notice to the public by means designed to reach those members of the public directly affected by the release and the planned corrective action. This notice may include, but is not limited to, public notice in local newspapers, block advertisements, public service announcements, publication in a state register, letters to individual households, or personal contacts by field staff.

(b) The Department must ensure that site release information and decisions concerning the corrective action plan are made available to the public for inspection upon request.

(c) Before approving a corrective action plan, the Department may hold a public meeting to consider comments on the proposed corrective action plan if there is sufficient public interest, or for any other reason.

(d) The Department must give public notice that complies with paragraph (a) of this section if implementation of an approved corrective action plan does not achieve the established cleanup levels in the plan and termination of that plan is under consideration by the Department.

SUBPART G
Out-of-Service UST Systems and Closure

SECTION 280.70. TEMPORARY CLOSURE.

(a) When an UST system is temporarily closed, owners and operators must continue operation and maintenance of corrosion protection in accordance with Section 280.31, and any release detection in accordance with Subparts D and K of this part. Subparts E and F of this part must be complied with if a release is suspected or confirmed. However, release detection ~~is~~and release detection operation and maintenance testing and inspections in Subparts C and D of this part are not required as long as the UST system is empty. The UST system is empty when all materials have been removed using commonly employed practices so that no more than 2.5 centimeters (one inch) of residue, or 0.3 percent by weight of the total capacity of the UST system, remain in the system. In addition, spill and overfill operation and maintenance testing and inspections in Subpart C of this part are not required.

(b) When an UST system is temporarily closed for 3 months or more, owners and operators must also comply with the following requirements:

(1) Leave vent lines open and functioning; and

(2) Cap and secure all other lines, pumps, manways, and ancillary equipment.

(c) When an UST system is temporarily closed for more than 12 months, owners and operators must permanently close the UST system if it does not meet either performance standards in Section 280.20 for new UST systems or the upgrading requirements in Section 280.21, except that the spill and overfill equipment requirements do not have to be met. Owners and operators must permanently close the substandard UST systems at the end of this 12-month period in accordance with Sections 280.71~~-~~ through 280.74, unless the Department provides an extension of the 12-month temporary closure period. Owners and operators must complete a site assessment in accordance with Section 280.72 before such an extension can be applied for.

(d) When an UST system is temporarily closed, owners and operators must maintain records in accordance with Section 280.45(b)(~~2~~3).

SECTION 280.71. PERMANENT CLOSURE AND CHANGES-IN-SERVICE.

(a) At least 30 days before beginning either permanent closure or a change-in-service under paragraphs (b) and (c) of this section, or within another reasonable time period determined by the Department, owners and operators must notify the Department in writing of their intent to permanently close or make the change-in-service, unless such action is in response to corrective action. At least 30 days before replacing previously installed piping or previously installed dispensers, owners and operators must notify the Department in writing of their intent. The required assessment of the excavation zone under Section 280.72 must be performed after notifying the Department but before completion of the permanent closure or a change-in-service.

(b) To permanently close a tank, owners and operators must empty and clean it by removing all liquids and accumulated sludges. All tanks taken out of service permanently must~~:~~ ~~also~~ be ~~either~~ removed from

the ground~~, or~~ filled with an inert solid material, or closed in place in a manner approved by the Department.

(c) Continued use of an UST system to store a non-regulated substance is considered a change-in-service. Before a change-in-service, owners and operators must empty and clean the tank by removing all liquid and accumulated sludge and conduct a site assessment in accordance with Section 280.72. A change-in-service also includes switching from a non-regulated substance to a regulated substance.

[Note~~:~~ to Section 280.71. The following cleaning and closure procedures may be used to comply with this section:

(A) American Petroleum Institute Recommended Practice RP 1604, "~~Removal and Disposal~~Closure of ~~Used~~ Underground Petroleum Storage Tanks";

(B) American Petroleum Institute ~~Publication~~Standard 2015, "Safe Entry and Cleaning of Petroleum Storage Tanks, Planning and Managing Tank Entry From Decommissioning Through Recommissioning";

(C) American Petroleum Institute Recommended Practice ~~1631~~2016, "~~Interior Lining of Underground~~Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks~~,"~~ ~~may be used as guidance for compliance with this section; and~~

(D) ~~The National Institute for Occupational Safety and Health "Criteria for a Recommended Standard. Working in Confined Space" may be used as guidance for conducting safe closure procedures at some hazardous substance tanks.~~]American Petroleum Institute Recommended Practice RP 1631, ‘‘Interior Lining and Periodic Inspection of Underground Storage Tanks,’’ may be used as guidance for compliance with this section;

(E) National Fire Protection Association Standard 326, ‘‘Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair’’; and

(F) National Institute for Occupational Safety and Health Publication 80–106, ‘‘Criteria for a Recommended Standard . . . Working in Confined Space’’ may be used as guidance for conducting safe closure procedures at some hazardous substance tanks.]

SECTION 280.72. ASSESSING THE SITE AT CLOSURE OR CHANGE-IN-SERVICE AND REPORTING REQUIREMENTS.

(a) Before permanent closure or a change-in-service is completed, owners and operators must measure for the presence of a release where contamination is most likely to be present at the UST site. In selecting sample types, sample locations, and measurement methods, owners and operators must consider the method of closure, the nature of the stored substance, the type of backfill, the depth to ~~ground water~~groundwater, and other factors appropriate for identifying the presence of a release. The requirements of this section are satisfied if one of the external release detection methods allowed in Section 280.43(e) and (f) is operating in accordance with the requirements in Section 280.43 at the time of closure or change-in-service, and indicates no release has occurred.

(b) If contaminated soils, contaminated ~~ground water~~groundwater, or free product as a liquid or vapor is discovered under paragraph (a) of this section, or by any other manner, owners and operators must begin corrective action in accordance with Subpart F of this part.

(c) Owners and operators must submit the information collected in compliance with paragraph (a) of this section, on a form supplied by the Department or an approved substitute, to the Department not later than 60 days after the tank has been either removed from the ground or filled with an inert solid material.

SECTION 280.73. APPLICABILITY TO PREVIOUSLY CLOSED UST SYSTEMS.

When directed by the Department, the owner and operator of an UST system permanently closed before December 22, 1988, must access the excavation zone and close the UST system in accordance with this ~~S~~subpart if releases from the UST may, in the judgment of the Department, pose a current or potential threat to human health and the environment.

SECTION 280.74. CLOSURE RECORDS.

Owners and operators must maintain records in accordance with Section 280.34 that are capable of demonstrating compliance with closure requirements under this ~~S~~subpart. The results of the excavation zone assessment required in Section 280.72 must be maintained for at least ~~3~~three years after completion of permanent closure or change-in-service in one of the following ways:

(a) By the owners and operators who took the UST system out of service;

(b) By the current owners and operators of the UST system site; or

(c) By ~~mailing~~submitting these records to the Department if they cannot be maintained at the closed facility.

SUBPART H
Financial Responsibility

SECTION 280.90. APPLICABILITY.

(a) This subpart applies to owners and operators of all petroleum underground storage tank (UST) systems in South Carolina except as otherwise provided in this section.

(b) Owners and operators of petroleum UST systems are subject to these requirements~~ if they are in operation on or after the effective date of this subpart~~ in accordance with Section 280.91.

(c) State and Federal government entities whose debts and liabilities are the debts and liabilities of a state or the United States are exempt from the requirements of this subpart.

(d) The requirements of this subpart do not apply to owners and operators of any UST system described in ~~s~~Section 280.10(b)~~, or~~ (c)(1), (c)(3), or (c)(4).

(e) If the owner and operator of a petroleum UST are separate persons, only one person is required to demonstrate financial responsibility; however, both parties are liable in the event of noncompliance. Regardless of which party complies, the date set for compliance at a particular facility is determined by the characteristics of the owner as set forth in ~~s~~Section 280.91.

SECTION 280.91. COMPLIANCE DATES.

[Note.~~:~~ Pursuant to 40 CFR Part 280, Vol. 58, No. 31 of February 18, 1993, the Federal Regulation entitled "Underground Storage Tanks Containing Petroleum--Financial Responsibility Requirements; Final Rule" became effective one year after its date of publication. The federal regulation thus became effective on February 18, 1994.]

As enacted by Title 44, Chapter 2, of the 1976 South Carolina Code of Laws, the State Underground Petroleum Environmental Response Bank Act (hereafter referred to as the SUPERB Act), all petroleum UST owners or operators are required to comply with the requirements of this subpart. Compliance with this subpart ~~is~~was required on September 22, 1995. Previously deferred UST systems must comply with the requirements of this subpart according to the schedule in Section 280.251(a).

SECTION 280.92. DEFINITION OF TERMS.

When used in this subpart, the following terms shall have the meanings given below:

(a) "Accidental release" means any sudden or nonsudden release of petroleum from an UST that results in a need for corrective action and/or compensation for bodily injury or property damage neither expected nor intended by the UST owner or operator.

(b) "Bodily injury" shall have the meaning given to this term by applicable South Carolina law; however, this term shall not include those liabilities which, consistent with standard insurance industry practices, are excluded from coverage in liability insurance policies for bodily injury.

(c) "Chief Financial Officer", in the case of local government owners and operators, means the individual with the overall authority and responsibility for the collection, disbursement, and use of funds by the local government. In the case of non-government owners and operators, the corporate officer officially designated as the Chief Financial Officer or functionally equivalent most senior financial officer. The Chief Financial Officer is the person who signs United States Securities and Exchange Commission (“SEC”) submissions or the equivalent.

(d) "Controlling interest" means direct ownership of at least 50 percent of the voting stock of another entity.

(e) "Department" refers to the South Carolina Department of Health and Environmental Control.

(f) "Financial reporting year" means the latest consecutive twelve-month period for which any of the following reports used to support a financial test is prepared: (1) a 10-K report submitted to the SEC; (2) an annual report of tangible net worth submitted to Dun and Bradstreet; or (3) annual reports submitted to the Energy Information Administration or the Rural ~~Electrification Administration~~Utilities Service.

[Note to the definition of “financial reporting year.” "Financial reporting year" may thus comprise a fiscal or a calendar year period.]

(g) "Legal defense cost" is any expense that an owner or operator or provider of financial assurance incurs in defending against claims or actions brought~~,~~: (1) by the Environmental Protection Agency (EPA) or the state of South Carolina to require corrective action or to recover the costs of corrective action; (2) by or on behalf of a third party for bodily injury or property damage caused by an accidental release; or (3) by any person to enforce the terms of a financial assurance mechanism.

(h) “Local government” shall have the meaning given this term by applicable state law and includes Indian tribes. The term is generally intended to include: (1) ~~C~~counties, municipalities, townships, separately chartered and operated special districts (including local government public transit systems and redevelopment authorities), and independent school districts authorized as governmental bodies by state charter or constitution; and (2) ~~S~~special districts and independent school districts established by counties, municipalities, townships, and other general purpose governments to provide essential services.

(i) "Occurrence" means an accident, including continuous or repeated exposure to conditions, which results in a release from an UST.

> [Note~~:~~ to the definition of “Occurrence.” This definition is intended to assist in the understanding of these regulations and is not intended either to limit the meaning of "occurrence" in a way that conflicts with standard insurance usage or to prevent the use of other standard insurance terms in place of "occurrence."]

(j) "Owner or operator," when the owner or operator are separate parties, refers to the party that is obtaining or has obtained financial assurances.

(k) "Petroleum marketing facilities" include all facilities at which petroleum is produced or refined and all facilities from which petroleum is sold or transferred to other petroleum marketers or to the public.

(l) "Petroleum marketing firms" are all firms owning petroleum marketing facilities. Firms owning other types of facilities with USTs as well as petroleum marketing facilities are considered to be petroleum marketing firms.

(m) "Property damage" shall have the meaning given this term by applicable South Carolina law. This term shall not include those liabilities which, consistent with standard insurance industry practices, are excluded from coverage in liability insurance policies for property damage. However, such exclusions for property damage shall not include corrective action associated with releases from tanks which are covered by the policy.

(n) "Provider of financial assurance" means an entity that provides financial assurance to an owner or operator of an underground storage tank through one of the mechanisms listed in ~~s~~Sections 280.95 through 280.10~~3~~7, including a guarantor, insurer, risk retention group, surety, issuer of a letter of credit, issuer of a state-required mechanism, or a state.

(o) "SCUSTCR" refers to the South Carolina Underground Storage Tank Control Regulations, promulgated pursuant to ~~s~~Section 44-2-50 of the 1976 South Carolina Code of Laws and enacted in March, 1990.

(p) "Substantial business relationship" means the extent of a business relationship necessary under applicable South Carolina law to make a guarantee contract issued incident to that relationship valid and enforceable. A guarantee contract is issued "incident to that relationship" if it arises from and depends on existing economic transactions between the guarantor and the owner or operator.

(q) "Substantial compliance" as stated in ~~s~~Section 44-2-20(14) of the 1976 Code of Laws, as amended, means that an UST owner or operator has demonstrated a good faith effort to comply with regulations necessary and essential in preventing releases, in facilitating their early detection, and in mitigating their impact on public health and the environment.

(r) "Substantial governmental relationship" means the extent of a governmental relationship necessary under applicable South Carolina law to make an added guarantee contract issued incident to that relationship valid and enforceable. A guarantee contract is issued "incident to that relationship" if it arises from a clear commonality of interest in the event of an UST release such as coterminous boundaries, overlapping constituencies, common ~~ground water~~groundwater aquifer, or other relationship other than monetary compensation that provides a motivation for the guarantor to provide a guarantee.

(s) "Tangible net worth" means the tangible assets that remain after deducting liabilities; such assets do not include intangibles such as goodwill and rights to patents or royalties. For purposes of this definition, "assets" means all existing and all probable future economic benefits obtained or controlled by a particular entity as a result of past transactions.

(t) ”Termination” under Section 280.97(b)(1) and (2) means only those changes that could result in a gap in coverage as where the insured has not obtained substitute coverage or has obtained substitute coverage with a different retroactive date than the retroactive date of the original policy.

SECTION 280.93. AMOUNT AND SCOPE OF REQUIRED FINANCIAL RESPONSIBILITY.

> [Note: The SUPERB Account and the SUPERB Financial Responsibility Fund, described in ~~s~~Section 280.101, may be used to meet the South Carolina financial responsibility requirements for corrective action and third party liability, respectively, when used in conjunction with the owner or operator responsibilities given in ~~s~~Section 280.101.]

(a) Owners or operators of petroleum USTs must demonstrate financial responsibility for taking corrective action and for compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum USTs in at least the following per-occurrence amounts:

(1) For owners or operators of petroleum USTs that are located at petroleum marketing facilities, or that handle an average of more than 10,000 gallons of petroleum per month based on annual throughput for the previous calendar year; $1~~,000,000~~ million.

(2) For all other owners or operators of petroleum USTs; $500,000.

(b) Owners or operators of petroleum USTs must demonstrate financial responsibility for taking corrective action and for compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum USTs in at least the following annual aggregate amounts:

(1) For owners or operators of 1 to 100 petroleum USTs, $l~~,000,000~~ million; and

(2) For owners or operators of 101 or more petroleum USTs, $2~~,000,000~~ million.

(c) For the purposes of paragraphs (b) and (f) of this section, only, "a petroleum UST" means a single containment unit and does not mean combinations of single containment units.

(d) Except as provided in paragraph (e) of this section, if the owner or operator uses separate mechanisms or separate combinations of mechanisms to demonstrate financial responsibility for:

(1) ~~t~~Taking corrective action;

(2) ~~c~~Compensating third parties for bodily injury and property damage caused by sudden accidental releases; or

(3) ~~c~~Compensating third parties for bodily injury and property damage caused by nonsudden accidental releases, the amount of assurance provided by each mechanism or combination of mechanisms must be in the full amount specified in paragraphs (a) and (b) of this section.

(e) If an owner or operator uses separate mechanisms or separate combinations of mechanisms to demonstrate financial responsibility for different petroleum USTs, the annual aggregate required shall be based on the number of tanks covered by each such separate mechanism or combination of mechanisms.

(f) Owners or operators shall review the amount of aggregate assurance provided whenever additional petroleum USTs are acquired or installed. If the number of petroleum USTs for which assurance must be provided exceeds 100, the owner or operator shall demonstrate financial responsibility in the amount of at least $2~~,000,000~~ million of annual aggregate assurance by the anniversary of the date on which the mechanism demonstrating financial responsibility became effective. If assurance is being demonstrated by a combination of mechanisms, the owner or operator shall demonstrate financial responsibility in the amount of at least $2~~,000,000~~ million of annual aggregate assurance by the first-occurring effective date anniversary of any one of the mechanisms combined (other than a financial test or guarantee) to provide assurance.

(g) The amounts of assurance required under this section exclude legal defense costs.

(h) The required per-occurrence and annual aggregate coverage amounts do not in any way limit the liability of the owner or operator.

SECTION 280.94. ALLOWABLE MECHANISMS AND COMBINATIONS OF MECHANISMS.

(a) Subject to the limitations of paragraphs (b) and (c) of this section:

(1) An owner or operator, including a local government owner or operator, may use any one or combination of the mechanisms listed in ~~s~~Sections 280.95 through 280.103 to demonstrate financial responsibility under this subpart for one or more USTs~~,~~; and

(2) A local government owner or operator may use any one or combination of the mechanisms listed in ~~s~~Sections 280.104 through 280.107 to demonstrate financial responsibility under this subpart for one or more USTs.

(b) An owner or operator may use a guarantee under ~~s~~Section 280.96 or surety bond under ~~s~~Section 280.98 to establish financial responsibility only if ~~such mechanism is approved by~~ the South Carolina Attorney General ~~as~~has (have) submitted a written statement to the Department that a guarantee or surety bond executed as described in this section is a legally valid and enforceable obligation in South Carolina.

(c) An owner or operator may use self-insurance in combination with a guarantee only if, for the purpose of meeting the requirements of the financial test under this rule, the financial statements of the owner or operator are not consolidated with the financial statements of the guarantor.

SECTION 280.95. FINANCIAL TEST OF SELF--INSURANCE.

(a) An owner or operator, and/or guarantor, may satisfy the requirements of ~~s~~Section 280.93 by passing a financial test as specified in this section. To pass the financial test of self-insurance, the owner or

operator, and/or guarantor must meet the criteria of paragraph (b) or (c) of this section based on year-end financial statements for the latest completed fiscal year.

(b)(1) The owner or operator, and/or guarantor, must have a tangible net worth of at least ten times:

(i) The total of the applicable aggregate amount required by ~~s~~Section 280.93, based on the number of USTs for which a financial test is used to demonstrate financial responsibility to EPA under this section or to the Department;

(ii) The sum of the corrective action cost estimates, the current closure and post-closure care cost estimates, and amount of liability coverage for which a financial test is used to demonstrate financial responsibility to EPA under 40 CFR Parts 264.101, 264.143, 264.145, 265.143, 265.145, 264.147, and 265.147 and to the Department (subsequent to authorization by EPA under 40 CFR Part 271); and

(iii) The sum of current plugging and abandonment cost estimates for which a financial test is used to demonstrate financial responsibility to EPA under 40 CFR Part 144.63 and to the Department (subsequent to authorization by EPA under 40 CFR Part 145).

(2) The owner or operator, and/or guarantor, must have a tangible net worth of at least $10 million.

(3) The owner or operator, and/or guarantor, must have a letter signed by the chief financial officer worded as specified in paragraph (d) of this section.

(4) The owner or operator, and/or guarantor, must either:

(i) File financial statements annually with the U.S. Securities and Exchange Commission, the Energy Information Administration, or the Rural ~~Electrification Administration~~Utilities Service; or

(ii) Report annually the firm's tangible net worth to Dun and Bradstreet, and Dun and Bradstreet must have assigned the firm a financial strength rating of 4A or 5A.

(5) The firm's year-end financial statements, if independently audited, cannot include an adverse auditor's opinion, a disclaimer of opinion, or a "going concern" qualification.

(c)(1) The owner or operator, and/or guarantor must meet the financial test requirements of 40 CFR 264.147(f)(1), substituting the appropriate amounts specified in ~~s~~Sections 280.93(b)(1) and ~~(b)~~(2) for the "amount of liability coverage" each time specified in that section.

(2) The fiscal year-end financial statements of the owner or operator, and/or guarantor, must be examined by an independent certified public accountant and be accompanied by the accountant's report of the examination.

(3) The firm's year-end financial statements cannot include an adverse auditor's opinion, a disclaimer of opinion, or a "going concern" qualification.

(4) The owner or operator, and/or guarantor, must have a letter signed by the chief financial officer, worded as specified in paragraph (d) of this section.

(5) If the financial statements of the owner or operator, and/or guarantor, are not submitted annually to the U.S. Securities and Exchange Commission, the Energy Information Administration or the Rural

~~Electrification Administration~~Utilities Service, the owner or operator, and/or guarantor, must obtain a special report by an independent certified public accountant stating that:

(i) He has compared the data that the letter from the chief financial officer specifies as having been derived from the latest year-end financial statements of the owner or operator, and/or guarantor, with the amounts in such financial statements; and

(ii) In connection with that comparison, no matters came to his attention which caused him to believe that the specified data should be adjusted.

(d) To demonstrate that it meets the financial test under paragraph (b) or (c) of this section, the chief financial officer of the owner or operator, ~~and/~~or guarantor, must sign, within 120 days of the close of each financial reporting year, as defined by the twelve-month period for which financial statements used to support the financial test are prepared, a letter worded exactly as follows, except that the instructions in brackets are to be replaced by the relevant information and the brackets deleted:

LETTER FROM CHIEF FINANCIAL OFFICER

I am the chief financial officer of [insert: name and address of the owner or operator, or guarantor]. This letter is in support of the use of [insert: "the financial test of self-insurance," and/or "guarantee"] to demonstrate financial responsibility for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage"] caused by [insert: "sudden accidental releases" ~~and/~~or "nonsudden accidental releases" or "accidental releases"] in the amount of at least [insert: dollar amount] per occurrence and [insert: dollar amount] annual aggregate arising from operating (an) underground storage tank(s).

Underground storage tanks at the following South Carolina facilities are assured by this financial test by this [insert: "owner or operator," and/or "guarantor"]: [List for each facility: the name and address of the facility where tanks assured by this financial test are located, and whether tanks are assured by this financial test. If separate mechanisms or combinations of mechanisms are being used to assure any of the tanks at this facility, list each tank assured by this financial test by the tank identification number provided in the notification submitted pursuant to R.61-92.280.22.]

A [insert: "financial test," and/or "guarantee"] is also used by this [insert: "owner or operator," or "guarantor"] to demonstrate evidence of financial responsibility in the following amounts under other EPA regulations or state programs authorized by EPA under 40 CFR Parts 271 and 145:

EPA Regulation:	Amount
Closure (~~s~~Sections 264.143 ~~&~~and 265.143).....	$_____
Post-Closure Care (~~s~~Sections 264.145 ~~&~~and 265.145).....	$_____
Liability Coverage (~~s~~Sections 264.147 and 265.147).....	$_____
Corrective Action (~~s~~Section 264.101(b)).....	$_____
Plugging and Abandonment (~~s~~Section 144.63)	$_____

South Carolina (Subsequent to authorization):	Amount
Closure.....	$_____

Post-Closure Care	$_____
Liability Coverage.....	$_____
Corrective Action.....	$_____
Plugging and Abandonment.....	$_____
TOTAL.....	$_____

This [insert: "owner or operator," or "guarantor"] has not received an adverse opinion, a disclaimer of opinion, or a "going concern" qualification from an independent auditor on his financial statements for the latest completed fiscal year.

[Fill in the information for Alternative I if the criteria of paragraph (b) of ~~s~~Section 280.95 are being used to demonstrate compliance with the financial test requirements. Fill in the information for Alternative II if the criteria of paragraph (c) of ~~s~~Section 280.95 are being used to demonstrate compliance with the financial test requirements.]

ALTERNATIVE I

1. Amount of annual UST aggregate coverage being assured by a financial test, and/or guarantee..... $ _
2. Amount of corrective action, closure and post- closure care costs, liability coverage, and plugging and abandonment costs covered by a financial test, and/or guarantee..... $ _
3. Sum of lines 1 and 2 ..... $ _
4. Total tangible assets ..... $ _
5. Total liabilities [if any of the amount reported on line 3 is included in total liabilities, you may deduct that amount from this line and add that amount to line 6]..... $ _
6. Tangible net worth [subtract line 5 from line 4] ..... $ _

	Yes	No
7. Is line 6 at least $10 million?	__	__
8. Is line 6 at least 10 times line 3?	__	__
9. Have financial statements for the latest fiscal year been filed with the Securities and Exchange Commission?	__	__
10. Have financial statements for the latest fiscal year been filed with the Energy Information Administration?	__	__
11. Have financial statements for the latest fiscal year been filed with the Rural ~~Electrification Administration~~Utilities Service?	__	__
12. Has financial information been provided to Dun and Bradstreet, and has Dun and Bradstreet provided a financial strength rating of 4A or 5A? [Answer ‘‘Yes’’ only if both criteria have been met.]	__	__

ALTERNATIVE II

1. Amount of annual UST aggregate coverage being assured by a financial test, and/or guarantee..... $ _

2. Amount of corrective action, closure and post-closure care costs, liability coverage, and plugging and abandonment costs covered by a financial test, and/or guarantee..... $ _
3. Sum of lines 1 and 2..... $ _
4. Total tangible assets..... $ _
5. Total liabilities [if any of the amount reported on line 3 is included in total liabilities, you may deduct that amount from this line and add that amount to line 6]..... $ _
6. Tangible net worth [subtract line 5 from line 4] $ _
7. Total assets in the U.S. [required only if less than 90 percent of assets are located in the U.S]..... $ _

	Yes	No
8. Is line 6 at least $10 million?.....	__	__
9. Is line 6 at least 6 times line 3?.....	__	__
10. Are at least 90 percent of assets located in the U.S.? [If ''No,'' complete line 11.].....	__	__
11. Is line 7 at least 6 times line 3?……	__	__

[Fill in either lines 12-15 or lines 16-18:]

12. Current assets..... $ __
13. Current liabilities..... $ __
14. Net working capital [subtract line 13 from line 12] ..... $ _

	Yes	No
15. Is line 14 at least 6 times line 3?	__	__

16. Current bond rating of most recent bond issue..... __
17. Name of rating service..... __
18. Date of maturity of bond..... __
19. Have financial statements for the latest fiscal year been filed with the SEC, the Energy Information Administration, or the Rural ~~Electrification Administration~~Utilities Service? ..... __

[If "No," please attach a report from an independent certified public accountant certifying that there are no material differences between the data as reported in lines 4-18 above and the financial statements for the latest fiscal year.]

[For both Alternative I and Alternative II complete the certification with this statement.]

I hereby certify that the wording of this letter is identical to the wording specified in R.61-92.280.95(d) as such regulations were constituted on the date shown immediately below.

[Signature]
[Name]
[Title]
[Date]

(e) If an owner or operator using the test to provide financial assurance finds that he or she no longer meets the requirements of the financial test based on the year-end financial statements, the owner or operator must obtain alternative coverage within 150 days of the end of the year for which financial statements have been prepared.

(f) The Department may require reports of financial condition at any time from the owner or operator, and/or guarantor. If the Department finds, on the basis of such reports or other information, that the owner or operator, and/or guarantor, no longer meets the financial test requirements of ~~s~~Section 280.95(b) or (c) and (d), the owner or operator must obtain alternate coverage within 30 days after notification of such a finding.

(g) If the owner or operator fails to obtain alternate assurance within 150 days of finding that he or she no longer meets the requirements of the financial test based on the year-end financial statements, or within 30 days of notification by the Department that he or she no longer meets the requirements of the financial test, the owner or operator must notify the Department of such failure within 10 days.

SECTION 280.96. GUARANTEE.

(a) An owner or operator may satisfy the requirements of ~~s~~Section 280.93 by obtaining a guarantee that conforms to the requirements of this section. The guarantor must be:

(1) A firm that:

_____(i) ~~p~~Possesses a controlling interest in the owner or operator;

_____(ii) ~~p~~Possesses a controlling interest in a firm described under paragraph (a)(1)(i) of this section; or,

_____(iii) ~~i~~Is controlled through stock ownership by a common parent firm that possesses a controlling interest in the owner or operator; or,

(2) A firm engaged in a substantial business relationship with the owner or operator and issuing the guarantee as an act incident to that business relationship.

(b) Within 120 days of the close of each financial reporting year the guarantor must demonstrate that it meets the financial test criteria of ~~s~~Section 280.95 based on year-end financial statements for the latest completed financial reporting year by completing the letter from the chief financial officer described in ~~s~~Section 280.95(d) and must deliver the letter to the owner or operator. If the guarantor fails to meet the requirements of the financial test at the end of any financial reporting year, within 120 days of the end of that financial reporting year the guarantor shall send by certified mail, before cancellation or nonrenewal of the guarantee, notice to the owner or operator. If the Department notifies the guarantor that he no longer meets the requirements of the financial test of ~~s~~Section 280.95(b) or (c) and (d), the guarantor must notify the owner or operator within 10 days of receiving such notification from the Department. In both cases, the guarantee will terminate no less than 120 days after the date the owner or operator receives the notification, as evidenced by the return receipt. The owner or operator must obtain alternate coverage as specified in ~~s~~Section 280.11~~0~~4(~~e~~e).

(c) The guarantee must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

GUARANTEE

Guarantee made this [date] by [name of guaranteeing entity], a business entity organized under the laws of the state of [name of state], herein referred to as guarantor, to the Department of Health and Environmental Control (Department) and to any and all third parties, and obligees, on behalf of [owner or operator] of [business address].

Recitals.

(1) Guarantor meets or exceeds the financial test criteria of R.61-92.280.95(b) or (c) and (d) and agrees to comply with the requirements for guarantors as specified in ~~s~~Section 280.96(b).

(2) [Owner or operator] owns or operates the following underground storage tank(s) in South Carolina covered by this guarantee: [List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to R.61-92.280.22 and the name and address of the facility.] This guarantee satisfies R.61-92.280, Subpart H requirements for assuring funding for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the above-identified underground storage tank(s) in the amount of [insert dollar amount] per occurrence and [insert dollar amount] annual aggregate.

(3) [Insert appropriate phrase: "On behalf of our subsidiary" (if guarantor is corporate parent of the owner or operator); "On behalf of our affiliate" (if guarantor is a related firm of the owner or operator); or "Incident to our business relationship with" (if guarantor is providing the guarantee as an incident to a substantial business relationship with owner or operator)] [owner or operator], guarantor guarantees to the Department and to any and all third parties that:

In the event that [owner or operator] fails to provide alternat~~e~~ive coverage within 60 days after receipt of a notice of cancellation of this guarantee and the Department has determined or suspects that a release has occurred at an underground storage tank covered by this guarantee, the guarantor, upon instructions from the Department, shall fund a standby trust fund in accordance with the provisions of R.61-92.280.1~~08~~12, in an amount not to exceed the coverage limits specified above.

In the event that the Department determines that [owner or operator] has failed to perform corrective action for releases arising out of the operation of the above-identified tank(s) in accordance with R.61-92.280, Subpart F, the guarantor upon written instructions from the Department shall fund a standby trust in accordance with the provisions of R.61-92.280.1~~08~~12, in an amount not to exceed the coverage limits specified above.

If [owner or operator] fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by ["sudden" and/or "nonsudden"] accidental releases arising from the operation of the above-identified tank(s), or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor, upon written instructions from the Department shall fund a standby trust in accordance with the provisions of R.61-92.280.1~~08~~12 to satisfy such judgment(s), award(s), or settlement agreement(s) up to the limits of coverage specified above.

(4) Guarantor agrees that if, at the end of any fiscal year before cancellation of this guarantee, the guarantor fails to meet the financial test criteria of R.61-92.280.95(b) or (c) and (d), guarantor shall send

within 120 days of such failure, by certified mail, notice to [owner or operator]. The guarantee will terminate 120 days from the date of receipt of the notice by [owner or operator], as evidenced by the return receipt.

(5) Guarantor agrees to notify [owner or operator] by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming guarantor as debtor, within 10 days after commencement of the proceeding.

(6) Guarantor agrees to remain bound under this guarantee notwithstanding any modification or alteration of any obligation of [owner or operator] pursuant to R.61-92.280.

(7) Guarantor agrees to remain bound under this guarantee for so long as [owner or operator] must comply with the applicable financial responsibility requirements of R.61-92.280, Subpart H for the above-identified tank(s), except that guarantor may cancel this guarantee by sending notice by certified mail to [owner or operator], such cancellation to become effective no earlier than 120 days after receipt of such notice by [owner or operator], as evidenced by the return receipt.

(8) The guarantor's obligation does not apply to any of the following:

(a) Any obligation of [insert owner or operator] under a workers' compensation, disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert owner or operator] arising from, and in the course of, employment by [insert owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaned to, in the care, custody, or control of, or occupied by [insert owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily damage or property damage for which [insert owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of R.61-92.280.93.

(9) Guarantor expressly waives notice of acceptance of this guarantee by the Department, by any or all third parties, or by [owner or operator].

I hereby certify that the wording of this guarantee is identical to the wording specified in R.61-92.280.96(c) as such regulations were constituted on the effective date shown immediately below.

Effective date: _____
[Name of guarantor] _____
[Authorized signature for guarantor] _____
[Name of person signing] _____
[Title of person signing] _____
Signature of witness or notary: _____

(d) An owner or operator who uses a guarantee to satisfy the requirements of ~~s~~Section 280.93 must establish a standby trust fund when the guarantee is obtained. Under the terms of the guarantee, all

amounts paid by the guarantor under the guarantee will be deposited directly into the standby trust fund in accordance with instructions from the Department under ~~s~~Section 280.1~~08~~12. This standby trust fund must meet the requirements specified in ~~s~~Section 280.103.

SECTION 280.97. INSURANCE AND RISK RETENTION GROUP COVERAGE.

(a) An owner or operator may satisfy the requirements of ~~s~~Section 280.93 by obtaining liability insurance that conforms to the requirements of this section from a qualified insurer or risk retention group. Such insurance may be in the form of a separate insurance policy or an endorsement to an existing insurance policy.

(b) Each insurance policy must be amended by an endorsement worded as specified in paragraph (b)(l) or evidenced by a certificate of insurance worded as specified in paragraph (b)(2), except that instructions in brackets must be replaced with the relevant information and the brackets deleted:

(1)
ENDORSEMENT

Name: [name of each covered location]
Address: [address of each covered location]

_____

_____
Policy Number:
Period of Coverage: [current policy period]
Name of [Insurer or Risk Retention Group]:

_____

_____
Address of [Insurer or Risk Retention Group]:

_____

_____
Name of Insured:
Address of Insured:

_____

_____

Endorsement:

1. This endorsement certifies that the policy to which the endorsement is attached provides liability insurance covering the following underground storage tanks:

[List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to R.61-92.280.22, and the name and address of the facility.]

for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; in accordance with and subject to the limits of liability, exclusions, conditions, and other terms of the policy; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the underground storage tank(s) identified above.

The limits of liability are [insert the dollar amount of the "each occurrence" and "annual aggregate" limits of the Insurer's or Group's liability; if the amount of coverage is different for different types of coverage or for different underground storage tanks or locations, indicate the amount of coverage for each type of coverage and/or for each underground storage tank or location], exclusive of legal defense costs, which are subject to a separate limit under the policy. This coverage is provided under [policy number]. The effective date of said policy is [date].

2. The insurance afforded with respect to such occurrences is subject to all of the terms and conditions of the policy; provided, however, that any provisions inconsistent with subsections (a) through (e) of this Paragraph 2 are hereby amended to conform with subsections (a) through (e):

a. Bankruptcy or insolvency of the insured shall not relieve the ["Insurer" or "Group"] of its obligations under the policy to which this endorsement is attached.

b. The ["Insurer" or "Group"] is liable for the payment of amounts within any deductible applicable to the policy to the provider of corrective action or a damaged third-party, with a right of reimbursement by the insured for any such payment made by the ["Insurer" or "Group"]. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated under another mechanism or combination of mechanisms as specified in R.61-92.280.95 through 280.102 and 280.104 through 280.107.

c. Whenever requested by the Department the ["Insurer" or "Group"] agrees to furnish to the Department a signed duplicate original of the policy and all endorsements.

d. Cancellation or any other termination of the insurance by the ["Insurer" or "Group"], except for non-payment of premium or misrepresentation by the insured, will be effective only upon written notice and only after the expiration of 60 days after a copy of such written notice is received by the insured. Cancellation for non-payment of premium or misrepresentation by the insured will be effective only upon written notice and only after expiration of a minimum of 10 days after a copy of such written notice is received by the insured.

[Insert for claims-made policies:

e. The insurance covers claims ~~for any occurrence that commenced~~ otherwise covered by the policy that are reported to the [‘‘Insurer’’ or ‘‘Group’’] within six months of the effective date of cancellation or non-renewal of the policy except where the new or renewed policy has the same retroactive date or a retroactive date earlier than that of the prior policy, and which arise out of any covered occurrence that commenced after the policy retroactive date, if applicable, and prior to such policy renewal or termination date. Claims reported during ~~the term of the policy that is discovered and reported to the ["Insurer" or~~

~~"Group"] within six months of the effective date of the cancellation or termination~~ such extended reporting period are subject to the terms, conditions, limits, including limits of liability, and exclusions of the policy.]

I hereby certify that the wording of this instrument is identical to the wording in R.61-92.280.97(b)(l) and that the ["Insurer" or "Group"] is ["licensed to transact the business of insurance or eligible to provide insurance as an excess or surplus lines insurer in South Carolina"].

[Signature of authorized representative of Insurer or Risk Retention Group]
[Name of person signing]
[Title of person signing], Authorized Representative of [name of Insurer or Risk Retention Group]
[Address of Representative]

---

(2) CERTIFICATE OF INSURANCE

Name: [name of each covered location]
Address: [address of each covered location]

_____

_____

Policy Number:
Endorsement (if applicable):
Period of Coverage: [current policy period]
Name of [Insurer or Risk Retention Group]:

_____

_____

Address of [Insurer or Risk Retention Group]:

_____

_____

Name of Insured:
Address of Insured:

_____

_____

Certification:

1. [Name of Insurer or Risk Retention Group], [the "Insurer" or "Group"], as identified above, hereby certifies that it has issued liability insurance covering the following underground storage tank(s):

[List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank

covered by this instrument, list the tank identification number provided in the notification submitted pursuant to R.61-92.280.22, and the name and address of the facility.]

for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; in accordance with and subject to the limits of liability, exclusions, conditions, and other terms of the policy; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the underground storage tank(s) identified above.

The limits of liability are [insert the dollar amount of the "each occurrence" and "annual aggregate" limits of the Insurer's or Group's liability; if the amount of coverage is different for different types of coverage or for different underground storage tanks or locations, indicate the amount of coverage for each type of coverage and/or for each underground storage tank or location], exclusive of legal defense costs, which are subject to a separate limit under the policy. This coverage is provided under [policy number]. The effective date of said policy is [date].

2. The ["Insurer" or "Group"] further certifies the following with respect to the insurance described in Paragraph 1:

a. Bankruptcy or insolvency of the insured shall not relieve the ["Insurer" or "Group"] of its obligations under the policy to which this certificate applies.

b. The ["Insurer" or "Group"] is liable for the payment of amounts within any deductible applicable to the policy to the provider of corrective action or a damaged third-party, with a right of reimbursement by the insured for any such payment made by the ["Insurer" or "Group"]. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated under another mechanism or combination of mechanisms as specified in R.61-92.280.95 through 280.102 and 280.104 through 280.107.

c. Whenever requested by the Department, the ["Insurer" or "Group"] agrees to furnish to the Department a signed duplicate original of the policy and all endorsements.

d. Cancellation or any other termination of the insurance by the ["Insurer" or "Group"], except for non-payment of premium or misrepresentation by the insured, will be effective only upon written notice and only after the expiration of 60 days after a copy of such written notice is received by the insured. Cancellation for non-payment of premium or misrepresentation by the insured will be effective only upon written notice and only after expiration of a minimum of 10 days after a copy of such written notice is received by the insured.

[Insert for claims-made policies:

e. The insurance covers claims ~~for any occurrence that commenced during the term of the policy that is discovered and reported~~otherwise covered by the policy that are reported to the ["Insurer" or "Group"] within six months of the effective date of ~~the~~ cancellation or other ~~termination of the policy~~non-renewal of the policy except where the new or renewed policy has the same retroactive date or a retroactive date earlier than that of the prior policy, and which arise out of any covered occurrence that commenced after the policy retroactive date, if applicable, and prior to such policy renewal or termination date. Claims reported during such extended reporting period are subject to the terms, conditions, limits, including limits of liability, and exclusions of the policy.]

I hereby certify that the wording of this instrument is identical to the wording in R.61-92.280.97(b)(2) and that the ["Insurer" or "Group"] is [“licensed to transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in South Carolina"].

[Signature of authorized representative of Insurer]
[Type name]
[Title], Authorized Representative of [name of Insurer or Risk Retention Group]
[Address of Representative]

(c) Each insurance policy must be issued by an insurer or a risk retention group that, at a minimum, is licensed to transact the business of insurance or is eligible to provide insurance as an excess or surplus lines insurer in South Carolina.

SECTION 280.98. SURETY BOND.

(a) An owner or operator may satisfy the requirements of ~~s~~Section 280.93 by obtaining a surety bond that conforms to the requirements of this section. The surety company issuing the bond must be among those listed as acceptable sureties on federal bonds in the latest Circular 570 of the U.S. Department of the Treasury.

(b) The surety bond must be worded as follows, except that instructions in brackets must be replaced with the relevant information and the brackets deleted:

PERFORMANCE BOND

Date bond executed:_____
Period of coverage:_____
Principal: [legal name and business address of owner or operator]
Type of organization: [insert "individual~~,~~", "joint venture~~,~~", "partnership~~,~~", or "corporation"]
State of incorporation (if applicable): _____
Surety(ies): [name(s) and business address(es)]_____

Scope of Coverage: [List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to R.61-92.280.22, and the name and address of the facility. List the coverage guaranteed by the bond: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases" "arising from operating the underground storage tank"].

Penal sums of bond: Per occurrence $_____
Annual aggregate $_____

Surety's bond number:_____

Know All Persons by These Presents, that we, the Principal and Surety(ies), hereto are firmly bound to the Department, in the above penal sums for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the Surety(ies) are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sums jointly and severally only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sums only as is set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sums.

Whereas said Principal is required under Subtitle I of the ~~Resource Conservation and Recovery Act (RCRA)~~Solid Waste Disposal Act, as amended, and the State Underground Petroleum Environmental Response Bank Act, as amended, to provide financial assurance for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the underground storage tanks identified above, and

Whereas said Principal shall establish a standby trust fund as is required when a surety bond is used to provide such financial assurance;

Now, therefore, the conditions of the obligation are such that if the Principal shall faithfully ["take corrective action, in accordance with R.61-92.280, Subpart F and the Department's instructions for," and/or "compensate injured third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "~~sudden and nonsudden"]~~ accidental releases"] arising from operating the tank(s) identified above, or if the Principal shall provide alternate financial assurance, as specified in R.61-92.280, Subpart H, within 120 days after the date the notice of cancellation is received by the Principal from the Surety(ies), then this obligation shall be null and void; otherwise it is to remain in full force and effect.

Such obligation does not apply to any of the following:

(a) Any obligation of [insert owner or operator] under a workers' compensation, disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert owner or operator] arising from, and in the course of, employment by [insert owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaned to, in the care, custody, or control of, or occupied by [insert owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily injury or property damage for which [insert owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of R.61-92.280.93.

The Surety(ies) shall become liable on this bond obligation only when the Principal has failed to fulfill the conditions described above.

Upon notification by the Department that the ~~p~~Principal has failed to ["take corrective action, in accordance with R.61-92.280, Subpart F and the Department's instructions," and/or "compensate injured third parties"] as guaranteed by this bond, the Surety(ies) shall either perform ["corrective action in accordance with R.61-92.280 and the Department's instructions," and/or "third-party liability compensation"] or place funds in an amount up to the annual aggregate penal sum into the standby trust fund as directed by the Department under R.61-92 280.1~~08~~12.

Upon notification by the Department that the Principal has failed to provide alternate financial assurance within 60 days after the date the notice of cancellation is received by the Principal from the Surety(ies) and

that the Department has determined or suspects that a release has occurred, the Surety(ies) shall place funds in an amount not exceeding the annual aggregate penal sum into the standby trust fund as directed by the Department under R.61-92.280.1~~08~~12.

The Surety(ies) hereby waive(s) notification of amendments to applicable laws, statutes, rules, and regulations and agrees that no such amendment shall in any way alleviate its (their) obligation on this bond.

The liability of the Surety(ies) shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the annual aggregate to the penal sum shown on the face of the bond, but in no event shall the obligation of the Surety(ies) hereunder exceed the amount of said annual aggregate penal sum.

The Surety(ies) may cancel the bond by sending notice of cancellation by certified mail to the Principal, provided, however, that cancellation shall not occur during the 120 days beginning on the date of receipt of the notice of cancellation by the Principal, as evidenced by the return receipt.

The Principal may terminate this bond by sending written notice to the Surety(ies).

In Witness Thereof, the Principal and Surety(ies) have executed this Bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the Principal and Surety(ies) and that the wording of this surety bond is identical to the wording specified in R.61-92.280.98(b) as such regulations were constituted on the date this bond was executed.

PRINCIPAL

[Signature(s)] _____
[Name(s)] _____
[Title(s)] _____
[Corporate seal]

CORPORATE SURETY(IES)

[Name and address] _____
[State of Incorporation: _____]
[Liability limit: $_____]
[Signature(s)] _____
[Name(s) and title(s)] _____
[Corporate seal]

[For every co-surety, provide signature(s), corporate seal, and other information in the same manner as for Surety above.]

Bond premium: $_____

(c) Under the terms of the bond, the surety will become liable on the bond obligation when the owner or operator fails to perform as guaranteed by the bond. In all cases, the surety's liability is limited to the per-occurrence and annual aggregate penal sums.

(d) The owner or operator who uses a surety bond to satisfy the requirements of ~~s~~Section 280.93 must establish a standby trust fund when the surety bond is acquired. Under the terms of the bond, all amounts paid by the surety under the bond will be deposited directly into the standby trust fund in accordance with instructions from the Department under ~~s~~Section 280.1~~08~~12. This standby trust fund must meet the requirements specified in ~~s~~Section 280.103.

SECTION 280.99. LETTER OF CREDIT.

(a) An owner or operator may satisfy the requirements of ~~s~~Section 280.93 by obtaining an irrevocable standby letter of credit that conforms to the requirements of this section. The issuing institution must be an entity that has the authority to issue letters of credit in South Carolina and whose letter-of-credit operations are regulated and examined by a federal or state agency.

(b) The letter of credit must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

IRREVOCABLE STANDBY LETTER OF CREDIT

[Name and address of issuing institution]

Department of Health and Environmental Control, Underground Storage Tank Program, 2600 Bull Street, Columbia, SC, 29201

Dear Sir or Madam: We hereby establish our Irrevocable Standby Letter of Credit No. _in your favor, at the request and for the account of [owner or operator name] of [address] up to the aggregate amount of [in words] U.S. dollars ($[insert dollar amount]), available upon presentation of

(1) your sight draft, bearing reference to this letter of credit, No. _, and

(2) your signed statement reading as follows: "I certify that the amount of the draft is payable pursuant to regulations issued under authority of Subtitle I of the ~~Resource Conservation and Recovery Act of 1976~~ Solid Waste Disposal Act, as amended, and the State Underground Petroleum Environmental Response Bank Act, as amended."

This letter of credit may be drawn on to cover [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"] arising from operating the underground storage tank(s) identified below in the amount of [in words] $[insert dollar amount] per occurrence and [in words] $[insert dollar amount] annual aggregate:

[List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to R.61-92.280.22, and the name and address of the facility.]

The letter of credit may not be drawn on to cover any of the following:

(a) Any obligation of [insert owner or operator] under a workers' compensation, disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert owner or operator] arising from, and in the course of, employment by [insert owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaned to, in the care, custody, or control of, or occupied by [insert owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily injury or property damage for which [insert owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of R.61-92.280.93.

This letter of credit is effective as of [date] and shall expire on [date], but such expiration date shall be automatically extended for a period of [at least the length of the original term] on [expiration date] and on each successive expiration date, unless, at least 120 days before the current expiration date, we notify [owner or operator and the Department] by certified mail that we have decided not to extend this letter of credit beyond the current expiration date. In the event that [owner or operator] is so notified, any unused portion of the credit shall be available upon presentation of your sight draft for 120 days after the date of receipt by [owner or operator], as shown on the signed return receipt.

Whenever this letter of credit is drawn on under and in compliance with the terms of this credit, we shall duly honor such draft upon presentation to us, and we shall deposit the amount of the draft directly into the standby trust fund of [owner or operator] in accordance with your instructions.

We certify that the wording of this letter of credit is identical to the wording specified in R.61-92.280.99(b) as such regulations were constituted on the date shown immediately below.

[Signature(s) and title(s) of official(s) of issuing institution] _____

[Date] _____

This credit is subject to [insert "the most recent edition of the Uniform Customs and Practice for Documentary Credits, published and copyrighted by the International Chamber of Commerce," or "the Uniform Commercial Code"].

(c) An owner or operator who uses a letter of credit to satisfy the requirements of ~~s~~Section 280.93 must also establish a standby trust fund when the letter of credit is acquired. Under the terms of the letter of credit, all amounts paid pursuant to a draft by the Department will be deposited by the issuing institution directly into the standby trust fund in accordance with instructions from the Department under ~~s~~Section 280.1~~08~~12. This standby trust fund must meet the requirements specified in ~~s~~Section 280.103.

(d) The letter of credit must be irrevocable with a term specified by the issuing institution. The letter of credit must provide that credit be automatically renewed for the same term as the original term, unless, at least 120 days before the current expiration date, the issuing institution notifies the owner or operator and the Department by certified mail of its decision not to renew the letter of credit. Under the terms of the letter of credit, the 120 days will begin on the date when the owner or operator receives the notice, as evidenced by the return receipt.

SECTION 280.100. (Reserved)

SECTION 280.101. STATE UNDERGROUND PETROLEUM ENVIRONMENTAL RESPONSE BANK (SUPERB) OR OTHER STATE ASSURANCE.

(a) When used in conjunction with the deductible amount[s] referenced in (c) below, the SUPERB Account and the SUPERB Financial Responsibility Fund may be used to satisfy the financial responsibility requirements of ~~s~~Section 280.93 for corrective action and third party bodily injury or property damage, respectively, for USTs located in South Carolina.

(b) To be qualified for coverage by these funds, the UST owner or operator shall meet the following requirements which have been extracted from Title 44, Chapter 2 of the 1976 Code of Laws, the State Underground Petroleum Environmental Response Bank Act, as amended, and the regulations promulgated thereafter:

(1) The UST for which coverage is requested is in substantial compliance with SCUSTCR.

(2) All UST registration and annual fees have been paid.

(3) Department representatives have not been denied site access during reasonable hours to perform any requested activities authorized under the SUPERB Act.

(4) The owner or operator is not cited in any enforcement action by the Department pertaining to the USTs for which coverage is requested.

(c) The deductible[s] in force at the time the site was reported may be met by using the mechanisms listed in ~~s~~Sections 280.95 through 280.~~100~~99 and ~~s~~Sections 280.102 through 280.107 or:

(1) For sites where the UST systems do not yet meet the federally mandated 1998 performance standards for corrosion protection and spill and overfill protection, by submitting a financial statement signed by a Certified Public Accountant or the chief financial officer of the company showing a tangible net worth of at least four times the deductible amount.

(2) For sites where the UST systems meet or have been upgraded to meet the federally mandated 1998 performance standards for corrosion protection and spill and overfill protection, by submitting a financial statement signed by a Certified Public Accountant or the chief financial officer of the company showing a tangible net worth of at least two times the deductible amount.

(d) The owner or operator must maintain a completed certificate, provided by the Department in ~~s~~Section 280.111(b)(11), on file ~~at the operating facility~~ as proof of financial responsibility. [See ~~s~~Sections 280.110 and 280.111 for additional recordkeeping requirements.]

(e) Subsequent to the abolishment of the environmental impact fee as authorized in ~~s~~Section 44-2-90 of the SUPERB Act, the coverage amounts afforded by these funds as authorized by this section will no longer be applicable. At that time owners or operators must demonstrate the full state financial responsibility requirement using approved mechanisms detailed in ~~s~~Sections 280.95 through 280.~~100~~99 and sSections 280.102 through 280.107.

SECTION 280.102. TRUST FUND.

(a) An owner or operator may satisfy the requirements of ~~s~~Section 280.93 by establishing a trust fund that conforms to the requirements of this section. The trustee must be an entity that has the authority to act as a

trustee and whose trust operations are regulated and examined by a federal agency or a South Carolina agency.

(b) The wording of the trust agreement must be identical to the wording specified in ~~s~~Section 280.103(b)(1), and must be accompanied by a formal certification of acknowledgment as specified in ~~s~~Section 280.103(b)(2).

(c) The trust fund, when established, must be funded for the full required amount of coverage, or funded for part of the required amount of coverage and used in combination with other mechanism(s) that provide the remaining required coverage.

(d) If the value of the trust fund is greater than the required amount of coverage, the owner or operator may submit a written request to the Department for release of the excess.

(e) If other financial assurance as specified in this subpart is substituted for all or part of the trust fund, the owner or operator may submit a written request to the Department for release of the excess.

(f) Within 60 days after receiving a request from the owner or operator for release of funds as specified in paragraphs (d) or (e) of this section, the Department will instruct the trustee to release to the owner or operator such funds as the Department specifies in writing.

SECTION 280.103. STANDBY TRUST FUND.

(a) An owner or operator using any one of the mechanisms authorized by ~~s~~Sections 280.96, 280.98, or 280.99 must establish a standby trust fund when the mechanism is acquired. The trustee of the standby trust fund must be an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a federal agency or a South Carolina agency.

(b)(1) The standby trust agreement, or trust agreement, must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

TRUST AGREEMENT

Trust agreement, the "Agreement," entered into as of [date] by and between [name of the owner or operator], a [name of state] [insert "corporation," "partnership," "association," or "proprietorship"], the "Grantor," and [name of corporate trustee], [insert "Incorporated in the state of SOUTH CAROLINA" or "a national bank"], the "Trustee."

~~[~~Whereas, the United States Environmental Protection Agency, "EPA," an agency of the United States Government, and the Department of Health and Environmental Control, an agency of the state of South Carolina, have established certain regulations applicable to the Grantor, requiring that an owner or operator of an underground storage tank shall provide assurance that funds will be available when needed for corrective action and third-party compensation for bodily injury and property damage caused by sudden and nonsudden accidental releases arising from the operation of the underground storage tank. The attached Schedule A lists the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located that are covered by the [insert ‘‘standby’’ where trust agreement is standby trust agreement] trust agreement. ~~(This paragraph is only applicable to the standby trust agreement.)]~~;

[Whereas, the Grantor has elected to establish [insert either "a guarantee," "surety bond," or "letter of credit"] to provide all or part of such financial assurance for the underground storage tanks identified herein

and is required to establish a standby trust fund able to accept payments from the instrument (This paragraph is only applicable to the standby trust agreement.)];

Whereas, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this agreement, and the Trustee is willing to act as trustee;

Now, therefore, the Grantor and the Trustee agree as follows:

Section 1. Definitions. As used in this Agreement:

(a) The term "Grantor" means the owner or operator who enters into this Agreement and any successors or assigns of the Grantor.

(b) The term "Trustee" means the Trustee who enters into this Agreement and any successor Trustee.

[Section 2. Identification of the Financial Assurance Mechanism. This Agreement pertains to the [identify the financial assurance mechanism, either a guarantee, surety bond, or letter of credit, from which the standby trust fund is established to receive payments (This paragraph is only applicable to the standby trust agreement.)].

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a trust fund, the "Fund," for the benefit of the Department of Health and Environmental Control (Department). The Grantor and the Trustee intend that no third party have access to the Fund except as herein provided. [The Fund is established initially as a standby to receive payments and shall not consist of any property. This sentence is only applicable to the standby trust agreement.] Payments made by the provider of financial assurance pursuant to the Department's instruction are transferred to the Trustee and are referred to as the Fund, together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount or adequacy of, nor any duty to collect from the Grantor as provider of financial assurance, any payments necessary to discharge any liability of the Grantor established by the Department.

Section 4. Payment for ["Corrective Action" and/or "Third-Party Liability Claims"]. The Trustee shall make payments from the Fund as the Department shall direct, in writing, to provide for the payment of the costs of [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"] arising from operating the tanks covered by the financial assurance mechanism identified in this Agreement.

The Fund may not be drawn upon to cover any of the following:

(a) Any obligation of [insert owner or operator] under a workers' compensation, disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert owner or operator] arising from, and in the course of, employment by [insert owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaned to, in the care, custody, or control of, or occupied by [insert owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily injury or property damage for which [insert owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of R.61-92.280.93.

The Trustee shall reimburse the Grantor, or other persons as specified by the Department, from the Fund for corrective action expenditures and/or third-party liability claims in such amounts as the Department shall direct in writing. In addition, the Trustee shall refund to the Grantor such amounts as the Department specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

Section 5. Payments Comprising the Fund. Payments made to the Trustee for the Fund shall consist of cash and securities acceptable to the Trustee.

Section 6. Trustee Management. The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge his duties with respect to the trust fund solely in the interest of the beneficiaries and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; except that:

(a) Securities or other obligations of the Grantor, or any other owner or operator of the tanks, or any of their affiliates as defined in the Investment Company Act of 1940, as amended, 15 U.S.C. 80a~~g~~-2(a), shall not be acquired or held, unless they are securities or other obligations of the federal or a state government;

(b) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the federal or state government; and

(c) The Trustee is authorized to hold cash awaiting investment or distribution uninvested for a reasonable time and without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion:

(a) To transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(b) To purchase shares in any investment company registered under the Investment Company Act of 1940, 15 U.S.C. 80a-1 et seq., including one which may be created, managed, underwritten, or to which investment advice is rendered or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and discretions conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered:

(a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale. No person dealing with the Trustee shall be bound to see to the application of the purchase money or to inquire into the validity or expediency of any such sale or other disposition;

(b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(c) To register any securities held in the Fund in its own name or in the name of a nominee and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee of such depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the United States Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;

(d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the federal or state government; and

(e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Advice of Counsel. The Trustee may from time to time consult with counsel, who may be counsel to the Grantor, with respect to any questions arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting upon the advice of counsel.

Section 11. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing from time to time with the Grantor.

Section 12. Successor Trustee. The Trustee may resign or the Grantor may replace the Trustee, but such resignation or replacement shall not be effective until the Grantor has appointed a successor trustee and this successor accepts the appointment. The successor trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor trustee's acceptance of the appointment, the Trustee shall assign, transfer, and pay over to the successor trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor trustee or for instructions. The successor trustee shall specify the date on which it assumes administration of the trust in writing sent to the Grantor and the present Trustee by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this section shall be paid as provided in ~~s~~Section 9.

Section 13. Instructions to the Trustee. All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are designated in the attached Schedule B or such other designees as the Grantor may designate by amendment to Schedule B. The Trustee shall be fully protected

in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. All orders, requests, and instructions by the Department to the Trustee shall be in writing, signed by the Department and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor or the Department hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instructions from the Grantor and/or the Department, except as provided for herein.

Section 14. Amendment of Agreement. This Agreement may be amended by an instrument in writing executed by the Grantor and the Trustee, or by the Trustee and the Department if the Grantor ceases to exist.

Section 15. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided in ~~s~~Section 14, this Trust shall be irrevocable and shall continue until terminated at the written direction of the Grantor and the Trustee, or by the Trustee and the Department if the Grantor ceases to exist. Upon termination of the Trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor.

Section 16. Immunity and Indemnification. The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this Trust, or in carrying out any directions by the Grantor or the Department issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

Section 17. Choice of Law. This Agreement shall be administered, construed, and enforced according to the laws of the state of South Carolina, or the Comptroller of the Currency in the case of National Association banks.

Section 18. Interpretation. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement.

In Witness whereof the parties have caused this Agreement to be executed by their respective officers duly authorized and their corporate seals (if applicable) to be hereunto affixed and attested as of the date first above written. The parties below certify that the wording of this Agreement is identical to the wording specified in R.61-92.280.103(b)(1) as such regulations were constituted on the date written above.

[Signature of Grantor] _____
[Name of the Grantor] _____
[Title] _____

Attest:

[Signature of Trustee] _____
[Name of the Trustee] _____
[Title] _____
[Seal]

Attest:

[Signature of Witness] _____

[Name of Witness] _____
[Title] _____
[Seal]

(2) The standby trust agreement, or trust agreement must be accompanied by a formal certification of acknowledgment similar to the following.

State of _____
County of _____

On this [date], before me personally came [owner or operator] to me known, who, being by me duly sworn, did depose and say that she/he resides at [address], that she/he is [title] of [corporation], the corporation described in and which executed the above instrument; that she/he knows the seal of said corporation; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation; and that she/he signed her/his name thereto by like order.

[Signature of Notary Public] _____
[Name of Notary Public] _____

(c) The Department will instruct the trustee to refund the balance of the standby trust fund to the provider of financial assurance if the Department determines that no additional corrective action costs or third-party liability claims will occur as a result of a release covered by the financial assurance mechanism for which the standby trust fund was established.

(d) An owner or operator may establish one trust fund as the depository mechanism for all funds assured in compliance with this rule.

SECTION 280.104. LOCAL GOVERNMENT BOND RATING TEST.

(a) A general purpose local government owner or operator and/or local government serving as a guarantor may satisfy the requirements of ~~s~~Section 280.93 by having a currently outstanding issue or issues of general obligation bonds of $1 million or more, excluding refunded obligations, with a Moody's rating of Aaa, Aa, A, or Baa, or a Standard & Poor's rating of AAA, AA, A, or BBB. Where a local government has multiple outstanding issues, or where a local government's bonds are rated by both Moody's and Standard and Poor's, the lowest rating must be used to determine eligibility. Bonds that are backed by credit enhancement other than municipal bond insurance may not be considered in determining the amount of applicable bonds outstanding.

(b) A local government owner or operator or local government serving as a guarantor that is not a general-purpose local government and does not have the legal authority to issue general obligation bonds may satisfy the requirements of ~~s~~Section 280.93 by having a currently outstanding issue or issues of revenue bonds of $1 million or more, excluding refunded issues and by also having a Moody's rating of Aaa, Aa, A, or Baa, or a Standard & Poor's rating of AAA, AA, A, or BBB as the lowest rating for any rated revenue bond issued by the local government. Where bonds are rated by both Moody's and Standard & Poor's, the lower rating for each bond must be used to determine eligibility. Bonds that are backed by credit enhancement may not be considered in determining the amount of applicable bonds outstanding.

(c) The local government owner or operator and/or guarantor must maintain a copy of its bond rating published within the last 12 months by Moody's or Standard & Poor's.

(d) To demonstrate that it meets the local government bond rating test, the chief financial officer of a general purpose local government owner or operator and/or guarantor must sign a letter worded exactly as follows, except that the instructions in brackets are to be replaced by the relevant information and the brackets deleted:

LETTER FROM CHIEF FINANCIAL OFFICER

I am the chief financial officer of [insert: name and address of local government owner or operator, or guarantor]. This letter is in support of the use of the bond rating test to demonstrate financial responsibility for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage"] caused by [insert: "sudden accidental releases" ~~and/~~or "nonsudden accidental releases" or "accidental releases"] in the amount of at least [insert: dollar amount] per occurrence and [insert: dollar amount] annual aggregate arising from operating (an) underground storage tank(s).

Underground storage tanks at the following facilities are assured by this bond rating test: [List for each facility: the name and address of the facility where tanks are assured by the bond rating test].

The details of the issue date, maturity, outstanding amount, bond rating, and bond rating agency of all outstanding bond issues that are being used by [name of local government owner or operator, or guarantor] to demonstrate financial responsibility are as follows: [complete table]

Issue date: _____
Maturity date: _____
Outstanding amount: _____
Bond rating: _____
Rating agency: _____
(Moody's or Standard & Poor's)

The total outstanding obligation of [insert amount], excluding refunded bond issues, exceeds the minimum amount of $1 million. All outstanding general obligation bonds issued by this government that have been rated by Moody's or Standard & Poor's are rated as at least investment grade (Moody's Baa or Standard & Poor's BBB) based on the most recent ratings published within the last 12 months. Neither rating service has provided notification within the last 12 months of downgrading of bond ratings below investment grade or of withdrawal of bond rating other than for repayment of outstanding bond issues.

I hereby certify that the wording of this letter is identical to the wording specified in R.61-92.280.104(d) as such regulations were constituted on the date shown immediately below.

[Date]_____
[Signature]_____
[Name]_____
[Title]_____

(e) To demonstrate that it meets the local government bond rating test, the chief financial officer of local government owner or operator and/or guarantor other than a general purpose government must sign a letter worded exactly as follows, except that the instructions in brackets are to be replaced by the relevant information and the brackets deleted:

LETTER FROM CHIEF FINANCIAL OFFICER

I am the chief financial officer of [insert: name and address of local government owner or operator, or guarantor]. This letter is in support of the use of the bond rating test to demonstrate financial responsibility for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage"] caused by [insert: "sudden accidental releases" ~~and/~~or "nonsudden accidental releases" or "accidental releases"] in the amount of at least [insert: dollar amount] per occurrence and [insert: dollar amount] annual aggregate arising from operating (an) underground storage tank(s). This local government is not organized to provide general governmental services and does not have the legal authority under state law or constitutional provisions to issue general obligation debt.

Underground storage tanks at the following facilities are assured by this bond rating test: [List for each facility: the name and address of the facility where tanks are assured by the bond rating test].

The details of the issue date, maturity, outstanding amount, bond rating, and bond rating agency of all outstanding revenue bond issues that are being used by [name of local government owner or operator, or guarantor] to demonstrate financial responsibility are as follows: [complete table]

Issue date: _____
Maturity date: _____
Outstanding amount: _____
Bond rating: _____
Rating agency: _____
(Moody's or Standard & Poor's)

The total outstanding obligation of [insert amount], excluding refunded bond issues, exceeds the minimum amount of $1 million. All outstanding revenue bonds issued by this government that have been rated by Moody's or Standard & Poor's are rated as at least investment grade (Moody's Baa or Standard & Poor's BBB) based on the most recent ratings published within the last 12 months. The revenue bonds listed are not backed by third-party credit enhancement or are insured by a municipal bond insurance company. Neither rating service has provided notification within the last 12 months of downgrading of bond ratings below investment grade or of withdrawal of bond rating other than for repayment of outstanding bond issues.

I hereby certify that the wording of this letter is identical to the wording specified in R.61-92.280.104(e) as such regulations were constituted on the date shown immediately below.

[Date]_____
[Signature]_____
[Name]_____
[Title]_____

(f) The Department may require reports of financial condition at any time from the local government owner or operator, and/or local government guarantor. If the Department finds, on the basis of such reports or other information, that the local government owner or operator, and/or guarantor, no longer meets the local government bond rating test requirements of ~~s~~Section 280.104, the local government owner or operator must obtain alternative coverage within 30 days after notification of such a finding.

(g) If a local government owner or operator using the bond rating test to provide financial assurance finds that it no longer meets the bond rating test requirements, the local government owner or operator must obtain alternative coverage within 150 days of the change in status.

(h) If the local government owner or operator fails to obtain alternate assurance within 150 days of finding that it no longer meets the requirements of the bond rating test or within 30 days of notification by the Department that it no longer meets the requirements of the bond rating test, the owner or operator must notify the Department of such failure within 10 days.

SECTION 280.105. LOCAL GOVERNMENT FINANCIAL TEST.

(a) A local government owner or operator may satisfy the requirements of ~~s~~Section 280.93 by passing the financial test specified in this section. To be eligible to use the financial test, the local government owner or operator must have the ability and authority to assess and levy taxes or to freely establish fees and charges. To pass the local government financial test, the owner or operator must meet the criteria of paragraphs (b)(2) and (b)(3) of this section based on year-end financial statements for the latest completed fiscal year.

(b)(1) The local government owner or operator must have the following information available, as shown in the year-end financial statements for the latest completed fiscal year:

(i) Total Revenues: Consists of the sum of general fund operating and non-operating revenues including net local taxes, licenses and permits, fines and forfeitures, revenues from use of money and property, charges for services, investment earnings, sales (property, publications, etc.), intergovernmental revenues (restricted and unrestricted), and total revenues from all other governmental funds including enterprise, debt service, capital projects, and special revenues, but excluding revenues to funds held in a trust or agency capacity. For purposes of this test, the calculation of total revenues shall exclude all transfers between funds under the direct control of the local government using the financial test (interfund transfers), liquidation of investments, and issuance of debt.

(ii) Total Expenditures: Consists of the sum of general fund operating and non-operating expenditures including public safety, public utilities, transportation, public works, environmental protection, cultural and recreational, community development, revenue sharing, employee benefits and compensation, office management, planning and zoning, capital projects, interest payments on debt, payments for retirement of debt principal, and total expenditures from all other governmental funds including enterprise, debt service, capital projects, and special revenues. For purposes of this test, the calculation of total expenditures shall exclude all transfers between funds under the direct control of the local government using the financial test (interfund transfers).

(iii) Local Revenues: Consists of total revenues (as defined in paragraph (b)(1)(i) of this section) minus the sum of all transfers from other governmental entities, including all monies received from Federal, State, or local government sources.

(iv) Debt Service: Consists of the sum of all interest and principal payments on all long-term credit obligations and all interest-bearing short-term credit obligations. Includes interest and principal payments on general obligation bonds, revenue bonds, notes, mortgages, judgments, and interest bearing warrants. Excludes payments on non-interest-bearing short-term obligation, interfund obligation, amounts owed in a trust or agency capacity, and advances and contingent loans from other governments.

(v) Total Funds: Consists of the sum of cash and investment securities from all funds, including general, enterprise, debt service, capital projects, and special revenue funds, but excluding employee retirement funds, at the end of the local government's financial reporting year. Includes Federal securities, Federal agency securities, state and local government securities, and other securities such as bonds, notes and mortgages. For purposes of this test, the calculation of total funds shall exclude agency funds, private trust funds, accounts receivable, value of real property, and other non-security assets.

(vi) Population: consists of the number of people in the area served by the local government.

(2) The local government's year-end financial statements, if independently audited, cannot include an adverse auditor's opinion or a disclaimer of opinion. The local government cannot have outstanding issues of general obligation or revenue bonds that are rated as less than investment grade.

(3) The local government owner or operator must have a letter signed by the chief financial officer worded as specified in paragraph (c) of this section.

(c) To demonstrate that it meets the financial test under paragraph (b) of this section, the chief financial officer of the local government owner or operator, must sign, within 120 days of the close of each financial reporting year, as defined by the twelve-month period for which financial statements used to support the financial test are prepared, a letter worded exactly as follows, except that the instructions in brackets are to be replaced by the relevant information and the brackets deleted:

LETTER FROM CHIEF FINANCIAL OFFICER

I am the chief financial officer of [insert: name and address of the owner or operator]. This letter is in support of the use of the local government financial test to demonstrate financial responsibility for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage"] caused by [insert: "sudden accidental releases" ~~and/~~or "nonsudden accidental releases" or "accidental releases"] in the amount of at least [insert: dollar amount] per occurrence and [insert: dollar amount] annual aggregate arising from operating ~~[~~(an~~]~~) underground storage tank(s).

Underground storage tanks at the following facilities are assured by this financial test [List for each facility: the name and address of the facility where tanks assured by this financial test are located. If separate mechanisms or combinations of mechanisms are being used to assure any of the tanks at this facility, list each tank assured by this financial test by the tank identification number provided in the notification submitted pursuant to R.61-92.280.22.

This owner or operator has not received an adverse opinion, or a disclaimer of opinion from an independent auditor on its financial statements for the latest completed fiscal year. Any outstanding issues of general obligation or revenue bonds, ~~it~~if rated, have a Moody's rating of Aaa, Aa, A, or Baa or a Standard & Poor's rating of AAA, AA, A, or BBB; if rated by both firms, the bonds have a Moody's rating of Aaa, Aa, A, or Baa and a Standard and Poor's rating of AAA, AA, A, or BBB.

WORKSHEET FOR MUNICIPAL FINANCIAL TEST

Part I: Basic Information

1. Total Revenues
   a. Revenues (dollars)_____

Value of revenues excludes liquidation of investments and issuance of debt. Value includes all general fund operating and non-operating revenues, as well as all revenues from all other governmental funds including enterprise, debt service, capital projects, and special revenues, but excluding revenues to funds held in a trust or agency capacity.

   b. Subtract interfund transfers (dollars)
   c. Total Revenues (dollars)

2. Total Expenditures
   a. Expenditures (dollars)_____

Value consists of the sum of general fund operating and non-operating expenditures including interest payments on debt, payments for retirement of debt principal, and total expenditures from all other governmental funds including enterprise, debt service, capital projects, and special revenues.

b. Subtract interfund transfers (dollars)_____

c. Total Expenditures (dollars)_____

3. Local Revenues

a. Total Revenues (from 1c) (dollars)_____

b. Subtract total intergovernmental transfers (dollars) _____

c. Local Revenues (dollars)_____

4. Debt Service

a. Interest and fiscal charges (dollars) _____

b. Add debt retirement (dollars) _____

c. Total Debt Service (dollars) _____

5. Total Funds (dollars)_____

(Sum of amounts held as cash and investment securities from all funds, excluding amounts held for employee retirement funds, agency funds, and trust funds)

6. Population (Persons)

Part II: Application of Test

7. Total Revenues to Population

a. Total Revenues (from 1c) _____

b. Population (from 6) _____

c. Divide 7a by 7b _____

d. Subtract 417 _____

e. Divide by 5,212 _____

f. Multiply by 4.095_____

8. Total Expenses to Population

a. Total Expenses (from 2c) _____

b. Population (from 6) _____

c. Divide 8a by 8b _____

d. Subtract 524 _____

e. Divide by 5,401_____

f. Multiply by 4.095 _____

9. Local Revenues to Total Revenues

a. Local Revenues (from 3c) _____

b. Total Revenues (from 1c) _____

c. Divide 9a by 9b _____

d. Subtract .695 _____

e. Divide by .205 _____

f. Multiply by 2.840_____

10. Debt Service to Population

a. Debt Service (from 4~~d~~c) _____

b. Population (from 6) _____

c. Divide 10a by 10b_____
d. Subtract 51 _____
e. Divide by 1,038_____
f. Multiply by -1.866_____

11. Debt Service to Total Revenues
a. Debt Service (from 4~~d~~c) _____
b. Total Revenues (from 1c) _____
c. Divide 11a by 11b_____
d. Subtract .068_____
e. Divide by .259_____
f. Multiply by -3.533 _____

12. Total Revenues to Total Expenses
a. Total Revenues (from 1c) _____
b. Total Expenses (from 2c) _____
c. Divide 12a by 12b_____
d. Subtract .910_____
e. Divide by .899_____
f. Multiply by 3.458_____

13. Funds Balance to Total Revenues
a. Total Funds (from 5) _____
b. Total Revenues (from 1c) _____
c. Divide 13a by 13b_____
d. Subtract .891_____
e. Divide by 9.156_____
f. Multiply by 3.270_____

14. Funds Balance to Total Expenses
a. Total Funds (from 5) _____
b. Total Expenses (from 2c) _____
c. Divide 14a by 14b_____
d. Subtract .866 _____
e. Divide by 6.409 _____
f. Multiply by 3.270_____

15. Total Funds to Population
a. Total Funds (from 5) _____
b. Population (from 6) _____
c. Divide 15a by 15b_____
d. Subtract 270 _____
e. Divide by 4,548_____
f. Multiply by 1.866_____

16. Add 7f + 8f + 9f + 10f + 11f + 12f + 13f + 14f + 15f + 4.937_____

I hereby certify that the financial index shown on line 16 of the worksheet is greater than zero and that the wording of this letter is identical to the wording specified in R.61-92.280.105(c) as such regulations were constituted on the date shown immediately below.

[Date] _____
[Signature] _____
[Name] _____
[Title] _____

(d) If a local government owner or operator using the test to provide financial assurance finds that it no longer meets the requirements of the financial test based on the year-end financial statements, the owner or operator must obtain alternative coverage within 150 days of the end of the year for which financial statements have been prepared.

(e) ~~t~~The Department may require reports of financial condition at any time from the local government owner or operator. If the Department finds, on the basis of such reports or other information, that the local government owner or operator no longer meets the financial test requirements of ~~s~~Section 280.105(b) and (c), the owner or operator must obtain alternate coverage within 30 days after notification of such a finding.

(f) If the local government owner or operator fails to obtain alternate assurance within 150 days of finding that it no longer meets the requirements of the financial test based on the year-end financial statements or within 30 days of notification by the Department that it no longer meets the requirements of the financial test, the owner or operator must notify the Department of such failure within 10 days.

SECTION 280.106. LOCAL GOVERNMENT GUARANTEE.

(a) A local government owner or operator may satisfy the requirements of ~~s~~Section 280.93 by obtaining a guarantee that conforms to the requirements of this section. The guarantor must be a local government having a "substantial governmental relationship" with the owner or operator and issuing the guarantee as an act incident to that relationship. A local government acting as the guarantor must:

(1) ~~d~~Demonstrate that it meets the bond rating test requirement of ~~s~~Section 280.104 and deliver a copy of the chief financial officer's letter as contained in ~~s~~Section 280.104(~~c~~d) and (e) to the local government owner or operator; or

(2) ~~d~~Demonstrate that it meets the worksheet test requirements of ~~s~~Section 280.105 and deliver a copy of the chief financial officer's letter as contained in ~~s~~Section 280.105(c) to the local government owner or operator; or

(3) ~~d~~Demonstrate that it meets the local government fund requirements of ~~s~~Sections 280.107(a), 280.107(b), or 280.107(c) and deliver a copy of the chief financial officer's letter as contained in ~~s~~Section 280.107 to the local government owner or operator.

(b) If the local government guarantor is unable to demonstrate financial assurance under any of ~~s~~Sections 280.104, 280.105, 280.107(a), 280.107(b), or 280.107(c), ~~as~~at the end of the financial reporting year, the guarantor shall send by certified mail, before cancellation or non-renewal of the guarantee, notice to the owner or operator. The guarantee will terminate no less than 120 days after the date the owner or operator receives the notification, as evidenced by the return receipt. The owner or operator must obtain alternative coverage as specified in ~~s~~Section 280.114(~~c~~e).

(c) The guarantee agreement must be worded as specified in paragraph (d) or (e) of this section, depending on which of the following alternative guarantee arrangements is selected:

(1) If, in the default or incapacity of the owner or operator, the guarantor guarantees to fund a standby trust as directed by the Department, the guarantee shall be worded as specified in paragraph (d) of this section.

(2) If, in the default or incapacity of the owner or operator, the guarantor guarantees to make payments as directed by the Department for taking corrective action or compensating third parties for bodily injury and property damage, the guarantee shall be worded as specified in paragraph (e) of this section.

(d) If the guarantor is a local government, the local government guarantee with standby trust must be worded exactly as follows, except that instructions in brackets are to be replaced with relevant information and the brackets deleted:

LOCAL GOVERNMENT GUARANTEE WITH STANDBY TRUST MADE BY A LOCAL GOVERNMENT

Guarantee made this [date] by [name of guaranteeing entity], a local government organized under the laws of South Carolina, herein referred to as guarantor, to the Department and to any and all third parties, and obliges, on behalf of [local government owner or operator].

Recitals

(1) Guarantor meets or exceeds [select one: the local government bond rating test requirements of R.61-92.280.104, the local government financial test requirements of R.61-92.280.105, or the local government fund under R.61-92.280.107(a), R.61-92.280.107(b), or R.61-92.280.107(c).

(2) [Local government owner or operator] owns or operates the following underground storage tank(s) covered by this guarantee: [List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to R.61-92.280 and the name and address of the facility.] This guarantee satisfies R.61-92.280, Subpart H requirements for assuring funding for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the above-identified underground storage tank(s) in the amount of [insert dollar amount] per occurrence and [insert: dollar amount] annual aggregate.

(3) Incident to our substantial governmental relationship with [local government owner or operator], guarantor guarantees to the Department and to any and all third parties that:

In the event that [local government owner or operator] fails to provide alternative coverage within 60 days after receipt of a notice of cancellation of this guarantee and the Department has determined or suspects that a release has occurred at an underground storage tank covered by this guarantee, the guarantor, upon instructions from the Department, shall fund a standby trust fund in accordance with the provisions of R.61-92.280.112, in an amount not to exceed the coverage limits specified above.

In the event that the Department determines that [local government owner or operator] has failed to perform corrective action for releases arising out of the operation of the above-identified tank(s) in accordance with R.61-92.280, Subpart F, the guarantor upon written instructions from the Department shall fund a standby trust fund in accordance with the provisions of R.61-92.280.112, in an amount not to exceed the coverage limits specified above.

If [owner or operator] fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by ["sudden" and/or "nonsudden"] accidental releases arising from the operation of the above-identified tank(s), or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor, upon written instructions from the Department, shall fund a standby trust in accordance with the provisions of R.61-92.280.112 to satisfy such judgment(s), award(s), or settlement agreement(s) up to the limits of coverage specified above.

(4) Guarantor agrees that, if at the end of any fiscal year before cancellation of this guarantee, the guarantor fails to meet or exceed the requirements of the financial responsibility mechanism specified in paragraph (1), guarantor shall send within 120 days of such failure, by certified mail, notice to [local government owner or operator], as evidenced by the return receipt.

(5) Guarantor agrees to notify [owner or operator] by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code naming guarantor as debtor, within 10 days after commencement of the proceeding.

(6) Guarantor agrees to remain bound under this guarantee notwithstanding any modification or alteration of any obligation of [owner or operator] pursuant to R.61-92.280.

(7) Guarantor agrees to remain bound under this guarantee for so long as [local government owner or operator] must comply with the applicable financial responsibility requirements of R.61-92.280, Subpart H for the above identified tank(s), except that guarantor may cancel this guarantee by sending notice by certified mail to [owner or operator], such cancellation to become effective no earlier than 120 days after receipt of such notice by [owner or operator], as evidenced by the return receipt.

(8) The guarantor's obligation does not apply to any of the following:

(a) Any obligation of [local government owner or operator] under a workers' compensation, disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert: local government owner or operator] arising from and in the course of employment by [insert: local government owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaned to, in the care, custody, or control of, or occupied by [insert: local government owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily damage or property damage for which [insert: owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of R.61-92.280.93.

(9) Guarantor expressly waives notice of acceptance of this guarantee by the Department by any or all third parties, or by [local government owner or operator].

I hereby certify that the wording of this guarantee is identical to the wording specified in R.61-92 Part 280.106(d) as such regulations were constituted on the effective date shown immediately below.

Effective date: _____
[Name of guarantor] _____
[Authorized signature of guarantor] _____
[Name of person signing] _____
[Title of person signing] _____
Signature of witness or notary: _____

(e) If the guarantor is a local government, the local government guarantee without standby trust must be worded exactly as follows, except that instructions in brackets are to be replaced with relevant information and the brackets deleted:

LOCAL GOVERNMENT GUARANTEE WITHOUT STANDBY TRUST MADE BY A LOCAL GOVERNMENT

Guarantee made this [date] by [name of guaranteeing entity], a local government organized under the laws of South Carolina, herein referred to as guarantor, to the Department and to any and all third parties, and obliges, on behalf of [local government owner or operator].

Recitals

(1) Guarantor meets or exceeds ~~(~~[select one: the local government bond rating test requirements of R.61-92.280.104, the local government financial test requirements of R.61-92.280.105, the local government fund under R.61-92.280.107(a), R.61-92.280.107(b), or R.61-92.280.107(c)].

(2) [Local government owner or operator] owns or operates the following underground storage tank(s) covered by this guarantee: [List the number of tanks at each facility and the name(s) and address(es) of the facility(ies) where the tanks are located. If more than one instrument is used to assure different tanks at any one facility, for each tank covered by this instrument, list the tank identification number provided in the notification submitted pursuant to R.61-92.280~~ or the corresponding state requirement~~, and the name and address of the facility.] This guarantee satisfies R.61-92.280, Subpart H requirements for assuring funding for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage caused by" either "sudden accidental releases" or "nonsudden accidental releases" or "accidental releases"~~]~~; if coverage is different for different tanks or locations, indicate the type of coverage applicable to each tank or location] arising from operating the above-identified underground storage tank(s) in the amount of ~~(~~[insert: dollar amount~~)~~] per occurrence and [insert: dollar amount] annual aggregate.

(3) Incident to our substantial governmental relationship with [local government owner or operator], guarantor guarantees to the Department and to any and all third parties and obliges that:

In the event that [local government owner or operator] fails to provide alternative coverage within 60 days after receipt of a notice of cancellation of this guarantee and the Department has determined or suspects that a release has occurred at an underground storage tank covered by this guarantee, the guarantor, upon written instructions from the Department shall make funds available to pay for corrective actions and compensate third parties for bodily injury and property damage in an amount not to exceed the coverage limits specified above.

In the event that the Department determines that [local government owner or operator] has failed to perform corrective action for releases arising out of the operation of the above-identified tank(s) in accordance with R.61-92.280, Subpart F, the guarantor upon written instructions from the Department shall

make funds available to pay for corrective actions in an amount not to exceed the coverage limits specified above.

If [owner or operator] fails to satisfy a judgement or award based on a determination of liability for bodily injury or property damage to third parties caused by ["sudden" and/or "nonsudden"] accidental releases arising from the operation of the above-identified tank(s), or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor, upon written instructions from the Department shall make funds available to compensate third parties for bodily injury and property damage in an amount not to exceed the coverage limits specified above.

(4) Guarantor agrees that if at the end of any fiscal year before cancellation of this guarantee, the guarantor fails to meet or exceed the requirements of the financial responsibility mechanism specified in paragraph (1), guarantor shall send within 120 days of such failure, by certified mail, notice to [local government owner or operator], as evidenced by the return receipt.

(5) Guarantor agrees to notify [owner or operator] by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code naming guarantor as debtor, within 10 days after commencement of the proceeding.

(6) Guarantor agrees to remain bound under this guarantee notwithstanding any modification or alteration of any obligation of [owner or operator] pursuant to R.61-92.280.

(7) Guarantor agrees to remain bound under this guarantee for so long as [local government owner or operator] must comply with the applicable financial responsibility requirements of R.61-92.280, Subpart H for the above identified tank(s), except that guarantor may cancel this guarantee by sending notice by certified mail to [owner or operator], such cancellation to become effective no earlier that~~t~~n 120 days after receipt of such notice by [owner or operator], as evidenced by the return receipt. If notified of a probable release, the guarantor agrees to remain bound to the terms of this guarantee for all charges arising from the release, up to the coverage limits specified above, notwithstanding the cancellation of the guarantee with respect to future releases.

(8) The guarantor's obligation does not apply to any of the following:

(a) Any obligation of [local government owner or operator] under a workers' compensation disability benefits, or unemployment compensation law or other similar law;

(b) Bodily injury to an employee of [insert: local government owner or operator] arising from, and in the course of, employment by [insert: local government owner or operator];

(c) Bodily injury or property damage arising from the ownership, maintenance, use or entrustment to others of any aircraft, motor vehicle, or watercraft;

(d) Property damage to any property owned, rented, loaned to, in the care, custody, or control of, or occupied by [insert: local government owner or operator] that is not the direct result of a release from a petroleum underground storage tank;

(e) Bodily damage or property damage for which [insert: owner or operator] is obligated to pay damages by reason of the assumption of liability in a contract or agreement other than a contract or agreement entered into to meet the requirements of R.61-92.280.93.

(9) Guarantor expressly waives notice of acceptance of this guarantee by ~~[~~the ~~implementing agency~~Department~~]~~, by any or all third parties, or by [local government owner or operator],

I hereby certify that the wording of this guarantee is identical to the wording specified in R.61-92.280.106(e) as such regulations were constituted on the effective date shown immediately below.

Effective date: _____
[Name of guarantor] _____
[Authorized signature for guarantor] _____
[Name of person signing] _____
[Title of person signing] _____
Signature of witness or notary: _____

SECTION 280.107. LOCAL GOVERNMENT FUND.

A local government owner or operator may satisfy the requirements of ~~s~~Section 280.93 by establishing a dedicated fund account that conforms to the requirements of this section. Except as specified in paragraph (b) of this section, a dedicated fund may not be co~~-~~mmingled with other funds or otherwise used in normal operations. A dedicated fund will be considered eligible if it meets one of the following requirements:

(a) The fund is dedicated by state constitutional provision, or local government statute, charter, ordinance or order to pay for taking corrective action and for compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum underground storage tanks and is funded for the full amount of coverage required under ~~s~~Section 280.93, or funded for part of the required amount of coverage and used in combination with other mechanism(s) that provide the remaining coverage; or

(b) The fund is dedicated by state constitutional provision, or local government statute, charter, ordinance, or order as a contingency fund for general emergencies, including taking corrective action and compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum underground storage tanks and is funded for five times the full amount of coverage required under ~~s~~Section 280.93, or funded for part of the required amount of coverage and used in combination with other mechanism(s) that provide the remaining coverage. If the fund is funded for less than five times the amount of coverage required under ~~s~~Section 280.93, the amount of financial responsibility demonstrated by the fund may not exceed one-fifth the amount in the fund; or

(c) The fund is dedicated by state constitutional provision, or local government statute, charter, ordinance or order to pay for taking corrective action and for compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum underground storage tanks. A payment is made to the fund once every year for seven years until the fund is fully funded. This seven year period is hereafter referred to as the "pay-in-period." The amount of each payment must be determined by this formula:

$$\frac{TF - CF}{Y}$$

Where TF is the total required financial assurance for the owner or operator, CF is the current amount in the fund, and Y is the number of years remaining in the pay-in-period~~,~~; and~~;~~.

(1) The local government owner or operator has available bonding authority, approved through voter referendum (if such approval is necessary prior to the issuance of bonds), for an amount equal to the difference between the required amount of coverage and the amount held in the dedicated fund. This bonding authority shall be available for taking corrective action and for compensating third parties for bodily injury and property damage caused by accidental releases arising from the operation of petroleum underground storage tanks~~,~~; or

(2) The local government owner or operator has a letter signed by the appropriate state attorney general stating that the use of the bonding authority will not increase the local government's debt beyond the legal debt ceilings established by the relevant state laws. The letter must also state that prior voter approval is not necessary before use of the bonding authority.

(d) To demonstrate that it meets the requirements of the local government fund, the chief financial officer of the local government owner or operator and/or guarantor must sign a letter worded exactly as follows, except that the instructions in brackets are to be replaced by the relevant information and the brackets deleted:

LETTER FROM CHIEF FINANCIAL OFFICER

I am the chief financial officer of [insert: name and address of local government owner or operator, or guarantor]. This letter is in support of the use of the local government fund mechanism to demonstrate financial responsibility for [insert: "taking corrective action" and/or "compensating third parties for bodily injury and property damage"] caused by [insert: "sudden accidental releases" ~~and/~~or "nonsudden accidental releases" or "accidental releases"] in the amount of at least [insert: dollar amount] per occurrence and [insert: dollar amount] annual aggregate arising from operating (an) underground storage tank(s).

Underground storage tanks at the following facilities are assured by this local government fund mechanism:

[List for each facility: the name and address of the facility where tanks are assured by the local government fund].

[Insert: "The local government fund is funded for the full amount of coverage required under ~~s~~Section 280.93, or funded for part of the required amount of coverage and used in combination with other mechanism(s) that provide the remaining coverage." or "The local government fund is funded for ~~ten~~five times the full amount of coverage required under ~~s~~Section 280.93, or funded for part of the required amount of coverage and used in combination with other mechanisms(s) that provide the remaining coverage," or "A payment is made to the fund once every year for seven years until the fund is fully-funded and [name of local government owner or operator] has available bonding authority, approved through voter referendum, of an amount equal to the difference between the required amount of coverage and the amount held in the dedicated fund" or "A payment is made to the fund once every year for seven years until the fund is fully-funded and I have attached a letter signed by the State Attorney General stating that (1) the use of the bonding authority will not increase the local government's debt beyond the legal debt ceilings established by the relevant state laws and (2) that prior voter approval is not necessary before use of the bonding authority"].

The details of the local government fund are as follows:

Amount in Fund (market value of fund at close of last fiscal year):_____

~~(~~[If fund balance is incrementally funded as specified in ~~s~~Section 280.107(c), insert:

Amount added to fund in the most recently completed fiscal year~~)~~:_____

Number of years remaining in the pay-in-period:_____]

A copy of the state constitutional provision, or local government statute, charter, ordinance, or order dedicating the fund is attached.

I hereby certify that the wording of this letter is identical to the wording specified in R.61-92.280.107(d) as such regulations were constituted on the date shown immediately below.

[Date] _____
[Signature] _____
[Name] _____
[Title] _____

SECTION 280.108. SUBSTITUTION OF FINANCIAL ASSURANCE MECHANISM BY OWNER OR OPERATOR.

(a) An owner or operator may substitute any alternate financial assurance mechanisms as specified in this subpart, provided that at all times he maintains an effective financial assurance mechanism or combination of mechanisms that satisfies the requirements of ~~s~~Section 280.93.

(b) After obtaining alternate financial assurance as specified in this subpart, an owner or operator may cancel a financial assurance mechanism by providing notice to the provider of financial assurance.

SECTION 280.109. CANCELLATION OR NONRENEWAL BY A PROVIDER OF FINANCIAL ASSURANCE.

(a) Except as otherwise provided, a provider of financial assurance may cancel or fail to renew an assurance mechanism by sending a notice of termination by certified mail to the owner or operator and the Department.

(1) Termination of a local government guarantee, a guarantee, a surety bond, or a letter of credit may not occur until 120 days after the date on which the owner or operator receives the notice of termination, as evidenced by the return receipt.

(2) Termination of insurance or risk retention coverage, except for non-payment or misrepresentation by the insured, may not occur until 60 days after the date on which the owner or operator receives the notice of termination, as evidenced by the return receipt. Termination for non-payment of premium or misrepresentation by the insured may not occur until a minimum of 10 days after the date on which the owner or operator receives the notice of termination, as evidenced by the return receipt.

(b) If a provider of financial responsibility cancels or fails to renew for reasons other than incapacity of the provider as specified in ~~s~~Section 280.114, the owner or operator must obtain alternate coverage as specified in this section within 60 days after receipt of the notice of termination. If the owner or operator fails to obtain alternate coverage within 60 days after receipt of the notice of termination, the owner or operator must notify the Department of such failure and submit:

(l) The name and address of the provider of financial assurance;

(2) The effective date of termination; and

(3) The evidence of the financial assurance mechanism subject to the termination maintained in accordance with ~~s~~Section 280.1~~07~~11(b).

SECTION 280.110. REPORTING BY OWNER OR OPERATOR.

(a) An owner or operator must submit the appropriate forms listed in ~~s~~Section 280.111(b) documenting current evidence of financial responsibility to the Department:

(l) Within 30 days after the owner or operator identifies a release from an UST required to be reported under ~~s~~Sections 280.53 or 280.61;

(2) If the owner or operator fails to obtain alternate coverage as required by this subpart, within 30 days after the owner or operator receives notice of:

(i) Commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming a provider of financial assurance as a debtor~~,~~;

(ii) Suspension or revocation of the authority of a provider of financial assurance to issue a financial assurance mechanism~~,~~;

(iii) Failure of a guarantor to meet the requirements of the financial test~~,~~;

(iv) Other incapacity of a provider of financial assurance; or

(3) As required by ~~s~~Sections 280.95(g) and 280.109(b).

(b) An owner or operator must certify compliance with the financial responsibility requirements of this ~~P~~part as specified in the new tank notification form when notifying the Department of the installation of a new UST under ~~s~~Section 280.22.

(c) The Department may require an owner or operator to submit evidence of financial assurance as described in ~~s~~Section 280.111(b) or other information relevant to compliance with this subpart at any time.

SECTION 280.111. RECORDKEEPING.

(a) Owners or operators must maintain evidence of all financial assurance mechanisms used to demonstrate financial responsibility under this subpart for an UST until released from the requirements of this subpart under ~~s~~Section 280.113. An owner or operator must maintain such evidence at the UST site or the owner's or operator's place of ~~business~~work. Records maintained off-site must be made available upon request of the Department.

(b) An owner or operator must maintain the following types of evidence of financial responsibility:

(1) An owner or operator using an assurance mechanism specified in ~~s~~Sections 280.95 through 280.100, or ~~s~~Section 280.102, or ~~s~~Sections 280.104 through 280.107, must maintain a copy of the instrument worded as specified.

(2) An owner or operator using a financial test or guarantee, or a local government financial test or a local government guarantee supported by the local government financial test must maintain a copy of the

chief financial officer's letter based on year-end financial statements for the most recent completed financial reporting year. Such evidence must be on file no later than 120 days after the close of the financial reporting year.

(3) An owner or operator using a guarantee, surety bond, or letter of credit must maintain a copy of the signed standby trust fund agreement and copies of any amendments to the agreement.

(4) A local government owner or operator using a local government guarantee under ~~s~~Section 280.106(d) must maintain a copy of the signed standby trust fund agreement and copies of any amendments to the agreement.

(5) A local government owner or operator using the local government bond rating test under ~~s~~Section 280.104 must maintain a copy of its bond rating published within the last twelve months by Moody's or Standard & Poor's.

(6) A local government owner or operator using the local government guarantee under ~~s~~Section 280.106, where the guarantor's demonstration of financial responsibility relies on the bond rating test under ~~s~~Section 280.104 must maintain a copy of the guarantor's bond rating published within the last twelve months by Moody's or Standard & Poor's.

(7) An owner or operator using an insurance policy or risk retention group coverage must maintain a copy of the signed insurance policy or risk retention group coverage policy, with the endorsement or certificate of insurance and any amendments to the agreements.

(8) An owner or operator covered by the SUPERB fund must maintain on file ~~at the operating facility~~ a copy of the Certification of Financial Responsibility required under ~~s~~Section 280.101(d)~~ and supplied in section 280.111(b)(11) below~~.

(9) An owner or operator using a local government fund under ~~s~~Section 280.107 must maintain the following documents:

(i) A copy of the state constitutional provision or local government statute, charter, ordinance, or order dedicating the fund~~,~~; and

(ii) Year-end financial statements for the most recent completed financial reporting year showing the amount in the fund. If the fund is established under ~~s~~Section 280.107(~~a~~c)~~(3)~~ using incremental funding backed by bonding authority, the financial statements must show the previous year's balance, the amount of funding during the year, and the closing balance in the fund.

(iii) If the fund is established under ~~s~~Section 280.107(~~a~~c)~~(3)~~ using incremental funding backed by bonding authority, the owner or operator must also maintain documentation of the required bonding authority, including either the results of a voter referendum (under ~~s~~Section 280.107(~~a~~c)(~~3~~1)~~(i)~~), or attestation by the State Attorney General as specified under ~~s~~Section 280.107(~~a~~c)(~~3~~2)~~(ii)~~.

(10) A local government owner or operator using the local government guarantee supported by the local government fund must maintain a copy of the guarantor's year-end financial statement for the most recent completed financial reporting year showing the amount of the fund.

(11)(i) An owner or operator using an assurance mechanism specified in ~~s~~Sections 280.95 through 280.107 must maintain an updated copy of a certification of financial responsibility using a Department

form or a Department approved form, worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

CERTIFICATION OF FINANCIAL RESPONSIBILITY

Complete and return one copy to the Department. Keep one copy ~~at your underground storage tank site~~on file, to be provided upon request.

Site Name_____ Site #_____

Site Address _____

Choose one or a combination of assurance mechanisms to demonstrate financial responsibility under R.61-92.280, Subpart H of the South Carolina Underground Storage Tank Control Regulations (SCUSTCR). Complete the chart for each mechanism selected.

MECHANISM	NAME OF ISSUER	AMOUNT OF COVERAGE	PERIOD OF COVERAGE

1. State fund (SUPERB)--[If you select this, show deductible coverage~~ of deductible~~ here.]

_____

2. Self insurance

_____

3. Guarantee

_____

4. Pollution insurance or
risk retention group

_____

5. Surety bond

_____

6. Letter of credit

_____

7. Trust fund

_____

8. Local government options

_____

____ hereby certifies compliance with the requirements of Subpart H of SCUSTCR ~~p~~Part 280.
[owner or operator]

_____ _____

[Signature of owner or operator] [Signature of witness or notary]

_____ _____
[Name of owner or operator] [Name of witness or notary]

_____ _____
[Title] [Date]

_____ _____
[Date]

(ii) The owner or operator must update this certification whenever the financial assurance mechanism(s) used to demonstrate financial responsibility change(s). As stated in ~~s~~Section 280.110, a copy must be sent to the Department under the following circumstances: (1) you install a new tank system; (2) you have confirmed that there has been a release; (3) you change financial mechanisms; (4) the Environmental Protection Agency or the Department requests your records. No mechanism may require expenditure of funds from the SUPERB Account or the SUPERB Financial Responsibility Fund prior to exhausting that mechanism.

SECTION 280.112. DRAWING ON FINANCIAL ASSURANCE MECHANISMS.

(a) Except as specified in paragraph (d) of this section, the Department shall require the guarantor, surety, or institution issuing a letter of credit to place the amount of funds stipulated by the Department up to the limit of funds provided by the financial assurance mechanism, into the standby trust if:

(l)(i) The owner or operator fails to establish alternate financial assurance within 60 days after receiving notice of cancellation of the guarantee, surety bond, letter of credit, or, as applicable, other financial assurance mechanism; and

(ii) The Department determines or suspects that a release from an underground storage tank covered by the mechanism has occurred and so notifies the owner or operator or the owner or operator has notified the Department pursuant to Subparts E or F of a release from an UST covered by the mechanism; or

(2) The conditions of paragraph (b)(l) or (b)(2)(i) or (ii) of this section are satisfied.

(b) The Department may draw on a standby trust fund when:

(l) The Department makes a final determination that a release has occurred and immediate or long-term corrective action for the release is needed, and the owner or operator, after appropriate notice and opportunity to comply, has not conducted corrective action as required under R.61-92.280, Subpart F of this part; or

(2) The Department has received either:

(i) Certification from the owner or operator and the third-party liability claimant(s) and from attorneys representing the owner or operator and the third-party liability claimant(s) that a third-party liability claim should be paid. The certification must be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

CERTIFICATION OF VALID CLAIM

The undersigned, as principals and as legal representatives of [insert: owner or operator] and [insert: name and address of third-party claimant], hereby certify that the claim of bodily injury [and/or] property damage

caused by an accidental release arising from operating [owner's or operator's] underground storage tank should be paid in the amount of $[_].

[Signatures]	[Signature(s)]
Owner or Operator	Claimant(s)
Attorney for Owner or Operator	Attorney(s) for Claimant(s)
(Notary) Date	(Notary) Date

or (ii) A valid final court order establishing a judgment against the owner or operator for bodily injury or property damage caused by an accidental release from an UST covered by financial assurance under this subpart and the Department determines that the owner or operator has not satisfied the judgment.

(c) If the Department determines that the amount of corrective action costs and third-party liability claims eligible for payment under paragraph (b) of this section may exceed the balance of the standby trust fund and the obligation of the provider of financial assurance, the first priority for payment shall be corrective action costs necessary to protect human health and the environment. The Department shall pay third-party liability claims in the order in which the Department receives certifications under paragraph (b)(2)(i) of this section, and valid court orders under paragraph (b)(2)(ii) of this section.

(d) A governmental entity acting as guarantor under ~~s~~Section 280.106(e), the local government guarantee without standby trust, shall make payments as directed by the Department under the circumstances described in ~~s~~Section 280.112(a), (b), and (c).

SECTION 280.113. RELEASE FROM THE REQUIREMENTS.

An owner or operator is no longer required to maintain financial responsibility under this subpart for an UST after the tank has been ~~properly~~permanently closed or undergoes a change-in-service or, if corrective action is required, after corrective action has been completed and the tank has been ~~properly~~permanently closed or undergoes a change-in-service as required by ~~R.61-92.280,~~ Subpart G of this part.

SECTION 280.114. BANKRUPTCY OR OTHER INCAPACITY OF OWNER OR OPERATOR OR PROVIDER OF FINANCIAL ASSURANCE.

(a) Within 10 days after commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming an owner or operator as debtor, the owner or operator must notify the Department by certified mail of such commencement and submit the appropriate forms listed in ~~s~~Section 280.111(b) documenting current financial responsibility.

(b) Within 10 days after commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming a guarantor providing financial assurance as debtor, such guarantor must notify the owner or operator by certified mail of such commencement as required under the terms of the guarantee specified in ~~s~~Section 280.96.

(c) Within 10 days after commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming a local government owner or operator as debtor, the local government owner or operator must notify the Department by certified mail of such commencement and submit the appropriate forms listed in ~~s~~Section 280.111(b) documenting current financial responsibility.

(d) Within 10 days after commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming a guarantor providing a local government financial assurance as debtor, such guarantor must notify the local government owner or operator by certified mail of such commencement as required under the terms of the guarantee specified in ~~s~~Section 280.106.

(e) An owner or operator who obtains financial assurance by a mechanism other than the financial test of self-insurance will be deemed to be without the required financial assurance in the event of a bankruptcy or incapacity of its provider of financial assurance, or a suspension or revocation of the authority of the provider of financial assurance to issue a guarantee, insurance policy, risk retention group coverage policy, surety bond, letter of credit, or state-required mechanism. The owner or operator must obtain alternate financial assurance as specified in this subpart within 30 days after receiving notice of such an event. If the owner or operator does not obtain alternate coverage within 30 days after such notification, he must notify the Department.

(f) Within 30 days after receipt of notification that a state fund or other state assurance has become incapable of paying for assured corrective action or third-party compensation costs, the owner or operator must obtain alternate financial assurance.

SECTION 280.115 REPLENISHMENT OF GUARANTEES, LETTERS OF CREDIT, OR SURETY BONDS.

(a) If at any time after a standby trust is funded upon the instruction of the Department with funds drawn from a guarantee, local government guarantee with standby trust, letter of credit, or surety bond, and the amount in the standby trust is reduced below the full amount of coverage required, the owner or operator shall by the anniversary date of the financial mechanism from which the funds were drawn:

(1) Replenish the value of financial assurance to equal the full amount of coverage required, or

(2) Acquire another financial assurance mechanism for the amount by which funds in the standby trust have been reduced.

(b) For purposes of this section, the full amount of coverage required is the amount of coverage to be provided by ~~s~~Section 280.93~~ of this Subpart~~. If a combination of mechanisms was used to provide the assurance funds which were drawn upon, replenishment shall occur by the earliest anniversary date among the mechanisms.

SECTION 280.116. SUSPENSION OF ENFORCEMENT [Reserved]

SUBPART I
Lender Liability

SECTION 280.200. DEFINITIONS.

(a) UST technical standards, as used in this subpart, refers to the UST preventative and operating requirements under ~~R.61-92 part 280 S~~subparts B, C, D, G, J, and K of this part and ~~s~~Section 280.50 of subpart E.

(b) Petroleum production, refining, and marketing.

(1) Petroleum production means the production of crude oil or other forms of petroleum (as defined in ~~s~~Section 280.12(xx)) as well as the production of petroleum products from purchased materials.

(2) Petroleum refining means the cracking, distillation, separation, conversion, upgrading, and finishing of refined petroleum or petroleum products.

(3) Petroleum marketing means the distribution, transfer, or sale of petroleum or petroleum products for wholesale or retail purposes.

(c) Indicia of ownership means evidence of a secured interest, evidence of an interest in a security interest, or evidence of an interest in real or personal property securing a loan or other obligation, including any legal or equitable title or deed to real or personal property acquired through or incident to foreclosure. Evidence of such interests include, but are not limited to, mortgages, deeds of trust, liens, surety bonds and guarantees of obligations, title held pursuant to a lease financing transaction in which the lessor does not select initially the leased property (hereinafter "lease financing transaction"), and legal or equitable title obtained pursuant to foreclosure. Evidence of such interests also includes assignments, pledges, or other rights to or other forms of encumbrance against property that are held primarily to protect a security interest. A person is not required to hold title or a security interest in order to maintain indicia of ownership.

(d) A holder is a person who, upon the effective date of this regulation or in the future, maintains indicia of ownership (as defined in ~~s~~Section 280.200(c)) primarily to protect a security interest (as defined in ~~s~~Section 280.200(f)(1)) in a petroleum or petroleum product UST or UST system or facility or property on which a petroleum or petroleum product UST or UST system is located. A holder includes the initial holder (such as a loan originator); any subsequent holder (such as a successor-in-interest or subsequent purchaser of the security interest on the secondary market); a guarantor of an obligation, surety, or any other person who holds ownership indicia primarily to protect a security interest; or a receiver or other person who acts on behalf or for the benefit of a holder.

(e) A borrower, debtor, or obligor is a person whose UST or UST system or facility or property on which the UST or UST system is located is encumbered by a security interest. These terms may be used interchangeably.

(f) Primarily to protect a security interest means that the holder's indicia of ownership are held primarily for the purpose of securing payment or performance of an obligation.

(1) Security interest means an interest in a petroleum or petroleum product UST or UST system or in the facility or property on which a petroleum or petroleum product UST or UST system is located, created or established for the purpose of securing a loan or other obligation. Security interests include but are not limited to mortgages, deeds of trusts, liens, and title pursuant to lease financing transactions. Security interests may also arise from transactions such as sale and leasebacks, conditional sales, installment sales, trust receipt transactions, certain assignments, factoring agreements, accounts receivable financing arrangements, and consignments, if the transaction creates or establishes an interest in an UST or UST system or in the facility or property on which the UST or UST system is located, for the purpose of securing a loan or other obligation.

(2) Primarily to protect a security interest, as used in this subpart, does not include indicia of ownership held primarily for investment purposes, nor ownership indicia held primarily for purposes other than as protection for a security interest. A holder may have other, secondary reasons for maintaining indicia of ownership, but the primary reason why any ownership indicia are held must be as protection for a security interest.

(g) "Operation" means, for purposes of this subpart, the use, storage, filling, or dispensing of petroleum or a petroleum product contained in an UST or UST system.

SECTION 280.210. PARTICIPATION IN MANAGEMENT.

The term "participating in the management of an UST or UST system" means that, subsequent to the effective date of this subpart, the holder is engaging in decision-making control of, or activities related to, operation of the UST or UST system, as defined herein.

(a) Actions that are participation in management.

(1) Participation in the management of an UST or UST system means, for purposes of this subpart, actual participation by the holder in the management or control of decision-making related to the operation of an UST or UST system. Participation in management does not include the mere capacity or ability to influence or the unexercised right to control UST or UST system operations. A holder is participating in the management of the UST or UST system only if the holder either:

(i) Exercises decision-making control over the operational (as opposed to financial or administrative) aspects of the UST or UST system, such that the holder has undertaken responsibility for all or substantially all of the management of the UST or UST system; or

(ii) Exercises control at a level comparable to that of a manager of the borrower's enterprise, such that the holder has assumed or manifested responsibility for the overall management of the enterprise encompassing the day-to-day decision-making of the enterprise with respect to all, or substantially all, of the operational (as opposed to financial or administrative) aspects of the enterprise.

(2) Operational aspects of the enterprise relate to the use, storage, filling, or dispensing of petroleum or a petroleum product contained in an UST or UST system, and include functions such as that of a facility or plant manager, operations manager, chief operating officer, or chief executive officer. Financial or administrative aspects include functions such as that of a credit manager, accounts payable/receivable manager, personnel manager, controller, chief financial officer, or similar functions. Operational aspects of the enterprise do not include the financial or administrative aspects of the enterprise, or actions associated with achieving or maintaining environmental compliance, or actions undertaken voluntarily to protect the environment in accordance with applicable requirements in R.61-92 ~~p~~Part 280.

(b) Actions that are not participation in management pre-foreclosure.

(1) Actions at the inception of the loan or other transaction. No act or omission prior to the time that indicia of ownership are held primarily to protect a security interest constitutes evidence of participation in management within the meaning of this subpart. A prospective holder who undertakes or requires an environmental investigation (which could include a site assessment, inspection, and/or audit) of the UST or UST system or facility or property on which the UST or UST system is located (in which indicia of ownership are to be held), or requires a prospective borrower to clean up contamination from the UST or UST system or to comply or come into compliance (whether prior or subsequent to the time that indicia of ownership are held primarily to protect a security interest) with any applicable law or regulation, is not by such action considered to be participating in the management of the UST or UST system or facility or property on which the UST or UST system is located.

(2) Loan policing and work out. Actions that are consistent with holding ownership indicia primarily to protect a security interest do not constitute participation in management for purposes of this subpart. The authority for the holder to take such actions may, but need not, be contained in contractual or other documents specifying requirements for financial, environmental, and other warranties, covenants, conditions, representations or promises from the borrower. Loan policing and work out activities cover and

include all such activities up to foreclosure, exclusive of any activities that constitute participation in management.

(i) Policing the security interest or loan.

(A) A holder who engages in policing activities prior to foreclosure will remain within the exemption provided that the holder does not together with other actions participate in the management of the UST or UST system as provided in ~~s~~Section 280.210(a). Such policing actions include, but are not limited to, requiring the borrower to clean up contamination from the UST or UST system during the term of the security interest; requiring the borrower to comply or come into compliance with applicable federal, state, and local environmental and other laws, rules, and regulations during the term of the security interest; securing or exercising authority to monitor or inspect the UST or UST system or facility or property on which the UST or UST system is located (including on-site inspections) in which indicia of ownership are maintained, or the borrower's business or financial condition during the term of the security interest; or taking other actions to adequately police the loan or security interest (such as requiring a borrower to comply with any warranties, covenants, conditions, representations, or promises from the borrower).

(B) Policing activities also include undertaking by the holder of UST environmental compliance actions and voluntary environmental actions taken in compliance with R.61-92 ~~p~~Part 280, provided that the holder does not otherwise participate in the management or daily operation of the UST or UST system as provided in ~~s~~Section 280.210(a) and ~~s~~Section 280.230. Such allowable actions include, but are not limited to, release detection and release reporting, release response and corrective action, temporary or permanent closure of an UST or UST system, UST upgrading or replacement, and maintenance of corrosion protection. A holder who undertakes these actions must do so in compliance with the applicable requirements in R.61-92 ~~p~~Part 280. A holder may directly oversee these environmental compliance actions and voluntary environmental actions, and directly hire contractors to perform the work, and is not by such action considered to be participating in the management of the UST or UST system.

(ii) Loan work out. A holder who engages in work out activities prior to foreclosure will remain within the exemption provided that the holder does not together with other actions participate in the management of the UST or UST system as provided in ~~s~~Section 280.210(a). For purposes of this rule, "work out" refers to those actions by which a holder, at any time prior to foreclosure, seeks to prevent, cure, or mitigate a default by the borrower or obligor; or to preserve, or prevent the diminution of, the value of the security. Work out activities include, but are not limited to, restructuring or renegotiating the terms of the security interest; requiring payment of additional rent or interest; exercising forbearance; requiring or exercising rights pursuant to an assignment of accounts or other amounts owing to an obligor; requiring or exercising rights pursuant to an escrow agreement pertaining to amounts owing to an obligor; providing specific or general financial or other advice, suggestions, counseling, or guidance; and exercising any right or remedy the holder is entitled to by law or under any warranties, covenants, conditions, representations, or promises from the borrower.

(c) Foreclosure on an UST or UST system or facility or property on which an UST or UST system is located, and participation in management activities post-foreclosure.

(1) Foreclosure.

(i) Indicia of ownership that are held primarily to protect a security interest include legal or equitable title or deed to real or personal property acquired through or incident to foreclosure. For purposes of this subpart, the term "foreclosure" means that legal, marketable or equitable title or deed has been issued, approved, and recorded, and that the holder has obtained access to the UST, UST system, UST facility, and property on which the UST or UST system is located, provided that the holder acted diligently to acquire

marketable title or deed and to gain access to the UST, UST system, UST facility, and property on which the UST or UST system is located. The indicia of ownership held after foreclosure continue to be maintained primarily as protection for a security interest provided that the holder undertakes to sell, re-lease an UST or UST system or facility or property on which the UST or UST system is located, held pursuant to a lease financing transaction (whether by a new lease financing transaction or substitution of the lessee), or otherwise divest itself of the UST or UST system or facility or property on which the UST or UST system is located, in a reasonably expeditious manner, using whatever commercially reasonable means are relevant or appropriate with respect to the UST or UST system or facility or property on which the UST or UST system is located, taking all facts and circumstances into consideration, and provided that the holder does not participate in management (as defined in ~~s~~Section 280.210(a)) prior to or after foreclosure.

(ii) For purposes of establishing that a holder is seeking to sell, re-lease pursuant to a lease financing transaction (whether by a new lease financing transaction or substitution of the lessee), or divest in a reasonably expeditious manner an UST or UST system or facility or property on which the UST or UST system is located, the holder may use whatever commercially reasonable means as are relevant or appropriate with respect to the UST or UST system or facility or property on which the UST or UST system is located, or may employ the means specified in ~~s~~Section 280.210(c)(2). A holder that outbids, rejects, or fails to act upon a written bona fide, firm offer of fair consideration for the UST or UST system or facility or property on which the UST or UST system is located, as provided in ~~s~~Section 280.210(c)(2), is not considered to hold indicia of ownership primarily to protect a security interest.

(2) Holding foreclosed property for disposition and liquidation. A holder, who does not participate in management prior to or after foreclosure, may sell, re-lease, pursuant to a lease financing transaction (whether by a new lease financing transaction or substitution of the lessee), an UST or UST system or facility or property on which the UST or UST system is located, liquidate, wind up operations, and take measures, prior to sale or other disposition, to preserve, protect, or prepare the secured UST or UST system or facility or property on which the UST or UST system is located. A holder may also arrange for an existing or new operator to continue or initiate operation of the UST or UST system. The holder may conduct these activities without voiding the security interest exemption, subject to the requirements of this subpart.

(i) A holder establishes that the ownership indicia maintained after foreclosure continue to be held primarily to protect a security interest by, within 12 months following foreclosure, listing the UST or UST system or the facility or property on which the UST or UST system is located, with a broker, dealer, or agent who deals with the type of property in question, or by advertising the UST or UST system or facility or property on which the UST or UST system is located, as being for sale or disposition on at least a monthly basis in either a real estate publication or a trade or other publication suitable for the UST or UST system or facility or property on which the UST or UST system is located, or a newspaper of general circulation (defined as one with a circulation over 10,000, or one suitable under any applicable federal, state, or local rules of court for publication required by court order or rules of civil procedure) covering the location of the UST or UST system or facility or property on which the UST or UST system is located. For purposes of this provision, the 12-month period begins to run from the effective date of this subpart or from the date that the marketable title or deed has been issued, approved and recorded, and the holder has obtained access to the UST, UST system, UST facility and property on which the UST or UST system is located, whichever is later, provided that the holder acted diligently to acquire marketable title or deed and to obtain access to the UST, UST system, UST facility and property on which the UST or UST system is located. If the holder fails to act diligently to acquire marketable title or deed or to gain access to the UST or UST system, the 12-month period begins to run from the effective date of this subpart or from the date on which the holder first acquires either title to or possession of the secured UST or UST system, or facility or property on which the UST or UST system is located, whichever is later.

(ii) A holder that outbids, rejects, or fails to act upon an offer of fair consideration for the UST or UST system or the facility or property on which the UST or UST system is located, establishes by such outbidding, rejection, or failure to act, that the ownership indicia in the secured UST or UST system or facility or property on which the UST or UST system is located are not held primarily to protect the security interest, unless the holder is required, in order to avoid liability under federal or state law, to make a higher bid, to obtain a higher offer, or to seek or obtain an offer in a different manner.

(A) Fair consideration, in the case of a holder maintaining indicia of ownership primarily to protect a senior security interest in the UST or UST system or facility or property on which the UST or UST system is located, is the value of the security interest as defined in this section. The value of the security interest includes all debt and costs incurred by the security interest holder, and is calculated as an amount equal to or in excess of the sum of the outstanding principal (or comparable amount in the case of a lease that constitutes a security interest) owed to the holder immediately preceding the acquisition of full title (or possession in the case of a lease financing transaction) pursuant to foreclosure, plus any unpaid interest, rent, or penalties (whether arising before or after foreclosure). The value of the security interest also includes all reasonable and necessary costs, fees, or other charges incurred by the holder incident to work out, foreclosure, retention, preserving, protecting, and preparing, prior to sale, the UST or UST system or facility or property on which the UST or UST system is located, re-lease, pursuant to a lease financing transaction (whether by a new lease financing transaction or substitution of the lessee), of an UST or UST system or facility or property on which the UST or UST system is located, or other disposition. The value of the security interest also includes environmental investigation costs (which could include a site assessment, inspection, and/or audit of the UST or UST system or facility or property on which the UST or UST system is located), and corrective action costs incurred under ~~s~~Sections 280.51 through 280.67 or any other costs incurred as a result of reasonable efforts to comply with any other applicable federal, state or local law or regulation; less any amounts received by the holder in connection with any partial disposition of the property and any amounts paid by the borrower (if not already applied to the borrower's obligations) subsequent to the acquisition of full title (or possession in the case of a lease financing transaction) pursuant to foreclosure. In the case of a holder maintaining indicia of ownership primarily to protect a junior security interest, fair consideration is the value of all outstanding higher priority security interests plus the value of the security interest held by the junior holder, each calculated as set forth in this paragraph (c).

(B) Outbids, rejects, or fails to act upon an offer of fair consideration means that the holder outbids, rejects, or fails to act upon within 90 days of receipt, a written, bona fide, firm offer of fair consideration for the UST or UST system or facility or property on which the UST or UST system is located received at any time after six months following foreclosure, as defined in ~~s~~Section 280.210(c). A "written, bona fide, firm offer" means a legally enforceable, commercially reasonable, cash offer solely for the foreclosed UST or UST system or facility or property on which the UST or UST system is located, including all material terms of the transaction, from a ready, willing, and able purchaser who demonstrates to the holder's satisfaction the ability to perform. For purposes of this provision, the six-month period begins to run from the effective date of this subpart or from the date that marketable title or deed has been issued, approved and recorded to the holder, and the holder has obtained access to the UST, UST system, UST facility and property on which the UST or UST system is located, whichever is later, provided that the holder was acting diligently to acquire marketable title or deed and to obtain access to the UST or UST system, UST facility and property on which the UST or UST system is located. If the holder fails to act diligently to acquire marketable title or deed or to gain access to the UST or UST system, the six-month period begins to run from the effective date of this subpart or from the date on which the holder first acquires either title to or possession of the secured UST or UST system, or facility or property on which the UST or UST system is located, whichever is later.

(3) Actions that are not participation in management post-foreclosure. A holder is not considered to be participating in the management of an UST or UST system or facility or property on which the UST or UST

system is located when undertaking actions under R.61-92 ~~p~~Part 280, provided that the holder does not otherwise participate in the management or daily operation of the UST or UST system as provided in ~~s~~Section 280.210(a) and ~~s~~Section 280.230. Such allowable actions include, but are not limited to, release detection and release reporting, release response and corrective action, temporary or permanent closure of an UST or UST system, UST upgrading or replacement, and maintenance of corrosion protection. A holder who undertakes these actions must do so in compliance with the applicable requirements in R.61-92 ~~p~~Part 280. A holder may directly oversee these environmental compliance actions and voluntary environmental actions, and directly hire contractors to perform the work, and is not by such action considered to be participating in the management of the UST or UST system.

SECTION 280.220. OWNERSHIP OF AN UNDERGROUND STORAGE TANK OR UNDERGROUND STORAGE TANK SYSTEM OR FACILITY OR PROPERTY ON WHICH AN UNDERGROUND STORAGE TANK OR UNDERGROUND STORAGE TANK SYSTEM IS LOCATED.

Ownership of an UST or UST system or facility or property on which an UST or UST system is located. A holder is not an "owner" of a petroleum or a petroleum product UST or UST system or facility or property on which a petroleum or a petroleum product UST or UST system is located for purposes of compliance with the UST technical standards as defined in ~~s~~Section 280.200(a), the UST corrective action requirements under ~~s~~Sections 280.51 through 280.67, and the UST financial responsibility requirements under ~~s~~Sections 280.90 through 280.111, provided the person:

(a) Does not participate in the management of the UST or UST system as defined in ~~s~~Section 280.210; and

(b) Does not engage in petroleum production, refining, and marketing as defined in ~~s~~Section 280.200(b).

SECTION 280.230. OPERATING AN UNDERGROUND STORAGE TANK OR UNDERGROUND STORAGE TANK SYSTEM.

(a) Operating an UST or UST system prior to foreclosure. A holder, prior to foreclosure, as defined in ~~s~~Section 280.210(c), is not an "operator" of a petroleum or a petroleum product UST or UST system for purposes of compliance with the UST technical standards as defined in ~~s~~Section 280.200(a), the UST corrective action requirements under ~~s~~Sections 280.51 through 280.67, and the UST financial responsibility requirements under ~~s~~Sections 280.90 through 280.111, provided that, after the effective date of this subpart, the holder is not in control of or does not have responsibility for the daily operation of the UST or UST system.

(b) Operating an UST or UST system after foreclosure. The following provisions apply to a holder who, through foreclosure, as defined in ~~s~~Section 280.210(c), acquires a petroleum or a petroleum product UST or UST system or facility or property on which a petroleum or a petroleum product UST or UST system is located.

(1) A holder is not an "operator" of a petroleum or a petroleum product UST or UST system for purposes of compliance with R.61-92 ~~p~~Part 280 if there is an operator, other than the holder, who is in control of or has responsibility for the daily operation of the UST or UST system, and who can be held responsible for compliance with applicable requirements of R.61-92 ~~p~~Part 280.

(2) If another operator does not exist, as provided for under paragraph (b)(1) of this section, a holder is not an "operator" of the UST or UST system, for purposes of compliance with the UST technical standards as defined in ~~s~~Section 280.200(a), the UST corrective action requirements under ~~s~~Sections 280.51 through

280.67, and the UST financial responsibility requirements under ~~s~~Sections 280.90 through 280.111, provided that the holder:

(i) Empties all of its known USTs and UST systems within 60 calendar days after foreclosure or within 60 calendar days after the effective date of this subpart, whichever is later, or another reasonable time period specified by the ~~implementing agency~~Department, so that no more than 2.5 centimeters (one inch) of residue, or 0.3 percent by weight of the total capacity of the UST system, remains in the system; leaves vent lines open and functioning; and caps and secures all other lines, pumps, manways, and ancillary equipment; and

(ii) Empties those USTs and UST systems that are discovered after foreclosure within 60 calendar days after discovery or within 60 calendar days after the effective date of this subpart, whichever is later, or another reasonable time period specified by the ~~implementing agency~~Department, so that no more than 2.5 centimeters (one inch) of residue, or 0.3 percent by weight of the total capacity of the UST system, remains in the system; leaves vent lines open and functioning; and caps and secures all other lines, pumps, manways, and ancillary equipment.

(3) If another operator does not exist, as provided for under paragraph (b)(1) of this section, in addition to satisfying the conditions under paragraph (b)(2) of this section, the holder must either:

(i) Permanently close the UST or UST system in accordance with ~~s~~Sections 280.71 through 280.74, except ~~s~~Section 280.72(b); or

(ii) Temporarily close the UST or UST system in accordance with the following applicable provisions of ~~s~~Section 280.70:

(A) Continue operation and maintenance of corrosion protection in accordance with ~~s~~Section 280.31;

(B) Report suspected releases to the ~~implementing agency~~Department; and

(C) Conduct a site assessment in accordance with ~~s~~Section 280.72(a) if the UST system is temporarily closed for more than 12 months and the UST system does not meet either the performance standards in ~~s~~Section 280.20 for new UST systems or the upgrading requirements in ~~s~~Section 280.21, except that the spill and overfill equipment requirements do not have to be met. The holder must report any suspected releases to the ~~implementing agency~~Department. For purposes of this provision, the 12-month period begins to run from the effective date of this subpart or from the date on which the UST system is emptied and secured under paragraph (b)(2) of this section, whichever is later.

(4) The UST system can remain in temporary closure until a subsequent purchaser has acquired marketable title to the UST or UST system or facility or property on which the UST or UST system is located. Once a subsequent purchaser acquires marketable title to the UST or UST system or facility or property on which the UST or UST system is located, the purchaser must decide whether to operate or close the UST or UST system in accordance with applicable requirements in R.61-92 ~~p~~Part 280.

SUBPART J
Operator Training

SECTION 280.240. GENERAL REQUIREMENT FOR ALL UST SYSTEMS.

(a) As of August 8, 2011, all owners and operators of UST systems must ensure they have designated Class A, Class B, and Class C operators who meet the requirements of this subpart.

(b) The Department shall:

(1) Maintain a registry of Class A and Class B operators to include facility responsibility, training completion date and training provider;

(2) Verify training and documentation is current for Class A, Class B, and Class C operators during inspections at UST facilities; and

(3) Develop supplemental training that will be provided to all designated Class A and Class B operators that completed their training prior to [*effective date*].

SECTION 280.241. DESIGNATION OF CLASS A, B, AND C OPERATORS.

UST system owners and operators must designate:

(a) At least one Class A and one Class B operator for each UST or group of USTs at a facility; and

(b) Each individual who meets the definition of Class C operator at the UST facility as a Class C operator.

SECTION 280.242. REQUIREMENTS FOR OPERATOR TRAINING.

UST system owners and operators must ensure Class A, Class B, and Class C operators meet the requirements of this section. At small facilities, one individual may handle all three duties. However, in the operation and maintenance structure at an underground storage tank facility that is part of a large store chain, open 24-hours, a number of persons may be designated to perform duties and responsibilities of operator classes A, B, and C. Any individual designated for more than one operator class must successfully complete the required training program or comparable examination, as approved by the Department, according to the operator class in which the individual is designated. Not later than thirty days after Class A and Class B Operators complete appropriate operator training, tank owners will notify the department of the name, training completion date and training provider for each operator.

(a) Class A operators. Each designated Class A operator must either be trained in accordance with paragraphs (a)(1) and (2) of this section or pass a comparable examination, as approved by the Department, in accordance with paragraph (e) of this section.

(1) At a minimum, the training program for the Class A operator must provide general knowledge of the requirements in this paragraph (a). At a minimum, the training must teach the Class A operators, as applicable, about the purpose, methods, and function of:

(i) Spill and overfill prevention;

(ii) Release detection;

(iii) Corrosion protection;

(iv) Emergency response;

(v) Product and equipment compatibility and demonstration;

(vi) Financial responsibility;

(vii) Notification and storage tank registration;

(viii) Temporary and permanent closure;

(ix) Related reporting, recordkeeping, testing, and inspections;

(x) Environmental and regulatory consequences of releases; and

(xi) Training requirements for Class B and Class C operators.

(2) At a minimum, the training program must evaluate Class A operators to determine these individuals have the knowledge and skills to make informed decisions regarding compliance and determine whether appropriate individuals are fulfilling the operation, maintenance, and recordkeeping requirements for UST systems in accordance with paragraph(a)(1) of this section.

(b) Class B operators. Each designated Class B operator must either receive training in accordance with paragraphs (b)(1) and (2) of this section or pass a comparable examination, as approved by the Department, in accordance with paragraph (e) of this section.

(1) At a minimum, the training program for the Class B operator must cover either: general requirements that encompass all regulatory requirements and typical equipment used at UST facilities; or site-specific requirements which address only the regulatory requirements and equipment specific to the facility. At a minimum, the training program for Class B operators must teach the Class B operator, as applicable, about the purpose, methods, and function of:

(i) Operation and maintenance;

(ii) Spill and overfill prevention;

(iii) Release detection and related reporting;

(iv) Corrosion protection;

(v) Emergency response;

(vi) Product and equipment compatibility and demonstration;

(vii) Reporting, recordkeeping, testing, and inspections;

(viii) Environmental and regulatory consequences of releases; and

(ix) Training requirements for Class C operators.

(2) At a minimum, the training program must evaluate Class B operators to determine these individuals have the knowledge and skills to implement applicable state UST regulatory requirements on the components of typical UST systems or, as applicable, site-specific equipment used at an UST facility in accordance with paragraph (b)(1) of this section.

(3) Once each month, Class B Operators shall validate that:

(i) Each assigned facility has accomplished the required release and leak detection monitoring;

(ii) Each assigned facility has the required release and equipment monitoring records;

(iii) Required equipment and system testing has been accomplished;

(iv) Unusual operating conditions or release detection system indications have been reported and investigated;

(v) Routine operations and maintenance activities have been accomplished;

(vi) Spill, overfill, and corrosion protection systems are in place and operational; and,

(vii) Class C operators have been designated and trained.

(4) Class B Operators shall physically visit each assigned facility quarterly.

(c) Class C operators. Each designated Class C operator must either: be trained by a Class A or Class B operator in accordance with paragraphs (c)(1) and (2) of this section; complete a training program in accordance with paragraphs (c)(1) and (2) of this section; or pass a comparable examination as approved by the Department, in accordance with paragraph (e) of this section.

(1) At a minimum, the training program for the Class C operator must teach the Class C operators to take appropriate actions (including notifying appropriate authorities) in response to emergencies or alarms caused by spills or releases resulting from the operation of the UST system.

(2) At a minimum, the training program must evaluate Class C operators to determine these individuals have the knowledge and skills to take appropriate action (including notifying appropriate authorities) in response to emergencies or alarms caused by spills or releases from an underground storage tank system.

(d) Training program. Any training program must meet the minimum requirements of this section and include an evaluation through testing, a practical demonstration, or another approach acceptable to the Department.

(e) Comparable examination. A comparable examination must, at a minimum, test the knowledge of the Class A, Class B, or Class C operators in accordance with the requirements of paragraphs (a), (b), or (c) of this section, as applicable.

SECTION 280.243. TIMING OF OPERATOR TRAINING.

(a) An owner and operator must ensure that designated Class A, Class B, and Class C operators meet the requirements in Section 280.242 not later than [*effective date*]. Class A and B operators, designated and trained prior to [*effective date*], must complete the supplemental training no later than [*three years from effective date*]. The supplemental training must be developed and administered by the Department or an independent organization whose program has been approved by the Department. UST system owners and operators must ensure that the Class A and Class B operators are retrained pursuant to this section no later than [*three years from the effective date*].

(b) Class A and Class B operators designated after [August 8, 2011] must meet requirements in Section 280.242 within 30 days of assuming duties.

(c) Class C operators designated after [August 8, 2011] must be trained before assuming duties of a Class C operator.

SECTION 280.244. RETRAINING.

Class A and Class B operators of UST systems determined by the Department to be out of compliance must complete a training program or comparable examination in accordance with requirements in Section 280.242. The training program or comparable examination must be developed or administered by the Department or an independent organization whose program has been approved by the Department. At a minimum, the training must cover the area(s) determined to be out of compliance. UST system owners and operators must ensure that the primary Class A and Class B operators are retrained pursuant to this section no later than 30 days from the date the Department determines the facility is out of compliance.

SECTION 280.245. DOCUMENTATION.

Owners and operators of underground storage tank systems must maintain a list of designated Class A, Class B, and Class C operators and maintain records verifying that training and retraining, as applicable, have been completed, in accordance with Section 280.34 as follows:

(a) The list must:

(1) Identify all Class A, Class B, and Class C operators currently designated for the facility; and

(2) Include names, class of operator trained, date assumed duties, date each completed initial training, and any retraining.

(b) Records verifying completion of training or retraining must be a paper or electronic record for Class A, Class B, and Class C operators. The records, at a minimum, must identify name of trainee, date trained, operator training class completed, and list the name of the trainer or examiner and the training company name, address, and telephone number. Owners and operators must maintain these records for as long as Class A, Class B, and Class C operators are designated. The following requirements also apply to the following types of training:

(1) Records from classroom or field training programs (including Class C operator training provided by the Class A or Class B operator) or a comparable examination must, at a minimum, be signed by the trainer or examiner;

(2) Records from computer based training must, at a minimum, indicate the name of the training program and web address, if Internet based; and

(3) Records of retraining must include those areas on which the Class A or Class B operator has been retrained.

SUBPART K
UST Systems with Field-Constructed Tanks and Airport Hydrant Fuel Distribution Systems

SECTION 280.250. DEFINITIONS.

For purposes of this subpart, the following definitions apply:

(a) "Airport hydrant fuel distribution system (also called airport hydrant system)" means an UST system which fuels aircraft and operates under high pressure with large diameter piping that typically terminates into one or more hydrants (fill stands). The airport hydrant system begins where fuel enters one or more tanks from an external source such as a pipeline, barge, rail car, or other motor fuel carrier.

(b) "Field-constructed tank" means a tank constructed in the field. For example, a tank constructed of concrete that is poured in the field, or a steel or fiberglass tank primarily fabricated in the field is considered field-constructed.

SECTION 280.251. GENERAL REQUIREMENTS.

(a) Implementation of requirements. Owners and operators must comply with the requirements of this part for UST systems with field-constructed tanks and airport hydrant systems as follows:

(1) For UST systems installed on or before [*Effective Date*] the requirements are effective according to the following schedule:

Requirement	Effective date
Upgrading UST systems; general operating requirements; and operator training	[*Three years from Effective Date*]
Release detection	[*Three years from Effective Date*]
Release reporting, response, and investigation; closure; financial responsibility and notification (except as provided in paragraph (b) of this section).	[*Effective Date*]

(2) For UST systems installed after [*Effective Date*], the requirements apply at installation.

(i) Not later than [*Three Years from Effective Date*], all owners of previously deferred UST systems must submit a one-time notice of tank system existence to the Department, using EPA form 7530-1, a Department form, a Department approved form, or submitted in a format as approved by the Department in accordance with Section 280.22(c). Owners and operators of UST systems in use as of [*Effective Date*] must demonstrate financial responsibility at the time of submission of the notification form.

(ii) Except as provided in Section 280.252, owners and operators must comply with the requirements of Subparts A through H and J of this part.

(iii) In addition to the codes of practice listed in Section 280.20, owners and operators may use military construction criteria, such as Unified Facilities Criteria (UFC) 3–460–01, "Petroleum Fuel Facilities," when designing, constructing, and installing airport hydrant systems and UST systems with field-constructed tanks.

SECTION 280.252. ADDITIONS, EXCEPTIONS, AND ALTERNATIVES FOR UST SYSTEMS WITH FIELD-CONSTRUCTED TANKS AND AIRPORT HYDRANT SYSTEMS.

(a) Exception to piping secondary containment requirements. Owners and operators may use single walled piping when installing or replacing piping associated with UST systems with field-constructed tanks greater than 50,000 gallons and piping associated with airport hydrant systems. Piping associated with UST systems with field-constructed tanks less than or equal to 50,000 gallons not part of an airport hydrant system must meet the secondary containment requirement when installed or replaced.

(b) Upgrade requirements. Not later than [*Three Years from Effective Date*], airport hydrant systems and UST systems with field-constructed tanks where installation commenced on or before [*Effective Date*] must meet the following requirements or be permanently closed pursuant to Subpart G of this part.

(1) Corrosion protection. UST system components in contact with the ground that routinely contain regulated substances must meet one of the following:

(i) Except as provided in paragraph (a) of this section, the new UST system performance standards for tanks at Section 280.20(a) and for piping at Section 280.20(b); or

(ii) Be constructed of metal and cathodically protected according to a code of practice developed by a nationally recognized association or independent testing laboratory and meets the following:

(A) Cathodic protection must meet the requirements of Section 280.20(a)(2)(ii), (iii), and (iv) for tanks, and Sections 280.20(b)(2)(ii), (iii), and (iv) for piping.

(B) Tanks greater than 10 years old without cathodic protection must be assessed to ensure the tank is structurally sound and free of corrosion holes prior to adding cathodic protection. The assessment must be by internal inspection or another method determined by the Department to adequately assess the tank for structural soundness and corrosion holes.

[Note to paragraph (b). The following codes of practice may be used to comply with this paragraph (b):

(A) NACE International Standard Practice SP 0285, ‘‘External Control of Underground Storage Tank Systems by Cathodic Protection’’;

(B) NACE International Standard Practice SP 0169, ‘‘Control of External Corrosion on Underground or Submerged Metallic Piping Systems’’;

(C) National Leak Prevention Association Standard 631, Chapter C, ‘‘Internal Inspection of Steel Tanks for Retrofit of Cathodic Protection’’; or

(D) American Society for Testing and Materials Standard G158, ‘‘Standard Guide for Three Methods of Assessing Buried Steel Tanks’’.]

(2) Spill and overfill prevention equipment. To prevent spilling and overfilling associated with product transfer to the UST system, all UST systems with field-constructed tanks and airport hydrant systems must comply with new UST system spill and overfill prevention equipment requirements specified in Section 280.20(c).

(c) Walkthrough inspections. In addition to the walkthrough inspection requirements in Section 280.36, owners and operators must inspect the following additional areas for airport hydrant systems at least once every 30 days if confined space entry according to the Occupational Safety and Health Administration (see 29 CFR part 1910) is not required or at least once annually if confined space entry is required and keep documentation of the inspection according to Section 280.36(b).

(1) Hydrant pits—visually check for any damage; remove any liquid or debris; and check for any leaks, and

(2) Hydrant piping vaults—check for any hydrant piping leaks.

(d) Release detection. Owners and operators of UST systems with field-constructed tanks and airport hydrant systems must begin meeting the release detection requirements described in this subpart not later than [*Three Years from Effective Date*].

(1) Methods of release detection for field-constructed tanks. Owners and operators of field-constructed tanks with a capacity less than or equal to 50,000 gallons must meet the release detection requirements in Subpart D of this part. Owners and operators of field-constructed tanks with a capacity greater than 50,000 gallons must meet either the requirements in Subpart D (except Section 280.43(e) and (f) must be combined with inventory control as stated below) or use one or a combination of the following alternative methods of release detection:

(i) Conduct an annual tank tightness test that can detect a 0.5 gallon per hour leak rate;

(ii) Use an automatic tank gauging system to perform release detection at least every 30 days that can detect a leak rate less than or equal to one gallon per hour. This method must be combined with a tank tightness test that can detect a 0.2 gallon per hour leak rate performed at least every three years;

(iii) Use an automatic tank gauging system to perform release detection at least every 30 days that can detect a leak rate less than or equal to two gallons per hour. This method must be combined with a tank tightness test that can detect a 0.2 gallon per hour leak rate performed at least every two years;

(iv) Perform vapor monitoring (conducted in accordance with Section 280.43(e) for a tracer compound placed in the tank system) capable of detecting a 0.1 gallon per hour leak rate at least every two years;

(v) Perform inventory control (conducted in accordance with Department of Defense Directive 4140.25; ATA Airport Fuel Facility Operations and Maintenance Guidance Manual; or equivalent procedures) at least every 30 days that can detect a leak equal to or less than 0.5 percent of flow-through; and

(A) Perform a tank tightness test that can detect a 0.5 gallon per hour leak rate at least every two years; or

(B) Perform vapor monitoring or groundwater monitoring (conducted in accordance with Section 280.43(e) or (f), respectively, for the stored regulated substance) at least every 30 days; or

(vi) Another method approved by the Department if the owner and operator can demonstrate that the method can detect a release as effectively as any of the methods allowed in paragraphs (d)(1)(i) through (v) of this section. In comparing methods, the Department shall consider the size of release that the method can detect and the frequency and reliability of detection.

(2) Methods of release detection for piping. Owners and operators of underground piping associated with field-constructed tanks less than or equal to 50,000 gallons must meet the release detection requirements in Subpart D of this part. Owners and operators of underground piping associated with airport hydrant systems and field-constructed tanks greater than 50,000 gallons must follow either the requirements in Subpart D (except Section 280.43(e) and (f) must be combined with inventory control as stated below) or use one or a combination of the following alternative methods of release detection:

(i)(A) Perform a semiannual or annual line tightness test at or above the piping operating pressure in accordance with the table below.

MAXIMUM LEAK DETECTION RATE PER TEST SECTION VOLUME		
Test section volume (gallons)	Semiannual test—leak detection rate not to exceed (gallons per hour)	Annual test— leak detection rate not to exceed (gallons per hour)
<50,000	1.0	0.5
≥50,000 to <75,000	1.5	0.75
≥75,000 to <100,000	2.0	1.0
≥100,000	3.0	1.5

(B) Piping segment volumes ≥100,000 gallons not capable of meeting the maximum 3.0 gallon per hour leak rate for the semiannual test may be tested at a leak rate up to 6.0 gallons per hour according to the following schedule:

PHASE IN FOR PIPING SEGMENTS ≥100,000 GALLONS IN VOLUME	
First test.....	Not later than [*Three Years from Effective Date*] (may use up to 6.0 gph leak rate).
Second test	Between [*Three Years from Effective Date*] and [*Six Years from Effective Date*] (may use up to 6.0 gph leak).
Third test	Between [*Six Years from Effective Date*] and [*Seven Years from Effective Date*] (must use 3.0 gph for leak rate).
Subsequent tests	After [*Seven Years from Effective Date*], begin using semiannual or annual line testing according to the Maximum Leak Detection Rate Per Test Section Volume table above.

(ii) Perform vapor monitoring (conducted in accordance with Section 280.43(e) for a tracer compound placed in the tank system) capable of detecting a 0.1 gallon per hour leak rate at least every two years;

(iii) Perform inventory control (conducted in accordance with Department of Defense Directive 4140.25; ATA "Airport Fuel Facility Operations and Maintenance Guidance Manual"; or equivalent procedures) at least every 30 days that can detect a leak equal to or less than 0.5 percent of flow-through; and

(A) Perform a line tightness test (conducted in accordance with paragraph (d)(2)(i) of this section using the leak rates for the semiannual test) at least every two years; or

(B) Perform vapor monitoring or groundwater monitoring (conducted in accordance with Section 280.43(e) or (f), respectively, for the stored regulated substance) at least every 30 days; or

(iv) Another method approved by the Department if the owner and operator can demonstrate that the method can detect a release as effectively as any of the methods allowed in paragraphs (d)(2)(i) through (iii) of this section. In comparing methods, the Department shall consider the size of release that the method can detect and the frequency and reliability of detection.

(3) Recordkeeping for release detection. Owners and operators must maintain release detection records according to the recordkeeping requirements in Section 280.45.

(e) Applicability of closure requirements to previously closed UST systems. When directed by the Department, the owner and operator of an UST system with field-constructed tanks or airport hydrant system permanently closed before [*Effective Date*] must assess the excavation zone and close the UST system in accordance with Subpart G of this part if releases from the UST may, in the judgment of the Department, pose a current or potential threat to human health and the environment.

SUBPART ~~J~~L
Variances -- Violations and Penalties -- Appeals

SECTION 280.300. VARIANCES.

The Department may vary the application of any provisions of these regulations, when, in its opinion, the applicant has demonstrated that an equivalent degree of protection will be provided to the State's waters. Any variance granted or denied by the Department shall be in writing and shall contain a brief statement of the reasons for the approval or denial.

SECTION 280.301. VIOLATIONS AND PENALTIES.

Any person or persons violating these regulations shall be subject to the penalties provided in Title 44 Chapter 2 Section 140 of the Code of Laws of South Carolina, as amended.

SECTION 280.302. APPEALS.

(a) A decision involving the issuance, denial, renewal, modification, suspension, or revocation of a permit or registration may be appealed by an affected person with standing pursuant to applicable law, including S.C. Code Title 44, Chapter 1 and Title 1, Chapter 23.

(b) Any person to whom an order is issued may appeal it pursuant to applicable law, including S.C. Code Title 44, Chapter 1 and Title 1, Chapter 23.

ATTACHMENT D
Summary of Public Comments and Responses
Regulation 61-92, Underground Storage Tank Control Regulations
December 8, 2016

NAME	SECTION CITATION	COMMENT	RESPONSE
Michael Fields, South Carolina Petroleum Marketers Association (SCPMA) by way of email to Eric F. Cathcart	Section 280.12 (bbb)(2) (Definitions)	For Piping – In order to be consistent with current state regulations, the language should be changed to read "to remove more than 25 percent" instead of the proposed language "to remove 25 percent or more".	**Accepted:** The Department revised language to be consistent with wording in Section 280.20 (h)(2) and Section 280.33(c). The revised language adequately addressed the comment as follows: **Accepted Change:** Add "more than" and remove "or more" to read: (bbb) "Replaced" means: (2) For piping—to remove **more than** 25 percent of piping and install other piping, excluding connectors, connected to a single tank. For tanks with multiple piping runs, this definition applies independently to each piping run. **Original language as proposed in the *State Register* from October 28, 2016:** (bbb) "Replaced" means: (2) For piping—to remove 25 percent **or more** of piping and install other piping, excluding connectors, connected to a single tank. For tanks with multiple piping runs, this definition applies independently to each piping run.
Michael Fields, SCPMA by way of email to Eric F. Cathcart	Section 280.26 (Delivery Prohibition)	While we are not opposing removing one method of notification for suppliers, we have proposed with staff and would ask that the Department adopt a procedure to date and time stamp when any and all	**Clarified:** The Department updated the web site recently to include a date and time stamp on the delivery prohibition page. This clarification does not change the

NAME	SECTION CITATION	COMMENT	RESPONSE
		changes are made to the delivery prohibition website. This will give suppliers the opportunity to screenshot that web page, so that they can confirm when a tank is put on or taken off delivery prohibition.	proposed regulations, but reflects an enhancement of the UST Program website procedures.
Michael Fields, SCPMA by way of email to Eric F. Cathcart	Section 280.36 (Periodic Operation and Maintenance Walkthrough Inspections)	As we discussed in both the workgroup meetings and in meetings with staff, we renew our concerns with both the federal and state regulations recommending the use PEI RP-900 as a guide for the walkthrough inspections, when both the federal and state regulations clearly spell out the requirements needed to meet the regulations. PEI RP-900 is significantly more stringent (and therefore more costly) than what is required and it begs the question as to why conducting inspections "according to a standard code of practice developed by a nationally recognized association" is even needed when the requirements for the compliance of this section are clearly set forth in the regulation.	**Clarified:** The stated concern involves language adopted directly from the federal regulation. The proposed regulation includes flexibility for owners and operators to comply with this section by using "a standard code of practice developed by a nationally recognized association or independent testing laboratory" or the Department. The reference to a specific code of practice, PEI RP-900, in the "Note to [Section 280.36] paragraph (a)(2)" of the proposed regulation is a recommendation, not a requirement, thus no change is necessary.
Michael Fields, SCPMA by way of email to Eric F. Cathcart	Section 280.40 (General Requirements for all UST Systems)	As we discussed in the workgroup meetings and with staff, we renew our concerns that both the federal and state regulations recommend the use of PEI RP-1200 for spill prevention and containment sump testing. It is our understanding that RP-1200 requires liquid testing to the top of the sump above the penetration points where the piping enters the sump area. We believe this method is potentially less protective of the environment because of the amount of hazardous wastewater that will be produced. The added costs related to the proper handling and disposal of this wastewater could be significant. We encourage the Department to look at and approve alternative testing methods to reduce the amount of hazardous wastewater that will be produced. For example, the state of California allows for a low liquid	**Clarified:** The stated concern involves language adopted directly from the federal regulation. The proposed regulation includes flexibility for owners and operators to comply with this section using "one of the following: manufacturer's instructions; a code of practice developed by a nationally recognized association or independent testing laboratory; or requirements determined by the Department to be no less protective of human health and the environment than the two options listed in paragraphs (a)(1) and (2) of [280.40]." The reference to a specific code of practice, PEI RP-1200, in the "Note to [Section 280.40] paragraph (a)(3)" of the

NAME	SECTION CITATION	COMMENT	RESPONSE
		level test. This test method allows for liquid testing only to the level where the sensor alarm will sound and shut down the system turbine. We believe this method is more protective of the environment and significantly less burdensome on the regulated community. Other methods that produce less hazardous wastewater, if available, should also be approved by the department.	proposed regulation is a recommendation, not a requirement. No change is necessary because the proposed regulation provides the Department the discretion to approve alternative testing methods that may be less burdensome on the regulated community and more protective of the environment.
Mr. Edward Kubinsky, Jr, CROMPCO, LLC. by way of email to Eric F. Cathcart	Not specific	We would like DHEC to consider requiring either the owners or companies that perform UST compliance testing services to provide advance notification of any testing activities (14 days advance) and also require that testing be performed during normal business hours (typically 7:00AM – 5:00PM). The reasons for this are: Safety concerns for individuals doing the work at night time when required by an owner. Regulatory oversight – DHEC would be able to coordinate their inspections with routine testing which would allow for better inspections of the equipment by state inspectors that do not have all the tools to open up everything on a tank. Better rapport developed between DHEC and those doing the work. Nighttime testing activities are poorly supervised and some "less than reputable" testers take advantage of the fact that they know there will be nobody out there overseeing their work. With daytime testing and the opportunity for state inspectors to come out and observe testing activities, results of testing will be more reliable and there would be a better level of services provided to owners.	**Clarified:** In accordance with S.C. Code Ann. 44-2-50(A), the testing requirements in the proposed regulation are applicable to owners and operators of underground storage tanks (USTs). The proposed regulation provides owners and operators flexibility in complying with the regulation, including the ability to schedule testing during daytime business hours and when department inspections are planned to occur at a facility. No change is necessary, because under the proposed regulation it is the responsibility of the owners and operators to ensure that all required testing is conducted in accordance with the applicable regulatory requirements.
Mr. Edward Kubinsky, Jr, CROMPCO, LLC. by way of email to Eric F. Cathcart	Not specific	With the addition of requiring state-specific forms for the testing, Crompco would like to suggest that DHEC consider using industry developed forms (such as those in PEI RP 1200) to document the new testing activities required by regulation. The reason for	**Clarified:** The proposed regulation provides owners and operators the flexibility to submit testing results and other information using "a Department form, a Department approved form, or submitted in a format as approved by the

NAME	SECTION CITATION	COMMENT	RESPONSE
		this is to provide a more standard form for documenting test results that would benefit multi-state owner operators as well as service providers. If the same form is used, it makes life a lot simpler for those reviewing the reports from multiple states as well as the technicians doing the work in multiple states. Other than that, great job on the new regs."	Department". No change is necessary because the potential use of industry developed forms, to ease the burden on members of the regulated community operating in multiple states, is already provided.

ATTACHMENT E
Excerpt from *State Register* Notice of Proposed Regulation
Regulation 61-92, Underground Storage Tank Control Regulations
October 28, 2016

Document No. 4706
DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
CHAPTER 61
Statutory Authority: 1976 Code Section 44-2-10 et.seq.

61-92, Underground Storage Tank Control Regulations

Preamble:

The Department proposes to amend R.61-92, Underground Storage Tank Control Regulations, Part 280. This amendment focuses on adopting the federal underground storage tank requirements of 40 CFR Section 280 effective October 13, 2015, and revising portions of R.61-92, Part 280 pertaining to compliance requirements of the UST Control Regulations. The Department proposes to reorganize the regulations for clarity and consistency with the format of the revised federal regulation effective October 13, 2015, along with other stylistic changes proposed to improve the overall quality of the Regulation.

A Notice of Drafting for these proposed amendments was published in the State Register on April 22, 2016.

Section-by-Section Discussion of Proposed Amendments:

A Summary of Proposed Revisions is submitted in Attachment B and is omitted here to conserve space in the Board Item.

ATTACHMENT F
Notice of Drafting
Published in the State Register
April 22, 2016

DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
CHAPTER 2
Statutory Authority: 1976 Code Section 44-2-10 et.seq.

Notice of Drafting:

The South Carolina Department of Health and Environmental Control (Department) proposes to amend R. 61-92, Part 280: Underground Storage Tank Control Regulations. Interested persons may submit written comments to Eric F. Cathcart, Program Manager, Underground Storage Tank Management Division, Bureau of Land and Waste Management, South Carolina Department of Health and Environmental Control, 2600 Bull Street, Columbia, South Carolina 29201 or via email at cathcaef@dhec.sc.gov. To be considered, all comments must be received no later than 5:00 p.m. May 23, 2016, the close of the comment period.

Synopsis:

The Department proposes to amend R. 61-92, Part 280: Underground Storage Tank Control Regulations. This amendment will focus on adopting, with state-specific modifications, the federal underground storage tank requirements of 40 CFR part 280 effective October 13, 2015, and revising portions of R. 61-92, Part 280 pertaining to permitting and compliance requirements of the UST Control Regulations. The Department proposes to reorganize the regulations for clarity and consistency with the format of the revised federal regulation effective October 13, 2015.

The Department may also include stylistic changes, which may include corrections for clarity and readability, grammar, punctuation, definitions, references, codification and overall improvement of the text of the regulation.

Legislative review will be required.

BOARD OF SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
SUMMARY SHEET

December 8, 2016

(X) ACTION
( ) INFORMATION

I. TITLE: Public Hearing and Request for Final Approval Regulation 61-33, *Drycleaning Facility Restoration*
State Register Document No. 4705

Legislative review is required.

II. SUBJECT: Request for Finding of Need and Reasonableness Pursuant to S.C. Code Section 1-23-111

III. FACTS:

1. Regulation 61-33 *Drycleaning Facility Restoration* was promulgated June 27, 1997 pursuant to S.C. Code Section 44-56-410 et seq. by Document No. 2071 and has never been amended. On May 21, 2013 South Carolina Governor Nikki Haley signed into law a revised version of the South Carolina Hazardous Waste Management Act (the Act). Article 4 of the Act, at S.C. Code Section 44-56-410 through 495, establishes the Drycleaning Facility Restoration Trust Fund. Revisions to Article 4 were made to better organize and clarify the Act, as well as to delete obsolete provisions.

2. The Department proposes amending R.61-33 to better conform the regulation to the revised South Carolina Hazardous Waste Management Act. The amendments, which revise the regulation title, also make stylistic changes for internal consistency, clarification in wording, corrections of references, grammatical errors, outlining/codification, and such other changes as may be necessary to improve the overall quality of the regulation.

3. Pursuant to S.C. Code Section 1-23-120(A), the proposed amendments of Regulation 61-33 require legislative review.

4. The Department initiated the statutory process to amend R.61-33 by publication of a Notice of Drafting in the *State Register* on July 22, 2016. The Notice of Drafting was also published in the *DHEC Regulation Development Update* online. A copy of the Notice of Drafting is submitted as Attachment F.

5. Following publication of the Notice of Drafting in the *State Register*, the Department received no comments. Additionally, the Department convened a meeting on August 10, 2016 of the Drycleaning Advisory Council, a council created by the Act to advise the Department on matters relating to regulations and standards that affect drycleaning and related industries to discuss, among other issues, regulatory revisions with Department representatives. A copy of the amendments was provided to all members of the advisory board prior to and during the meeting. Ten members and three Department staffers attended the meeting affording an opportunity to discuss the regulation with stakeholders and receive guidance and clarification on certain items within the regulation. Department staff considered guidance provided at the regulation development meeting in finalizing the regulatory text for the Notice of Proposed Regulation.

6. Pursuant to agency internal review policy, all appropriate Department personnel reviewed the proposed amendments prior to requesting the Board's approval to publicly notice them.

7. The Board granted approval on October 13, 2016 to publicly notice the proposed amendments.

8. Pursuant to S.C. Code Section 1-23-110(A)(3), the Department published a Notice of Proposed Regulation containing the text and notice of opportunity for public comment in the *State Register* on October 28, 2016 as Document No. 4705 (see Excerpt of Notice in Attachment E). The Notice of Proposed Regulation was also published on the Department's website in the *DHEC Regulation Development Update*. The publication of the Notice of Proposed Regulation provided opportunity for interested parties to offer input on the proposed regulation by submitting written comments during a public comment period and/or by commenting at the public hearing before the Board scheduled for December 8, 2016.

9. Following the notice publication, a postcard was mailed to 380 drycleaning owners and operators, property owners with current or former drycleaners on the property, and drycleaning suppliers. The postcard informed them of the proposed revisions to the Drycleaning Facility Restoration Trust Fund Regulations 61-33 and the opportunity for interested parties to offer input on the proposed regulation by submitting written comments during a public comment period and/or by commenting at the public hearing before the Board. The Department received no comments.

10. A Summary of Proposed Revisions and Text of the Proposed Amendments of R.61-33are submitted as Attachments B and C.

11. The Department requests the Board conduct a public hearing pursuant to S.C. Code Section 1-23-111 and find for the need and reasonableness of the proposed amendments to Regulation 61-33.

IV. ANALYSIS:

1. Existing R.61-33 provides for establishing of criteria, procedures and standards for: eligibility assessment, moratorium, financial responsibility, facility prioritization, restoration investigation and goals, and contractor certification.

2. Revisions to the Act signed into law May 21, 2013 included the following changes:
   a. Sections were reorganized to group similar items;
   b. The requirement that evidence of contamination be obtained before fund money may be spent was removed, allowing the Fund to conduct initial assessments;
   c. An eligibility application deadline of December 31, 2014 was added for existing and former facilities; and,
   d. Adding the requirement of all operating facilities to certify containment structures every five years.

3. The proposed amendments to R.61-33 will:
   a. Remove definitions of terms that are defined in the Act, and add or clarify definitions of terms used in inserted or existing provisions;
   b. Remove regulatory direction for conducting eligibility (initial) assessments -no longer required of the regulated community by Act revisions (2b. above) and clarify the eligibility application process; and,
   c. Remove the regulatory direction for certifying assessment contractors – no longer required by the Act.

(Note: the process for certifying containment structure every five years is described in the Act.)

4. In addition, the Department has made stylistic changes for internal consistency, clarification in wording, corrections of references, grammatical errors, outlining/codification, and such other changes necessary to improve the overall quality of the regulation. The Statement of Need and Reasonableness and Rationale is submitted as Attachment A.

V. RECOMMENDATION:

The Department recommends the Board find for the need and reasonableness of the proposed regulations and approve them for submission to the General Assembly for review.

Daphne G. Neel
Chief
Bureau of Land and Waste Management

Myra C. Reece
Director
Environmental Affairs

Attachments:
A. Statement of Need and Reasonableness and Rationale
B. Summary of Proposed Amendments
C. Text of Proposed Amendments
D. Excerpt from *State Register* Notice of Proposed Regulation published October 28, 2016
E. *State Register* Notice of Drafting

ATTACHMENT A
STATEMENT OF NEED AND REASONABLENESS AND RATIONALE
REGULATION 61-33, DRYCLEANING FACILITY RESTORATION

December 8, 2016

This Statement of Need and Reasonableness is based on an analysis of the factors listed in 1976 Code Section 1-23-115(C)(1)-(3) and (9)-(11).

DESCRIPTION OF REGULATION: R61-33, *Drycleaning Facility Restoration.*

Purpose: The purpose of these amendments to R61-33 is to revise and clarify criteria, procedures and standards for eligibility, moratorium, financial responsibility, facility prioritization, and restoration investigation and goals of drycleaning facilities and sites participating in the restoration trust fund. These proposed amendments provide updates to the definitions, removes requirements and procedures for documenting existing contamination, removes requirements and procedures for certifying contractors. Additional changes include revising the regulation title, stylistic changes for internal consistency, clarification in wording, corrections of references, grammatical errors, outlining/codification, and such other changes necessary to improve the overall quality of the regulation.

Legal Authority: 1976 Code Section 44-56-410 et seq.

Plan for Implementation: Upon approval by the General Assembly and publication in the *State Register* as a final regulation, a copy of R.61-33, which includes these latest amendments, will be available electronically on the Department's Laws and Regulations website under the Land and Waste category at: http://www.scdhec.gov/Agency/RegulationsAndUpdates/LawsAndRegulations/. Subsequently, this regulation will be published in the South Carolina Code of Regulations. Printed copies will be available for a fee from the Department's Freedom of Information Office. The Department will also send an email to stakeholders, affected services and facilities, and other interested parties.

DETERMINATION OF NEED AND REASONABLENESS OF THE PROPOSED REGULATION BASED ON ALL FACTORS HEREIN AND EXPECTED BENEFITS:

Regulation 61-33 has not been substantively updated since 1997. Revisions of Article 4 of the South Carolina Hazardous Waste Management Act, 1976 Code Section 44-56-410 et seq., on May 21, 2013 removed certain requirements of drycleaning facility and site owners to participate in the Drycleaning Restoration Trust Fund. Therefore, many of the procedures, practices, and terms of Regulation 61-33 are outdated and/or no longer applicable. The amendments further clarify and improve the overall quality of the regulation.

DETERMINATION OF COSTS AND BENEFITS:

Implementation of these amendments will not require additional resources. There is no anticipated additional cost to the Department or state government due to any inherent requirements of these amendments. There are no anticipated additional costs to the regulated community. Amendments to R.61-33remove descriptions and instructions for actions that were required of the regulated community prior to the Act revisions but are now no longer required by Law.

UNCERTAINTIES OF ESTIMATES:

None.

EFFECT ON THE ENVIRONMENT AND PUBLIC HEALTH:

The amendments to R.61-33 seek to support the Department's goals relating to the protection of public health and the environment through increased oversight of environmental cleanup and improved stewardship of the Trust Fund. There is no anticipated effect on the environment.

DETRIMENTAL EFFECT ON THE ENVIRONMENT AND PUBLIC HEALTH IF THE REGULATION IS NOT IMPLEMENTED:

There is no anticipated detrimental effect on the environment. If the revision is not implemented, the regulation will be maintained in its current form without realizing the benefits of the amendments herein.

STATEMENT OF RATIONALE:

The Department proposes amending R.61-33, *Drycleaning facility Restoration* to better conform the regulation to the revised South Carolina Hazardous Waste Management Act, at 1976 S.C Code Section 44-56-410 et seq. The amendments update R.61-33 to remove descriptions and instructions of activities that are no longer required of the regulated community as a result of revisions to the Act. Additional changes include revising the regulation title, stylistic changes for internal consistency, clarification in wording, corrections of references, grammatical errors, outlining/codification, and such other changes necessary to improve the overall quality of the regulation.

ATTACHMENT B
SUMMARY OF PROPOSED AMENDMENTS
REGULATION 61-33, DRYCLEANING FACILITY RESTORATION

December 8, 2016

Section-by-Section Discussion of Proposed Amendments

The title of the Regulation is revised to reflect the title of the Act.

Citation of statutory authority for this regulation was modified under the title of the regulation and before the table of contents.

Throughout the regulation document, all defined terms have been capitalized.

Throughout the regulation document, the term "applicant" is replaced with "Responsible Applicant" to specify as the defined term for clarification.

TABLE OF CONTENTS
The table of contents was updated to reflect amended sections.

61-33.1.Purpose and Applicability
Section 33.1(A) - Revised to correctly name the Act. The criteria for determining eligibility is included in the Act. The Regulation is revised to remove the criteria as redundant.
Section 33.1(B)(1)(i) – The term "facility or site" is replaced with "Site" as defined.
Section 33.1(B)(2) – Revised to cite the Act in determining a "dry cleaner that has chosen not to participate" rather than a later section of the regulation.
Section 33.1(B)(3) – Revised to cite the Act regarding application of the regulation to a "dry cleaner owned by a government entity" delete rather than in a later section of the regulation.

61-33.2. Definitions
The definitions of 33.2(A) Acquired Subsidiary Business, 33.2(C) Analytical Data, 33.2(E) Certified Contractor, 33.2(F) Certified Laboratory, 33.2(G) Chain of Custody, 33.2(H) Commercial Property, 33.2(I) Contractor, 33.2(L) Discharge, 33.2(M) Dry Cleaner, 33.2(P) Drycleaning Waste, 33.2(Q) Due Diligence, 33.2(S) Environmental Sample, 33.2(T) Evidence of Contamination, 33.2(V) Exposed Individual, 33.2(Z) Non-Chlorinated Solvent, 33.2(AA) Operation, 33.2(CC) Probable Release Point, 33.2(FF) Reportable Quantity, and 33.2(GG) Wet Site are deleted because they are either no longer used in the regulation or are defined in the Act.

The definitions of 33.2(L) Ineligible, 33.2(M) New Drycleaning Facility, 33.2(N) Nonhalogenated Drycleaning Fluid, 33.2(Q) Release, and 33.2(S) Site are added.

The definitions of 33.2(B) Act, 33.2(J) Deductible, 33.2(E) Drycleaning Facility, 33.2(O) Drycleaning Solvents, 33.2(U) Existing Drycleaning Facility, 33.2(W) Former Wet Site, 33.2(Y) Gross Negligence, 33.2(O) Person, 33.2(P) Registrant, and 33.2(EE) Responsible Applicant are revised for clarification.

The remaining definitions are renumbered to adjust the codification.

61-33.4 [Reserved] Deleted as unnecessary.

Subpart A
The title of Subpart A is centered and italicize for stylistic change for internal consistency, and revised from “Assessments” to “Applications” to align with the removal of the requirement to document contamination before expenditure of Fund money from the Act.

61-33.5 [Reserved] Deleted as unnecessary.

61-33.6 General Provisions
Section 33.6 is revised in entirety to remove all activities for complying with the requirement to document contamination before expenditure of Fund money and to retain and clarify the process of applying for eligibility.

61-33.7 Due Diligence
Section 33.7 is revised to clarify the process, and specify the person responsible, for ensuring due diligence in the identification of all eligible Drycleaning Facilities.
Section 33.7(A)(1) is revised to remove the limit to commercial property only and to move the requirements for previously owned property to stand alone in Section 33.7(A)(2) which is revised as such.
Section 33.7(A)(2) is renumbered as Section 33.7(A)(3).
Section 33.7(C) is revised to include the requirement to submit an application for Former Drycleaning Facilities.

61-33.8 [Reserved] Deleted as unnecessary.

61-33.9 Documenting Evidence of Contamination
Section 33.9 is deleted in its entirety because this requirement was removed from the Act.

61-33.10 Initial Assessment Procedure
Section 33.10 is deleted in its entirety because this requirement was in partial fulfillment of Section 61-33.9.

61-33.11 [Reserved] Deleted as unnecessary.

66-33.12 Secondary Assessment Procedure
Section 33.12 is deleted in its entirety because this requirement was in partial fulfillment of Section 61-33.9.

66-33.13 Procedure for Obtaining Access to former Sites that the Applicant Does Not Own
Section 33.13 is deleted in its entirety because this requirement was in partial fulfillment of Section 61-33.9.

66-31.14 [Reserved] Deleted as unnecessary.

Subpart B Moratorium for Eligible Sites
The title of Subpart B is centered and italicize for stylistic change for internal consistency.

61-33.15 [Reserved] Deleted as unnecessary.

61-33.16 [Reserved] Deleted as unnecessary.

61-33.17 [Reserved] Deleted as unnecessary.

61-33.18 Moratorium for Eligible Sites
Section 33.18(A)(1) is revised to include all Sites rather than only Facilities.
Section 33.18(A)(2) is revised to include all solvent-containing waste rather than Drycleaning Solvents only.
Section 33.18(A)(3) is revised to match definitions.
Section 33.18(B) is deleted because the action is included in the Act and, therefore, is redundant.
Section 33.18(C) is deleted because the action is included in the Act and, therefore, is redundant.

Subpart C Financial Responsibility
The title of Subpart C is centered and italicize for stylistic change for internal consistency.

66-33.19[Reserved] Deleted as unnecessary.

61-33.20 General Provisions
Section 33.20(A) is revised to clarify eligibility is through application rather than assessment and that surcharge and fee payments shall be current in addition to payment of deductible.
Section 33(D) is revised to clarify that judicial or administrative actions may be taken against responsible parties rather than all parties.

61-33.21 Transfer of Ownership
Section 33.21(A) is revised to specify who is responsible for notifying the Department of a change of ownership.
Section 33.21(A)(1) is revised for grammatical correctness.
Section 33.21(A)(2) is revised to specify information to be submitted with a change of ownership.
Section 33.21(B) is revised to include all Sites rather than only Drycleaning Facilities.
Section 33.21(C) is deleted because this requirement was in partial fulfillment of Section 61-33.9.
Section 33.12(D) is revised to correct references.
Section 33.21(E) is revised to restate more clearly the requirement of financial responsibility of a new owner.

61-33.22 [Reserved] Deleted as unnecessary.

61-33.23 Excluded Costs.
Section 33.21(B)(2) is revised to remove actions regarding certified contractors because that was a requirement in partial fulfillment of Section 61-33.9.
Section 33.23(B)(4) is deleted because this requirement was in partial fulfillment of Section 61-33.9.
Section 33.23(B)(5) is deleted because this requirement was in partial fulfillment of Section 61-33.9.

61-33.24 Reimbursements from the Fund
Section 33.24 is deleted in its entirety because reimbursements from the fund were for activity taken under Section 61-33.9.

61-33.26 [Reserved] Deleted as unnecessary.

61.33.27 Costs Incurred for Emergency Actions
Section 33.27 is revised to indicate eligibility is through application rather than assessment and that cost recovery can be sought from any Person, as defined, rather than a dry cleaner.

61-33.28 [reserved] Deleted as unnecessary.

Subpart D Facility Prioritization
The title of Subpart D is centered and italicize for stylistic change for internal consistency.

61.33.29 [Reserved] Deleted as unnecessary.

61-33.30 General Provisions
Section 33.30(A) is revised for clarity.
Section 33.30(B)(1) is revised to update activity.
Section 33.30(C) is revised to include all Sites rather than Drycleaning Facilities.
Section 33.30(E) is revised for clarity.
Section 33.30(F) is revised to include all Sites rather than Drycleaning Facilities.

61-33.31 Immediate Removal Actions
Section 33.31(A) is revised to include all Sites rather than Drycleaning Facilities.
Section 33.31(A)(1) is revised for grammatical correctness.
Section 33.31(A)(3) is revised to conform with definitions.
Section 33.31(B) is revised to conform with definitions.
Section 33.31(B)(2) is revised to conform with definitions.

61-33.32 [Reserved] Deleted as unnecessary.

61-33.33 Emergency Sites
Section 33.33(B) is revised to include all Sites and to indicate that funds will be spent to reduce risk of exposure rather than requiring actual exposure.

61-33.34 Restoration Priority List
Section 33.34(A) is revised for clarification.
Section 33.34(A)(3) is revised for clarification.
Section 33.34(B) is deleted to allow the Department to budget fund expenditures throughout the year as needed.
Section 33-34(C)(1) is revised to agree with the deletion of Section 61.33.9.
Section 33.34(C)(3) is revised for grammatical correctness.

61-33.35 [Reserved] Deleted as unnecessary.

Subpart E Restoration
The title of Subpart E is centered and italicize for stylistic change for internal consistency.

61-33.36 [Reserved] Deleted as unnecessary.

61-33.37 General Provisions
Section 33.37(A) is revised to include all Sites and for grammatical correctness.
Section 33.37(B) is deleted because it is a superfluous statement repeating Statutory authority.
Section 33.37(C) is deleted because this use and certification of contractors was an activity in partial fulfillment of Section 61-33.9.

61-33.38 Detailed Facility Investigation
Section 33.38(A) is revised to include all Sites.
Section 33.38(C) is revised for clarification and correcting references.

61-33.39 Restoration Goals and Evaluation
Section 33.39(A)(2) is revised for grammatical correctness.
Section 33.39(C) is revised to include all Sites.
Section 33.39(D) is revised to include all Sites.

61-33.40 Restoration Implementation
Section 33.40(A) is revised for clarification and correcting references.
Section 33.40(B) is revised for correcting references.

61-33.41 [Reserved] Deleted as unnecessary.

Subpart F Contractor Certification
Subpart F (Sections 61-33.42 through 61-33.49) is deleted in its entirety because certification of contractors was an activity in partial fulfillment of Section 61-33.9.

Subpart G Violations, Penalties, and Appeals
Subpart G (Sections 61-33.50 through 61-33.53) is deleted in its entirety because appeal authority appears in statute.

ATTACHMENT C
TEXT OF PROPOSED AMENDMENTS
REGULATION 61-33, DRYCLEANING FACILITY RESTORATION

61-33. Drycleaning Facility Restoration Trust Fund.

(Statutory Authority: 1976 Code §§Section44-56-410, et seq. ~~44-56-405; 44-56-410; 44-56-420, 44-56-425; 44-56-430, 44-56-435; 44-56-440, 44-56-450, 44-56-460, 44-56-470, 44-56-480, 44-56-485, 44-56-490, and 44-56-495 and 1-23-10 et seq.~~)

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33.1. Purpose and Applicability.

(A)~~.~~ This regulation contains procedures to implement the Drycleaning Facility Restoration Trust Fund Act and establishes the criteria for determining ~~eligibility of and~~ priority for

rehabilitation of Drycleaning ~~f~~Facilities contaminated with Drycleaning ~~s~~Solvents using funds provided under this ~~a~~Act.

(B)~~.~~ Applicability:

(1)~~.~~ This regulation applies to dry cleaners, ~~p~~Persons and wholesalers that have registered with the Department of Revenue where:

(i)~~.~~ The owner or operator of a ~~facility or site~~ Site uses or has used Drycleaning ~~s~~Solvents for the purpose of cleaning clothing and other fabrics; or,

(ii)~~.~~ The ~~p~~Person owns, has dominion, has legal or rightful title, or has a ground lease interest in the real property where a Drycleaning Facility or ~~w~~Wholesale ~~s~~Supply ~~f~~Facility is or has been located; or,

(iii)~~.~~ The wholesaler stores or has stored Drycleaning ~~s~~Solvent for wholesale distribution to Drycleaning establishments.

(2)~~.~~ This regulation does not apply to any dry cleaner that has chosen not to participate in the Drycleaning Facility Restoration Trust Fund as specified in ~~Section 44-56-485~~the Drycleaning Facility Restoration Trust Fund Act.

(3)~~.~~ This regulation does not apply to any dry cleaner owned by a government entity as specified in ~~Section 44-56-440(H)~~the definition of Drycleaning Facility.

(4)~~.~~ This regulation does not apply to textile mills, linen supply, or uniform rental facilities unless operated as a commercial Drycleaning ~~f~~Facility prior to July 1, 1995 as specified in Section 44-56-410(3).

(5)~~.~~ This regulation does not apply to ~~r~~Releases that occur after November 18, 1980 that are the result of gross negligence.

33.2. Definitions.

For the purpose of these regulations, the following definitions will apply.

(A). ~~"Acquired Subsidiary Business" means any business, corporation, partnership or other entity for which the applicant has an ownership interest through either purchase, merger, family inheritance or other means of acquisition.~~

~~(B).~~ "Act" means Article 4 of the S.C. Hazardous Waste Management Act, Section 44-56-400 et seq. of the Code of Laws of 1976 as amended, known as the Drycleaning Facility Restoration Trust Fund.

~~(C). "Analytical Data" means quantitative data generated by a laboratory using approved or documented methods.~~

(~~D~~B)~~.~~ "Board" means the ~~South Carolina~~ Board of the South Carolina Department of Health and Environmental Control.

~~(E). "Certified Contractor" means a contractor meeting the requirements of Subpart F as capable of assessing drycleaning establishments that are eligible for reimbursement from the fund.~~

~~(F). "Certified Laboratory" means a laboratory certified in accordance with 25A SC Code Ann. R.61-81, Laboratory Certification.~~

~~(G). "Chain of Custody" means documentation of sample possession and other physical evidence such that they are traceable from the time they are obtained until analytical results are submitted to the Department.~~

~~(H). "Commercial Property" means any real property currently or formerly located in non-agricultural or non-residential areas, or any property where non-agricultural or non-residential businesses have operated.~~

~~(I). "Contractor" means an individual or environmental contracting company.~~

(~~J~~C)~~.~~ "Deductible" means the monies specified in ~~Section 44-56-440(E) of~~ the Act that the Responsible ~~a~~Applicant is responsible for paying.

(~~K~~D)~~.~~ "Department" means the Department of Health and Environmental Control, including personnel thereof authorized by the Board to act on behalf of the Department or Board.

~~(L). "Discharge" means the accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of drycleaning waste into or onto any land or water.~~

~~(M). "Dry Cleaner" means the owner or operator of a drycleaning facility.~~

(~~N~~E)~~.~~ "Drycleaning Facility" ~~means a commercial establishment located in this State that operates or has operated in whole or in part for the purpose of cleaning clothing and other fabrics utilizing a process which involves the use of drycleaning solvents. "Ddrycleaning Facility" includes laundry facilities that are using or have used drycleaning solvents as part of their cleaning process, but does not include textile mills or uniform rental and linen supply facilities.~~ means a professional commercial establishment located in this State for the purpose of cleaning clothing and other fabrics utilizing a process that involves the use of drycleaning solvent. In the case of a retail establishment, the establishment is one that operates or has at some time in the past operated in whole or in part for the purpose of cleaning clothing and other fabrics for members of the public, other drycleaning facilities, and dry drop-off facilities. In the case of a wholesale establishment, the establishment is one that operates or has at some time in the past operated in whole or in part for the purpose of cleaning clothing and other fabrics for other drycleaning facilities or dry drop-off facilities. "Drycleaning facility" includes laundry facilities that are using or have used drycleaning solvent as part of their cleaning process but does not include textile mills, uniform rental and linen supply facilities, or drycleaning facilities owned or operated by a local, state, or federal government.

(~~O~~F)~~.~~ "Drycleaning Solvents" ~~means nonaqueous solvents used in the cleaning of clothing and other fabrics and includes perchloroethylene (also known as tetrachloroethylene) and Stoddard solvent, and their breakdown products. "Ddrycleaning Solvents" includes only solvents originating from use at a drycleaning facility or by a wholesale supply facility.~~ means nonaqueous solvents used in the cleaning of clothing and other fabrics and includes halogenated drycleaning fluids and nonhalogenated drycleaning fluids, and their breakdown products. "Drycleaning Solvent" includes solvent that has been recycled for use at a drycleaning facility

and applies only to those solvents used at a drycleaning facility or handled by a wholesale supply facility.

~~(P). "drycleaning Waste" means waste which contains drycleaning solvent generated at a drycleaning facility.~~

~~(Q). "Due Diligence" means the process used to identify former wet sites as defined in 33.7.~~

(~~R~~G)~~.~~ "Emergency Site" means a site that is contaminated with Drycleaning ~~s~~Solvents at concentrations above an action level or the appropriate risk-based standard set by the Department:

(1~~.~~) in a public or private drinking water well; or,

(2~~.~~) at off-site areas with high potential for human exposure.

~~(S). "Environmental Sample" means any soil, water or groundwater collected outside of the boundaries of any building used as a drycleaning facility or for storage of drycleaning solvents and submitted for laboratory analysis. For purposes of this definition, the boundaries of the building are delineated by the outside surface of the external walls and the uppermost surface of any soil matrix underlying any structural flooring or foundation.~~

~~(T). "Evidence of Contamination" means analytical data that identifies any concentration of a drycleaning solvent in the soil, surface water, or groundwater that is attributable to the applicant's drycleaning facility.~~

(~~U~~H)~~.~~ "Existing Drycleaning Facility" means a Drycleaning ~~f~~Facility that ~~was in~~started operation ~~on October 1, 1995~~before November 24, 2004.

~~(V). "Exposed Individual" means any person subjected to concentrations of drycleaning solvents above health-based action levels as a result of releases to the environment. Exposed individuals do not include employees of the drycleaning facility where the exposure is the result of normal occupational contact with drycleaning solvents.~~

(~~W~~I)~~.~~ "Former ~~Wet Site~~Drycleaning Facility" means a~~ piece of property, including structures, that at one time was used as a drycleaning facility that used drycleaning solvents on the property and which has not been in operation as a wet site after September 30, 1995~~Drycleaning Facility that ceased to be operated as a Drycleaning Facility before July 1, 1995.

(~~X~~J)~~.~~ "Fund" means the Drycleaning Facility Restoration Trust Fund.

(~~Y~~K)~~.~~ "Gross Negligence" means any action where normal reasonable precautions, including but not limited to the requirements of ~~s~~Section 44-56-~~470(E), -470(F), and -470(G)~~480 of the Act, and including those in general widespread industrial practice, have been avoided, neglected, or deliberately omitted.

(L) "Ineligible" means a Drycleaning Facility or contaminated Site that has been permanently barred from receiving monies from the Fund and to which the moratorium does not apply pursuant to the Act.

(M) "New Drycleaning Facility" means a Drycleaning Facility that started operation on or after November 24, 2004.

(N) "Nonhalogenated Drycleaning Fluid" means any nonaqueous solvent used in a drycleaning facility that contains less than ten percent by volume of any halogenated drycleaning fluid. Nonhalogenated Drycleaning Fluid includes petroleum-based Drycleaning Solvents and their breakdown components.

~~(Z). "Non-Chlorinated Solvent" for purposes of this regulation means any drycleaning solvent composed of Stoddard, Varsol, Naphtha, or other Petroleum solvent, or their derivatives.~~

~~(AA). "Operation" means the cleaning of clothes and other fabrics by the use of drycleaning solvents.~~

(~~BB~~O)~~.~~ "Person" means ~~any individual, partnership, corporation, association, or other entity that is vested with ownership, dominion, or legal or rightful title to the real property or which has a ground lease interest in the real property on which a drycleaning or wholesale supply facility is or has ever been located.~~ an individual, partnership, corporation, association, trust, estate, receiver, company, limited liability company, or another entity or group.

~~(CC). "Probable Release Point" means any location on a drycleaning facility where drycleaning solvents may have been discharged to the environment. These may include, but are not limited to: floor sumps, floor drains, external vent locations, leaks from machine plumbing or overflow, spotting board locations, septic tanks and associated drain fields, publicly-owned sewer lines, and areas where drycleaning solvents or wastes have been temporarily or permanently stored.~~

(~~DD~~P)~~.~~ "Registrant" means a dry cleaner or ~~p~~Person who has registered with the Department of Revenue pursuant to ~~Section 44-56-470 of~~ the Act.

(Q) "Release" means the accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a Drycleaning Solvent.

(~~EE~~R). "Responsible Applicant" is ~~as~~ defined ~~in 33.6.(B).~~as follows:

(1) For an existing Drycleaning Facility, the current registrant identified to the Department of Revenue on the yearly registrations forms.

(2) For an existing Drycleaning Facility that ceases to operate as such, the most recent registrant identified to the Department of Revenue at the time the operation was discontinued.

(3) For a former Drycleaning Facility, the registrant which most recently owned or operated the Drycleaning Facility.

(4) For a Drycleaning Facility that was owned by one registrant and concurrently operated by a different registrant and both are eligible for the Fund, the registrant who operated the facility.

~~(FF). "Reportable Quantity" means the quantity of a product that if spilled the EPA will require that they be notified.~~

~~(GG). "Wet Site" see drycleaning facility.~~

(S) “Site” means the area where a Drycleaning Facility or Wholesale Supply Facility is or has been located and where drycleaning fluids have been deposited, stored, disposed of, or placed, or otherwise come to be located.

(~~HH~~T). “Wholesale Supply Facility” means a commercial establishment that supplies Drycleaning ~~s~~Solvents to Drycleaning ~~f~~Facilities.

33.3. Severability.

Should any section, paragraph, sentence, clause or phrase of this regulation be declared unconstitutional or invalid for any reason, the remainder of this regulation shall not be affected thereby.

~~33.4 [Reserved]~~

~~SUBPART A. Eligibility Assessments~~

SUBPART A
Eligibility Applications

~~33.5. [Reserved]~~

33.~~6~~4. General Provisions.

(A)~~.~~ In order for a Drycleaning ~~f~~Facility or Wholesale Supply Facility to be considered for ~~f~~Fund eligibility, the Responsible Applicant shall submit an application package on forms provided by the Department and consisting of:

(1)~~.~~ A signed ~~and notarized Dry Cleaning Restoration~~ application form ~~which can be obtained from:~~
~~DHEC - Bureau of Solid and Hazardous Waste~~
~~Att: Ddrycleaning Restoration Trust Fund Program~~
~~2600 Bull St.~~
~~Columbia, S.C. 29201~~;
(2)~~.~~ The findings of due diligence as defined in subsection 33.5 if this is the first application package completed by a registrant; and,

(3)~~. One of the following:~~

~~(i). Documentation of evidence of contamination obtained with either an initial assessment procedure or data existing prior to this regulation; or,~~

~~(ii). Documentation that an initial assessment procedure was conducted that did not prove evidence of contamination; or,~~

~~(iii). Documentation that the facility is a former wet site that the applicant does not own, occupy or otherwise have access to the property.~~A signed containment certification form. Forms can be obtained from the DHEC website or by mail from: DHEC – Bureau of Land and Waste Management, Attn.: Drycleaning Facility Restoration Trust Fund Program, 2600 Bull Street, Columbia, SC, 29201.

(B)~~.Multiple parties may have potential liability for a Drycleaning facility; however, the Department will recognize only one of these parties as the Responsible Applicant for the sole~~

purpose of facilitating implementation of this regulation;.recognition does not indicate any other liability. The Responsible Applicant shall be designated for a site as followsThe Responsible Applicant is responsible for compliance with these regulations.

(1). For an existing Ddrycleaning Facility, the current registrant identified to the Department of Revenue on the yearly registrations forms.

(2). For an existing Drycleaning Facility that ceases to operate as a wet site such, the most recent registrant identified to the Department of Revenue at the time the operation was discontinued.

(3). For a former wet site Drycleaning Facility, the registrant which most recently owned or operated the Ddrycleaning facility.

(4). For a Drycleaning Facility that was owned by one registrant and concurrently operated by a different registrant and both are eligible for the fFund, the registrant who operated the facility.

(C). The rResponsible aApplicant shall submit a separate application package for each Drycleaning fFacility where an eligibility determination is desired. Deadlines for submittal of an application package are: as specified in Section 44-56-470(D).

(1). For a Drycleaning facility that opened prior to July 1, 1995, not later than one year after the deductible reaches twenty-five thousand dollars.

(2). For a Drycleaning facility that the Department declares to be an emergency site or a candidate for an immediate removal as detailed in 33.31 and 33.33, not later than forty-five days after the Department's declaration. If the Department declares a Drycleaning Facility or Wholesale Supply Facility an emergency or an immediate removal site as detailed in subsections 33.14 and 33.13, the Responsible Applicant shall submit the application package for a determination of eligibility not later than forty-five days after the Department's declaration, if the package had not been submitted previously.

(3). For a former wet site with evidence of contamination, by the latter of October 1, 1997 or 180 days after the evidence is obtained.

(4). For a former wet site with no evidence of contamination, within one year of being identified to the Department by the Responsible Applicant.

(D). The Department will notify the rResponsible aApplicant within ninety days after receipt and review of an application package. This notification will include a statement that the application package is either complete or incomplete.

(1).IfThe submittal date of the application package is complete, or subsequently made complete, the date of its initial receiptshall be the date of its receipt by the Departmentshall determine the deductible level for the Drycleaning facility once the site is determined to be eligible for the fund.

(2). If the application package is incomplete, the rResponsible aApplicant shall be allowed up to forty-five days to supply the additional from the Department's request for further information. Failure to provide the information as requested shall render the application package as null and void. A new application package may be submitted at a later date for the Drycleaning facility; however, the deductible will be set at the level in effect at the time of re-submittal.

(E)~~.~~ Within one hundred and eighty days after initial receipt of a complete application package, the Department will notify the ~~r~~Responsible ~~a~~Applicant as to whether the ~~drycleaning facility~~Site is eligible or ineligible for the ~~f~~Fund. ~~Should any Drycleaning facility be determined to be ineligible for any reason, all other registrants shall be notified and allowed to submit an application package if they have potential liability for the Drycleaning facility in question.~~ Eligibility for the ~~f~~Fund is contingent on:

(1)~~.~~ The ~~r~~Responsible ~~a~~Applicant submitting an application by the deadlines specified in ~~33.6.(C)~~Section 44-56-470 (D); and,

(2)~~.~~ The ~~r~~Responsible ~~a~~Applicant meeting all criteria set forth in all ~~S~~sections~~44-56-440 and 44-56-470~~ of the Act~~; and,~~.

~~(3). The Responsible Applicant documenting evidence of contamination; however, a Drycleaning facility where evidence of contamination was not documented and an initial assessment was conducted shall be eligible, provided evidence of contamination is found at a later date and the conditions of 33.6.(E).(1) and 33.6.(E).(2) are met.~~

(F)~~.~~ The Department will prioritize all ~~Drycleaning facilities~~ Sites based upon Subpart D of this regulation for which an application package has been submitted. ~~Any facility where evidence of contamination was not documented will be prioritized as if contamination exists. Based on this prioritization, the Responsible Applicant may be required to do one of the following at the facility before fund eligibility can be determined:~~

~~(1). A secondary assessment procedure, if evidence of contamination was not documented and an initial assessment procedure was done.~~

~~(2). Obtain access as described in 33.13. if the Responsible Applicant does not have property rights to the location of a former wet site prior to submittal of the application package.~~

~~(G). Failure by the applicant to use a contractor as specified in 33.10.(B) or 33.12.(F).(2) will result in the application being rejected and the incurred cost will not count toward the applicant's deductible nor be reimbursable by the fund.~~

33.~~7~~5. Due Diligence.

(A)~~.~~ The Responsible ~~a~~Applicant shall exercise due diligence to identify any and all former ~~wet sites~~Drycleaning Facilities for which the Responsible ~~a~~Applicant was the owner, operator, ~~p~~Person or otherwise potentially financially liable. This identification shall extend backwards in time until either the existence of a ~~f~~Former ~~wet site~~Drycleaning Facility is discovered or the history of the property ~~strongly suggests~~reasonably indicates that it could not have been used ~~for~~as a Former Drycleaning ~~f~~Facility. This due diligence shall include~~, but is not limited to,~~ the following:

(1)~~.~~ A review of all ~~commercial~~ property currently or previously owned by the applicant to determine if a Former Drycleaning ~~f~~Facility operated on the property prior to, or concurrent with, the Responsible ~~a~~Applicant ownership of the property. ~~A review of any commercial property previously owned by any acquired subsidiary business to determine if a drycleaning facility operated on the property at any time prior to, or concurrent with, the applicant's ownership interest of the property.~~

(2)~~.A review of any business location currently or formerly operated by the applicant or the applicant's acquired subsidiary business on leased property to determine if a drycleaning facility~~

~~was ever operated by the applicant or his acquired subsidiary business.~~ A review of any property previously owned by any Responsible Applicant's acquired subsidiary business to determine if a Drycleaning Facility operated on the property at any time prior to, or concurrent with, the Responsible Applicant's ownership interest of the property; and,

(3) A review of any business location currently or formerly operated by the Responsible Applicant or the Responsible Applicant's acquired subsidiary business on leased property to determine if a Former Drycleaning Facility was at any time operated by the Responsible Applicant or his acquired subsidiary business.

(B)~~.~~ A narrative summary including supporting documentation of all property location reviews shall be submitted with the first eligibility ~~assessment~~ application.

(C)~~.~~ The Responsible ~~a~~Applicant shall have a continuing obligation to disclose the location of ~~f~~Former ~~wet sites~~Drycleaning Facilities for which ~~he or she is~~the applicant is liable. ~~An~~The Responsible Applicant shall submit application packagesin compliance with the Act and include an addendum to the narrative summary described in subsection33.~~7~~5(B)~~shall be submitted to the Department~~:

(1)~~.~~ Within ninety days of the Responsible ~~a~~Applicant ~~acquiring knowledge of~~discovering a ~~f~~Former ~~wet site~~Drycleaning Facility not previously identified in the narrative summary. This addendum shall include information on the newly-identified ~~f~~Former~~wet site~~ Drycleaning Facility and a detailed explanation of why the site was not discovered using due diligence. If the Department subsequently determines that the ~~f~~Former~~wet site~~ Drycleaning Facility should have been discovered using a reasonable application of due diligence, the ~~f~~Former ~~wet site~~Drycleaning Facility shall not be eligible for the ~~f~~Fund or the moratorium.

(2)~~.~~ Within one hundred and eighty days after the Responsible ~~a~~Applicant acquires new commercial property either through direct acquisition or through a new ownership interest in an acquired subsidiary business that included a Former Drycleaning Facility. Any properties not identified within one hundred and eighty days will not be eligible for the ~~f~~Fund.

(D)~~.~~ Any costs incurred by the Responsible ~~a~~Applicant to identify ~~f~~Former ~~wet site~~Drycleaning Facilities shall not be credited toward the Responsible ~~a~~Applicant deductible nor be eligible for reimbursement from the ~~f~~Fund.

~~33.8. [Reserved]~~

~~33.9. Documenting Evidence of Contamination.~~

~~(A). Evidence of contamination must be documented before any expenses can be credited toward the applicant's deductible or reimbursement from the fund. However, any allowable cost incurred by the applicant where contamination was not found may be accredited if evidence of contamination is subsequently documented at the same site.~~

~~(B). The applicant shall document evidence of contamination using the procedures detailed in 33.10. If previously collected data is available, the applicant may submit data using the procedures detailed in 33.9.(D) in place of 33.10.~~

~~(C). In order to document evidence of contamination the applicant shall provide:~~

~~(1). The location of samples relative to the features on the facilities;~~

~~(2). The rational for selection of sampling locations;~~

~~(3). The sampling methodology including, at a minimum, the depth interval and type of media sampled;~~

~~(4). The complete chain of custody record;~~

~~(5). Analytical data generated by a certified laboratory including the assigned S.C. laboratory identification number;~~

~~(6). Reasonable proof that the evidence of contamination is attributable to his Drycleaning facility.~~

~~(D). The Department shall accept data including analytical data collected prior to the effective date of this regulation if the data meets all criteria specified in 33.9.(C); however:~~

~~(1). If the analytical data has not been generated by a certified laboratory, the Department may accept the data as deemed appropriate on a case by case basis.~~

~~(2). The Department will not accept non-certified laboratory data for analysis performed after July 1, 1995.~~

~~(3). Any cost incurred before implementation of this regulation shall not be accredited toward the applicant's deductible nor be eligible for reimbursement from the fund.~~

~~33.10. Initial Assessment Procedure.~~

~~(A). The applicant shall have an initial assessment performed on the Drycleaning facility to document evidence of contamination as described in 33.9.~~

~~(B). The applicant shall choose a Class I or Class II certified contractor from the list provided by the Department. The applicant shall arrange for all payments to the certified contractor.~~

~~(C). All field activities performed during the initial assessment shall be documented in a facility inspection form to be provided by the Department.~~

~~(D). The procedure for an initial assessment at a Drycleaning facility shall be as follows:~~

~~(1). The locations of probable release points of Drycleaning solvents shall be determined.~~

~~(2). One environmental sample biased toward the detection of evidence of contamination from the Drycleaning facility shall be collected. The certified contractor shall evaluate the probable release points using best professional judgement to efficiently and economically select a sample location. A screening technique may be used to indicate the sampling location. Any screening technique other than photoionization or flame ionization detectors must be approved in writing by the Department.~~

~~(3). In the event that all probable release points are investigated and do not show any indication of Drycleaning solvents with the screening technique in use, one environmental sample shall be collected at the most economical release point.~~

~~(4). In the event that probable release points cannot be identified, best professional judgement shall be used to locate and collect one environmental sample.~~

~~(5). A field log of all sampling activities on the facility shall be maintained and submitted to the Department along with the facility inspection form.~~

~~(E). The applicant shall submit the facility inspection form, copies of receipts for allowable costs, the contractor statement specified in 33.47.(C), and analytical results generated from the initial assessment to the Department as part of the eligibility assessment application.~~

~~(F). The allowable costs for performing an initial assessment shall include:~~

~~(1). The actual and reasonable costs charged by the certified contractor to determine the probable release points.~~

~~(2). The actual and reasonable costs incurred to collect one environmental sample.~~

~~(3). Analysis by a certified laboratory for one sample using EPA SW 846 Method 8260 regardless of the type of solvent used at the facility, and EPA SW 846 Method 8270 on the same sample if there is any history of using non-chlorinated solvents or the type of solvent used at the facility is not known. The analytical methods shall be the most recently cited versions. The Department will consider both analyses as one environmental sample.~~

~~(4). The actual and reasonable costs charged by the certified contractor for completion of the facility inspection form and any supporting documentation such as field logbooks.~~

~~(5). The actual and reasonable costs charged by the certified contractor for any expendable supplies used during the initial assessment or for equipment costs necessary to complete the investigation, including the costs necessary to use one screening technique.~~

~~(6). The true costs of resealing any previously sealed floor surface if the integrity of the seal was compromised during the initial assessment. The allowable costs shall only be for repair of that portion of the floor that was compromised by the investigation.~~

~~(G). Non-allowable expenses incurred during the initial assessment shall remain the responsibility of the applicant. Non-allowable expenses include but are not limited to the following:~~

~~(1). The costs of collection of more than one environmental sample.~~

~~(2). Costs incurred to investigate additional probable release points of Drycleaning solvents where the screening technique or best professional judgement strongly suggests that a sample from a previously investigated location would prove evidence of contamination.~~

~~(3). Costs to investigate more probable release points of Drycleaning solvents than are reasonably known or suspected at the facility except as allowed by 33.10.(D).(4).~~

~~(4). Costs to collect or analyze any sample of groundwater or surface water.~~

~~(5). Costs incurred to collect any sample deeper than twenty feet below the land's surface unless prior written Department approval is obtained.~~

~~(6). Costs of drill rigs, hydraulic punches or other power equipment used for subsurface investigation that are mounted on any vehicle, including those on trailers.~~

~~(7). Costs associated with the use by the certified contractor of more than one screening technique.~~

~~(8). Costs to install any structure or device for collection of groundwater.~~

~~(9). Any costs charged by the certified contractor for development or preparation of any report or narrative document detailing the initial assessment other than the facility inspection form.~~

~~(10). Any additional costs of investigation where additional data is collected for any purpose other than an initial assessment.~~

~~33.11 [Reserved]~~

~~33.12. Secondary Assessment Procedure.~~

~~(A). The secondary assessment procedure applies only to those Drycleaning facilities where an initial assessment has been done and evidence of contamination was not documented.~~

~~(B). The Department will prioritize all facilities as if evidence of contamination was found and will notify the applicant that a secondary assessment is required if the Drycleaning facility is determined to be a priority and is projected to receive funds as specified in 33.34.(B).~~

~~(C). The applicant shall respond to the Department, in writing, within thirty days of receipt of notification as to whether the applicant will proceed with a secondary assessment.~~

~~(D). In the event that the applicant wishes to proceed with a secondary assessment prior to the site being given a high priority, the procedure shall be as described in 33.12.(F); however, any costs incurred by the applicant shall be subject to 33.24.(C).~~

~~(E). If the applicant chooses not to proceed with a secondary assessment and evidence of contamination is subsequently detected, the Drycleaning facility shall not be eligible to receive fund money nor shall the Department's moratorium apply to enforcement actions.~~

~~(F). If the applicant chooses to proceed with the secondary assessment, the procedure shall be as follows:~~

~~(1). The applicant shall remit with the response in 33.12.(B), one hundred dollars to the Drycleaning Restoration Trust Fund to pay for the Department's review. In the event that evidence of contamination is discovered during the secondary assessment, the one hundred dollars will be considered an allowable cost.~~

~~(2). The applicant shall choose a Class I certified contractor from the list provided by the Department and shall arrange for all payments to the certified contractor within forty-five days of 33.12.(B). One copy of the contract, including cost estimates, shall be provided to the Department within fifteen days of being signed by all parties.~~

~~(3). The certified contractor shall review the initial eligibility assessment and determine probable release points of dry cleaning solvents. A work plan shall be developed by the certified~~

~~contractor that will most likely detect evidence of contamination in one environmental sample based on the certified contractor's best professional judgement.~~

~~(4). The work plan shall include but not be limited to the certified contractor's rationale for sample locations, estimated costs, and anticipated work schedule. If groundwater monitoring wells are proposed, the work plan shall meet the reporting requirements of the South Carolina Well Standards and Regulations (R61-71.E.11).~~

~~(5). The applicant shall submit two copies of the work plan to the Department.~~

~~(6). The Department will review the work plan within fifteen working days and notify the applicant of any required changes. Two copies of any changes shall be submitted in writing within ten days.~~

~~(7). Once the work plan is deemed acceptable, the Department will issue a notice to proceed to the applicant.~~

~~(8). Analytical results from the secondary assessment shall be forwarded to the Department within ten days of the certified contractor receiving the results from the analytical laboratory.~~

~~(9). The applicant shall include the certified contractor statement specified in 33.47.(C).~~

~~(G). If evidence of contamination is documented during the secondary assessment, the approved costs incurred by the applicant shall be accredited toward the applicant's deductible. Any amount exceeding the applicant's deductible shall be reimbursed to the applicant from the fund. The approved cost for the secondary assessment shall include:~~

~~(1). Fees paid by the applicant for the Department's review of the work plan.~~

~~(2). Costs of implementing the sampling plan as approved by the Department.~~

~~(3). Expenses incurred for the certified contractor's review of the initial eligibility assessment and development of the work plan.~~

~~(4). Other actual and reasonable costs incurred by the applicant in contracting for the secondary assessment except as specified in 33.23.~~

~~(H). If evidence of contamination is not documented with the secondary assessment, any costs incurred by the applicant shall not be accredited toward the applicant's deductible nor be eligible for reimbursement from the fund. Copies of all receipts shall be forwarded to the Department within fifteen days of payment. If evidence of contamination is subsequently detected, and the Department determines that the contamination was present at the time of the secondary assessment but not detected, the approved costs shall be accredited to the applicant's deductible or reimbursed from the fund as in 33.12.(G).~~

~~33.13. Procedure for Obtaining Access to Former Sites that the Applicant Does Not Own.~~

~~(A). The Department will notify the Responsible Applicant that an initial assessment is required if the Drycleaning facility is projected to receive funds as specified in 33.34.(B).~~

~~(B). The Responsible Applicant shall respond to the Department within forty-five days of receipt of notification as to whether the applicant will proceed with assessment of the site. If the decision is to proceed, the applicant shall provide:~~

~~(1). A signed statement from the property owner that the applicant has permission to access the property; or,~~

~~(2). Documentation that the property owner has been contacted and is unwilling to allow access; or,~~

~~(3). Documentation that the applicant is negotiating with the property owner and needs an additional forty-five days to provide the documentation in either 33.13.(B).(1) or 33.13.(B).(2) to the Department.~~

~~(C). Failure by the applicant to respond as specified in 33.13 or indicating his or her unwillingness to proceed with assessing the Drycleaning facility shall constitute an election to remove the Drycleaning facility from any eligibility for the fund and the Department's moratorium.~~

~~(D). The Department will attempt to obtain permission for the applicant to access the site where the applicant wants to proceed and has been denied access by the property owner.~~

~~(E). If the applicant is allowed permission to access the property, he or she shall:~~

~~(1). Not later than thirty days after the submittal of 33.13.(B).(1)., conduct an initial assessment procedure as described in 33.10.~~
~~(2). Within fifteen days of receipt of the results from the analytical laboratory, submit the items listed in the initial assessment procedure to the Department.~~

~~(3). If evidence of contamination is not found in the initial assessment, within fifteen days of submittal of the results called for in 33.13.(E).(2)., initiate a secondary assessment procedure as detailed in 33.12.~~

~~(F). If access to the property is only granted to the Department, the applicant will be notified and:~~

~~(1). Within fifteen days of notification by the Department, the applicant shall remit two hundred dollars to the Drycleaning Restoration Trust Fund. This will pay for the Department's field oversight of an initial assessment in the event that evidence of contamination is not documented.~~

~~(2). Within thirty days of notification by the Department, the applicant shall choose a certified contractor from the list provided by the Department and inform the certified contractor that the Department will be acting as his or her representative with regard to field activities. The applicant shall arrange for all payments to the certified contractor.~~

~~(3). The Department will oversee the initial assessment field activities in accordance with the procedures in 33.10.~~

~~(4). Within fifteen days of receipt of data from the analytical laboratory, the applicant shall submit the results of the initial assessment to the Department.~~

~~(5). Where evidence of contamination is not found in the initial assessment, a secondary assessment procedure shall be done as detailed in 33.12, except:~~

~~(i). Within fifteen days of receipt of data from the analytical laboratory required in 33.13.(F).(4)., the applicant shall remit three hundred dollars to the Drycleaning Restoration Trust Fund. This will pay for the Department's review and field oversight of a secondary assessment in the event that evidence of contamination is not documented.~~

~~(ii). The Department will oversee the secondary assessment field activities in accordance with the procedures in 33.12.~~

~~(G). Where access has been denied to both the applicant and the Department and contamination is detected, the Drycleaning facility shall be considered for fund eligibility if the Department determines that the contamination was present when access was denied. The applicant will be required to perform an assessment as described in 33.13.(E) or 33.13.(F) as applicable.~~

~~(H). All costs paid for the Department's field oversight and review required under 33.13.(E) or 33.13.(F) along with allowable costs as described in other sections of this regulation, shall count toward the applicant's deductible when evidence of contamination is found.~~

~~33.14. [Reserved]~~

~~SUBPART B. Moratorium for Eligible Sites~~.

SUBPART B
Moratorium for Eligible Sites

~~33.15. [Reserved]~~

~~33.16. [Reserved]~~

~~33.17. [Reserved]~~

33.~~18~~6. Moratorium for Eligible Sites.

~~(A).~~ In order to qualify for the moratorium on judicial or administrative actions by the Department:

(~~1~~A)~~.~~ The ~~Drycleaning facility~~Site must be determined by the Department to be eligible for the ~~f~~Fund under Subpart A.

(~~2~~B)~~.~~ The dry cleaner or ~~p~~Person shall comply with the Act and all regulations promulgated by the Department for the proper control, management, or disposal of Drycleaning ~~s~~Solvents and wastes containing Drycleaning Solvents, including any regulations to restrict ~~r~~Releases to the atmosphere.

(~~3~~C)~~.~~ The ~~discharges~~Releases of Drycleaning ~~s~~Solvent ~~cannot~~must notbe the result of gross negligence after November 18, 1980.

~~(B). The Board may suspend or modify the moratorium for any or all Drycleaning facilities upon review.~~

~~(C). If the Department determines that a Drycleaning facility is grossly negligent under this regulation, the moratorium shall no longer apply to that facility.~~

~~SUBPART C. Financial Responsibility.~~

SUBPART C

Financial Responsibility

~~33.19. [Reserved]~~

33.~~20~~7. General Provisions.

(A)~~.~~ The ~~r~~Responsible ~~a~~Applicant shall submit the application for eligibility ~~assessment~~ and pay any deductibles as set forth in subsection33.~~25~~10 and shall be current with payment of all surcharges and fees.

(B)~~.~~ The Department will only negotiate with the ~~r~~Responsible ~~a~~Applicant or his/her designee.

(C)~~.~~ Nothing in this subsection shall preclude the ~~r~~Responsible ~~a~~Applicant from entering into contractual arrangements with any other owners/operators or ~~p~~Persons to obtain ~~their~~a share, if any, of the cost of the assessments or the deductibles from the ~~f~~Fund.

(D)~~.~~ Designation of the ~~r~~Responsible ~~a~~Applicant shall not preclude the Department from seeking judicial or administrative actions against any and all responsible parties in the event that the ~~Drycleaning facility~~Site is no longer eligible for the ~~f~~Fund or the moratorium.

33.~~21~~8. Transfer of Ownership.

(A)~~.~~ The ~~Department~~sellershall ~~be notified~~notify the Department within fifteen days after ownership of any ~~existing~~ Drycleaning~~f~~Facility is conveyed to a different ~~dry cleaner~~Person or after the responsibilities under this regulation for any ~~f~~Former ~~wet site is~~Drycleaning Facility are conveyed to a ~~new~~different~~p~~Person.

(1)~~.~~The seller shall submit ~~T~~this notification ~~shall be~~ in writing ~~by the seller of the Drycleaning facility and shall be notarized~~.

(2)~~.~~ This notification shall include the identity of the purchaser along with ~~sufficient information to allow the Department to contact the purchaser by phone and in writing~~ a mailing address and telephone number.

(B)~~.~~ Once a ~~Drycleaning facility~~Site is determined to be eligible for the ~~f~~Fund, subsequent conveyance of the ownership of the Drycleaning ~~f~~Facility shall not restrict the eligibility of the ~~facility~~Site for the ~~f~~Fund or the moratorium.

~~(C). The new owner of the Drycleaning facility shall assume all responsibility for performing any additional assessment required by the Department.~~

(~~D~~C)~~.~~ The new owner of the Drycleaning ~~f~~Facility shall be financially responsible for any remaining portion of the previous owner's deductible as specified in subsection 33.~~25~~10.

(~~E~~D)~~.If an eligible Drycleaning facility is in operation and ownership is conveyed to a person that is not currently certified as required by Section 44-56-470 (D) of the Act, the previous owner/operator shall retain all responsibility to the Drycleaning Restoration Trust Fund for the~~

~~facility until the new owner/operator obtains the appropriate certification~~ The new owner of the Drycleaning Facility shall be financially responsible for all surcharges and fees.

(~~F~~E)~~.~~ Once a Drycleaning ~~f~~Facility or Wholesale Supply Facility has been determined by the Department to be ineligible for the ~~f~~Fund, that facility shall not become eligible for the ~~f~~Fund even if ownership is transferred to ~~another~~a different~~p~~ Person.

~~33.22. [Reserved]~~

33.~~23~~9. Excluded Costs.

(A)~~.~~ Excluded costs incurred by the Responsible ~~a~~Applicant shall not be accredited towards the Responsible ~~a~~Applicant deductible or be considered for reimbursement from the ~~f~~Fund.

(B)~~.~~ Excluded costs include but are not limited to:

(1)~~.~~ Compensation for any time expended by the Responsible ~~a~~Applicant or his employees to conduct due diligence, locate potential ~~r~~Release points of Drycleaning ~~s~~Solvents, or complete any required information or application forms.

(2)~~.~~ Fees paid to attorneys, accountants, or other auxiliary ~~legal~~ personnel which may be incurred as a result of ~~contracting with a certified contractor or~~ negotiating with the Department.

(3)~~.~~ Any real or perceived loss of revenue resulting from any activities performed under these regulations.

~~(4). Non-allowable costs as specified in 33.10.(G).~~

~~(5). Any payment for work where a certified contractor has not provided a signed statement under 33.47.(C).~~

~~33.24. Reimbursements from the Fund.~~

~~(A). Allowable expenditures exceeding the applicant's deductible will be reimbursed to the applicant as funds are available after the site is determined to be eligible.~~

~~(B). Reimbursement from the fund shall only be for actual incurred costs covered by this regulation and shall not include interest.~~

~~(C). If a secondary assessment is voluntarily performed by the applicant prior to being requested by the Department, reimbursement will be made to the applicant only at such time as the site is determined by the Department to be a high priority site.~~

33.~~25~~10. Remitting Payments to the Fund.

(A)~~.~~ After the Department spends Fund money on ~~the facility~~ a site, the Responsible ~~a~~Applicant shall pay into the Fund any unspent balance of his/her deductible up to the amount spent by the Department.

(B)~~.~~ The Responsible ~~a~~Applicant shall remit the full balance of the expended funds or shall enter into a payment plan with the Department within thirty days after notification by the Department that the funds have been used.

—(~~1~~C)~~.~~ If the Responsible ~~a~~Applicant chooses to enter into a payment plan,the Responsible Applicant shall make~~equal~~ payments to the ~~f~~Fund ~~shall be made~~ on a quarterly basis.

(~~2~~1)~~.~~ No interest shall be assessed for any outstanding balance paid in full within one year after notification by the Department.

(~~3~~2)~~.~~ For payments extending beyond one year, interest shall be collected as a fixed-rate, simple interest on the remaining balance spent by the Department.

(~~4~~3)~~.~~ The Department will set the annual interest rate at one and one-half times greater than the Federal Prime Interest rate in effect on the first day of July of that year. All payment plans entered into during the fiscal year July ~~first~~1 through June ~~thirtieth~~30 shall ~~have~~be set at that rate.

~~33.26. [Reserved]~~

33.~~27~~11. Costs Incurred for Emergency Actions.

If the Department uses ~~f~~Fund money on an emergency site pursuant to subsection 33.~~33~~14.(B) and an eligibility ~~assessment~~application is not submitted as specified in subsection 33.~~6.(C).(2)~~4, the Department shall recover to the fund the total amount expended, plus interest, from any ~~dry cleaner orp~~Person responsible to the ~~f~~Fund for the contamination.

~~33.28. [Reserved]~~

~~SUBPART D. Facility Prioritization.~~

SUBPART D
Facility Prioritization

~~33.29. [Reserved]~~

33.~~30~~12. General Provisions.

(A)~~.~~ All sites will be prioritized after an application package has been received using the ~~scoring~~prioritization system described in subsection 33.~~34~~15 to determine the appropriate order by which ~~f~~Fund monies will be expended for the most efficient reduction of risk.

(B)~~.~~ Publication of the prioritization list.

(1)~~.~~ The prioritization list will be ~~initially~~ published ~~on July 1, 1998 and~~ on an annual basis thereafter on the Department's web site.

(2)~~.~~ This list ~~can and~~ will be revised as sites are re-scored or added to the list.

(C)~~.~~ The Department will determine whether a ~~Drycleaning facility~~Site is an ~~e~~Emergency ~~s~~Site or a candidate for an immediate removal action based on information obtained from any source.

(D)~~.~~ The Department may expend ~~f~~Fund monies to reduce the threat to human health for an ~~e~~Emergency ~~s~~Site before an eligibility assessment has been submitted.

(E)~~.~~ Once the concerns of the ~~e~~Emergency ~~s~~Site or the immediate removal site have been addressed, additional restoration will proceed at the ~~facility~~ Site based on its priority determined through use of the ~~scoring~~prioritization system.

(F)~~.~~ The Department may ~~rescore or~~ reprioritize a ~~Drycleaning facility~~Site at any time to reflect new information gained on the ~~facility~~Site.

33.~~31~~13. Immediate Removal Actions.

(A)~~.~~ The Department may require an immediate removal action at a ~~Drycleaning facility~~Site if the Department determines that:

(1)~~.Drycleaning waste is present at the facility in such a manner that the waste contains a significant~~Waste containing a substantial concentration of Drycleaning ~~s~~Solvent that has not entered into the environment is present at the Site; and,

(2)~~.~~ Early removal of the waste will effectively reduce the long-term cost of restoring the ~~facility~~Site; and,

(3)~~.~~ The waste can easily be removed from the ~~facility~~Site through conventional methods of segregation, excavation, and/or pumping from containers.

(B)~~.~~ The ~~dry cleaner~~Responsible Applicantshall remove the waste from the ~~facility~~Site within 45 days after notification by the Department.

(1)~~.~~ The removed waste must be managed in accordance with the South Carolina Hazardous Waste Management Regulations, R.61-79 as amended.

(2)~~.~~ Any costs incurred by the ~~dry cleaner~~Responsible Applicant for removal of the waste shall not be accredited towards his/her deductible or reimbursed from the ~~f~~Fund.

(3)~~.~~ Failure to remove the waste properly after due notice shall constitute gross negligence under this regulation.

(C)~~.~~ Immediate removal actions will not include any extraction techniques to reduce the contaminant concentrations in soil or water.

~~33.32. [Reserved]~~

33.~~33~~14. Emergency Sites.

(A)~~.~~ The Department will declare a ~~Drycleaning facility~~Site to be an ~~e~~Emergency ~~s~~Site if:

(1)~~.~~ Any currently used drinking water is contaminated with Drycleaning ~~s~~Solvents or their breakdown products at concentrations greater than the appropriate risk based criteria and/or established standards; or,

(2)~~.~~Drycleaning ~~s~~Solvents, or their breakdown products, are found in ~~off-site~~ surface soils at concentrations greater than the appropriate risk based criteria and/or established standards for short term exposure and the Department has determined that the potential for human contact is likely.

(B)~~.~~ If the Department declares a ~~Drycleaning facility~~ Site to be an ~~e~~Emergency ~~s~~Site, money from the ~~f~~Fund will be allocated for the Department to reduce the risk of human exposure.~~ (1).~~ Preference will be given to an action that provides long-term permanent protection without continual maintenance; however, nothing in this section shall preclude the Department from employing temporary measures or technologies to reduce the risk of exposure ~~at the human receptor~~ as deemed appropriate. The Department will notify all exposed individuals and may select the appropriate remedy after consultation with the exposed individuals.

33.~~34~~15. Restoration Priority List.

(A)~~.~~ The ~~scoring~~prioritization system to be used when ranking sites for remedial action under this regulation will consider the following:

(1)~~.~~ Age and number of years of operation;

(2)~~.~~ Types of Drycleaning ~~s~~Solvent used;

(3)~~.~~ Location in relation to affected or potentially affected ~~population and resources~~receptors; and,

(4)~~.~~ The likelihood of contamination migrating to the population or resources.

~~(B). The Department will budget funds during the upcoming year for as many sites as the fund will allow. These sites will be chosen based upon their position on the prioritization list.~~

(~~C~~B)~~.~~ Sites can be removed from the prioritization list for the following reasons:

(1)~~.The secondary~~An assessment by the Department shows no evidence of contamination~~,~~;

(2)~~.~~ Restoration of the site is completed; or,

(3)~~.Loss of site eligibility~~The Site is deemed ineligible.

~~33.35. [Reserved]~~

~~SUBPART E. Restoration.~~

SUBPART E
Restoration

~~33.36. [Reserved]~~

33.~~37~~16. General Provisions.

~~(A).~~ The goal of the restoration phase will be to alleviate any known existing exposure pathway where the clean-up goals are exceeded. The clean-up goals for each ~~Drycleaning facility~~Site will be determined on a site specific basis and will be based on the appropriate risk based criteria and/or ~~established~~ standards established by the Department.

~~(B). Activities under this part will be performed by the Only the Department or private firms under contract with the Department in accordance with the S.C. Procurement Code, S.C. Code Section 11-35-10 et seq., shall perform activities under this part.~~

~~(C). Contractors used for restoration shall be certified as Class I and will be selected in accordance with the S.C. procurement code.~~

33.~~38~~17. Detailed Facility Investigation.

(A)~~.~~ The purpose of the detailed facility investigation is to collect data to determine the nature and extent of contamination at a ~~Drycleaning facility~~Site and to support evaluation and selection of restoration alternatives. The detailed facility investigation can include, but may not be limited to, the following:

(1)~~.~~ Physical characteristics of the site, including important surface and subsurface features, soil types, and hydrogeology.

(2)~~.~~ The general characteristics of the Drycleaning ~~s~~Solvent waste in the source areas, including quantity, physical state, concentration, and potential mobility.

(3)~~.~~ Actual and potential exposure pathways including inhalation, ingestion, and dermal adsorption.

(B)~~.~~ A detailed facility investigation work plan will be developed. The work plan will describe the number, type, and location of samples to be collected and the type of analysis to be performed.

(C)~~.~~ A detailed facility investigation report shall be developed after the completion of the field work. The report will summarize the information and data collected ~~on the Drycleaning facility~~ during the investigation. In addition, the report will evaluate potential treatment alternatives that will meet the restoration objectives of subsection33.~~39~~18.

33.~~39~~18. Restoration Goals and Evaluation.

(A)~~.~~ The Department will evaluate the restoration alternatives presented in the approved detailed facility investigation report. The selection criteria shall consider:

(1)~~.~~ The effectiveness of the technology to eliminate or reduce the existing and potential risks, hazards, and concerns of Drycleaning ~~s~~Solvents both during implementation and following completion of the selected restoration;

(2)~~.~~ The ~~implementability~~ability to implement a remedy as it relates to the degree of difficulty associated with construction and management of the remedy, including the technical, administrative, and logistic problems that affect the resources necessary to complete the restoration.

(3)~~.~~ Compliance with Federal and State environmental laws; and,

(4)~~.~~ The capital cost, both direct and indirect, and the annual management and maintenance costs;

(B)~~.~~ The Department will publish a notice of availability and a brief explanation of the proposed restoration alternatives in a major local newspaper of general circulation. The Department will present the findings of the detailed facility investigation and the proposed plan in a public meeting and will accept written comments for a period of not less than thirty calendar days after the meeting.

(C)~~.~~ The Department will review the public comments to determine if the proposed restoration alternative remains the most appropriate alternative for the ~~Drycleaning facility~~Site.

(D)~~.~~ The Department will document the evaluation process, including response to public comments, and the selected restoration alternative, in the administrative record for the ~~Drycleaning facility~~ Site.

33.~~40~~19. Restoration Implementation.

(A)~~.~~ The Department will review and approve a restoration design report developed by the selected ~~certified~~ contractor, which will include the actual design and provisions for the implementation of the selected restoration as documented in subsection 33.~~39~~18.(D).

(B)~~.~~ The Department will review the restoration on a periodic basis to ensure that the goals are met to eliminate or reduce the existing and potential risks, hazards, and concerns of Drycleaning ~~s~~Solvents in the environment. In the event that the technology does not achieve the stated goals, the Department will select another remedy after public participation as detailed in subsection33.~~39~~18.

~~33.41. [Reserved]~~

~~SUBPART F. Contractor Certification.~~

~~33.42. [Reserved]~~

~~33.43. Applicability.~~

~~This section applies to contractors or subcontractors who directly or indirectly participate in initial assessment, secondary assessment or remediation pursuant to the Act.~~

~~33.44. Minimum Standards.~~

~~(A). Contractors who perform on-site work as a primary contractor under the Act must be certified under this regulation. The Department will certify those contractors that demonstrate sufficient experience and knowledge in performing site rehabilitation and investigation activities related to releases of Drycleaning solvents or similar substances. Contractors must maintain certification to perform rehabilitation and investigation actions. Contractors providing off-site support services (e.g., analytical laboratories) are not required to be certified under this regulation. The primary contractor maintains responsibility for the quality of work performed by individuals or companies sub-contracted to them.~~

~~(B). Contractors shall be certified in one or both of the following classes before performing any work under the Act:~~

~~(1). Class I. Contractors performing work involving the collection and interpretation of investigative data; the evaluation of risk; and/or the design and implementation of corrective action plans.~~

~~(2). Class II. Contractors performing work involving routine investigative activities where said activities do not require interpretation of the data and are performed in accordance with established regulatory or industry standards.~~

~~(C). A contractor who applies for certification shall be certified upon satisfaction of the requirements in 33.44.(B).(1) or 33.44.(B).(2), as appropriate. For a company to become certified, a full-time permanent employee of that company must satisfy the requirements in 33.44.(B).(1) or 33.44.(B).(2), as appropriate.~~

~~(1). Applicants for a Class I certification must satisfy the following:~~

~~(i). Registration as a Professional Engineer or Geologist in South Carolina including three years' applicable experience in performing site rehabilitation activities related to releases of Drycleaning solvents or similar substances.~~

~~(ii). Any necessary South Carolina certification and/or license.~~

~~(2). Applicants for a Class II certification must satisfy the following:~~

~~(i). A minimum of three years' applicable experience in performing site investigation activities related to releases of Drycleaning solvents or similar substances; and,~~

~~(ii). Any necessary South Carolina certification and/or license.~~

~~(3). Applicants for either class shall maintain liability insurance coverage of the types and in the amounts described below and shall provide certification to the Department of such coverage upon meeting the requirements of 33.44.(B).(1) and/or 33.44.(B).(2) and yearly thereafter:~~

~~(i). General Liability of five hundred thousand dollars per occurrence and one million dollars' aggregate;~~

~~(ii). Professional Liability of five hundred thousand dollars per occurrence and one million dollars aggregate; and,~~

~~(iii). Pollution/Property Damage of three hundred thousand dollars.~~

~~(4). The contractor shall be required to indemnify the property owner, Drycleaning facility owner/operator and the State of South Carolina from and against all claims, damages, losses and expenses arising out of or resulting from activity conducted by the contractor, its agents, employees or subcontractors.~~

~~33.45. [Reserved]~~

~~33.46. Contractor List Availability.~~

~~(A). The Department will maintain a list of contractors showing the names and places of business of all certified contractors. Copies of this roster shall be provided within forty-five days of the promulgation of this regulation, and annually thereafter, to all registered dry cleaners and to the public upon request.~~

~~(B). The Department will notify all registered dry cleaners of any deletions from the list.~~

~~(C). Each certified contractor shall notify the Department within thirty (30) days of any changes of address or telephone number.~~

~~(D). Each certified contractor shall notify the Department within thirty (30) days of any changes that may affect qualification pursuant to 33.44.(C).~~

~~(E). Within thirty (30) days of receipt of information that may affect certification, the Department shall evaluate the current qualifications of the contractor and make a determination as to certification per the requirements of this regulation.~~

~~33.47. Certification.~~

~~(A). Certification of a contractor shall in no way establish liability or responsibility on the part of the Department or the State of South Carolina in regards to the services provided by the contractor or circumstances which may occur as a result of such services.~~

~~(B). Contractors shall be re-certified every two years.~~

~~(C). For each site, a certified contractor shall sign a statement certifying that he/she meets the requirements of 33.44 during the time work is performed at the site and provide a copy of the statement to the dry cleaner.~~

~~33.48. Loss of Certification.~~

~~(A). A contractor will lose certification for conducting activities if he does not meet 33.44.~~

~~(B). Any monies due or collected for work conducted while not meeting 33.44 will be forfeited to the fund within 30 days of being notified by the Department.~~

~~(C). The Department will make available to the applicant any funds he/she paid to a contractor who has lost certification if payment occurred before the Department's notification pursuant to 33.46.(B).~~

~~(D). The Department may decertify a contractor performing or seeking to perform site assessment or rehabilitation in South Carolina when:~~

~~(1). The contractor fails to maintain qualification pursuant to 33.44.(C);~~

~~(2). The contractor has had administrative or civil enforcement action taken against him within the last three years by the Department;~~

~~(3). The contractor has demonstrated repeated noncompliance with financial criteria established by the Department, to include, but not be limited to:~~

~~(i). Submitting bills to the Department that are inconsistent with regulations, established criteria and/or general accounting principles;~~

~~(ii). Submitting duplicate or fraudulent bills to the Department;~~

~~(iii). Submitting bills to the Department for work not yet performed or equipment and materials not yet delivered or received; and,~~

~~(iv). Failure to pay cost recovery requests from the Department (including disallowed costs and overpayment), provided the debt is uncontested by the debtor or if contested provided that the debtor's legal and administrative remedies have been exhausted.~~

~~(4). Where a person has demonstrated repeated inability to perform site assessment or rehabilitation in accordance with performance standards and criteria developed by the Department and accepted industry standards to include, but not be limited to:~~

~~(i). Deliberate failure to perform according to the specifications or within the schedule approved by the Department;~~

~~(ii). A record of failure to perform or of unsatisfactory performance according to the terms of one or more site assessment or rehabilitation work plans; provided that failure to perform or unsatisfactory performance caused by acts beyond the control of the person shall not be considered a basis for decertification;~~

~~(5). Any other cause that the Department determines to be so serious and compelling as to affect the ability of a contractor or subcontractor to perform site assessment or rehabilitation activities in a satisfactory manner, including decertification or similar action by another governmental entity.~~

~~(E). Information of a cause for decertification from any source shall be promptly reported to the Department by dry cleaners, persons, or other contractors. The Department will promptly investigate, and may issue a notice of proposed decertification.~~

~~(F). A decertification notice shall be issued to the contractor advising;~~

~~(1). That decertification is being considered;~~

~~(2). Of the reasons for the proposed decertification in terms sufficient to put the respondent on notice of the conduct or activity upon which it is based;~~

~~(3). Of the potential effect of decertification.~~

~~(G). Within fifteen (15) days after receipt of the notice of proposed decertification, the contractor may submit in writing information and argument in opposition to the proposed decertification and notify the Department if a conference is desired. If such request is made, the contractor shall be afforded an opportunity to appear with a representative, and submit documentary evidence and other appropriate information.~~

~~(H). Notice of Decertification.~~

~~(1). The decision shall be made within forty-five (45) days after receipt of any information and argument submitted by the respondent, unless the Department extends the period for good cause.~~

~~(2). The notice of the Department's decision shall specify the reason(s) for decertification; state the period of decertification; and advise that the decertification is effective for all activities under this Act.~~

~~(3). If the Department decides not to impose decertification, the contractor shall be given prompt notice of that decision. A decision not to impose decertification shall be without prejudice to a subsequent imposition of decertification by the Department.~~

~~(4). When in the best interest of the State or the Department, the Department may, at any time, settle a decertification.~~

~~(I). Period of Decertification.~~

~~(1). Decertification shall be for a period commensurate with the seriousness of the cause(s).~~

~~(2). Decertification should generally not exceed three (3) years. Where circumstances warrant, a longer period of decertification may be imposed.~~

~~(3). The Department may extend an existing decertification for an additional period, if the Department determines that an extension is necessary to protect the public interest. However, a decertification may not be extended solely on the basis of the facts and circumstances upon which the initial decertification action was based.~~

~~(J). The Department may reverse a decertification decision for reasons including, but not limited to:~~

~~(1). Newly discovered material evidence;~~

~~(2). Reversal of the conviction or civil judgement upon which the decertification was based;~~

~~(3). Bona fide change in ownership or management;~~

~~(4). Elimination of other causes for which the decertification was imposed; or~~

~~(5). Other reasons the Department deems appropriate.~~

~~33.49. [Reserved]~~

~~SUBPART G. Violations, Penalties and Appeals.~~

~~33.50. [Reserved]~~

~~33.51. [Reserved]~~

~~33.52. [Reserved]~~

~~33.53~~20. ~~Violations, Penalties and Appeals.~~

~~(A). A violation of this regulation is subject to the issuance of a Department order, or to civil or criminal enforcement action in accordance with s~~Section ~~44-56-490 of the Act including civil penalty not to exceed ten thousand dollars for each day of violation.~~

~~(B). A decision by the Board of Health and Environmental Control, pursuant to s~~Section ~~44-56-440(A)~~420(B) ~~of the Act, after notice and opportunity to comment, to suspend all or a portion of the moratorium applicable to a class of D~~drycleaning ~~facilities or wholesale supply facilities, shall not be a contested case.~~

~~(C). The following decisions by the Department are appealable as a contested case pursuant to the Administrative Procedures Act and Regulation 61-72:~~

~~(1). Removal of eligibility after a Drycleaning facilitysite has been determined to be eligible for funds and the moratorium.~~

~~(2). Issuance of an order in response to a violation of the Act.~~

~~(3). Decertification of a contractor.~~

ATTACHMENT D
EXCERPT FROM STATE REGISTER NOTICE OF PROPOSED REGULATION
REGULATION 61-33, DRYCLEANING FACILITY RESTORATION

Document No. 4705
DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
CHAPTER 61
Statutory Authority: 1976 Code Sections 44-56-410 et seq.

61-33. Drycleaning Facility Restoration.

Preamble:

Regulation 61-33 has not been substantively updated since 1997. Revisions of Article 4 of the South Carolina Hazardous Waste Management Act, 1976 Code Section 44-56-410 et seq., on May 21, 2013 removed certain requirements of drycleaning facility and site owners to participate in the Drycleaning Restoration Trust Fund. As such, many of the procedures, practices, and terms of Regulation 61-33 are outdated and/or no longer applicable. The purpose of these amendments to R.61-33 is to revise and clarify criteria, procedures and standards for eligibility, moratorium, financial responsibility, facility prioritization, and restoration investigation and clean-up goals of drycleaning facilities and sites participating in the Drycleaning Facility Restoration Trust Fund. These proposed amendments provide updates to the definitions, removes requirements and procedures for documenting existing contamination, and removes requirements and procedures for certifying contractors. Additional changes include revising the regulation title, stylistic changes for internal consistency, clarification in wording, corrections of references, grammatical errors, outlining/codification, and such other changes necessary to improve the overall quality of the regulation.

A Notice of Drafting was published in the *State Register* on July 22, 2016.

Section-by-Section Discussion of Proposed Amendments

A Summary of Proposed Revisions is submitted in Attachment B and is omitted here to conserve space in the Board Item.

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ATTACHMENT E
STATE REGISTER NOTICE OF DRAFTING
REGULATION 61-33, DRYCLEANING FACILITY RESTORATION

DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
CHAPTER 61
Statutory Authority: 1976 Code Sections 44-56-410 et seq.

Notice of Drafting:

The Department of Health and Environmental Control proposes to amend Regulation 61- 33, Drycleaning Facility Restoration. This second Notice of Drafting replaces and supersedes the Notice of Drafting published in the State Register on May 22, 2015 for the purpose of extending the statutory promulgation period pursuant to S.C. Code Section 1-23-120(A). Interested persons are invited to submit written comments to G. Kendall Taylor, P.G., Director, Site Assessment, Remediation, and Revitalization Division, Bureau of Land and Waste Management, S.C. Department of Health and Environmental Control, 2600 Bull Street, Columbia, South Carolina 29201 or via email at taylorgk@dhec.sc.gov. To be considered, comments must be received no later than 5:00 p.m. on August 22, 2016, the close of the drafting comment period.

Synopsis:

On May 21, 2013 South Carolina Governor Nikki Haley signed into law a revised version of the South Carolina Hazardous Waste Management Act. Article 4 of the Act establishes the Drycleaning Facility Restoration Trust Fund. Revisions to Article 4 were made to better organize and clarify the Act, as well as to delete obsolete provisions. The Department proposes amending R.61-33 to better conform the regulation to the revised South Carolina Hazardous Waste Management Act.

The Department may also make stylistic changes for internal consistency, clarification in wording, corrections of references, grammatical errors, outlining/codification, and such other changes as may be necessary to improve the overall quality of the regulation.

Legislative review is required.

BOARD OF HEALTH AND ENVIRONMENTAL CONTROL
AMENDMENT OF R.61-22, THE EVALUATION OF SCHOOL EMPLOYEES FOR TUBERCULOSIS
SUMMARY SHEET

December 08, 2016

(X) ACTION/DECISION
( ) INFORMATION

I. TITLE: Public Hearing before the Board and Consideration for Final Approval of Proposed Amendment of Regulation 61-22, The Evaluation of School Employees for Tuberculosis *State Register* Document No. 4704

Legislative Review is Required.

II. SUBJECT: Request for Finding of Need and Reasonableness Pursuant to S.C. Code Section 1-23-111

III. FACTS:

1. Regulation 61-22, *The Evaluation of School Employees for Tuberculosis*, was promulgated pursuant to Section 44-29-150 of the South Carolina Code of Laws, which authorizes the Department of Health and Environmental Control ("DHEC" or the "Department") to promulgate guidelines for the evaluation of staff of any public or private school, kindergarten, nursery or day care center for infants and children as a pre-condition to employment and as a condition of continued employment.

2. The Department is proposing to amend R.61-22 to incorporate recommended changes identified by staff during internal review, including integrating of current tuberculosis evaluation and preventive treatment guidelines, updating the screening/evaluation requirements for schools and child care settings, clarifying language relating to issuing, completion and retention of certificates of tuberculosis evaluation and language relating to requirements for new hires, and providing for consistency with applicable state and federal laws. The proposed amendments also incorporate stylistic changes, which include corrections for clarity, readability, grammar, punctuation and overall improvement of the text. The proposed changes also align the Department with advancements and best practices in tuberculosis evaluation.

3. The proposed amendments will have no substantial negative fiscal or economic impact on the State and its political subdivisions or the regulated community as employees in schools and child care settings are currently required by S.C. Code Section 44-29-160 to be evaluated for tuberculosis as a condition of employment. In fact, these amendments are designed to lower the financial and human resources burdens on schools and child care centers while continuing to afford protection against tuberculosis in these settings consistent with best practices.

4. The Department initiated the statutory process to amend R.61-22 by publication of a Notice of Drafting in the *State Register* on August 26, 2016, and requested that comments be submitted by September 26, 2016. The Notice of Drafting was also published on the Department's Regulation website in its *Monthly Regulation Development Update*. A copy of the Notice of Drafting is submitted as Attachment E. The Department received no comments during the comment period.

5. Appropriate Department personnel reviewed current R.61-22 and the proposed revisions. A Summary of Proposed Revisions and Text of Proposed Revisions are submitted as Attachments B and C, respectively.

6. The Board granted Department staff initial approval on October 13, 2016, to publicly notice the proposed regulation. Pursuant to S.C. Code Ann. Section 1-23-110(A)(3), the Department published a Notice of Proposed Regulation with notice of opportunity for public comment in the *State Register* on October 28, 2016, as Document No. 4704 (see Excerpt of Notice in Attachment D). The Notice of Proposed Regulation was also published on the Department's website in its *Monthly Regulation Development Update*. The publication of the Notice of Proposed Regulation provided notice to the public of the opportunity for interested parties to offer input on the proposed regulation by submitting written comments during a public comment period, from October 28, 2016 through November 28, 2016, and/or by commenting at the public hearing before the Board scheduled for December 8, 2016. The Department received numerous comments during the public comment period. A summary of the public comments received, including the Department's responses, is submitted as Attachment F.

7. The Department requests the Board conduct a public hearing pursuant to S.C. Code Ann. Section 1-23-111 and find for the need and reasonableness of the proposed amendment of Regulation 61-22.

IV. ANALYSIS:

The Department proposes to substantially amend R.61-22 in order to simplify and clarify the tuberculosis screening and evaluation requirements for schools and child care centers and to significantly reduce the financial and human resources burden created in prior revisions to R.61-22, all while affording children greater protection against exposure to tuberculosis in these settings. The proposed amendments herein include the Department's effort to incorporate current tuberculosis evaluation and preventive treatment guidelines, update the screening and evaluation requirements for those working in schools and child care centers, clarify language relating to the issuance of evaluation certificates, and provide for consistency with applicable state and federal laws. The need and reasonableness of these regulations is more fully addressed in the "Statement of Need and Reasonableness and Rationale" submitted as Attachment A.

V. RECOMMENDATION:

Department staff recommend the Board find for the need and reasonableness of the proposed regulation and approve it for submission to the Legislature for review.

Submitted by:

Melissa C. Overman, DO, MPH, CHES, FAOCOPM
Assistant State Epidemiologist

Approved by:

Lisa Davis
Director of Health Services

Attachments:

Attachment A: Statement of Need and Reasonableness and Rationale
Attachment B: Summary of Proposed Revisions of R.61-22
Attachment C: Text of Proposed Revisions of R.61-22
Attachment D: Excerpt from *State Register* - Notice of Proposed Regulation published October 28, 2016
Attachment E: *State Register* Notice of Drafting published on August 26, 2015
Attachment F: Public Comment Summary

ATTACHMENT A

STATEMENT OF NEED AND REASONABLENESS AND RATIONALE
AMENDMENT OF R.61-22, THE EVALUATION OF SCHOOL EMPLOYEES FOR TUBERCULOSIS
December 8, 2015

The following is based on an analysis of the factors listed in S.C. Code Ann. Sections 1-23-115(C)(1)-(3) and (9)-(11):

DESCRIPTION OF THE REGULATION: R.61-22, The Evaluation of School Employees for Tuberculosis

PURPOSE OF THE REGULATION: The purpose of these revisions is to update R.61-22 and incorporate recommended changes identified by staff during internal review, including integrating current tuberculosis evaluation and preventive treatment guidelines, updating the screening/evaluation requirements for schools and child care centers, clarifying language relating to issuing, completion and retention of certificates of tuberculosis evaluation and language relating to requirements for new hires, and providing for consistency with applicable state and federal laws. The proposed revisions also incorporate stylistic changes, which include corrections for clarity, readability, grammar, punctuation and overall improvement of the text. The proposed changes also align the Department with advancements and best practices in tuberculosis evaluation.

LEGAL AUTHORITY FOR THE REGULATION: 1976 Code Section 44-29-150, as amended.

PLAN FOR IMPLEMENTATION: Upon approval by the S.C. General Assembly and publication in the *State Register* as final, these revisions will take effect as law. In addition to publication in the *State Register*, the amended regulation will be available electronically on the Department's website in the *DHEC Regulation Development Update*. Also, a copy of this regulation, to include these latest amendments, will be published in the Department's *Laws and Regulations* section of its website under the Disease Control category and subsequently in the Code of Regulations in the S.C. Code of Laws. Printed copies will be available for a fee from the Department's Freedom of Information Office.

DETERMINATION OF NEED AND REASONABLENESS OF THE PROPOSED REGULATION AND EXPECTED BENEFITS: The proposed amendments to R.61-22 are needed to update and clarify the guidelines for tuberculosis screening and evaluation of employees in school and child care settings. The amendments are reasonable as they accomplish their intended purpose of identifying high-risk school employees and will afford children greater protection against exposure to tuberculosis in these settings.

DETERMINATION OF COSTS AND BENEFITS: There are no anticipated additional costs to the state or its political subdivisions. Staff of schools and child care settings are currently required by S.C. Code Section 44-29-160 to be evaluated for tuberculosis as a condition of employment. In addition, current R.61-22 requires two tuberculin skin tests for all school and child care center staff as well as annual screening. The amendments to R.61-22, which lessen those requirements while continuing to afford protection against tuberculosis in these settings consistent with best practices, should lower the financial and human resources burdens on schools and child care centers.

UNCERTAINTIES OF ESTIMATES: None.

EFFECT ON ENVIRONMENT AND PUBLIC HEALTH: Implementation of the proposed amendments herein will not compromise the protection of the environment or public health. The effect should be beneficial because the amendments ensure proper tuberculosis evaluation prior to initial hire, facilitate targeted testing

of identified higher risk school employees and improve knowledge of tuberculosis disease, signs and symptoms, by staff of schools and child care centers.

DETRIMENTAL EFFECT ON THE ENVIRONMENT AND PUBLIC HEALTH IF THE REGULATION IS NOT IMPLEMENTED: There is no anticipated detrimental effect on the environment if the amendments are not implemented. Failure to amend the regulation could result in the lack of proper evaluation of employees for tuberculosis as well as an undue financial and human resources burden on schools and child care centers.

STATEMENT OF RATIONALE: The Department is amending R.61-22, *The Evaluation of School Employees for Tuberculosis*, to incorporate current tuberculosis evaluation and preventive treatment guidelines, update the screening and evaluation requirements for school employees, clarify language relating to the issuance, completion and retention of evaluation certificates and language relating to requirements for new hires, and provide for consistency with applicable state and federal laws. The proposed amendments herein are needed to update and clarify the guidelines for tuberculosis screening and evaluation of employees in school and child care settings in South Carolina.

ATTACHMENT B

SUMMARY OF PROPOSED REVISIONS
AMENDMENT OF R.61-22, THE EVALUATION OF SCHOOL EMPLOYEES FOR TUBERCULOSIS
December 8, 2016

Section-by-Section Discussion of Proposed Revisions

The title of R. 61-22 has been changed to reflect the scope of the guidelines, which are not limited to employees or to schools, but include certain non-employees and those who work in child care centers.

Section I. Purpose and Scope: Changes were made in this section to more accurately reflect the scope of the guidelines, which are not limited to employees of schools and cover others who work in school environments and in child care centers, but do not apply to registered family child care homes. Changes were also made to clarify the purpose of the guidelines and to improve the section's readability.

Section II. Definitions: Wholesale changes were made to the Definitions section in order to bring clarity to the guidelines, remove unnecessary language, and improve accuracy and readability. Definitions were added to include the terms "Approved TB Screening Tests," "Department," "DHEC 1420," "disposition," "employee," "latent TB infection," "preventive treatment," and "tuberculosis" or "TB." Definitions of the following terms were deleted as being unnecessary, including "adequate treatment," "blood assay for mycobacterium tuberculosis (BAMT)," "legally authorized healthcare provider," "new employee," "non-reactor," "non-routine testing," "regular employee," "school employees," "treatment for tuberculosis infection (TTBI)," "tuberculin/BAMT positive reactor," "tuberculin skin test (TST)," "tuberculosis infection," and "two-step tuberculin skin test." The definition of "tuberculosis disease" or "TB disease" was revised.

Section III. Guidelines for Screening and Evaluation, Subsection A: This section was renamed and significantly revised to simplify tuberculosis screening and evaluation requirements and to improve clarity. The revisions eliminated the ninety (90) day window for pre-employment testing and the two-step tuberculin skin tests as those requirements proved burdensome and confusing to school districts and others and are not necessary under best practices for tuberculosis screening. Instead, TB testing is specified as a prerequisite to employment and a condition for continued employment, with schools and child care centers given greater discretion to determine how far in advance of working with students the testing and documentation must be accomplished. These revisions reduce the burden on schools and child care centers, give them greater flexibility, while still ensuring that all persons are evaluated for tuberculosis before working in a school or child care center.

Section III. Guidelines for Screening and Evaluation, Subsection B. Disposition Following Evaluation: This section was significantly revised to simplify the actions to be taken by schools and child care centers following tuberculosis evaluation. The revisions eliminated the requirement for annual screening of all employees, provide for re-evaluation only upon a gap in employment, and make clear that the guidelines establish minimum requirements, with schools and child care centers free to implement stricter requirements to meet their individual needs.

Section III. Guidelines for Screening and Evaluation, Subsection C. Documentation of results of screening and evaluation. This section was significantly revised to simplify the documentation needed to verify tuberculosis evaluation. Language was added to clarify documentation requirements for those who transfer from one location to another and for those who work in more than one location. Additional language was added to give schools and child care centers the discretion to maintain documentation at individual locations

or at centralized locations, such as district offices, and to clarify that outside vendors that provide staff to schools are responsible for maintaining proper documentation of their employees.

Section III. Guidelines for Screening and Evaluation, Subsection D. Non-routine screening. Minor revisions to this section were made to reflect the scope of the guidelines. A subsection pertaining to education was added to recommend, but not require, annual public health instruction so that educators and those working in school and child care environments may gain additional knowledge regarding public health issues including, but not limited to, recognizing the signs and symptoms of tuberculosis.

Section IV. Additional Information and Forms. Only minor changes were made to improve clarity.

Appendix. Interpretation of the Tuberculin Skin Test (TST). The appendix was deleted in its entirety.

ATTACHMENT C

TEXT OF PROPOSED REVISIONS
AMENDMENT OF R.61-22, THE EVALUATION OF SCHOOL EMPLOYEES FOR TUBERCULOSIS
December 8, 2016

~~Indicates Matter Stricken~~
Indicates New Matter

Text:

61-22. The Evaluation of Staff of Schools and Child Care Centers~~Employees~~ for Tuberculosis.

(Statutory Authority: 1976 Code Sections 44-29-150, 44-29-160, 44-29-170)

TABLE OF CONTENTS

I. PURPOSE AND SCOPE.
II. DEFINITIONS.
III. GUIDELINES FOR SCREENING AND EVALUATION.
IV. ADDITIONAL INFORMATION AND FORMS.

I. PURPOSE AND SCOPE.

The General Assembly, in s~~S~~ections 44-29-150 through 44-29-170 of the 1976 South Carolina Code of Laws, charged the South Carolina Board of Health and Environmental Control with approving guidelines for~~pertain to~~ the evaluation for tuberculosis of ~~employees~~persons working in~~of~~ a public or private school, kindergarten, nursery or day care center for infants and children~~ for tuberculosis~~ (Registered family child care homes are exempt from the requirements of these guidelines). As more fully set forth below, as a prerequisite to employment and as a condition of continued employment, all persons to whom these guidelines apply shall be evaluated for tuberculosis and shall provide certification on a form designated by the Department that the person does not have tuberculosis in an active stage. Re-evaluation will not be required for employment in subsequent consecutive years unless otherwise indicated.~~ Section 44-29-150 authorizes the Department of Health and Environmental Control to establish guidelines for the evaluation of school employees for tuberculosis. Under these guidelines, all employees of a public or private school, kindergarten, nursery or child care center shall be screened for tuberculosis within ninety (90) days prior to initial hire, and will not be required to be evaluated annually for risk of tuberculosis exposure or development of tuberculosis disease. These guidelines shall apply to any person applying for a position or currently employed, whether full time, temporarily or in any other capacity, in a public or private school, kindergarten, nursery or child care center. The Department will provide guidelines to emphasize risk assessment for tuberculosis and targeted testing of identified high risk employees affording children greater protection against exposure to tuberculosis in the school environment.~~

These guidelines modernize the approach to screening for tuberculosis and take into account contemporary scientific and epidemiologic principles. Under these guidelines, most school employees will need to be evaluated for tuberculosis only one time and will not be required to be screened annually absent certain factors. Non-routine screening is based on epidemiologic and clinical information and is combined with an underlying policy concerning preventive treatment of tuberculosis disease and infection. These guidelines will

afford children greater protection against exposure to tuberculosis in the school, kindergarten, nursery and day care center environments.

II. DEFINITIONS.

For the purpose of these guidelines~~the evaluation of public or private school, kindergarten, nursery or day care center for infants and children employees for tuberculosis~~, the following definitions and clarifications shall apply:

A. "Approved TB Screening Tests" means tests for the detection of TB disease and/or latent TB infection approved by the United States Food and Drug Administration and recommended by the Centers for Disease Control and Prevention~~Adequate treatment. Therapy with anti-tuberculosis drugs that is determined by the department's Tuberculosis Medical Consultant to be sufficient for the treatment of infection or disease~~.

B. "Department" means the South Carolina Department of Health and Environmental Control~~Blood assay for mycobacterium tuberculosis (BAMT). A general term used to refer to in vitro diagnostic tests that assess for the presence of infection with mycobacterium tuberculosis (MTB), such as an interferon gamma release assay (IGRA)~~.

C. "DHEC 1420" means the form designated by the Department for documenting and certifying tuberculosis evaluation, including results of Approved TB Screening Tests, disposition and preventive measures~~Legally authorized healthcare provider. An individual authorized by law and currently licensed in South Carolina to provide specific medical treatments, care, or services to staff members and/or patients, such as, physicians, advanced practice registered nurses, physician assistants~~.

D. "Disposition" means the plan for continuing healthcare of a person following evaluation for tuberculosis~~New employee. An individual being initially hired~~.

E. "Employee" means any person working in a public or private school, kindergarten, nursery or day care center for infants and children, whether a new hire or currently employed, whether a direct employee or an independent contractor, and whether full-time, part-time, temporary or in any other capacity. Examples of employees to whom these guidelines apply include, but are not limited to, teachers, substitute teachers, teacher aides, student teachers, administrators, school psychologists, custodians, bus drivers, coaches, trainers, guidance counselors, school nurses and cafeteria workers, among others~~Non reactor. An individual with a negative skin test (see Appendix) or a negative BAMT~~.

F. "Latent TB infection" means a person has become infected with the bacterium that causes TB, but does not have TB in an active stage. A person with latent TB infection does not feel sick, does not have symptoms and cannot spread TB bacteria to others~~Non routine testing. Testing that may be required in special circumstances where there is epidemiologic evidence, such as when an employee is identified as a close contact of a person with infectious tuberculosis disease, that employees may have become infected or infectious, when tuberculosis is known to have occurred in the public or private school, kindergarten, nursery or child care center environment, or when an employee is observed to have signs or symptoms suggestive of tuberculosis~~.

G. "Preventive treatment" means treatment to prevent latent TB infection in an individual from developing into TB disease~~Regular employee. An individual currently employed who has had a pre-employment TB evaluation~~.

H. "Tuberculosis" or "TB" means generally a bacterial infection caused by a bacterium called *Mycobacterium tuberculosis*. The bacteria usually attack the lungs, but TB bacteria can attack any part

of the body such as the kidneys, spine, and brain. TB bacteria can live in the body without making you sick. This is called "latent TB infection." For most people who breathe in TB bacteria and become infected, the body is able to fight the bacteria to stop them from growing. For others, TB bacteria become active in the body and multiply. In those instances, people will go from having latent TB infection to being sick with "TB disease" or "TB in an active stage."~~School employees. All employees to include teachers, bus drivers, office staff, custodial and cafeteria staff, and any other persons employed, in any capacity, by a public or private school, kindergarten, nursery or day care center for infants and children~~.

I. "TB disease" or "TB in an active stage" means a person has become infected with the bacterium that causes TB and the bacterium has become active and has multiplied. People with TB disease usually have symptoms and may spread TB bacteria to others~~Treatment for tuberculosis infection (TTBI). Treatment to prevent tuberculosis disease form developing in tuberculin or BAMT positive reactors~~.

~~J. Tuberculin/BAMT positive reactor. Any individual found to have a positive skin test reaction (see Appendix), or an individual who has a positive BAMT.~~

~~K. Tuberculin skin test (TST). Test done by intradermal injection (Mantoux or any tuberculosis infection test currently approved by the Federal Drug Administration) of five (5) tuberculin units of purified protein derivative.~~

~~L. Tuberculosis disease (TB). A disease often contagious, usually diagnosed by chest x-ray and culture of tubercle bacilli from sputum or direct DNA testing, such as nucleic acid amplification testing (NAAT).~~

~~M. Tuberculosis infection. Presence of living tubercle bacilli in the body of an asymptomatic, non-infectious individual in which active disease has been excluded, as diagnosed by the TST or BAMT and a negative chest x-ray.~~

~~N. Two-step tuberculin skin test. Refers to the "booster test" where a second TST is given one to three (1 to 3) weeks after an initial negative TST in order to "boost" the immune system to recognize tubercle protein in the TST in the event infection is actually present in the body but is suppressed due to age or illness.~~

III. GUIDELINES FOR SCREENING AND EVALUATION.

A. Evaluation for Tuberculosis:~~Required screening and evaluation of public and private school, kindergarten, nursery or child care center employees for tuberculosis:~~

1. As a prerequisite to employment, and as a condition for continued employment, all employees shall be evaluated for tuberculosis by a licensed healthcare provider and shall provide written certification from a licensed physician that the person does not have TB disease~~Each employee of a public or private school, kindergarten, nursery or day care center for infants and children shall have a DHEC Form 1420 on file in their personnel record at their current place of employment~~.

2. Tuberculosis evaluations must be completed no more than one year prior to employment~~Unless directed otherwise under part 5 or 6 of this subsection, new employees shall have a two-step TST or single BAMT within ninety (90) days prior to the date of initial employment and tuberculosis annual risk assessment questionnaires thereafter administered by the school district~~.

3. Tuberculosis evaluations shall be conducted utilizing Approved TB Screening Tests~~Unless directed otherwise under part 5 or 6 of this subsection, regular employees, if they have not already done so, shall provide documentation of a two-step TST or BAMT (DHEC Form 1420) to be kept on file at their current place of employment~~.

4. Certification of tuberculosis evaluation, including disposition and preventive treatment, shall be documented on DHEC 1420 and retained in the files of the school, kindergarten, nursery or day care center for infants and children where the person works.~~New or regular employees documented to have been reactors to a prior TST or to have had a positive BAMT shall not be required to have a TST or BAMT. These employees shall have their records and health status reviewed by a legally authorized healthcare provider and obtain certification of being non-infectious via DHEC Form 1420 in order to begin or continue employment.~~

~~a. If a prescribed course of treatment for TB infection with anti-tubercular medications has been completed and documentation is provided, the employee may continue to work and annual risk assessments shall be required.~~

~~b. If the employee has not completed treatment for TB infection, or cannot provide documentation of completed treatment, the employee may continue to work provided there are no "yes" answers to the symptom sections on the risk assessment questionnaire.~~

~~c. The DHEC Form 1420 shall be completed by a legally authorized healthcare provider certifying that the individual is considered to be infected and remains at lifelong risk of developing tuberculosis disease.~~

~~5. New or regular employees who have had active tuberculosis in the past shall not be required to have a TST or BAMT. Instead, these employees shall comply with the following:~~

~~a. Employees with a history of active tuberculosis shall have their records and health status reviews annually by a legally authorized healthcare provider who shall, if appropriate and in consultation with the Department of Health and Environmental Control Tuberculosis Medical Consultant, certify the employee as non-infectious on DHEC Form 1420. All employees shall have a DHEC Form 1420 on file at their current place of employment.~~

~~b. If the employee has completed a prescribed course of therapy with anti-tubercular medications, and provides documentation indicating completion of such treatment, the employee may continue to work provided there are no "yes" answers on the risk assessment questionnaire.~~

~~c. If the employee has not completed a prescribed course of treatment, or cannot provide documentation of completed treatment, a legally authorized healthcare provider shall note on DHEC Form 1420 that the individual is considered to be infected and remains at lifelong risk of developing tuberculosis diseases.~~

B. Disposition ~~f~~Following ~~results of screening and~~ ~~e~~Evaluation:

1. Any employee with a negative Approved TB Screening Test shall require no further routine screening except as otherwise provided in section III(B)(3) below.~~All employees found to be new tuberculin reactors shall have a chest x-ray and subsequent medical evaluation to rule out active tuberculosis disease prior to start or return to work~~.

2. Any employee with a positive Approved TB Screening Test or with a history of latent TB infection or TB disease shall be further evaluated by a licensed healthcare provider.~~Any employee with symptoms of pulmonary tuberculosis shall be evaluated regardless of the BAMT or TST result. All symptomatic employees shall be excluded from work until disease is ruled out or the employee is no longer considered infectious, as certified on DHEC Form 1420 by a legally authorized healthcare provider in consultation with the Department of Health and Environmental Control Tuberculosis Medical Consultant~~.

a. If the evaluation reveals no TB disease, then no exclusion and no further routine screening shall be required except as otherwise provided in section III(B)(3) below~~If a chest x-ray (and sputum cultures, acid fast bacillus (AFB) staining or NAAT, if necessary) of a tuberculin reactor shows no evidence of current tuberculosis disease, the employee shall be evaluated for TTBI~~.

~~(i)If TTBI is medically indicated, and if the employee completes the treatment regimen as prescribed, only annual risk assessments shall be required.~~

~~(ii) If TTBI is not medically indicated, or if the employee for whom such therapy is indicated does not complete the prescribed course of treatment, annual risk assessments shall be required and a notation shall be made by a legally authorized healthcare provider on DHEC Form 1420, that the individual is considered to be infected and remains at lifelong risk of developing tuberculosis disease. The DHEC Form 1420 shall be maintained in the employee's personnel file.~~

b. If the evaluation reveals TB disease, then the individual shall be excluded from working in any school, kindergarten, nursery or day care center for infants and children until a licensed physician certifies that the individual no longer has TB in an active stage~~If a chest x-ray (and sputum cultures, AFB staining, or NAAT, if necessary) of a tuberculin reactor shows evidence of current tuberculosis disease, the employee shall not work in any public or private school, kindergarten, nursery or day care center, until a Department of Health and Environmental Control Tuberculosis Medical Consultant certifies on DHEC Form 1420 that the individual is non-infectious. Certification is subject to review by the Department of Health and Environmental Control or delegated representatives in county health departments. This provision applies to an employee found to have tuberculosis disease at the time of hiring or at any other time~~.

3. Once an employee in a public or private school, kindergarten, nursery or day care center for infants and children has been evaluated for tuberculosis as required above, no further routine screening shall be required so long as the person's employment in one or more of these settings remains uninterrupted. Moving directly from one of these work settings to another, such as from a public school directly to a private school, or working outside of one of these work settings during summer break but returning to work after the break, shall be considered uninterrupted. However, any employee who leaves employment in a public or private school, kindergarten, nursery or day care center for infants and children must be re-evaluated for TB as a prerequisite to returning to employment in any of these work settings. TB evaluations completed within one year of returning to employment may be used.~~Disposition of results of the tuberculosis risk assessment questionnaire:~~

~~a. Employees who have negative responses to the symptom and to the exposure risk sections of the questionnaire will need no further testing.~~

~~b. Employees with any "yes" responses to the tuberculosis symptoms section of the questionnaire shall receive further medical evaluation by a legally authorized healthcare provider which may include imaging, TST or BAMT testing, sputum collection or other, and further medical follow up based on symptoms.~~

4. Nothing in these guidelines shall prevent a public or private school, kindergarten, nursery or day care center for infants and children from requiring additional tuberculosis evaluations or screenings of its employees and volunteers.~~New employees who are found to be infected, such as those who are reactors to the TST or who have a positive BAMT, will require a chest x-ray and certification (DHEC Form 1420) by a legally authorized healthcare provider that they are free of tuberculosis disease.~~

C. Documentation~~of results of screening and evaluation~~:

1. Every school, kindergarten, nursery or day care center for infants and children shall maintain a completed DHEC 1420 for each employee and shall make such records available for review by representatives of the Department upon request. Records may be maintained in an individual facility or in a centralized office, such as in a school district office.~~Results of the required evaluation or certification and the subsequent disposition for each employee shall be recorded on DHEC Form 1420 as provided for in Section 44-29-170 of the S.C. Code of Laws~~.

2. For persons who are not employed directly by a school, kindergarten, nursery or day care center, but who work in these settings, the person's employer shall maintain a completed DHEC 1420 and shall make such records available for review upon request by representatives of the Department as well as representatives of any school, kindergarten, nursery or day care center in which the person works.~~The public or private school, kindergarten, nursery or day care center for infants and children shall be required to maintain a copy of the annual risk assessment questionnaire completed by employees. Each employee of a public or private school, kindergarten, nursery or day care center for infants and children must have a DHEC Form 1420 on file in their personnel record at their current place of employment~~.

3. If an employee moves or transfers directly to another public or private school, kindergarten, nursery or day care center for infants and children such that employment in any of these work settings remains uninterrupted, no additional routine screening or evaluation for tuberculosis shall be required beyond that which is described above, provided the employee has a completed DHEC 1420, which should be transferred to the new place of employment.

4. If an employee works in more than one school, kindergarten, nursery or day care center for infants and children, each facility shall maintain a separate copy of the individual's completed DHEC 1420 unless kept in a centralized office governing all places of employment.

5. Any employee who does not have proper documentation on file that he or she is free of TB disease shall be excluded from working in any school, kindergarten, nursery or day care center for infants and children until written certification by a licensed physician is received and documented on DHEC 1420 declaring that the individual does not have tuberculosis in an active stage.

D. Non-routine ~~s~~Screening and Recommended Education:

1. An employee who would otherwise be exempt from routine annual screening for tuberculosis ~~Any employee~~ may be required to undergo non-routine screening~~,~~ if there is epidemiologic or clinical evidence that such employee may have been exposed to TB bacteria or become infected with TB or may have moved from having latent TB infection to TB disease ~~or infectious~~. Epidemiologic and clinical evidence ~~for contact investigation~~ includes, but may ~~is~~ not be limited to:

~~1~~a. Identification of an employee~~s~~ as a close contact~~s~~ of a person with TB disease~~tuberculosis cases~~;

~~2~~b. Occurrence of tuberculosis in ~~the~~any public or private school, kindergarten, nursery or ~~child care facility~~ day care center for infants and children ~~environment~~; or

~~3~~c. Observation of signs or symptoms in an employee~~s~~ suggestive of tuberculosis.

2. The Department recommends that regular employees and volunteers of public or private schools, kindergartens, nurseries or day care centers for infants and children participate in a Public Health Education element annually. Recommended Public Health Education materials will be made available by the Department and will include disease prevention, symptoms and screening information for communicable diseases common to public or private school, kindergarten, nursery or day care center environments.

IV. ADDITIONAL INFORMATION AND FORMS.

A. Questions regarding ~~this regulation~~these guidelines may be addressed to personnel of the county health departments or the regional offices of the Department of Health and Environmental Control. Questions which cannot be resolved at the local level may be referred to the Tuberculosis Control Program~~Division~~, Department of Health and Environmental Control, 2600 Bull Street, Columbia, S.C. 29201.

B. Employees may obtain tuberculosis evaluations and certifications~~Examination and certification may be obtained by employees~~ from private physicians. Certification forms (DHEC ~~Form~~ 1420) are ~~also~~ available, upon request, from the Department ~~of Health and Environmental Control~~.

~~Appendix. Interpretation of the Tuberculin Skin Test (TST).~~
~~Reference:~~
~~Targeted Tuberculin Testing, MMWR, 2000, (49) No, RR-6~~

~~**Induration of 5 mm or greater is considered positive in**~~	~~**Induration of 10 mm or greater is considered positive in**~~	~~**Induration of 15 mm or greater is considered positive in**~~
~~Human immunodeficiency virus (HIV) positive persons~~ ~~Recent contacts of TB case patients~~ ~~Persons with fibrotic changes on chest radiograph consistent with prior TB~~ ~~Patients with organ transplants and other immunosuppressed patients (Receiving the equivalent of 15 mg/d of prednisone for 1 month or more. Risk of TB in patients with corticosteroids increases with higher dose and longer duration.)~~	~~Recent immigrants (i.e., within the last 5 years) from high-prevalence countries~~ ~~Injection drug users~~ ~~Residents and employees of the following high-risk congregate settings: prisons and jails, nursing homes and other long-term facilities for the elderly, hospitals and other health care facilities, residential facilities for patients with acquired immunodeficiency syndrome (AIDS), and homeless shelters~~ ~~Mycobacteriology laboratory personnel~~ ~~Persons with the following clinical conditions that place them at high risk: silicosis, diabetes mellitus, chronic renal failure, some hematologic disorders (such as leukemias and lymphomas), other specific malignancies (such as carcinoma of the head, neck, or lung),weight loss of 10 percent of ideal body weight, gastrectomy, and jejunoileal bypass~~ ~~Children less than 4 years of age, or infants, children and adolescents exposed to adults at high-risk~~ ~~Persons on TNF inhibitors~~	~~Persons with no known risk factors for TB~~

ATTACHMENT D
EXCERPT FROM *STATE REGISTER*, NOTICE OF PROPOSED REGULATION
PUBLISHED June 26, 2015

Document No. 4704
DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
CHAPTER 61
Statutory Authority: 1976 Code Sections 44-29-150 through 44-29-170

61-22. The Evaluation of School Employees for Tuberculosis.

Preamble:

The Department has conducted a review of Regulation 61-22 pertaining to the evaluation and screening for tuberculosis for those working in schools and child care centers. As a result of the review, the Department is proposing to substantially amend R.61-22 in order to simplify and clarify the tuberculosis screening and evaluation requirements for schools and child care centers and to significantly reduce the financial and human resources burden on schools and child care centers created in prior revisions to R. 61-22, all while affording children greater protection against exposure to tuberculosis in these settings. The proposed amendments herein include the Department's effort to incorporate current tuberculosis evaluation and preventive treatment guidelines, update the screening and evaluation requirements for those working and volunteering in schools and child care centers, clarify language relating to the issuance of evaluation certificates, and provide for consistency with applicable state and federal laws. The title of the Regulation will also be revised.

A Notice of Drafting was published in the *State Register* on August 26, 2016.

Section-by-Section Discussion of Proposed Amendments

The title of R.61-22 has been changed to reflect the scope of the guidelines, which are not limited to employees or schools, but include certain non-employees and those who work in child care centers.

Section I. Purpose and Scope: Changes were made in this section to more accurately reflect the scope of the guidelines, which are not limited to employees of schools, but cover others who work in school environments and in child care centers. Changes were also made to clarify the purpose of the guidelines and to improve the section's readability.

Section II. Definitions: Wholesale changes were made to the Definitions section in order to bring clarity to the guidelines, remove unnecessary language, and improve accuracy and readability. Definitions were added to include the terms "Approved TB Screening Tests," "Department," "DHEC 1420," "disposition," "employee," "latent TB infection," "preventive treatment," "tuberculosis" or "TB," and "volunteer." Definitions of the following terms were deleted as being unnecessary, including "adequate treatment," "blood assay for mycobacterium tuberculosis (BAMT)," "legally authorized healthcare provider," "new employee," "non-reactor," "non-routine testing," "regular employee," "school employees," "treatment for tuberculosis infection (TTBI)," "tuberculin/BAMT positive reactor," "tuberculin skin test (TST)," "tuberculosis infection," and "two-step tuberculin skin test." The definition of "tuberculosis disease" or "TB disease" was revised.

Section III. Guidelines for Screening and Evaluation, Subsection A: This section was renamed and significantly revised to simplify tuberculosis screening and evaluation requirements and to improve clarity. The revisions eliminated the ninety (90) day window for pre-employment testing and the two-step tuberculin skin tests as those requirements proved burdensome and confusing to school districts and others and are not necessary under best practices for tuberculosis screening. Instead, TB testing is specified as a prerequisite to employment and a condition for continued employment, with schools and child care centers given discretion to determine how far in advance of working with students the testing and documentation must be accomplished. These revisions reduce the burden on schools and child care centers, give them greater flexibility, while still ensuring that all persons are evaluated for tuberculosis before working or volunteering in a school or child care center.

Section III. Guidelines for Screening and Evaluation, Subsection B. Disposition Following Evaluation: This section was significantly revised to simplify the actions to be taken by schools and child care centers following tuberculosis evaluation. The revisions also eliminated the requirement for annual screening of all employees.

Section III. Guidelines for Screening and Evaluation, Subsection C. Documentation of results of screening and evaluation. This section was significantly revised to simplify the documentation needed to verify tuberculosis evaluation. Language was added to clarify documentation requirements for those who transfer from one location to another and for those who work in more than one location.

Section III. Guidelines for Screening and Evaluation, Subsection D. Non-routine screening. Minor revisions to this section were made to reflect the scope of the guidelines and their application to not only employees and schools, but also to certain non-employees of schools and child care centers. A subsection pertaining to education was added to recommend, but not require, annual public health instruction so that educators and those working in school and child care environments may gain additional knowledge regarding public health issues including, but not limited to, recognizing the signs and symptoms of tuberculosis.

Section IV. Additional Information and Forms. Only minor changes were made to improve clarity.

Appendix. Interpretation of the Tuberculin Skin Test (TST). The appendix was deleted in its entirety.

Notice of Public Hearing and Opportunity for Public Comments:

Interested persons are provided an opportunity to submit written comments on the proposed regulation by writing to Dr. Melissa C. Overman, Assistant State Epidemiologist, Tuberculosis Control Program, Department of Health and Environmental Control, 2600 Bull Street, Columbia, South Carolina 29201 or by email to overmamc@dhec.sc.gov. To be considered, written comments must be received no later than 5:00 p.m. on November 28, 2016, the close of the public comment period. Written comments received by the deadline, November 28, 2016, shall be considered by the Department in formulating the final proposed regulation for public hearing on December 8, 2016, as

noticed below. The Department will submit a summary of public comments and Department responses to the Board for its consideration at the public hearing.

Interested members of the public and regulated community are also invited to make oral or written comments on the proposed regulation at a public hearing to be conducted by the Board of Health and Environmental Control on December 8, 2016. The Board will conduct the public hearing in the Board Room, Third Floor, Aycock Building of the Department of Health and Environmental Control at 2600 Bull Street, Columbia, South Carolina 29201. The Board meeting commences at 10:00 a.m., at which time the Board will consider items on its agenda in the order presented. The order of presentation for public hearings will be noted in the Board's agenda published by the Department twenty-four (24) hours in advance of the meeting at the following address: http://www.scdhec.gov/Agency/docs/AGENDA.pdf. The agenda will also provide notice of cancellation or any change in meeting times. Persons desiring to make oral comments at the hearing are asked to limit their statements to five (5) minutes and, as a courtesy, persons are asked to provide written copies of their presentations for the record. Due to admittance procedures at the DHEC Building, all visitors should enter through the Bull Street entrance and register at the front desk.

Copies of the proposed regulation for public comment may be obtained by contacting Dr. Melissa C. Overman at the above address. Also, electronic copies of the proposed regulation will be available on the Department's Regulatory Development Update website at the following address: http://www.scdhec.gov/Agency/RegulationsAndUpdates/RegulationDevelopmentUpdate/. Click on the “Disease Control” category and scroll down for R.61-22.

ATTACHMENT E
***STATE REGISTER* NOTICE OF DRAFTING**
PROPOSED AMENDMENT OF R.61-22, The Evaluation of School Employees for Tuberculosis
August 26, 2016

DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
CHAPTER 61
Statutory Authority: 1976 Code Section 44-29-150

Notice of Drafting:

The Department of Health and Environmental Control proposes to amend Regulation 61-22, The Evaluation of School Employees for Tuberculosis. Interested persons are invited to submit written comments to Melissa C. Overman, DO, MPH, CHES, FAOCOPM**,** Assistant State Epidemiologist, S.C. Department of Health and Environmental Control, 2100 Bull Street, Columbia, South Carolina 29201 or via email at OVERMAMC@dhec.sc.gov. To be considered, comments must be received no later than 5:00 p.m. on September 26, 2016, the close of the drafting comment period.

Synopsis:

The Department of Health and Environmental Control proposes amending Regulation 61-22. The amendments will seek to incorporate scientifically-based measures for disease prevention while ensuring standards for tuberculosis evaluation meet best practices attainable with respect to compliance.

The Department may also make stylistic changes for internal consistency, clarification in wording, corrections of references, grammatical errors, outlining/codification, and such other changes as may be necessary to improve the overall quality of the regulation.

Legislative review is required.

ATTACHMENT F

SUMMARY OF PUBLIC COMMENTS AND DEPARTMENT RESPONSES
AMENDMENT OF R.61-22, THE EVALUATION OF SCHOOL EMPLOYEES FOR TUBERCULOSIS
December 8, 2016

The Department received no comments during the public comment period following publication of the Notice of Drafting in the *State Register*, but received multiple comments after publication of the Notice of Proposed Regulation and Text in the *State Register* on October 28, 2016. The following summarizes those comments and the Department's responses.

COMMENTOR	SECTION CITATION	COMMENT	DEPARTMENT RESPONSE
Joy Grayson, President-Elect SCPTA; Derek Lewis, First Steps and Greenville County Schools	61-22, Sections II, III & IV, definition of and references to "volunteers"	Proposed revisions to the regulation include not only school employees, but "volunteers," who would also need to be evaluated for tuberculosis. "Volunteers" was defined as someone who is not an employee but who spends more than twenty hours per month in any one location and who spends his or her time primarily inside the facility or in close contact with children. It was strongly recommended that "volunteers" not be included in the proposed revisions. Commentors' concerns included: 1) schools and child care centers do not currently track volunteer hours so their inclusion would add to the administrative burden; 2) many school districts struggle to get volunteers, so requiring	The Department concurs. Because of the administrative burden that tracking volunteers may have on schools and child care centers and the possible chilling effect the proposed revisions may have on the ability to recruit volunteers, the Department has removed the proposed requirement that volunteers be tested for tuberculosis, but will, upon support from the same Commentors, leave the *recommendation* that volunteers be included in annual public health education.

		volunteers to be tested for TB and to pay for testing could have a chilling effect on those willing to volunteer.	
Catherine Storey, RN, Greenville County School District; Dawn McAdams, RN, Richland County School District 2	61-22, Section III(C)	The proposed revisions require that schools and child care centers maintain a completed DHEC 1420 form for each employee certifying that the employee does not have TB disease. Commentors raised the question as to who should maintain copies of the forms when the person working in the school is directly employed by an outside entity and not by the school or child care center, such as is the case with some substitute teachers. Commentors recommended that the entity employing the individual should be responsible.	The Department concurs. The Department has revised the regulation to make the outside entity responsible for maintaining copies of DHEC 1420 for their employees who work in schools and child care centers.
Dawn McAdams, RN, Richland County School District 2	61-22, Section III	The proposed revisions included the requirement that TB evaluations be conducted by "licensed physicians." The Commentor suggested that often times it is a physician assistant or nurse that gives the TB test and reads the results. Consequently, the suggestion was made that the wording be changed to "licensed health care provider."	The Department concurs in part. Where possible, the Department changed "licensed physician" to "licensed health care provider." However, the relevant statutes provide, in pertinent part, that one must "secure a health certificate from a *licensed physician*" and that "the *physician* shall make the aforesaid certificate" on the DHEC form (S.C. Code Ann. 44-29-160 & -170). Because the Department cannot lessen the requirements of a statute, but must work within the authority given, the Department revised the regulation so that a person can

			be *evaluated* by a licensed health care provider, but must obtain the written certification from a licensed physician.
Catherine Storey, RN, Greenville County School District; Dawn McAdams, RN, Richland County School District 2; Cynthia Lara, DSS	61-22, Section III(B)	The proposed revisions provide that once a person is evaluated for TB disease and found to be free of TB in an active state, no further routine evaluation is required. Commentors questioned how the requirements would apply to someone who left employment in a school or child care setting and returned a year or more later. They suggested that re-evaluation be required for those with gaps in employment.	The Department concurs. The regulation has been revised to include Section III(B)(3), providing that so long as a person continuously works in one of these settings re-evaluation for TB (absent certain other circumstances) is not required, but if one leaves employment, re-evaluation is required as a condition of employment. The Department also added Section III(B)(4), which is related to and seeks to clarify new section III(B)(3), by explaining that these are minimum recommended guidelines and that schools and child care centers are free to require TB evaluations and screenings more frequently than these guidelines provide.
Cynthia Lara, DSS; Maggie Meekin, Joint Citizen and Legislative Committee on Children	61-22, Section I	The statute on which the regulation is based provides that it applies to public and private schools, kindergartens, nurseries and "day care centers for infants and children." The terms are not defined in the relevant section of the statute. Consequently, the Commentors questioned whether the regulation should apply to registered family child care homes, suggesting that it should not.	The Department concurs. To the Department's knowledge, registered family child care homes, which provide care for up to 6 children at any given time within the home of the child care provider, have never been included in practice in the application of the regulation. The Department has revised the regulation to specifically exempt from its requirements registered family child care homes.
John F. Emerson, General Counsel,	61-22, Section III(C)	The proposed revisions provide that every school, kindergarten, nursery or day care	The Department concurs. Schools and child care centers should have flexibility in how they meet the requirement of

Charleston County School District		center for infants and children shall maintain a completed DHEC 1420 for each employee. The Commentor questioned whether the regulation would allow a school district office to maintain the records instead of each individual school, suggesting that it should.	documenting TB evaluations for employees. Consequently, the Department revised the proposed regulation to make it clear that records may be maintained at each individual facility or in a centralized office, such as a school district office.

BOARD OF HEALTH AND ENVIRONMENTAL CONTROL

Summary Sheet
December 8, 2016

__X_ Action
____ Information

I. SUBJECT: Placement of Furanyl Fentanyl into Schedule I for Controlled Substances

II. FACTS: Controlled substances are governed by the Controlled Substances Act (CSA), found at Title 44, Chapter 53, of the S.C. Code of Laws. Section 44-53-160 is titled "Manner in which changes in schedule of controlled substances shall be made." Pursuant to Section 44-53-160, controlled substances are generally designated by the General Assembly, upon recommendation by DHEC. Schedule I substances are listed in § 44-53-190. Section 44-53-160(C) provides a process by which DHEC can expeditiously designate a substance as a controlled substance if the federal government has so designated.

§ 44-53-160(C) states:

> If a substance is added, deleted, or rescheduled as a controlled substance pursuant to federal law or regulation, the department shall, at the first regular or special meeting of the South Carolina Board of Health and Environmental Control within thirty days after publication in the federal register of the final order designating the substance as a controlled substance or rescheduling or deleting the substance, add, delete, or reschedule the substance in the appropriate schedule. The addition, deletion, or rescheduling of a substance by the department pursuant to this subsection has the full force of law unless overturned by the General Assembly. The addition, deletion, or rescheduling of a substance by the department pursuant to this subsection must be in substance identical with the order published in the federal register effecting the change in federal status of the substance. Upon the addition, deletion, or rescheduling of a substance, the department shall forward copies of the change to the Chairman of the Medical Affairs Committee and the Judiciary Committee of the Senate, the Medical, Military, Public and Municipal Affairs Committee and the Judiciary Committee of the House of Representatives, and to the Clerks of the Senate and House, and shall post the schedules on the department's website indicating the change and specifying the effective date of the change.

The U.S. Department of Justice, Drug Enforcement Administration (DEA), published on September 27, 2016, its notice of intent to temporarily schedule the synthetic opioid, N-(1- phenethylpiperidin-4-yl)-N-phenylfuran-2-carboxamide (furanyl fentanyl), and its isomers, esters, ethers, salts and salts of isomers, esters, and ethers into Schedule I, pursuant to the temporary scheduling provisions of the Controlled Substances Act. This action was based on a finding by the Administrator that the placement of this synthetic opioid into Schedule I of the Controlled Substances Act is necessary to avoid an imminent hazard to the public safety. https://www.gpo.gov/fdsys/pkg/FR-2016-09-27/pdf/2016-23183.pdf. The DEA further noted its intent to publish its final order following the required 30-day notice period.

On November 29, 2016, the DEA published its final order to temporarily schedule furanyl fentanyl into Schedule I of the CSA. https://www.gpo.gov/fdsys/pkg/FR-2016-11-29/pdf/2016-28693.pdf.

III. ANALYSIS: The DEA is currently aware of at least 128 confirmed fatalities associated with furanyl fentanyl.

Based on documented case reports of overdose fatalities, the abuse of furanyl fentanyl leads to the same qualitative public health risks as heroin, fentanyl and other opioid analgesic substances. The public health risks attendant to the abuse of heroin and opioid analgesics are well established and have resulted in large numbers of drug treatment admissions, emergency department visits, and fatal overdoses.

To find that placing a substance temporarily into Schedule I of the CSA is necessary to avoid an imminent hazard to the public safety, the Administrator is required to consider three of the eight factors set forth in section 201(c) of the CSA, 21 U.S.C. 811(c): The substance's history and current pattern of abuse; the scope, duration and significance of abuse; and what, if any, risk there is to the public health. 21 U.S.C. 811(h)(3). Consideration of these factors includes actual abuse, diversion from legitimate channels, and clandestine importation, manufacture, or distribution. 21 U.S.C. 811(h)(3).

A substance meeting the statutory requirements for temporary scheduling may only be placed into Schedule I. 21 U.S.C. 811(h)(1). Substances in Schedule I are those that have a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use under medical supervision. 21 U.S.C. 812(b)(1). Available data and information for furanyl fentanyl, summarized below, indicate that this synthetic opioid has a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use under medical supervision.

IV. RECOMMENDATION: As the DEA has determined it is necessary to temporarily schedule furanyl fentanyl into Schedule I of the CSA, and finds that placement of this synthetic opioid into Schedule I of the CSA is necessary in order to avoid an imminent hazard to the public safety; therefore, the Department recommends the Board adopt the scheduling of Furanyl Fentanyl into Schedule I for Controlled Substances as set forth below, and amend S.C. Code Section 44-53-190(C) to include:

N-(1-phenethylpiperidin-4-yl)-N-phenylfuran-2-carboxamide, its isomers, esters, ethers, salts and salts of isomers, esters and ethers (Other names: furanyl fentanyl) (9843).

Submitted by:

Lisa Thomson
Chief, Bureau of Drug Control

BRM for Shelly Kelly
Shelly Kelly
Deputy Director for Health Regulations

Attachments: Federal Register Vol. 81, No. 187, Tuesday, September 27, 2016
Federal Register Vol. 81, No. 229, Tuesday, November 29, 2016

ATTACHMENT A
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12.5 miles northeast of the airport, and within a 6.5-mile radius of Ohio State University Airport, and within a 7.4-mile radius of Bolton Field Airport, and within a 7-mile radius of Fairfield County Airport, and within a 6.5-mile radius of Darby Dan Airport, excluding that airspace within the London, OH, Class E airspace area.

* * * * *

AGL OH E5 Defiance, OH [Amended]

Defiance Memorial Airport, OH
(Lat. 41°20′15″ N., long. 84°25′44″ W.)
Defiance Regional Medical Center Heliport, OH, Point in Space Coordinates
(Lat. 41°17′53″ N., long. 84°22′40″ W.)

That airspace extending upward from 700 feet above the surface within a 6.4-mile radius of Defiance Memorial Airport, and within a 6-mile radius of the Point in Space serving Defiance Regional Medical Center Heliport.

* * * * *

AGL OH E5 Findlay, OH [Amended]

Findlay Airport, OH
(Lat. 41°00′43″ N., long. 83°40′07″ W.)
Bluffton Airport, OH
(Lat. 40°53′08″ N., long. 83°52′07″ W.)

That airspace extending upward from 700 feet above the surface within a 6.8-mile radius of Findlay Airport and within a 7.2-mile radius of Bluffton Airport.

* * * * *

AGL OH E5 Hamilton, OH [Amended]

Butler County Regional Airport-Hogan Field, OH
(Lat. 39°21′50'' N., long. 84°31′19'' W.)

That airspace extending upward from 700 feet above the surface within a 6.9-mile radius of Butler County Regional Airport-Hogan Field.

* * * * *

AGL OH E5 Lima, OH [Amended]

Lima Allen County Airport, OH
(Lat. 40°42′27″ N., long. 84°01′37″ W.)
St. Rita's Medical Center Heliport, OH, Point in Space Coordinates
(Lat. 40°44′26″ N., long. 84°07′06″ W.)

That airspace extending upward from 700 feet above the surface within a 6.6-mile radius of Lima Allen County Airport, and within a 6-mile radius of the Point in Space serving St. Rita's Medical Center Heliport, excluding the airspace within the Findlay, OH, Class E airspace area.

AGL OH E5 London, OH [Amended]

Madison County Airport, OH
(Lat. 39°55′58″ N., long. 83°27′43″ W.)

That airspace extending upward from 700 feet above the surface within a 6.4-mile radius of Madison County Airport.

Issued in Fort Worth, Texas, on September 19, 2016.

Walter Tweedy,

Acting Manager, Operations Support Group, ATO Central Service Center.

[FR Doc. 2016–23113 Filed 9–26–16; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF JUSTICE

Drug Enforcement Administration

21 CFR Part 1308

[Docket No. DEA–448]

Schedules of Controlled Substances: Temporary Placement of Furanyl Fentanyl Into Schedule I

AGENCY: Drug Enforcement Administration, Department of Justice.

ACTION: Notice of intent.

SUMMARY: The Administrator of the Drug Enforcement Administration is issuing this notice of intent to temporarily schedule the synthetic opioid, *N*-(1-phenethylpiperidin-4-yl)-*N*-phenylfuran-2-carboxamide (furanyl fentanyl), into schedule I pursuant to the temporary scheduling provisions of the Controlled Substances Act. This action is based on a finding by the Administrator that the placement of this synthetic opioid into schedule I of the Controlled Substances Act is necessary to avoid an imminent hazard to the public safety. Any final order will impose the administrative, civil, and criminal sanctions and regulatory controls applicable to schedule I controlled substances under the Controlled Substances Act on the manufacture, distribution, possession, importation, exportation, research, and conduct of, instructional activities of this synthetic opioid.

DATES: September 27, 2016.

FOR FURTHER INFORMATION CONTACT: Michael J. Lewis, Office of Diversion Control, Drug Enforcement Administration; Mailing Address: 8701 Morrissette Drive, Springfield, Virginia 22152; Telephone: (202) 598–6812.

SUPPLEMENTARY INFORMATION: Any final order will be published in the **Federal Register** and may not be effective prior to October 27, 2016.

Legal Authority

The Drug Enforcement Administration (DEA) implements and enforces titles II and III of the Comprehensive Drug Abuse Prevention and Control Act of 1970, as amended. 21 U.S.C. 801–971. Titles II and III are referred to as the ''Controlled Substances Act'' and the ''Controlled Substances Import and Export Act,'' respectively, and are collectively referred to as the ''Controlled Substances Act'' or the ''CSA'' for the purpose of this action. The DEA publishes the implementing regulations for these statutes in title 21 of the Code of Federal Regulations (CFR), chapter II. The CSA and its implementing regulations are designed to prevent, detect, and eliminate the diversion of controlled substances and listed chemicals into the illicit market while providing for the legitimate medical, scientific, research, and industrial needs of the United States. Controlled substances have the potential for abuse and dependence and are controlled to protect the public health and safety.

Under the CSA, each controlled substance is classified into one of five schedules based upon its potential for abuse, its currently accepted medical use in treatment in the United States, and the degree of dependence the drug or other substance may cause. 21 U.S.C. 812. The initial schedules of controlled substances established by Congress are found at 21 U.S.C. 812(c), and the current list of all scheduled substances is published at 21 CFR part 1308.

Section 201 of the CSA, 21 U.S.C. 811, provides the Attorney General with the authority to temporarily place a substance into schedule I of the CSA for two years without regard to the requirements of 21 U.S.C. 811(b) if she finds that such action is necessary to avoid imminent hazard to the public safety. 21 U.S.C. 811(h)(1). In addition, if proceedings to control a substance are initiated under 21 U.S.C. 811(a)(1), the Attorney General may extend the temporary scheduling for up to one year. 21 U.S.C. 811(h)(2).

Where the necessary findings are made, a substance may be temporarily scheduled if it is not listed in any other schedule under section 202 of the CSA, 21 U.S.C. 812, or if there is no exemption or approval in effect for the substance under section 505 of the Federal Food, Drug, and Cosmetic Act (FDCA), 21 U.S.C. 355. 21 U.S.C. 811(h)(1). The Attorney General has delegated scheduling authority under 21 U.S.C. 811 to the Administrator of the DEA. 28 CFR 0.100.

Background

Section 201(h)(4) of the CSA, 21 U.S.C. 811(h)(4), requires the Administrator to notify the Secretary of the Department of Health and Human Services (HHS) of his intention to temporarily place a substance into schedule I of the CSA.[1] The

[1] As discussed in a memorandum of understanding entered into by the Food and Drug Administration (FDA) and the National Institute on Drug Abuse (NIDA), the FDA acts as the lead agency within the HHS in carrying out the Secretary's scheduling responsibilities under the CSA, with the concurrence of NIDA. 50 FR 9518, Mar. 8, 1985. The Secretary of the HHS has delegated to the Assistant Secretary for Health of the HHS the authority to make domestic drug scheduling recommendations. 58 FR 35460, July 1, 1993.

Administrator transmitted notice of his intent to place furanyl fentanyl in schedule I on a temporary basis to the Assistant Secretary by letter dated June 22, 2016. The Assistant Secretary responded to this notice by letter dated July 8, 2016, and advised that based on review by the Food and Drug Administration (FDA), there are currently no investigational new drug applications or approved new drug applications for furanyl fentanyl. The Assistant Secretary also stated that the HHS has no objection to the temporary placement of furanyl fentanyl into schedule I of the CSA. Furanyl fentanyl is not currently listed in any schedule under the CSA, and no exemptions or approvals are in effect for furanyl fentanyl under section 505 of the FDCA, 21 U.S.C. 355. The DEA has found that the control of furanyl fentanyl in schedule I on a temporary basis is necessary to avoid an imminent hazard to public safety.

To find that placing a substance temporarily into schedule I of the CSA is necessary to avoid an imminent hazard to the public safety, the Administrator is required to consider three of the eight factors set forth in section 201(c) of the CSA, 21 U.S.C. 811(c): The substance's history and current pattern of abuse; the scope, duration and significance of abuse; and what, if any, risk there is to the public health. 21 U.S.C. 811(h)(3). Consideration of these factors includes actual abuse, diversion from legitimate channels, and clandestine importation, manufacture, or distribution. 21 U.S.C. 811(h)(3).

A substance meeting the statutory requirements for temporary scheduling may only be placed in schedule I. 21 U.S.C. 811(h)(1). Substances in schedule I are those that have a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use under medical supervision. 21 U.S.C. 812(b)(1).

Furanyl Fentanyl

Furanyl fentanyl was first described in 1986 in the patent literature. The scientific literature reported overdose events involving furanyl fentanyl, among other fentanyl analogues in 2015 in Sweden. No approved medical use has been identified for furanyl fentanyl, nor has it been approved by the FDA for human consumption. The recent identification of furanyl fentanyl in drug evidence and the identification of this substance in association with fatal overdose events indicate that this substance is being abused for its morphine-like properties.

Available data and information for furanyl fentanyl, summarized below, indicate that this synthetic opioid has a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use under medical supervision. The DEA's three-factor analysis is available in its entirety under the public docket of this action as a supporting document at *www.regulations.gov* under Docket Number DEA–448.

Factor 4. History and Current Pattern of Abuse

On October 1, 2014, the DEA implemented STARLiMS (a web-based, commercial laboratory information management system) to replace the System to Retrieve Information from Drug Evidence (STRIDE) as its laboratory drug evidence data system of record. DEA laboratory data submitted after September 30, 2014, are reposited in STARLiMS; data from STRIDE and STARLiMS were queried on July 11, 2016. STARLiMS registered 36 reports containing furanyl fentanyl, all reported in 2016, from California, Connecticut, Florida, Georgia, Maryland, Montana, New Jersey, New York, North Carolina, North Dakota, Tennessee, Utah, West Virginia, and the District of Columbia. The DEA is not aware of any laboratory identifications of furanyl fentanyl prior to 2015.

The National Forensic Laboratory Information System (NFLIS) is a national drug forensic laboratory reporting system that systematically collects results from drug chemistry analyses conducted by other federal, state and local forensic laboratories across the country. According to NFLIS, the first report of furanyl fentanyl at other federal, state, or local forensic laboratories was recorded in January 2016 in Ohio. From January through May 2016, a total of 80 submissions involving furanyl fentanyl were reported in NFLIS as a result of law enforcement encounters in Iowa, New Jersey, North Dakota, Ohio, and Wisconsin (query date: July 11, 2016).

Evidence suggests that the pattern of abuse of fentanyl analogues, including furanyl fentanyl, parallels that of heroin and prescription opioid analgesics. Seizures of furanyl fentanyl have been encountered in powder form. Furanyl fentanyl has also been encountered in drug paraphernalia commonly associated with heroin or other opioid abuse including glassine bags, and as a residue on spoons and bottle caps. Furanyl fentanyl has been encountered as a single substance as well as in combination with other substances of abuse, including heroin, fentanyl, butyryl fentanyl, and U–47700. Furanyl fentanyl has caused fatal overdoses, in which intravenous routes of administration are documented.

Factor 5. Scope, Duration and Significance of Abuse

The DEA is currently aware of at least 128 confirmed fatalities associated with furanyl fentanyl. The information on these deaths occurring in 2015 and 2016 was collected from personal communications or toxicology and medical examiner reports received by the DEA. These deaths were reported from five states—Illinois (36), Maryland (41), New Jersey (1), North Carolina (49), and Ohio (1). STARLiMS and NFLIS have a total of 116 drug reports in which furanyl fentanyl was identified in drug exhibits submitted to forensic laboratories in 2016 from law enforcement encounters in California, Connecticut, Florida, Georgia, Iowa, Maryland, Montana, New Jersey, New York, North Carolina, North Dakota, Ohio, Tennessee, Utah, West Virginia, Wisconsin, and the District of Columbia. It is likely that the prevalence of furanyl fentanyl in opioid analgesic-related emergency room admissions and deaths is underreported as standard immunoassays may not differentiate this substance from fentanyl.

The population likely to abuse furanyl fentanyl overlaps with the population abusing prescription opioid analgesics and heroin. This is evidenced by the routes of drug administration and drug use history documented in furanyl fentanyl fatal overdose cases. Because abusers of furanyl fentanyl are likely to obtain this substance through unregulated sources, the identity, purity, and quantity are uncertain and inconsistent, thus posing significant adverse health risks to the end user. Individuals who initiate (*i.e.* use an illicit drug for the first time) furanyl fentanyl abuse are likely to be at risk of developing substance use disorder, overdose, and death similar to that of other opioid analgesics (*e.g.,* fentanyl, morphine, etc.).

Factor 6. What, if Any, Risk There Is to the Public Health

Furanyl fentanyl exhibits pharmacological profiles similar to that of fentanyl and other μ-opioid receptor agonists. The toxic effects of furanyl fentanyl in humans are demonstrated by overdose fatalities involving this substance. Abusers of furanyl fentanyl may not know the origin, identity, or purity of this substance, thus posing significant adverse health risks when compared to abuse of pharmaceutical

preparations of opioid analgesics, such as morphine and oxycodone.

Based on the documented case reports of overdose fatalities, the abuse of furanyl fentanyl leads to the same qualitative public health risks as heroin, fentanyl and other opioid analgesic substances. The public health risks attendant to the abuse of heroin and opioid analgesics are well established and have resulted in large numbers of drug treatment admissions, emergency department visits, and fatal overdoses.

Furanyl fentanyl has been associated with numerous fatalities. At least 128 confirmed overdose deaths involving furanyl fentanyl abuse have been reported throughout Illinois (36), Maryland (41), New Jersey (1), North Carolina (49), and Ohio (1) between 2015 and 2016.

Finding of Necessity of Schedule I Placement To Avoid Imminent Hazard to Public Safety

In accordance with 21 U.S.C. 811(h)(3), based on the available data and information, summarized above, the continued uncontrolled manufacture, distribution, reverse distribution, importation, exportation, conduct of research and chemical analysis, possession, and abuse of furanyl fentanyl poses an imminent hazard to the public safety. The DEA is not aware of any currently accepted medical uses for furanyl fentanyl in the United States. A substance meeting the statutory requirements for temporary scheduling, 21 U.S.C. 811(h)(1) may only be placed in schedule I. Substances in schedule I are those that have a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use under medical supervision. Available data and information for furanyl fentanyl indicate that this substance has a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use under medical supervision. As required by section 201(h)(4) of the CSA, 21 U.S.C. 811(h)(4), the Administrator, through a letter dated June 22, 2016, notified the Assistant Secretary of the DEA's intention to temporarily place this substance in schedule I.

Conclusion

This notice of intent initiates an expedited temporary scheduling action and provides the 30-day notice pursuant to section 201(h) of the CSA, 21 U.S.C. 811(h). In accordance with the provisions of section 201(h) of the CSA, 21 U.S.C. 811(h), the Administrator considered available data and information, herein set forth the grounds for his determination that it is necessary to temporarily schedule furanyl fentanyl in schedule I of the CSA, and finds that placement of this synthetic opioid substance into schedule I of the CSA is necessary in order to avoid an imminent hazard to the public safety.

Because the Administrator hereby finds that it is necessary to temporarily place furanyl fentanyl into schedule I to avoid an imminent hazard to the public safety, any subsequent final order temporarily scheduling this substance will be effective on the date of publication in the **Federal Register**, and will be in effect for a period of two years, with a possible extension of one additional year, pending completion of the regular scheduling process. 21 U.S.C. 811(h)(1) and (2). It is the intention of the Administrator to issue such a final order as soon as possible after the expiration of 30 days from the date of publication of this notice. Furanyl fentanyl will then be subject to the regulatory controls and administrative, civil, and criminal sanctions applicable to the manufacture, distribution, reverse distribution, importation, exportation, research, conduct of instructional activities and chemical analysis, and possession of a schedule I controlled substance.

The CSA sets forth specific criteria for scheduling a drug or other substance. Regular scheduling actions in accordance with 21 U.S.C. 811(a) are subject to formal rulemaking procedures done ''on the record after opportunity for a hearing'' conducted pursuant to the provisions of 5 U.S.C. 556 and 557. 21 U.S.C. 811. The regular scheduling process of formal rulemaking affords interested parties with appropriate process and the government with any additional relevant information needed to make a determination. Final decisions that conclude the regular scheduling process of formal rulemaking are subject to judicial review. 21 U.S.C. 877. Temporary scheduling orders are not subject to judicial review. 21 U.S.C. 811(h)(6).

Regulatory Matters

Section 201(h) of the CSA, 21 U.S.C. 811(h), provides for an expedited temporary scheduling action where such action is necessary to avoid an imminent hazard to the public safety. As provided in this subsection, the Attorney General may, by order, schedule a substance in schedule I on a temporary basis. Such an order may not be issued before the expiration of 30 days from (1) the publication of a notice in the **Federal Register** of the intention to issue such order and the grounds upon which such order is to be issued, and (2) the date that notice of the proposed temporary scheduling order is transmitted to the Assistant Secretary of HHS. 21 U.S.C. 811(h)(1).

Inasmuch as section 201(h) of the CSA directs that temporary scheduling actions be issued by order and sets forth the procedures by which such orders are to be issued, the DEA believes that the notice and comment requirements of section 553 of the Administrative Procedure Act (APA), 5 U.S.C. 553, do not apply to this notice of intent. In the alternative, even assuming that this notice of intent might be subject to section 553 of the APA, the Administrator finds that there is good cause to forgo the notice and comment requirements of section 553, as any further delays in the process for issuance of temporary scheduling orders would be impracticable and contrary to the public interest in view of the manifest urgency to avoid an imminent hazard to the public safety.

Although the DEA believes this notice of intent to issue a temporary scheduling order is not subject to the notice and comment requirements of section 553 of the APA, the DEA notes that in accordance with 21 U.S.C. 811(h)(4), the Administrator will take into consideration any comments submitted by the Assistant Secretary with regard to the proposed temporary scheduling order.

Further, the DEA believes that this temporary scheduling action is not a ''rule'' as defined by 5 U.S.C. 601(2), and, accordingly, is not subject to the requirements of the Regulatory Flexibility Act (RFA). The requirements for the preparation of an initial regulatory flexibility analysis in 5 U.S.C. 603(a) are not applicable where, as here, the DEA is not required by section 553 of the APA or any other law to publish a general notice of proposed rulemaking.

Additionally, this action is not a significant regulatory action as defined by Executive Order 12866 (Regulatory Planning and Review), section 3(f), and, accordingly, this action has not been reviewed by the Office of Management and Budget (OMB).

This action will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 13132 (Federalism) it is determined that this action does not have sufficient

federalism implications to warrant the preparation of a Federalism Assessment.

List of Subjects in 21 CFR Part 1308

Administrative practice and procedure, Drug traffic control, Reporting and recordkeeping requirements.

For the reasons set out above, the DEA proposes to amend 21 CFR part 1308 as follows:

PART 1308—SCHEDULES OF CONTROLLED SUBSTANCES

■ 1. The authority citation for part 1308 continues to read as follows:

Authority: 21 U.S.C. 811, 812, 871(b), unless otherwise noted.

■ 2. In § 1308.11, add paragraph (h)(21) to read as follows:

§ 1308.11 Schedule I

* * * * *

(h) * * *

(21) *N*-(1-phenethylpiperidin-4-yl)-*N*-phenylfuran-2-carboxamide, its isomers, esters, ethers, salts and salts of isomers, esters and ethers (Other names: Furanyl fentanyl) . . . (9834).

Dated: September 15, 2016.

Chuck Rosenberg,

Acting Administrator.

[FR Doc. 2016–23183 Filed 9–26–16; 8:45 am]

BILLING CODE 4410–09–P

AGENCY FOR INTERNATIONAL DEVELOPMENT

22 CFR Part 212

Freedom of Information Act Regulations

AGENCY: Agency for International Development (USAID).

ACTION: Proposed rule.

SUMMARY: This regulation prescribes the procedures and standards USAID follows in processing requests for records under the Freedom of Information Act (''FOIA''), 5 U.S.C. 552. The Act requires agencies to review their FOIA regulations, and no later than 180 days after enactment, directed the head of each agency to issue regulations on various elements of its FOIA program.

DATES: Submit comments on or before November 25, 2016.

FOR FURTHER INFORMATION CONTACT: Lynn P. Winston, Bureau for Management, Office of Management Services, Information Records Division, U.S. Agency for International Development, Washington, DC 20523–6601; tel. 202–712–0960, fax: 202–216–3070.

SUPPLEMENTARY INFORMATION: On June 30, 2016, President Obama signed into law the FOIA Improvement Act of 2016. The Act addresses a range of procedural issues that affect agency FOIA regulations, including requirements that agencies establish a minimum of 90 days for requesters to file an administrative appeal, and that they provide dispute resolution services at various times throughout the FOIA process. The Act also, among other things, codifies the Department of Justice's ''foreseeable harm'' standard, amends Exemption 5, creates a new ''Chief FOIA Officer Council,'' and adds two new elements to agency Annual FOIA Reports.

List of Subjects in 22 CFR Part 212

Freedom of information.

For the reasons stated in the preamble, USAID proposes to revise 22 CFR part 212 to read as follows:

PART 212—PUBLIC INFORMATION

Subpart A—General Provisions

212.1 Purpose and scope.
212.2 Policy.
212.3 Records available on the Agency's Web site.

Subpart B—Proactive Disclosures of Agency Records

212.4 Materials available for public inspection and copying.

Subpart C—Requirements for Making Requests

212.5 How to make a request for records.

Subpart D—Responsibility for Responding to Requests

212.6 Designation of authorized officials.
212.7 Processing of request.

Subpart E—Reasons for Withholding Some Records

212.8 General policy.
212.9 Exemption 1: National defense and foreign policy.
212.10 Exemption 2: Internal personnel rules and practices.
212.11 Exemption 3: Records exempted by other statutes.
212.12 Exemption 4: Trade secrets and confidential commercial or financial information.
212.13 Exemption 5: Internal memoranda.
212.14 Exemption 6: Clearly unwarranted invasion of personal privacy.
212.15 Exemption 7: Law enforcement.
212.16 Exemption 8: Records on financial institutions.
212.17 Exemption 9: Records concerning geological information.
212.18 Exclusions one through three.

Subpart F—Timing of Responses to Requests

212.19 Time limits.

Subpart G—Responses to Requests

212.20 Responsibility for responding to requests.

Subpart H—Confidential Commercial Information

212.21 Policy and procedures.

Subpart I—Administrative Appeals

212.22 Appeal procedures.
212.23 Mediation and dispute services.

Subpart J—Preservation of Records

212.24 Policy and procedures.

Subpart K—Fees

212.25 Fees to be charged—general.
212.26 Fees to be charged—requester categories.

Subpart L—Annual Reporting Requirements

212.27 Annual Report.
212.28 Chief FOIA Officer's Report.

Subpart M—FOIA Definitions

212.29 Glossary.

Subpart N—Other Rights and Services

212.30 Rights and services qualified by the FOIA statute.

Subpart O—Privacy Act Provisions

212.31 Purpose and scope.
212.32 Privacy definitions.
212.33 Request for access to records.
212.34 Request to amend or correct records.
212.35 Appeals from denials of PA amendment requests.
212.36 Request for accounting of record disclosures.
212.37 Specific exemptions.

Subpart A—General Provisions

§ 212.1 Purpose and scope.

This subpart contains the rules that the United States Agency of International Development (hereinafter ''USAID'' or ''the Agency'') follows in processing requests for records under the Freedom of Information Act (''FOIA''), 5 U.S.C. 552. The rules in this subpart should be read in conjunction with the text of the FOIA. Requests made by individuals for records about themselves under the Privacy Act of 1974, are processed under Subpart O. Definitions of FOIA terms are referenced in Subpart L. As a matter of policy, the Agency makes discretionary disclosures of records or information exempt from disclosure under the FOIA whenever disclosure would not foreseeably harm an interest protected by a FOIA exemption, but this policy does not create any right enforceable in court.

§ 212.2 Policy.

(a) As a general policy, USAID follows a balanced approach in administering the FOIA. USAID recognizes the right of the public to access information in the possession of the Agency. USAID also recognizes the legitimate interests of

ATTACHMENT B
Federal Register Vol. 81, No. 229, Tuesday, November 29, 2016

§ 1.90 Notice of sampling.

When a sample of an article offered for import has been requested by the district director, FDA shall provide to the owner or consignee prompt notice of delivery of, or intention to deliver, such sample. Upon receipt of the notice, the owner or consignee shall hold such article and not distribute it until further notice from the district director or U.S. Customs and Border Protection of the results of examination of the sample.

■ 5. In § 1.94, revise the first sentence of paragraphs (a) and (c) to read as follows:

§ 1.94 Hearing on refusal of admission or destruction.

(a) If it appears that the article may be subject to refusal of admission, or that the article is a drug that may be subject to destruction under section 801(a) of the Federal Food, Drug, and Cosmetic Act, the district director shall give the owner or consignee a written or electronic notice to that effect, stating the reasons therefor. * * *

* * * * *

(c) If the article is a drug that may be subject to destruction under section 801(a) of the Federal Food, Drug, and Cosmetic Act, the district director may give the owner or consignee a single written or electronic notice that provides the notice of refusal of admission and the notice of destruction of an article described in paragraph (a) of this section. * * *

PART 1005—IMPORTATION OF ELECTRONIC PRODUCTS

■ 6. The authority citation for part 1005 continues to read as follows:

Authority: 21 U.S.C. 360ii, 360mm.

■ 7. Revise § 1005.2 to read as follows:

§ 1005.2 Definitions.

As used in this part:

The term *owner* or *consignee* means the person who makes entry under the provisions of section 484 of the Tariff Act of 1930, as amended (19 U.S.C. 1484), namely, the ''importer of record.''

PART 1271—HUMAN CELLS, TISSUES, AND CELLULAR AND TISSUE–BASED PRODUCTS

■ 8. The authority citation for part 1271 continues to read as follows:

Authority: 42 U.S.C. 216, 243, 263a, 264, 271.

■ 9. In § 1271.420, revise paragraph (a) to read as follows:

§ 1271.420 HCT/Ps offered for import.

(a) Except as provided in paragraphs (c) and (d) of this section, when an HCT/P is offered for import, the importer of record must notify, either before or at the time of importation, the director of the district of the Food and Drug Administration (FDA) having jurisdiction over the port of entry through which the HCT/P is imported or offered for import, or such officer of the district as the director may designate to act in his or her behalf in administering and enforcing this part, and must provide sufficient information, including information submitted in the Automated Commercial Environment (ACE) system or any other electronic data interchange system authorized by the U.S. Customs and Border Protection Agency as required in part 1, subpart D of this chapter, for FDA to make an admissibility decision.

* * * * *

Dated: November 21, 2016.

Leslie Kux,

Associate Commissioner for Policy, Food and Drug Administration.

In concurrence with FDA:

Dated: November 21, 2016.

Timothy E. Skud,

Deputy Assistant Secretary (Tax, Trade, and Tariff Policy), Department of the Treasury.

[FR Doc. 2016–28582 Filed 11–28–16; 8:45 am]

BILLING CODE 4164–01–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Food and Drug Administration

21 CFR Part 558

[Docket No. FDA–2016–N–1896]

New Animal Drugs for Use in Animal Feed; Category Definitions; Confirmation of Effective Date

AGENCY: Food and Drug Administration, HHS.

ACTION: Direct final rule; confirmation of effective date.

SUMMARY: The Food and Drug Administration (FDA) is confirming the effective date of December 1, 2016, for the final rule that appeared in the **Federal Register** of August 24, 2016. The direct final rule amends the animal drug regulations by revising the definitions of the two categories of new animal drugs used in medicated feeds to base category assignment only on approved uses in major animal species. This document confirms the effective date of the direct final rule.

DATES: Effective date of final rule published in the **Federal Register** of August 24, 2016 (81 FR 57796) confirmed: December 1, 2016.

FOR FURTHER INFORMATION CONTACT: David Edwards, Center for Veterinary Medicine (HFV–220), Food and Drug Administration, 7519 Standish Pl., Rockville, MD 20855, 240–402–6205.

SUPPLEMENTARY INFORMATION: In the **Federal Register** of August 24, 2016 (81 FR 57796), FDA solicited comments concerning the direct final rule for a 75-day period ending November 7, 2016. FDA stated that the effective date of the direct final rule would be on December 1, 2016, unless any significant adverse comment was submitted to FDA during the comment period. FDA did not receive any significant adverse comments.

Authority: Therefore, under the animal drug provisions of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 354, 360b, 360ccc, 360ccc–1, and 371), and under authority delegated to the Commissioner of Food and Drugs, 21 CFR part 558 is amended. Accordingly, the amendments issued thereby are effective.

Dated: November 22, 2016.

Leslie Kux,

Associate Commissioner for Policy.

[FR Doc. 2016–28607 Filed 11–28–16; 8:45 am]

BILLING CODE 4164–01–P

DEPARTMENT OF JUSTICE

Drug Enforcement Administration

21 CFR Part 1308

[Docket No. DEA–448]

Schedules of Controlled Substances: Temporary Placement of Furanyl Fentanyl Into Schedule I

AGENCY: Drug Enforcement Administration, Department of Justice.

ACTION: Final order.

SUMMARY: The Administrator of the Drug Enforcement Administration is issuing this final order to temporarily schedule the synthetic opioid, *N*-(1-phenethylpiperidin-4-yl)-*N*-phenylfuran-2-carboxamide (furanyl fentanyl), and its isomers, esters, ethers, salts and salts of isomers, esters and ethers, into schedule I pursuant to the temporary scheduling provisions of the Controlled Substances Act. This action is based on a finding by the Administrator that the placement of furanyl fentanyl into schedule I of the Controlled Substances Act is necessary to avoid an imminent hazard to the public safety. As a result of this order, the regulatory controls and administrative, civil, and criminal sanctions applicable to schedule I controlled substances will be imposed

on persons who handle (manufacture, distribute, reverse distribute, import, export, engage in research, conduct instructional activities or chemical analysis, or possess), or propose to handle, furanyl fentanyl.

DATES: This final order is effective on November 29, 2016.

FOR FURTHER INFORMATION CONTACT: Michael J. Lewis, Diversion Control Division, Drug Enforcement Administration; Mailing Address: 8701 Morrissette Drive, Springfield, Virginia 22152; Telephone: (202) 598–6812.

SUPPLEMENTARY INFORMATION:

Legal Authority

The Drug Enforcement Administration (DEA) implements and enforces titles II and III of the Comprehensive Drug Abuse Prevention and Control Act of 1970, as amended. 21 U.S.C. 801–971. Titles II and III are referred to as the ''Controlled Substances Act'' and the ''Controlled Substances Import and Export Act,'' respectively, and are collectively referred to as the ''Controlled Substances Act'' or the ''CSA'' for the purpose of this action. The DEA publishes the implementing regulations for these statutes in title 21 of the Code of Federal Regulations (CFR), chapter II. The CSA and its implementing regulations are designed to prevent, detect, and eliminate the diversion of controlled substances and listed chemicals into the illicit market while ensuring an adequate supply is available for the legitimate medical, scientific, research, and industrial needs of the United States. Controlled substances have the potential for abuse and dependence and are controlled to protect the public health and safety.

Under the CSA, every controlled substance is classified into one of five schedules based upon its potential for abuse, its currently accepted medical use in treatment in the United States, and the degree of dependence the drug or other substance may cause. 21 U.S.C. 812. The initial schedules of controlled substances established by Congress are found at 21 U.S.C. 812(c), and the current list of all scheduled substances is published at 21 CFR part 1308.

Section 201 of the CSA, 21 U.S.C. 811, provides the Attorney General with the authority to temporarily place a substance into schedule I of the CSA for two years without regard to the requirements of 21 U.S.C. 811(b) if she finds that such action is necessary to avoid an imminent hazard to the public safety. 21 U.S.C. 811(h)(1). In addition, if proceedings to control a substance are initiated under 21 U.S.C. 811(a)(1), the Attorney General may extend the temporary scheduling for up to one year. 21 U.S.C. 811(h)(2).

Where the necessary findings are made, a substance may be temporarily scheduled if it is not listed in any other schedule under section 202 of the CSA, 21 U.S.C. 812, or if there is no exemption or approval in effect for the substance under section 505 of the Federal Food, Drug, and Cosmetic Act (FDCA), 21 U.S.C. 355. 21 U.S.C. 811(h)(1). The Attorney General has delegated her scheduling authority under 21 U.S.C. 811 to the Administrator of the DEA. 28 CFR 0.100.

Background

Section 201(h)(4) of the CSA, 21 U.S.C. 811(h)(4), requires the Administrator to notify the Secretary of the Department of Health and Human Services (HHS) of his intention to temporarily place a substance into schedule I of the CSA.[1] The Administrator transmitted the notice of intent to place furanyl fentanyl into schedule I on a temporary basis to the Assistant Secretary by letter dated June 22, 2016. The Assistant Secretary responded to this notice by letter dated July 8, 2016, and advised that based on review by the Food and Drug Administration (FDA), there are currently no investigational new drug applications or approved new drug applications for furanyl fentanyl. The Assistant Secretary also stated that the HHS has no objection to the temporary placement of furanyl fentanyl into schedule I of the CSA. The DEA has taken into consideration the Assistant Secretary's comments as required by 21 U.S.C. 811(h)(4). Furanyl fentanyl is not currently listed in any schedule under the CSA, and no exemptions or approvals are in effect for furanyl fentanyl under section 505 of the FDCA, 21 U.S.C. 355. The DEA has found that the control of furanyl fentanyl in schedule I on a temporary basis is necessary to avoid an imminent hazard to the public safety, and as required by 21 U.S.C. 811(h)(1)(A), a notice of intent to temporarily schedule furanyl fentanyl was published in the **Federal Register** on September 27, 2016. 81 FR 66224.

To find that placing a substance temporarily into schedule I of the CSA is necessary to avoid an imminent hazard to the public safety, the Administrator is required to consider three of the eight factors set forth in section 201(c) of the CSA, 21 U.S.C. 811(c): The substance's history and current pattern of abuse; the scope, duration and significance of abuse; and what, if any, risk there is to the public health. 21 U.S.C. 811(h)(3). Consideration of these factors includes actual abuse, diversion from legitimate channels, and clandestine importation, manufacture, or distribution. 21 U.S.C. 811(h)(3).

A substance meeting the statutory requirements for temporary scheduling may only be placed into schedule I. 21 U.S.C. 811(h)(1). Substances in schedule I are those that have a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use under medical supervision. 21 U.S.C. 812(b)(1). Available data and information for furanyl fentanyl, summarized below, indicate that this synthetic opioid has a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use under medical supervision. The DEA's updated three-factor analysis, and the Assistant Secretary's July 8, 2016, letter, are available in their entirety under the tab ''Supporting Documents'' of the public docket of this action at *www.regulations.gov* under FDMS Docket ID: DEA–2016–0018 (Docket Number DEA–448).

Factor 4. History and Current Pattern of Abuse

The recreational abuse of fentanyl-like substances continues to be a significant concern. These substances are distributed to users with often unpredictable outcomes. Furanyl fentanyl has recently been encountered by law enforcement and public health officials and the adverse health effects and outcomes are documented in the scientific literature. The documented negative effects of furanyl fentanyl are consistent with those of other opioids. On October 1, 2014, the DEA implemented STARLiMS (a Web-based, commercial laboratory information management system) to replace the System to Retrieve Information from Drug Evidence (STRIDE) as its laboratory drug evidence data system of record. DEA laboratory data submitted after September 30, 2014, are reposited in STARLiMS; data from STRIDE and STARLiMS were queried on November 2, 2016. STARLiMS registered 113

[1] As discussed in a memorandum of understanding entered into by the Food and Drug Administration (FDA) and the National Institute on Drug Abuse (NIDA), the FDA acts as the lead agency within the HHS in carrying out the Secretary's scheduling responsibilities under the CSA, with the concurrence of NIDA. 50 FR 9518, Mar. 8, 1985. The Secretary of the HHS has delegated to the Assistant Secretary for Health of the HHS the authority to make domestic drug scheduling recommendations. 58 FR 35460, July 1, 1993.

reports containing furanyl fentanyl, all reported in 2016, from Alabama, California, Connecticut, Delaware, Florida, Georgia, Illinois, Maryland, Mississippi, Missouri, Montana, New Jersey, New York, North Carolina, North Dakota, Rhode Island, Tennessee, Texas, Utah, Virginia, Wisconsin, West Virginia, and the District of Columbia.

The National Forensic Laboratory Information System (NFLIS) is a national drug forensic laboratory reporting system that systematically collects results from drug chemistry analyses conducted by participating Federal, State and local forensic laboratories across the country. According to NFLIS, the first report of furanyl fentanyl was recorded in December 2015 in Oregon. From December 2015 through September 2016, a total of 494 submissions to state and local forensic laboratories identifying furanyl fentanyl were reported in NFLIS as a result of law enforcement encounters in California, Connecticut, Florida, Iowa, Kentucky, Massachusetts, Minnesota, Missouri, New Jersey, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Virginia, and Wisconsin (query date: November 2, 2016). The DEA is not aware of any laboratory identifications of furanyl fentanyl prior to 2015.

Evidence suggests that the pattern of abuse of fentanyl analogues, including furanyl fentanyl, parallels that of heroin and prescription opioid analgesics. Seizures of furanyl fentanyl have been encountered in powder form. Furanyl fentanyl has also been encountered in drug paraphernalia commonly associated with heroin or other opioid abuse including glassine bags, and as a residue on spoons and bottle caps. Furanyl fentanyl has been encountered as a single substance as well as in combination with other substances of abuse, including heroin, fentanyl, butyryl fentanyl, and U–47700. Furanyl fentanyl has been connected to fatal overdoses, in which intravenous routes of administration are documented.

Factor 5. Scope, Duration and Significance of Abuse

The scientific literature and reports collected by the DEA demonstrate furanyl fentanyl is being abused for its opioid properties. This abuse of furanyl fentanyl has resulted in morbidity and mortality (see updated DEA 3-Factor Analysis for full discussion). The DEA has received reports for at least 128 confirmed fatalities associated with furanyl fentanyl. The information on these deaths occurring in 2015 and 2016 was collected from email communications or toxicology and medical examiner reports received by the DEA. These deaths were reported from five states—Illinois (36), Maryland (41), New Jersey (1), North Carolina (49), and Ohio (1). The scientific literature notes additional fatal overdoses connected to furanyl fentanyl. STARLiMS and NFLIS have a total of 607 drug reports in which furanyl fentanyl was identified in drug exhibits submitted to forensic laboratories from December 2015 through September 2016 from law enforcement encounters. It is likely that the prevalence of furanyl fentanyl in opioid analgesic-related emergency room admissions and deaths is underreported as standard immunoassays may not differentiate this substance from fentanyl.

The population likely to abuse furanyl fentanyl overlaps with the population abusing prescription opioid analgesics and heroin. This is evidenced by the routes of drug administration and drug use history documented in furanyl fentanyl fatal overdose cases. Because abusers of furanyl fentanyl are likely to obtain this substance through unregulated sources (*i.e.* on-line purchases or drug dealers), the identity, purity, and quantity are uncertain and inconsistent, thus posing significant adverse health risks to the end user. Individuals who initiate (*i.e.* use a drug for the first time) furanyl fentanyl abuse are likely to be at risk of developing substance use disorder, overdose, and death similar to that of other opioid analgesics (*e.g.,* fentanyl, morphine, etc.).

Factor 6. What, if Any, Risk There Is to the Public Health

Furanyl fentanyl exhibits pharmacological profiles similar to that of fentanyl and other μ-opioid receptor agonists. The toxic effects of furanyl fentanyl in humans are demonstrated by overdose fatalities involving this substance. Abusers of furanyl fentanyl may not know the origin, identity, or purity of this substance, thus posing significant adverse health risks when compared to abuse of pharmaceutical preparations of opioid analgesics, such as morphine and oxycodone.

Based on reports in the scientific literature and information received by the DEA, the abuse of furanyl fentanyl leads to the same qualitative public health risks as heroin, fentanyl and other opioid analgesic substances. As with any non-medically approved opioid, the health and safety risks for users are great. The public health risks attendant to the abuse of heroin and opioid analgesics are well established and have resulted in large numbers of drug treatment admissions, emergency department visits, and fatal overdoses.

Furanyl fentanyl has been associated with a number of fatalities and non-fatal overdoses as detailed in the scientific literature. The DEA has received information connecting furanyl fentanyl to at least 128 confirmed overdose deaths occurring in 2015 and 2016 in Illinois (36), Maryland (41), New Jersey (1), North Carolina (49), and Ohio (1).

Finding of Necessity of Schedule I Placement To Avoid Imminent Hazard to Public Safety

In accordance with 21 U.S.C. 811(h)(3), based on the data and information summarized above, the continued uncontrolled manufacture, distribution, importation, exportation, and abuse of furanyl fentanyl pose an imminent hazard to the public safety. The DEA is not aware of any currently accepted medical uses for this substance in treatment in the United States. A substance meeting the statutory requirements for temporary scheduling, 21 U.S.C. 811(h)(1), may only be placed into schedule I. Substances in schedule I are those that have a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use under medical supervision. Available data and information for furanyl fentanyl indicate that this substance has a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety for use under medical supervision. As required by section 201(h)(4) of the CSA, 21 U.S.C. 811(h)(4), the Administrator, through a letter dated June 22, 2016, notified the Assistant Secretary of the DEA's intention to temporarily place this substance into schedule I.

Conclusion

In accordance with the provisions of section 201(h) of the CSA, 21 U.S.C. 811(h), the Administrator considered available data and information, herein sets forth the grounds for his determination that it is necessary to temporarily schedule furanyl fentanyl into schedule I of the CSA, and finds that placement of this synthetic opioid into schedule I of the CSA is necessary to avoid an imminent hazard to the public safety. Because the Administrator hereby finds it necessary to temporarily place this synthetic opioid into schedule I to avoid an imminent hazard to the public safety, this final order temporarily scheduling furanyl fentanyl will be effective on the date of publication in the **Federal Register**, and will be in effect for a period of two

years, with a possible extension of one additional year, pending completion of the regular (permanent) scheduling process. 21 U.S.C. 811(h) (1) and (2).

The CSA sets forth specific criteria for scheduling a drug or other substance. Permanent scheduling actions in accordance with 21 U.S.C. 811(a) are subject to formal rulemaking procedures done ''on the record after opportunity for a hearing'' conducted pursuant to the provisions of 5 U.S.C. 556 and 557. 21 U.S.C. 811. The permanent scheduling process of formal rulemaking affords interested parties with appropriate process and the government with any additional relevant information needed to make a determination. Final decisions that conclude the permanent scheduling process of formal rulemaking are subject to judicial review. 21 U.S.C. 877. Temporary scheduling orders are not subject to judicial review. 21 U.S.C. 811(h)(6).

Requirements for Handling

Upon the effective date of this final order, furanyl fentanyl will become subject to the regulatory controls and administrative, civil, and criminal sanctions applicable to the manufacture, distribution, reverse distribution, importation, exportation, engagement in research, and conduct of instructional activities or chemical analysis with, and possession of schedule I controlled substances including the following:

1. *Registration.* Any person who handles (manufactures, distributes, reverse distributes, imports, exports, engages in research, or conducts instructional activities or chemical analysis with, or possesses), or who desires to handle, furanyl fentanyl must be registered with the DEA to conduct such activities pursuant to 21 U.S.C. 822, 823, 957, and 958 and in accordance with 21 CFR parts 1301 and 1312, as of November 29, 2016. Any person who currently handles furanyl fentanyl, and is not registered with the DEA, must submit an application for registration and may not continue to handle furanyl fentanyl as of November 29, 2016, unless the DEA has approved that application for registration pursuant to 21 U.S.C. 822, 823, 957, 958, and in accordance with 21 CFR parts 1301 and 1312. Retail sales of schedule I controlled substances to the general public are not allowed under the CSA. Possession of any quantity of this substance in a manner not authorized by the CSA on or after November 29, 2016 is unlawful and those in possession of any quantity of this substance may be subject to prosecution pursuant to the CSA.

2. *Disposal of stocks.* Any person who does not desire or is not able to obtain a schedule I registration to handle furanyl fentanyl, must surrender all quantities of currently held furanyl fentanyl.

3. *Security.* Furanyl fentanyl is subject to schedule I security requirements and must be handled and stored pursuant to 21 U.S.C. 821, 823, 871(b), and in accordance with 21 CFR 1301.71–1301.93, as of November 29, 2016.

4. *Labeling and packaging.* All labels, labeling, and packaging for commercial containers of furanyl fentanyl must be in compliance with 21 U.S.C. 825, 958(e), and be in accordance with 21 CFR part 1302. Current DEA registrants shall have 30 calendar days from November 29, 2016, to comply with all labeling and packaging requirements.

5. *Inventory.* Every DEA registrant who possesses any quantity of furanyl fentanyl on the effective date of this order must take an inventory of all stocks of this substance on hand, pursuant to 21 U.S.C. 827 and 958, and in accordance with 21 CFR 1304.03, 1304.04, and 1304.11. Current DEA registrants shall have 30 calendar days from the effective date of this order to be in compliance with all inventory requirements. After the initial inventory, every DEA registrant must take an inventory of all controlled substances (including furanyl fentanyl) on hand on a biennial basis, pursuant to 21 U.S.C. 827 and 958, and in accordance with 21 CFR 1304.03, 1304.04, and 1304.11.

6. *Records.* All DEA registrants must maintain records with respect to furanyl fentanyl pursuant to 21 U.S.C. 827 and 958, and in accordance with 21 CFR parts 1304, and 1312, 1317 and § 1307.11. Current DEA registrants shall have 30 calendar days from the effective date of this order to be in compliance with all recordkeeping requirements.

7. *Reports.* All DEA registrants who manufacture or distribute furanyl fentanyl must submit reports pursuant to 21 U.S.C. 827 and in accordance with 21 CFR parts 1304, and 1312 as of November 29, 2016.

8. *Order Forms.* All DEA registrants who distribute furanyl fentanyl must comply with order form requirements pursuant to 21 U.S.C. 828 and in accordance with 21 CFR part 1305 as of November 29, 2016.

9. *Importation and Exportation.* All importation and exportation of furanyl fentanyl must be in compliance with 21 U.S.C. 952, 953, 957, 958, and in accordance with 21 CFR part 1312 as of November 29, 2016.

10. *Quota.* Only DEA registered manufacturers may manufacture furanyl fentanyl in accordance with a quota assigned pursuant to 21 U.S.C. 826 and in accordance with 21 CFR part 1303 as of November 29, 2016.

11. *Liability.* Any activity involving furanyl fentanyl not authorized by, or in violation of the CSA, occurring as of November 29, 2016, is unlawful, and may subject the person to administrative, civil, and/or criminal sanctions.

Regulatory Matters

Section 201(h) of the CSA, 21 U.S.C. 811(h), provides for a temporary scheduling action where such action is necessary to avoid an imminent hazard to the public safety. As provided in this subsection, the Attorney General may, by order, schedule a substance in schedule I on a temporary basis. Such an order may not be issued before the expiration of 30 days from (1) the publication of a notice in the **Federal Register** of the intention to issue such order and the grounds upon which such order is to be issued, and (2) the date that notice of the proposed temporary scheduling order is transmitted to the Assistant Secretary. 21 U.S.C. 811(h)(1).

Inasmuch as section 201(h) of the CSA directs that temporary scheduling actions be issued by order and sets forth the procedures by which such orders are to be issued, the DEA believes that the notice and comment requirements of the Administrative Procedure Act (APA) at 5 U.S.C. 553, do not apply to this temporary scheduling action. In the alternative, even assuming that this action might be subject to 5 U.S.C. 553, the Administrator finds that there is good cause to forgo the notice and comment requirements of 5 U.S.C. 553, as any further delays in the process for issuance of temporary scheduling orders would be impracticable and contrary to the public interest in view of the manifest urgency to avoid an imminent hazard to the public safety.

Further, the DEA believes that this temporary scheduling action is not a ''rule'' as defined by 5 U.S.C. 601(2), and, accordingly, is not subject to the requirements of the Regulatory Flexibility Act. The requirements for the preparation of an initial regulatory flexibility analysis in 5 U.S.C. 603(a) are not applicable where, as here, the DEA is not required by the APA or any other law to publish a general notice of proposed rulemaking.

Additionally, this action is not a significant regulatory action as defined by Executive Order 12866 (Regulatory Planning and Review), section 3(f), and, accordingly, this action has not been reviewed by the Office of Management and Budget (OMB).

This action will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 13132 (Federalism) it is determined that this action does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

As noted above, this action is an order, not a rule. Accordingly, the Congressional Review Act (CRA) is inapplicable, as it applies only to rules. However, if this were a rule, pursuant to the Congressional Review Act, ''any rule for which an agency for good cause finds that notice and public procedure thereon are impracticable, unnecessary, or contrary to the public interest, shall take effect at such time as the federal agency promulgating the rule determines.'' 5 U.S.C. 808(2). It is in the public interest to schedule this substance immediately to avoid an imminent hazard to the public safety. This temporary scheduling action is taken pursuant to 21 U.S.C. 811(h), which is specifically designed to enable the DEA to act in an expeditious manner to avoid an imminent hazard to the public safety. 21 U.S.C. 811(h) exempts the temporary scheduling order from standard notice and comment rulemaking procedures to ensure that the process moves swiftly. For the same reasons that underlie 21 U.S.C. 811(h), that is, the DEA's need to move quickly to place this substance into schedule I because it poses an imminent hazard to the public safety, it would be contrary to the public interest to delay implementation of the temporary scheduling order. Therefore, this order shall take effect immediately upon its publication. The DEA has submitted a copy of this final order to both Houses of Congress and to the Comptroller General, although such filing is not required under the Small Business Regulatory Enforcement Fairness Act of 1996 (Congressional Review Act), 5 U.S.C. 801–808 because, as noted above, this action is an order, not a rule.

List of Subjects in 21 CFR Part 1308

Administrative practice and procedure, Drug traffic control, Reporting and recordkeeping requirements.

■ For the reasons set out above, the DEA amends 21 CFR Part 1308 as follows:

PART 1308—SCHEDULES OF CONTROLLED SUBSTANCES

■ 1. The authority citation for part 1308 continues to read as follows:

Authority: 21 U.S.C. 811, 812, 871(b), unless otherwise noted.

■ 2. Amend § 1308.11 by adding paragraph (h)(19) to read as follows:

§ 1308.11 Schedule I.

* * * * *

(h) * * *

(19) *N*-(1-phenethylpiperidin-4-yl)-*N*-phenylfuran-2-carboxamide, its isomers, esters, ethers, salts and salts of isomers, esters and ethers (Other name: Furanyl fentanyl) (9834).

Dated: November 22, 2016

Chuck Rosenberg,

Acting Administrator.

[FR Doc. 2016–28693 Filed 11–28–16; 8:45 am]

BILLING CODE 4410–09–P

DEPARTMENT OF JUSTICE

28 CFR Part 90

[OVW Docket No. 120]

RIN 1105–AB46

Conforming STOP Violence Against Women Formula Grant Program Regulations to Statutory Change; Definitions and Confidentiality Requirements Applicable to All OVW Grant Programs

AGENCY: Office on Violence Against Women, Justice.

ACTION: Final rule.

SUMMARY: This rule amends the regulations for the STOP (*Services•Training•Officers•Prosecutors*) Violence Against Women Formula Grant Program (STOP Program) and the general provisions governing Office on Violence Against Women (OVW) programs to comply with statutory changes and reduce repetition of statutory language. Also, this rule implements statutory requirements for nondisclosure of confidential or private information relating to all OVW grant programs.

DATES: This rule is effective December 29, 2016.

FOR FURTHER INFORMATION CONTACT: Marnie Shiels, Office on Violence Against Women, 145 N Street NE., Suite 10W.100, Washington, DC 20530, by telephone (202) 307–6026 or by email at *marnie.shiels@usdoj.gov.*

SUPPLEMENTARY INFORMATION:

I. Executive Summary

The Violence Against Women Act (VAWA) was enacted on September 13, 1994, by title IV of the Violent Crime Control and Law Enforcement Act of 1994, Public Law 103–322, 108 Stat. 1796. The STOP Program is codified at 42 U.S.C. 3796gg through 3796gg–5 and 3796gg–8. The final rule for this program, found at 28 CFR part 90, subpart B, was promulgated on April 18, 1995. General provisions affecting all OVW grant programs are found at 28 CFR part 90, subpart A.

This rule amends the general provisions applicable to all OVW grant programs and the regulations governing the STOP Program to comply with the amendments to these programs enacted by the Violence Against Women Act of 2000 (VAWA 2000), Division B of the Victims of Trafficking and Violence Protection Act of 2000, Public Law 106–386, 114 Stat. 1464 (Oct. 28, 2000), the Violence Against Women and Department of Justice Reauthorization Act of 2005 (VAWA 2005), Public Law 109–162, 119 Stat. 2960 (Jan. 5, 2006), and the Violence Against Women Reauthorization Act of 2013 (VAWA 2013), Public Law 113–4, 127 Stat. 54 (Mar. 7, 2013). These changes to the regulations incorporate the statutory changes, make minor technical corrections, implement enhanced administrative and planning practices for formula grantees, and streamline existing regulations to reduce repetition of statutory language.

In addition, this rule amends an existing regulatory provision, § 90.2, that sets forth certain definitions that apply to all OVW grant programs. Furthermore, the rule adds a new regulatory provision, § 90.4, that is applicable to all OVW grant programs to implement statutory amendments requiring nondisclosure of confidential or private information pertaining to victims of domestic violence, dating violence, sexual assault and stalking.

II. Background

A. Overview of the Violence Against Women Act and Subsequent Reauthorizations

In 1994, Congress passed the Violence Against Women Act (VAWA), a comprehensive legislative package aimed at ending violence against women. VAWA was enacted on September 13, 1994, as title IV of the Violent Crime Control and Law Enforcement Act of 1994, Public Law 103–322, 108 Stat. 1796. VAWA was designed to improve criminal justice system responses to domestic violence, sexual assault, and stalking, and to

BOARD OF HEALTH AND ENVIRONMENTAL CONTROL
SUMMARY SHEET

December 8, 2016

(X) ACTION/DECISION
( ) INFORMATION

I. TITLE: Staff Recommendation and Request for Public Hearing to Inform the Final Agency Decision - Wave Dissipation System

II. SUBJECT: Request Approval to Publish the Staff Recommendation to Provide Opportunity for Public Comment and Conduct a Public Hearing before the Board

III. FACTS:

1. In accordance with the S.C. Code Ann. § 48-39-130(D)(2) exception, Budget Proviso 34.51 of the 2014-2015 General Appropriations Act (amended in 2015-2016 as Budget Proviso 34.48) authorized "[t]he deployment of a qualified wave dissipation device seaward of the setback line or baseline pursuant to a study conducted by the Citadel or a research university."

2. From March through September 2015, researchers from The Citadel submitted formal requests to the Department to perform a study of the Wave Dissipation System (WDS) at the following locations: Ocean Club Villas, Beachwood East and Seascape Villas in the Wild Dunes community, Isle of Palms, SC; and Harbor Island, St. Helena, SC pursuant to S.C. Code Ann. Regulation §30-5(A)(2).

3. The Department acknowledged that the proposed research projects at the above referenced locations met the "research activities of a State educational institution" exception pursuant to S.C. Code Ann. Regulation §30-5(A)(2) and did not require a direct critical area permit provided conditions were met.

4. The Citadel's WDS research projects ended on July 28, 2016. Data collected from the study was provided to the Department in a final report from The Citadel on August 28, 2016.

5. The Department contracted with GEL Engineering to collect data and information on the design and functionality of the WDS research projects, and provide a third party evaluation of the findings in a final report. GEL collected information between March and July 2016, and the final report was submitted to the Department on October 31, 2016.

6. Pursuant to 1976 Code Ann. Section 48-39-320(C), the Department is tasked with determining whether the WDS has been successful in addressing an erosional issue and whether it is allowed for continued use in emergency situations under SC Code Ann. Regulations §30-15(H).

7. Data and information from The Citadel's final report and GEL Engineering's final report, along with Department observations and evaluations, were considered in formulating this recommendation. The Citadel report and the GEL report are submitted as Attachments B and C.

III. ANALYSIS:

As detailed in the Staff Recommendation document (Attachment A), Department staff concludes that the WDS has not been successful in addressing an erosional issue and results in negative impacts to the beach. Staff is therefore recommending that this technology, methodology or structure not be approved for future or continued use at these pilot locations or additional locations.

Observations and survey data results collected during the study demonstrated that the WDS does not hold the scarp line position at locations where the WDS was the sole erosion mitigation technique. The scarp line stabilized in areas where properties employed sandbags for additional protection.

Survey data collected by GEL Engineering documented the loss of sand volume landward of (behind) the WDS. Net accretion of sand observed by GEL during the study was always on the seaward side (in front) of the WDS. Sand volume data indicates that the WDS does not increase or retain sand landward of (behind) the system and blocks the natural accretion of sand on the shoreline during calm conditions.

Other impacts to the beach are outlined in the Staff Recommendation document including trenching and scouring around the WDS, impacts of periodic excavations, impacts to adjacent properties, and similar issues associated with seawalls. Impacts on lateral public beach access and potential effects on sea turtles were also noted.

IV. RECOMMENDATION:

To ensure that the general public and potential affected parties have the opportunity to provide input to the Board regarding the Staff Recommendation, Department staff requests that the Board grant approval to publish the Staff Recommendation for a 45-day public comment period. Following the public comment period, staff requests that the Board conduct a public hearing to receive additional information for consideration in determining a final agency decision.

Submitted By:

Elizabeth B. von Kolnitz
Chief
Office of Ocean and Coastal Resource Management

Approved By:

Myra C. Reece
Director
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Attachments:

A. Staff Recommendation and Request for Public Hearing to Inform the Final Agency Decision - Wave Dissipation System
B. The Citadel: Wave Dissipation System – OC/SS/BWE/HI Report
C. GEL Engineering: Wave Dissipation System Monitoring Report

ATTACHMENT A

STAFF RECOMMENDATION AND REQUEST FOR PUBLIC HEARING TO INFORM THE FINAL AGENCY DECISION - WAVE DISSIPATION SYSTEM

December 8, 2016

ATTACHMENT B

THE CITADEL: WAVE DISSIPATION SYSTEM – OC/SS/BWE/HI REPORT

December 8, 2016

ATTACHMENT C

GEL ENGINEERING: WAVE DISSIPATION SYSTEM MONITORING REPORT

December 8, 2016

ATTACHMENT A

STAFF RECOMMENDATION AND REQUEST FOR PUBLIC HEARING TO INFORM THE FINAL AGENCY DECISION - WAVE DISSIPATION SYSTEM

December 8, 2016

Staff Recommendation and Request for Public Hearing to Inform the Final Agency Decision - Wave Dissipation System

November 2016

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Introduction and Background

The South Carolina Department of Health and Environmental Control – Office of Ocean and Coastal Resource Management (DHEC-OCRM or the Department) is tasked with determining whether the Wave Dissipation System (WDS) has been successful in addressing an erosional issue and whether it is qualified for future use in emergency situations, pursuant to S.C. Code Ann. Regulation § 30-15(H).

The WDS is an experimental device intended to reduce wave energy and its erosive effects on the beach, while also protecting landward elements including houses and infrastructure. The WDS was independently designed and academically sponsored for research by The Citadel as an alternative to sandbags to employ only in emergency situations. The purpose of The Citadel's academic study was to determine the performance of the WDS under various wave loading scenarios, and to gather data on the resulting effects on the beach. Specifically, The Citadel's request letters to the Department to initiate the study all state that "The scarp behind the [WDS] will be measured and a performance measure will be the ability of the [WDS] to stabilize the scarp line….Finally, performance of the system will be measured using numerous tests where horizontal spacers and related horizontal elements are studied in regards to sand accretion and erosion in front of and behind the system." A scarp is characterized as a very steep or vertical slope on the beach due to wave action. The scarp line position is captured at the top of the vertical slope.

The WDS consists of vertical piles (encased in hard plastic) and horizontal members (PVC pipes). The spacing between the horizontal members can be adjusted based on tide and wave conditions to allow some sand and water to pass through the structure. The WDS structures were initially developed under a pilot program established by the South Carolina Legislature in Budget Proviso 34.51 of the 2014-2015 General Appropriations Act, and subsequently, Budget Proviso 34.48 of the 2015-2016 General Appropriations Act. The proviso language is listed in Appendix A.

The first WDS was constructed seaward of Seascape Villas in Wild Dunes on the Isle of Palms in November 2013, and was removed prior to a large-scale beach scraping project in November 2014. The Department found the results of this initial study to be inconclusive, so the Department acknowledged an expanded study at additional site types to allow The Citadel an opportunity to collect more data and evaluate the WDS under different conditions. Four WDS structures are currently in place along the state's beaches. One is on Harbor Island and the other three are in Wild Dunes on the Isle of Palms (Ocean Club Villas, Seascape Villas, and Beachwood East).

The Harbor Island WDS spans four lots on North Harbor Drive: lots 49, 52, 53, and 56. According to The Citadel, the purpose of this particular study location is to "determine and subsequently describe the performance of the [WDS] under less extreme loading (more tidal in this location due to low beach elevation and smaller waves with possible periods of respite)." The WDS is a single-tier structure at this location, and the pilings are spaced 10 feet apart. It is approximately 400 feet long.

The Ocean Club Villas WDS is seaward of Ocean Club Villas in the Wild Dunes development on the Isle of Palms. According to The Citadel, the purpose of this particular study location is to "determine and subsequently describe the performance of the [WDS] under extreme loading that is imminent as the beach continues to lower and the adjacent scarp line continues to retreat." The WDS is a triple-tier structure at this location, and the pilings are spaced 8 feet apart. It is approximately 256 feet long. The WDS at this location was originally installed with two walls in April 2015, but a third wall was added in November 2015. The Seascape Villas WDS is seaward of Seascape Villas in Wild Dunes on the Isle of Palms. The WDS is a double-tier structure at this location, and the pilings are spaced 8 feet apart. It is approximately 120 feet long. The WDS at this location was originally installed with one wall in November 2015, but a second wall was added in January 2016. The Ocean Club Villas and Seascape Villas WDS installations were built separately at different times, but they are attached and are effectively one structure for monitoring purposes. The combined structure length is approximately 376 feet.

The Beachwood East WDS is installed on the beach seaward of nine houses in the Wild Dunes development on the Isle of Palms: 11, 12, 13, 14, 15, 16, 17, 18, and 19 Beachwood East. According to The Citadel, the purpose of this particular study location is to "determine and subsequently describe the performance of the [WDS] under less extreme loading than the installation at Ocean Club yet more extreme loading, and not as tidal, as the installation at Harbor Island." The WDS is a single-tier structure at this location, and the pilings are spaced 8 feet apart. It is approximately 850 feet long. For additional information about the WDS sites, please see the attached final reports from The Citadel and GEL Engineering, LLC.

Data Collection and Analysis

The Citadel

Data collection by The Citadel researchers involved collecting monthly beach elevation data along shore-perpendicular transects from the WDS to the low tide line, monthly measurements of the scarp line position, and photo/video documentation. However, there was no data collected landward of the WDS (between the scarp line and the WDS). DHEC-OCRM reiterated to The Citadel researchers on several occasions that they should also collect data landward of the WDS to determine whether erosion or accretion was occurring. In their study request letters to the Department, The Citadel had stated that they would collect elevation data landward of the WDS, and this was also required in the Department's study acknowledgement letters. The Citadel data, including transects seaward of the WDS and the scarp line position, was provided to DHEC-OCRM as lists of coordinates and elevations in Excel spreadsheets, but no beach profile figures or data analyses were provided. The Citadel also provided raw data pertaining to water levels, wind speeds and directions, and wave heights for the duration of the study.

GEL Engineering

The Department drafted a Request for Proposals (RFP) to solicit an objective third-party review of the design and functionality of the WDS system. The RFP was intended to supplement the data being collected by The Citadel and to ensure that the Department had sufficient information to evaluate the effectiveness of the structures. Through the RFP process, the Department contracted with GEL Engineering, LLC of Charleston, SC to collect survey and photo data, and to answer specific questions pertaining to their observations of each WDS structure. GEL

collected these data between March and July 2016 and produced a final report, which is provided along with this document.

Data collection by GEL involved collecting monthly beach elevation data along shore-perpendicular transects from the scarp line to the low tide line, monthly measurements of the scarp line position, and photo/video documentation. The transect data were requested by DHEC-OCRM to quantify the effectiveness of the WDS in maintaining the position of the scarp line landward of the WDS and to determine whether the WDS resulted in erosion (loss of sand) or accretion (gain of sand) landward of the WDS structure. By collecting data between the scarp line and the WDS at each study location, GEL was able to analyze erosion or accretion of the beach both landward and seaward of the WDS.

DHEC-OCRM

Department staff made regular visits to each of the WDS sites. Photographs and videos were taken in order to visually monitor changes to the beach profile and scarp line position, to document modifications of the WDS structures, and to document the frequency of scouring seaward and landward of the WDS structures.

Table 1 and Figure 1 compare the data collection efforts of The Citadel, GEL, and DHEC-OCRM.

Table 1: Data Collection Efforts

Type	Citadel	GEL	DHEC - OCRM staff
Scarp Line Position	Yes	Yes	N/A
Elevation Data Landward of WDS	No	Yes	N/A
Elevation Data Seaward of WDS	Yes	Yes	N/A
Trenching Documented	Yes	Yes	Yes
WDS Modifications Documented	Yes	Yes	Yes
Photos/Videos	Both	Both	Both

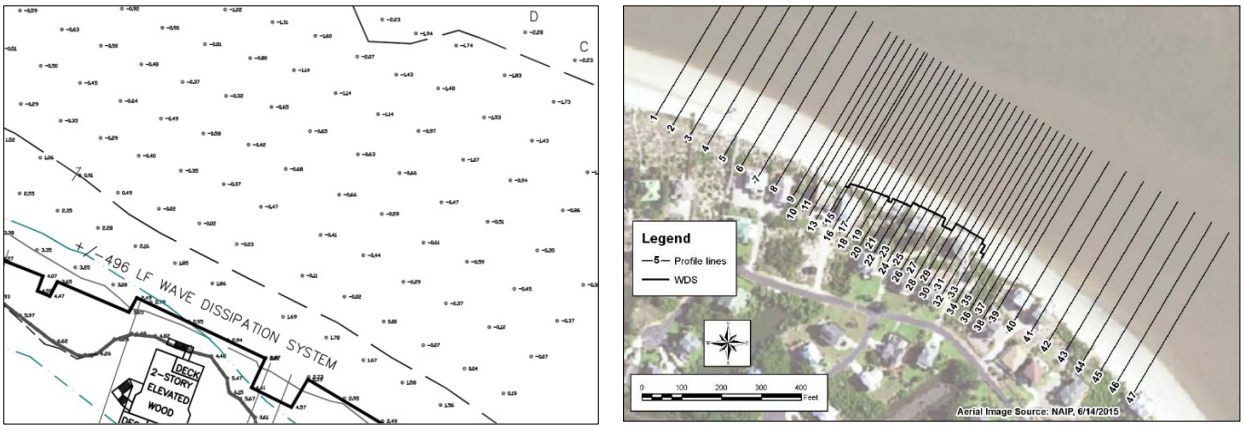


Figure 1: Example of The Citadel data collection transects (left) and GEL data collection transects (right) at Harbor Island. The main difference is GEL collected elevation data both landward and seaward of the WDS at each location, while The Citadel only collected data seaward of the WDS.

Findings

In evaluating whether the WDS is a qualified system that was successful in addressing an erosional issue, and whether there were additional beach impacts, DHEC-OCRM relied upon the statutory language in S.C. Code Ann. § 48-39-320(C) and S.C. Code Ann. § 48-39-130(D)(2).

S.C. Code Ann. § 48-39-320(C) states, "(C) Notwithstanding any other provision of law contained in this chapter, the board, or the Office of Ocean and Coastal Resource Management, may allow the use in a pilot project of any technology, methodology, or structure, whether or not referenced in this chapter, if it is reasonably anticipated that the use will be successful in addressing an erosional issue in a beach or dune area. <u>If success is demonstrated, the board, or the Office of Ocean and Coastal Resource Management, may allow the continued use of the technology, methodology, or structure used in the pilot project location and additional locations</u>."

S.C. Code Ann. § 48-39-130(D)(2) provides, "(D) It shall not be necessary to apply for a permit for the following activities: (2) Hunting, erecting duckblinds, fishing, shellfishing and trapping when and where otherwise permitted by law; the conservation, replenishment and research activities of state agencies and educational institutions or boating or other recreation <u>provided that such activities cause no material harm to the flora, fauna, physical or aesthetic resources of the area."</u>

Finally, The Department reviewed the seven qualification criteria found within the budget provisos listed in Appendix A.

DHEC-OCRM finds that the WDS has not been successful in addressing an erosional issue, and results in additional impacts to the beach. In addition, findings also indicate that the WDS does not meet the qualification criteria of Budget Proviso 34.51 of the 2014-2015 General Appropriations Act or Budget Proviso 34.48 of the 2015-2016 General Appropriations Act.

This document is divided into three sections to provide support for the stated findings.

Section 1: The WDS is unsuccessful in addressing an erosional issue.
Section 2: The WDS results in additional impacts to the beach.
Section 3: The WDS does not satisfy the Budget Proviso qualification criteria.

Throughout this document, relevant direct excerpts from The Citadel's final report and GEL's final report are provided to document each conclusion. Rather than paraphrase and summarize those reports, DHEC-OCRM lists direct quotes and page numbers so the reader can refer to the reports directly. All tables and figures referenced by The Citadel or GEL should be referred to in their final reports. The conclusions drawn by DHEC-OCRM staff are based on a thorough evaluation of The Citadel's final report, GEL's final report, and frequent staff site visits throughout the study period. All photographs provided in this recommendation to the Board were taken by DHEC-OCRM staff, with the exception of those shown in Figures 18, 19, and 20.

Section 1: The WDS is Unsuccessful in Addressing an Erosional Issue

The Department based the ability of the WDS to address an erosional issue on three erosional indices: 1.) The ability of the WDS to hold the scarp line position, 2.) The ability to increase or retain sand volume on the landward side of the WDS, and 3.) The ability to minimize trenching and scour.

The Citadel

Scarp line position

- The Citadel collected scarp line position data, which was provided to DHEC – OCRM. They did not provide any analysis results or conclusions regarding the movement of the scarp line position in their final report.

The ability to increase or retain sand volume on the landward side of the structure

- The Citadel provided The Department with raw transect data points seaward of the WDS, but no analyses or conclusions were provided in the final report regarding sand volumes landward or seaward of the WDS.
- At all sites, The Citadel stated that "our review of the surveys and the related data (sand volumes gained and lost over time) leads to the conclusion that there is no negative or significant impact by the WDS on the adjacent beach profile" (The Citadel, pgs. 16, 19, and 26).
- At Beachwood East, "noticing the enormous level of accretion the research team forecast for several more weeks of accretion, Dr. Mays acted quickly and notified OCRM that the team wanted to test (as shown clearly during the previous Seascape study) that the sand accreting behind the system could be pushed back to allow the homeowners to reclaim the sand they lost from the 1,000 year event, to rebuild the dune to its initial configuration prior to the 1,000 year event, and to allow the removal of sandbags (which served no purpose) that the homeowners bought as added protection after the 1,000 year event damage to their property. It seemed like a perfect win-win for the research team and the community. However, OCRM did not allow the research team to prove that it could function in this capacity. This was disappointing since it is very important to prove that the system can perform as advertised" (The Citadel, pg. 19).
- At Harbor Island, "Although at first, there was some accretion, the wave energy was not strong enough to push it more than three ft or so beyond the WDS. This led to an unacceptable low space (relative to the accreted area) beyond the accreted sand. It should be noted that the horizontal panel system at Harbor Island was designed to be over two times as flexible as the one installed at Ocean Club (and Seascape in 2013-2014). This flexibility alone did not provide adequate 'breathing' of the ocean such that a more uniform distribution of accreted sand fell behind the system. For that reason, the research team added some trial spacers to encourage more natural sand accretion behind the system. The initial result of the added spacers was an improved distribution of sand behind the system. Soon after, the site developed what has been the biggest issue at Harbor Island. As the beach lowered and the added spacer elevations became too high (relative to the beach profile) to allow for exit water to efficiently leave the area behind the WDS, a trench developed directly under the system. (The Citadel pgs. 21-24).

The Ability to Minimize Trenching and Scour

- "The only major concern that the research team noted during the study is the temporary local trenching that occurred at times at each site….The trenching appears to be related to scour caused by extreme tides, significant erosion events, and the uncontrolled volume of water that is allowed to pass through the system (this same volume of water must escape as the tide goes back out)" (The Citadel, pg. 4).
- "Removing just the horizontal panels in areas of local trenching almost immediately restores the beach profile by eliminating the trenching effect and the horizontal panels are easily removed for this purpose" (The Citadel, pg. 4).
- Spacers were located at several locations during the second quarter of this study and it was determined that they are not the ideal solution to trenching. They help at times but they must be constantly adjusted with changing elevations." (The Citadel pgs. 21-24).
- "The [Vertical Porous Panels] VPPs are experimental prototypes that must be studied to determine their optimal configuration, hole pattern, length, etc. and the typical sketch given to OCRM was intended to provide an idea of what the panels should like [sic] during the first installation. During construction of the panel, the research team found that drilling slots was too difficult (and was damaging the panel) and that holes would work better. Hence the team made the decision to move forward with holes instead of slots. In addition, the actual as constructed version of the panel was actually more porous than the proposed version considering its overall purposely placed installation configuration. The goal of studying the vertical panels was to determine the optimal porosity and configuration. The research team spent hours designing different details for the porosity prior to OCRM saying that the VPPs could no longer be tested. We are very disappointed that the research team's main proposed method (prior to the expensive option of lowering of the system) for removing the team's one major concern from the study at Ocean Club and Seascape was not allowed to be studied for stated technical reasons that are not justified nor based on engineering mechanics, coastal engineering, or coastal geology principals" (The Citadel, pg. 10-11).
- At all WDS sites, "Trenching, caused by significant erosion events, and related to the system's allowance of rising tide levels (with moving water) behind the WDS can, when deep enough, become a concern. The study has shown that the system is always self-healing and that the trenching is always temporary. On the contrary, deep trenching on site should not be allowed and must be mitigated anytime it appears on site" (The Citadel, pgs. 16, 19-20, 26).
- "It has always been known that flooding the system using isolated panel removal can easily remove trenching and is almost instantaneous" (The Citadel, pgs. 16, 20).

GEL Engineering

Scarp Line Position

- At Harbor Island, "the erosion downdrift of the WDS, in the adjacent lot west of the WDS, is evident in Figures 4-33 and 4-34 (see changes at alongshore distances between 400 and 500 feet). The fraction of this erosion attributable to the WDS cannot be quantified, but the pattern suggests that the WDS may contribute to scarp erosion within a short distance (i.e., mostly within 100 feet) of the end of the structure (GEL, pg. 66).
- At Harbor Island, "the wave activity between the March and April surveys caused recession of the [Mean High Water (MHW)] shoreline along the entire study area. The WDS did not prevent erosion of the MHW contour landward of the WDS. The MHW

contour along the WDS receded by an average of 24 ft, a similar amount as the average recession to the east (24 ft) and the west (23 ft). During the subsequent survey periods, the wave climate was milder, and the MHW contour shifted seaward" (GEL, pg. 48). At lot 49 on Harbor Island, "there was erosion on the landward side of the WDS in this area during the March to April time period, but the sandbags and the top of the scarp remained stable. Small sand bags such as those deployed here do not remain stable when subjected to any significant wave action. The overall stability of the sandbags at lot 49 during the March to April timeframe demonstrates that the WDS was effective at attenuating wave action sufficiently such that there was only minimal, if any, erosion of the slope protected by the sandbags" (GEL, pg. 49).

- At Beachwood East, "the wave action between the March and April surveys resulted in recession of the MHW contour along the WDS by an average of 8 feet. In contrast, the MHW contour to the east moved seaward by an average of 3 feet in this time period. Over the whole study period between March and July, the MHW contour along the WDS segment eroded by an average of 6 feet, while the MHW contour east of the WDS moved seaward by an average of 38 feet. The accretion pattern east of the WDS is the result of the spreading of sand from the attaching shoal east of the BE project site. Scarp lines experienced only minor changes during the monitoring period. The stability of scarp along the east end is due to the accretion from the shoal attachment and spreading. The stability of the scarp line on the landward side of the WDS despite the recession of the MHW contour in this area can be attributed to the combination of the WDS and the large sandbags that protect a majority of the scarp line along this segment of the beach (GEL, pg. 67).
- At Ocean Club and Seascape Villas, "the wave activity between the March and April surveys caused recession of the MHW shoreline along the entire study area…. The MHW contour along the WDS receded by an average of 32 feet. The areas to the east and west receded by 22 and 19 feet, respectively, on average. During the subsequent survey periods, the wave climate was milder, and the MHW contour shifted seaward" (GEL, pg. 80). "The landward most top-of-scarp line surveyed in March remained mostly stable throughout the study period. A small section of this scarp adjacent to the east side of the OC building receded about 4 feet over the course of the study" (GEL, pg. 82).
- "During the monitoring period, March through July, the scarp was stable in areas where the WDS was used in combination with sandbags (except where small sandbags or fill material were stacked at an excessively steep angle). In some areas fronted only by the WDS, scarp erosion was observed following the storm wave action that occurred between the March and April surveys. <u>The survey data collected by The Citadel researchers shows large amounts of scarp erosion at the BE and OC/SV site following the initial installation of the WDSs"</u> (GEL, pg. 124-127).

<u>The ability to increase or retain sand volume on the landward side of the structure</u>

- "During the typical storm wave conditions that occurred during this monitoring study, the WDS allowed erosion of sand from the landward side of the WDS. In areas where the WDS was at relatively high elevations on the beach, scour holes did not develop that extended below the horizontal members. In these scenarios, transport of sand seaward through the WDS was minor. Figure 5-5 shows an example of erosion on the landward side of a section of the Seascape Villas WDS that occurred after the March through April period when waves caused large amounts of erosion of the entire beach. Areas with the

greatest amount of erosion during storm events occurred in areas where the scour passed beneath the WDS, or the entire beach profile was lowered beneath the WDS, which allowed sand to be transported seaward. When this occurs, large volumes of sand were transported seaward underneath the WDS horizontal panels. During the subsequent natural beach recovery, large volumes were also observed to move landward underneath the WDS horizontal panels" (GEL, pg. 124).

- At Harbor Island, "the WDS allows some transport of accreting sand through the WDS. However, given the buildup of sand observed on the seaward side of the WDS, it appears that the WDS can inhibit the amount of natural landward migration of sand during mild wave conditions" (GEL, pg. 55).
- At Harbor Island, "The fact that the upper beach showed a small net loss of sand behind the WDS (-0.2 cy/ft) while the entire beach down to the low tide line showed accretion (1.1 cy/ft), indicates that <u>the accretion in the WDS beach segment shown in Table 4-3 and Figure 4-33 occurred on the seaward side of the WDS"</u> (GEL, pg. 65).
- At Ocean Club and Seascape Villas, "The net change over the study period showed a small amount of accretion to the west of the WDS (0.3 cy/ft, on average), <u>erosion landward of the WDS</u> (-0.7 cy/ft at SV and -0.9 cy/ft at OC, on average), and a small amount of erosion east of the WDS (-0.2 cy/ft, on average)". (GEL, pg. 100).
- At Beachwood East, "Similar to the observations at Harbor Island, the upper beach showed a small net loss of sand on the landward side of the WDS over the March to July period (-0.6 cy/ft) while the entire beach down to the low tide line for the same segment showed accretion (1.4 cy/ft) (compare Table 4-5 to Table 4-6). <u>This indicates that the accretion in the WDS beach segment occurred on the seaward side of the WDS" (GEL, pg. 79).</u>

<u>The Ability to Minimize Trenching and Scour</u>

- At Ocean Club, "the waves between March and April eroded and lowered the beach profile in this area to the point that the bottom of the WDS horizontal members were above the beach. In response, sections of the OC WDS system were lowered by 2 feet in April. Additional sections were lowered in May…. Typically, during lowering of the WDS, a trench is excavated along the WDS, and the sand is placed on the landward side" (GEL, pg. 82).
- "Scour occurred at all four WDS sites prior to the April survey, and the beach in these areas subsequently accreted" (GEL, pg. 101).
- "High tide observations of wave action at these sites confirmed that if the scour hole is deep enough to allow free flow of water beneath the horizontal members, the WDS becomes less effective at attenuating waves" (GEL, pg. 107).
- "Based on our field observations, scour can occur at the WDS when subjected to erosive wave action. This scour is limited to a temporary localized effect that allows greater wave energy to be transmitted to the landward side of the WDS. There is no evidence of adverse impacts other than reduced WDS performance (i.e., reduced wave attenuation" (GEL, pg. 107).
- "In general, when a wave interacts with a coastal structure such as the WDS, some of the wave energy is dissipated through wave breaking or structure deflection, some of the wave energy is reflected, and some of the wave energy is transmitted landward of the structure. Wave interaction with the WDS is dependent on the water level and offshore wave conditions. As the tide rises and the stillwater level approaches the WDS, the WDS

is within the swash zone, which is the area of the beach where waves run up the beach after breaking. During these conditions, the WDS is effective at blocking the uprush of the wave, either dissipating or reflecting all of the wave energy when there are no spacers between the horizontal members" (GEL, pg. 107). "When the WDS is in deeper water (e.g., at the seaward-most tier of the OC WDS, or during very high tide conditions at the other WDS sites), the fraction of transmitted wave energy increases. The amount of wave energy transmitted depends on the presence of spacers between the horizontal members, the water depth, the incident wave characteristics and the presence/absence of scour beneath the WDS" (GEL, pg. 107).

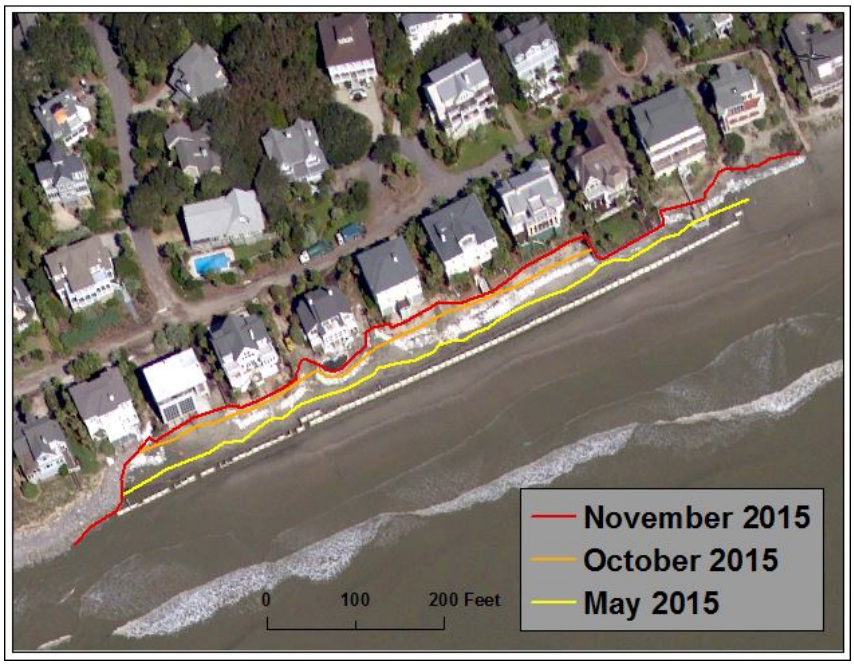
- "During energetic wave conditions, wave overtopping was observed (Figure 4-107). The return flow of water from wave overtopping likely contributes to the creation of scour holes beneath the WDS during high tides with energetic waves. The transport of overtopping water laterally along the shoreline can also contribute to erosion landward of the WDS" (GEL, pg. 109).

DHEC-OCRM Observations

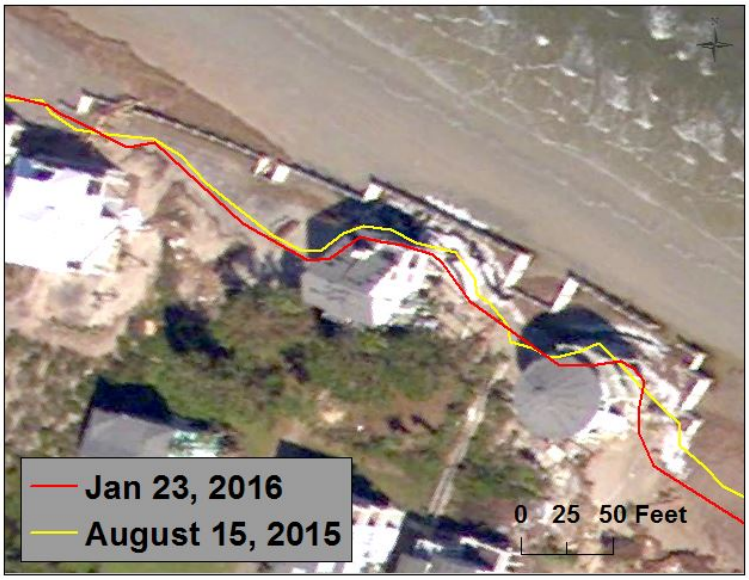
Scarp Line Position

- The WDS did not maintain the scarp line or MHW positions. While the scarp line position did not change drastically during GEL's study, which covered the time period between March and July 2016, the scarp eroded significantly at each WDS site after the structures were installed, but before GEL began their study (Figure 2). This earlier scarp line movement was documented in the data collected by The Citadel and mapped by DHEC – OCRM (Maps 1 and 2). This continued scarp erosion led to property owners requesting emergency sandbags for scarp protection at different times during the study at all four WDS locations. The sandbags at Harbor Island were already present prior to installation of the WDS at that location, but several renewals of the sandbag Emergency Orders were issued by DHEC-OCRM during the study to allow property owners to continue to protect their property from erosion (Figure 3). At Beachwood East, sandbags have been on the beach landward of the WDS since Fall of 2015 (Figure 4). At Ocean Club Villas, the sandbags were cut open after the broken slab beneath the building was repaired to allow the sand to be added landward of the WDS (Figure 5). The sandbags were subsequently removed from the site. At Seascape Villas, the sandbags were also cut open to allow the sand to be added landward of the WDS. The sandbags were cut open and removed after the second tier of the WDS was installed (Figure 6).

Figure 2: Scarp erosion landward of the Beachwood East WDS during storm conditions before the placement of emergency sandbags. This was approximately 1 month after the WDS was installed.



Map 1: Shows the landward movement of the scarp line position at Beachwood East after the WDS was installed.



Map 2: Shows the landward movement of the scarp line position at Harbor Island after the WDS was installed.

Figure 3: Harbor Island WDS location after WDS installation (left) and after new sandbags (right).

Figure 4: Beachwood East WDS location before (left) and after (right) sandbags.

Figure 5: Ocean Club Villas WDS location before (left) and after (right) sandbags.

Figure 6: Seascape Villas WDS location before 2nd tier installed (left) and after 2nd tier installed (right).

- DHEC-OCRM staff observed that the pooling of water on the landward side of the WDS allowed waves to re-form and break higher up on the beach, thus impacting the sandbags or eroding the scarp line (Figure 7).

Figure 7: Waves re-forming and breaking on the landward side of the Beachwood East WDS. Video screen-grab from September 29, 2015.

- When used as the sole erosion mitigation technique, the WDS does not hold the scarp line position or protect property landward of it. At Beachwood East and Harbor Island, sandbags were requested and employed by property owners for the duration of the study to stabilize the scarp line and protect their property. At Ocean Club, sandbags were deployed for part of the study. When sandbags were not present at that location, the three-walled system of the WDS was sufficient to break enough wave energy to minimize damage to the building. However, the parking slab beneath the building collapsed and had to be replaced, and the scarp continued to move landward beneath the building (Figure 8).

Figure 8: Continued erosion beneath Ocean Club Villas Building #1. Also note the scour (trenching) that is present on both sides of the WDS.

The ability to increase or retain sand volume on the landward side of the structure

- As observed by GEL during their study of the WDS, there was a loss of sand on the landward side of the structure at all four sites. Accretion of sand at all sites was always on the seaward side of the structure, not on the landward side. The WDS blocks the natural accretion of sand on the shoreline during calm conditions, and is ineffective without sandbags during storm conditions. Therefore, the WDS does not increase or retain sand on the landward side. (Table 2)

	Ocean Club	Seascape Villas	Beachwood East	Harbor Island
Volume change landward of low tide line (cy/ft)	**1.3**	**3.1**	**1.4**	**1.1**
Volume change landward of WDS (cy/ft)	**-0.9**	**-0.7**	**-0.6**	**-0.2**

Table 2: All four sites saw sand volume decrease landward of the WDS between March and July, while the beach seaward of the WDS accreted sand. This indicates that the WDS blocked the natural movement of sand up the beach.

- As noted by GEL, "sand often migrates onshore through a process of landward movement of ridge-and-runnel features that gradually merge onto and widen the dry beach" (GEL, pg. 96). Figure 9 is an example of a ridge-and-runnel feature moving onto the beach in November 2016 northeast of the Ocean Club WDS on Isle of Palms. The ridge of accreting sand is the light colored smooth surface to the right of the photograph. Another example from Folly Beach in December 2015 is also shown in Figure 9. The Folly Beach photograph was taken at approximately the same time that several horizontal panels were removed from the Beachwood East WDS to allow the naturally accreting sand to move landward of the WDS. The landward movement of ridge-and-runnel features occurs during calm conditions and is a natural process.

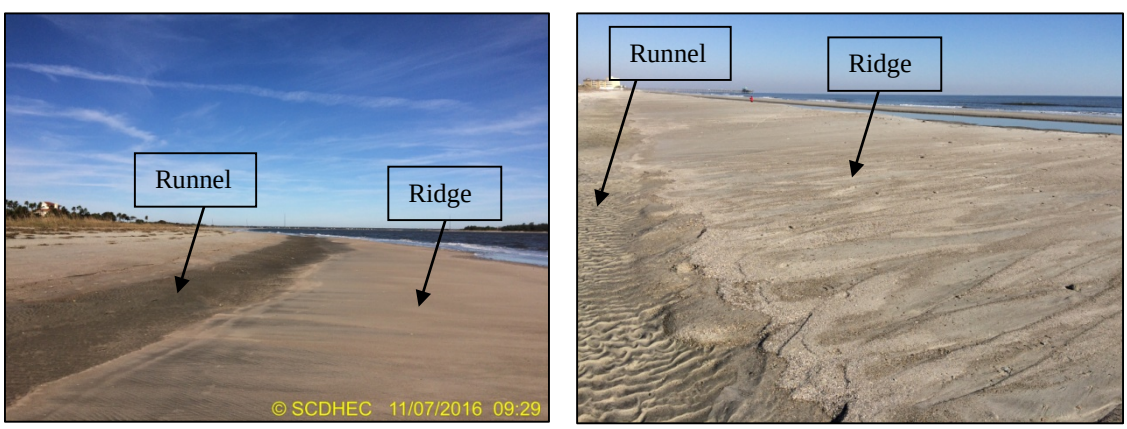


Figure 9: Landward movement of ridge-and-runnel features at Isle of Palms in November 2016 (left) and at Folly Beach in December 2015 (right). The natural widening of the beach during this process occurs during calm conditions.

- Figure 10 below compares typical beach cross-section profiles during storm conditions, after storm conditions, and during calm conditions. During storm conditions, the beach profile lowers and the berm (dry sand beach) erodes as waves and currents transport sand seaward. After a storm, the eroded sand has been deposited just offshore or in the intertidal zone as sand bars. During calm conditions, the sand that has been deposited on the sand bars is gradually pushed back towards the beach by gentle wave action, forms ridge-and-runnel features, and then fully welds onto the berm and widens the dry sand beach. Again, this process of beach erosion during storm conditions followed by accretion during calm conditions is a natural phenomenon and cannot be attributed to the presence of the WDS.

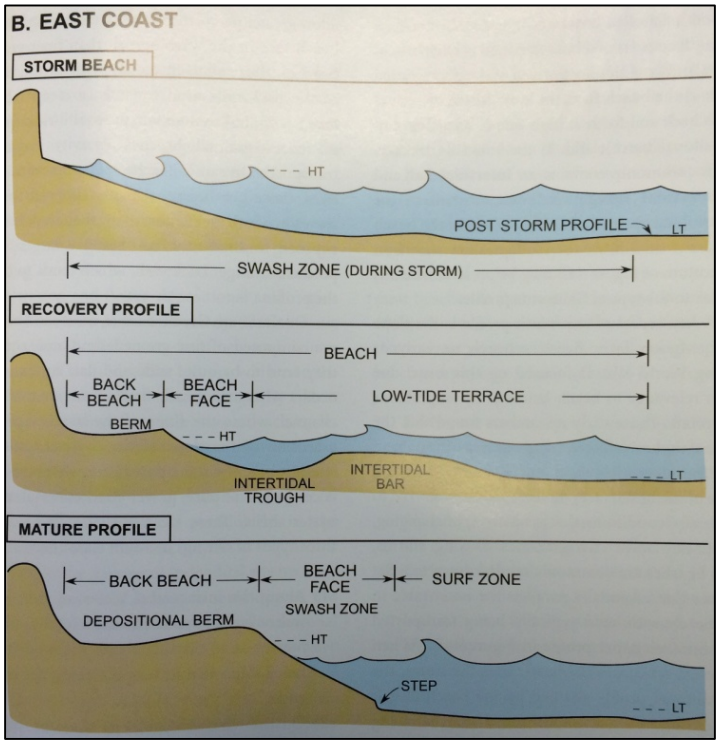


Figure 10: Typical beach cross-section profiles during storm conditions (top), after storm conditions (middle), and during calm conditions (bottom). Source: Miles O. Hayes and Jacqueline Michel. 2008. A Coast for All Seasons: A Naturalist's Guide to the Coast of South Carolina.

- The Citadel researchers requested to bulldoze sand on the landward side of the WDS at Beachwood East to build a dune. DHEC-OCRM denied the request for two reasons: 1.) Bulldozing the sand would have altered the study data. Beach profile data (elevations and scarp line positions) were collected monthly throughout the study by both The Citadel and by GEL to determine the effects of the WDS on the beach. Artificially altering the beach profile by bulldozing or minor renourishment would have resulted in an inconclusive study, 2.) During the first WDS study at Seascape Villas in 2014, The Citadel researchers bulldozed the sand behind that WDS installation without prior DHEC-OCRM authorization, and the piled up sand eroded away in a matter of days (Figure 11). Lowering the beach profile landward of the WDS by bulldozing allowed the waves to reach higher up the beach and erode the scarp line more quickly.

Figure 11: Sand that was scraped and piled up by The Citadel research team at Seascape Villas on September 19, 2014 (left), which had almost completely eroded by September 22, 2014 (right).

- Where the WDS is present during calm conditions, sand that is naturally moving landward (up the beach profile) becomes trapped on the seaward side of the WDS. This results in the need for spacers and periodic panel removal to allow the trapped sand to move to the landward side of the WDS (Figure 12). Limited sand is able to be pushed by waves and tides through the panels, but this sand would have moved up the beach profile naturally if the WDS were not obstructing it (Figure 13). Where the WDS is present during storm conditions, scour on both sides of the WDS allows more water to reach the scarp and erode it when the scarp is not protected by sandbags. <u>Net accretion observed by GEL during their study at the WDS sites was always on the seaward side of the structure (not on the landward side). The WDS blocks the natural accretion of sand on the shoreline during calm conditions, and is ineffective without sandbags during storm conditions. Therefore, the WDS does not increase or retain sand on the landward side.</u>

Figure 12: Horizontal panels removed at the Ocean Club WDS in January 2016 to allow sand that was trapped on the seaward side of the structure to continue moving to the landward side of the structure.

Figure 13: Small mounds of sand that have been able to move landward through the Ocean Club WDS in December 2015.

The Ability to Minimize Trenching and Scour

- DHEC – OCRM staff observed persistent trenching and scour at the base of the structures at all sites except Seascape Villas (Figures 14 and 15).
- Trenching and scour was photo documented at the following locations and dates.
  - Ocean Club in April and May of 2016.
  - Beachwood East in September, October, November, and December 2015 and February, April, May, and June 2016.
  - Harbor Island in July, August, September, October 2015, and March and April 2016.

Figure 14: Scour (trenching) on the seaward and landward sides of the Beachwood East WDS.

Figure 15: Example of persistent scour (trenching) at the Beachwood East WDS. Similar effects were seen throughout the study at all WDS sites except Seascape Villas.

- The Citadel researchers installed "Vertical Porous Panels" (VPP's) at certain locations at Ocean Club and Beachwood East below grade as a means to reduce trenching and scour. DHEC-OCRM approved a conceptual drawing of slotted VPP's (Figure 16), but the installed VPP's had very small drill holes instead of slots, resulting in a sheet pile structure below grade with minimal porosity (Figure 17). Since the installed panels did not match the approved panel, DHEC-OCRM informed The Citadel researchers that those VPP's could not be installed at additional locations. DHEC-OCRM informed The Citadel researchers that the installed VPP's could remain in place due to the physical alterations to the beach that would occur if they were dug up and removed. After some VPP's were dislodged by wave action (Figure 18), The Citadel researchers voluntarily removed the VPP's that were still in place.

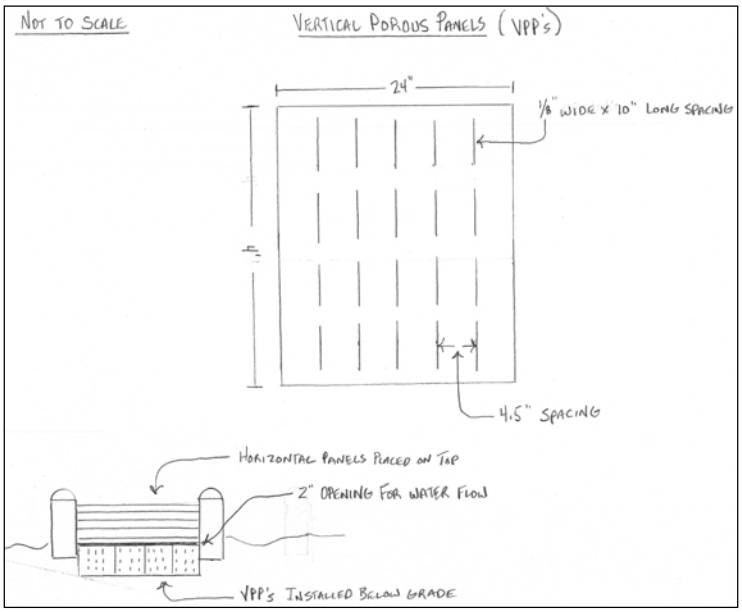


Figure 16: Conceptual drawing of Vertical Porous Panels that was submitted by The Citadel research team and approved for use in the study by DHEC-OCRM. Each vertical slot was intended to be 1/8" wide and 10" long.

Figure 17: The actual Vertical Porous Panels that were installed at the Ocean Club WDS (left). Note that very small drill holes were used instead of slots, resulting in a VPP with minimal porosity (right).

Figure 18: A Vertical Porous Panel that was dislodged by waves at the Ocean Club WDS in February 2016. Photo was taken by Stantec.

Section 2: The WDS Results in Additional Impacts to the Beach

The exception to normal permitting requirements found in S.C. Code Ann. § 48-39-130(D)(2) and S.C. Code Ann. Regulation § 30-5(A)(2) states that certain activities do not require a Critical Area Permit "provided that such activities cause no material harm to the flora, fauna, physical or aesthetic resources of the area." Additionally, Budget Proviso 34.48 Criteria 7 states that "A qualified wave dissipation device otherwise prevents down-coast erosion, protects property, and limits negative impacts to public safety and welfare, beach access, and the health of the beach dune system."

This section will review the impacts of the WDS to flora, fauna, physical or aesthetic resources, adjacent property, and beach access.

The Citadel

Impacts to Flora and Fauna

- "It is recommended that the system be installed with the horizontal panels fully in place during times outside of turtle season. During turtle season, it is recommended that the system be completely open (only vertical elements in place) except when the structure behind the system is in immediate danger of losing structural support" (The Citadel, pg. 37).

Impacts to Physical or Aesthetic Resources

- "The only major concern that the research team noted during the study is the temporary local trenching that occurred at times at each site….The trenching appears to be related to scour caused by extreme tides, significant erosion events, and the uncontrolled volume of water that is allowed to pass through the system (this same volume of water must escape as the tide goes back out)" (The Citadel, pg. 4).

Impacts to Adjacent Property

- At all sites, The Citadel stated that "our review of the surveys and the related data (sand volumes gained and lost over time) leads to the conclusion that there is no negative or significant impact by the WDS on the adjacent beach profile" (The Citadel, pgs. 16, 19, and 26).

Impacts to Beach Access

- No information provided.

GEL Engineering

Impacts to Flora and Fauna

- "There have been false crawls caused by sea turtles encountering the WDS. Evaluation of false crawl data along Harbor Island and IOP indicates that there was a higher rate of false crawls along the segments of shoreline with the WDS than the remainder of the island. However, given the conditions of the shoreline on the landward side of the WDSs, there is no evidence that the WDSs caused a significant increase in the incidence of false crawls as compared to what may have occurred in the absence of the WDSs. The adverse effect on turtles associated with a false crawl at a WDS is uncertain. After returning to the water from an aborted attempt, the turtle typically returns to the same beach or area where they first emerged on the same or the following night (Miller 1997). Therefore, if a sea turtle makes a non-nesting emergence at a WDS location, it will most likely nest nearby on the same or following night. We found no evidence that the false crawls at the

WDS locations result in a decrease in the total number of nests on Harbor Island or IOP. The WDS was not observed to adversely interact with other fauna" (GEL, pg. 132).

Impacts to Physical or Aesthetic Resources

- At Harbor Island, "the erosion downdrift of the WDS, in the adjacent lot west of the WDS, is evident in Figures 4-33 and 4-34 (see changes at alongshore distances between 400 and 500 feet). The fraction of this erosion attributable to the WDS cannot be quantified, but the pattern suggests that the WDS may contribute to scarp erosion within a short distance (i.e., mostly within 100 feet) of the end of the structure (GEL, pg. 66).

Impacts to Beach Access

- "At Harbor Island, beach walkers cannot pass the WDS on dry beach more than 35 percent of the time…. Beach walkers at [Beachwood East] may not be able to pass seaward of the WDS more than 50 percent of the time…. In April, beach walkers at [Seagrove Villas] may not be [sic] have been able to pass seaward of the WDS more than 34 percent of the time, although this decreased to one percent by July due to accretion…. At [Ocean Club], beach walkers at [sic] may not be able to pass seaward of the WDS more than 58 percent of the time" (GEL, pg. 114).

DHEC-OCRM Observations

Impacts to Flora and Fauna

- Impacts to flora are undetermined, but data suggests that continued erosion of the scarp line landward of the WDS and increased erosion rates immediately adjacent to the WDS structure could impact flora in areas where dune vegetation is present.
- Nesting sea turtles interacted with the WDS twice at Ocean Club, once at Beachwood East, and four times at Harbor Island during the study period. In all cases, based on the tracks left in the sand, the sea turtles bumped into the WDS and eventually returned to the ocean without laying their eggs (Figure 19).

Figure 19: Examples of nesting sea turtle interactions with the WDS at Ocean Club (left), Beachwood East (middle), and Harbor Island (right).

- It can be debated whether these sea turtle interactions with the WDS were "false crawls," where the turtle would not have laid her eggs regardless of the presence of the WDS, or if the WDS interrupted a nesting attempt. It has been stated that nesting sea turtles are not negatively impacted by the WDS because the shoreline landward of the structures is heavily eroded and not conducive to sea turtle nesting. However, DHEC-OCRM has photographic evidence of sea turtle nesting in less than optimal areas, including at the base of erosional scarps (Figure 20). When a sea turtle nest is laid in an area with little

chance for successful hatching, Nest Protection Project Leaders and volunteers (which are active on Isle of Palms and Harbor Island) relocate the eggs to a more ideal location along the shoreline. The sea turtle interactions that occurred at the WDS may have been false crawls or they may have been legitimate nesting attempts. Therefore, regarding impacts to fauna, the WDS presents a potential harm associated with continued nesting attempts of sea turtles.

Figure 20: Sea turtle nests that were laid in less-than-ideal locations in areas without a WDS. These are nests on Debidue Island, SC.

Impacts to Physical or Aesthetic Resources

- Regarding impacts to physical resources, the WDS results in impacts to the beach through 1.) Continued erosion of the scarp line landward of the WDS structures, 2.) Persistent scouring and trenching, 3.) Periodic excavations to adjust the system, 4.) Erosion of adjacent unprotected properties, and 5.) Similar impacts to those of seawalls. Scarp line erosion and scouring have been discussed previously. Impacts of periodic excavations, impacts to adjacent properties, and similar issues associated with seawalls are discussed below.
- Periodic Excavations: The WDS can be adjusted after initial deployment by lowering the pilings, lowering or raising the panels, adding spacers between panels, or temporarily removing the panels altogether. All of these adjustments were requested by The Citadel researchers and approved by DHEC-OCRM during the study period. These periodic excavations result in temporary impacts to the beach (Figure 21).
- Adjacent properties: The WDS does not prevent erosion of the shoreline on the "down-coast" side of the structure. In fact, where the WDS terminates, increased erosion was observed on unprotected properties immediately adjacent to the WDS (Figure 22).

Figure 21: Adjustments to the Ocean Club WDS being made by The Citadel research team after Hurricane Joaquin in October 2015.

Figure 22: Erosion at the northeastern end of the Beachwood East WDS (left) and the southwestern end of the Ocean Club WDS (right).

- <u>Similar impacts to that of a seawall:</u> S.C. Code Ann. Regulation § 30-1(D)(22)(a) defines a seawall as "a special type of retaining wall that is specifically designed to withstand wave forces". While not defined as a seawall or bulkhead, GEL notes that the WDS has similar negative effects on the beach as these traditional types of erosion control structures. In particular, when discussing seawalls, GEL states that "storms may cause localized scour in front of and at the lateral ends of the structure" and "as ongoing erosion continues, the dry-beach width accessible to the public in front of the structure will decrease because the landward limit of the accessible beach is held in place by the structure" (GEL, pg. 35). These observations of the effects of seawalls were also clearly observed during the WDS pilot project. Shore-parallel erosion control structures like seawalls and bulkheads are banned by the South Carolina Beachfront Management Act (S.C. Code Ann. § 48-39-250 et. seq). In writing that Act, the General Assembly found that "The use of armoring in the form of hard erosion control devices such as seawalls, bulkheads, and rip-rap to protect erosion-threatened structures adjacent to the beach has not proven effective. These armoring devices have given a false sense of security to beachfront property owners. In reality, these hard structures, in many instances, have

increased the vulnerability of beachfront property to damage from wind and waves while contributing to the deterioration and loss of the dry sand beach which is so important to the tourism industry."

- Regarding aesthetic resources, aesthetics is a subjective criterion, and an eroding shoreline is not generally aesthetically pleasing when infrastructure and buildings are located immediately landward of it. The Citadel researchers sought to demonstrate that the WDS is a viable alternative to sandbags, but The Citadel's study and GEL's study both showed that the scarp landward of the WDS continued to erode when not protected by sandbags. Since sandbags are needed landward of the WDS to help minimize erosion of the scarp, DHEC-OCRM finds that the WDS is not an effective alternative to sandbags. The existing erosion mitigation techniques allowed under the Emergency Order process (sandbags, sand scraping, and minor beach renourishment) are effective at providing temporary protection by mitigating erosion and result in less harm to the beach dune system than the WDS.

Impacts to Beach Access

- Throughout the study, DHEC-OCRM received complaints from members of the public regarding their inability to walk past the WDS structures at high tide. GEL's final report summarizes the percentage of time that lateral access along the beach is not possible due to the WDS. Although the WDS is placed mostly parallel to the shoreline, it is important to note that it extends a significant distance out onto the beach (approximately 40 feet seaward of the building at Ocean Club, approximately 30 feet seaward of sandbags at Beachwood East, and approximately 13 feet seaward of sandbags at Harbor Island) (GEL, pg. 114).

Section 3: The WDS Does Not Satisfy the Budget Proviso Qualification Criteria

1) A qualified wave dissipation device is placed mostly parallel to the shoreline.

The Citadel

- The Citadel did not specifically analyze how much of the WDS was installed parallel to the shoreline, but it is clear that the structures are mostly parallel to the shoreline.

GEL Engineering

- "The WDSs at all four locations are oriented parallel to the shoreline, with the exception of perpendicular segments that tie-back the WDS to the scarp or dune line, and perpendicular segments that connect parallel tiers in areas with multi-tier WDS designs. The fractions of parallel segments are 76%, 77% and 95% for the OC/SV, Harbor Island and BE sites, respectively" (GEL, pg. 123).

DHEC-OCRM Observations and Conclusion

- Since the structures are placed mostly parallel to the shoreline, DHEC-OCRM finds that the WDS **satisfies** this qualification.

2) A qualified wave dissipation device is designed to dissipate wave energy.

The Citadel

- "Although researchers are happy with the overall performance of the system and its ability to dissipate energy from waves, some concerns are expressed in the recommendations and conclusions section of this report. Readers should carefully note that unlike research at other universities where structures can be tested in a university wave pool where wave period, wave height, and tide levels can be controlled, these structures were completely loaded by whatever events God allowed to occur at each site over a one year period. As such, the now infamous 1,000 year storm, many nor'easters, and several tropical storms impacted the system. The WDS survived all the events, some of which were beyond levels considered in the original design of the system" (The Citadel, pg. 3).

GEL Engineering

- "In general, when a wave interacts with a coastal structure such as the WDS, some of the wave energy is dissipated through wave breaking or structure deflection, some of the wave energy is reflected, and some of the wave energy is transmitted landward of the structure. Wave interaction with the WDS is dependent on the water level and offshore wave conditions. As the tide rises and the stillwater level approaches the WDS, the WDS is within the swash zone, which is the area of the beach where waves run up the beach after breaking. During these conditions, the WDS is effective at blocking the uprush of the wave, either dissipating or reflecting all of the wave energy when there are no spacers between the horizontal members" (GEL, pg. 107). "When the WDS is in deeper water (e.g., at the seaward-most tier of the OC WDS, or during very high tide conditions at the other WDS sites), the fraction of transmitted wave energy increases. The amount of wave energy transmitted depends on the presence of spacers between the horizontal members,

the water depth, the incident wave characteristics and the presence/absence of scour beneath the WDS" (GEL, pg. 107).

- "During energetic wave conditions, wave overtopping was observed (Figure 4-107). The return flow of water from wave overtopping likely contributes to the creation of scour holes beneath the WDS during high tides with energetic waves. The transport of overtopping water laterally along the shoreline can also contribute to erosion landward of the WDS" (GEL, pg. 109).

- "During the monitoring period, March through July, the scarp was stable in areas where the WDS was used in combination with sandbags (except where small sandbags or fill material were stacked at an excessively steep angle). In some areas fronted only by the WDS, scarp erosion was observed following the storm wave action that occurred between the March and April surveys. The survey data collected by The Citadel researchers shows large amounts of scarp erosion at the BE and OC/SV site following the initial installation of the WDSs" (GEL, pg. 124-127).

- At Harbor Island, "the wave activity between the March and April surveys caused recession of the [Mean High Water (MHW)] shoreline along the entire study area. The WDS did not prevent erosion of the MHW contour landward of the WDS. The MHW contour along the WDS receded by an average of 24 ft, a similar amount as the average recession to the east (24 ft) and the west (23 ft). During the subsequent survey periods, the wave climate was milder, and the MHW contour shifted seaward" (GEL, pg. 48). At lot 49 on Harbor Island, "there was erosion on the landward side of the WDS in this area during the March to April time period, but the sandbags and the top of the scarp remained stable. Small sand bags such as those deployed here do not remain stable when subjected to any significant wave action. The overall stability of the sandbags at lot 49 during the March to April timeframe demonstrates that the WDS was effective at attenuating wave action sufficiently such that there was only minimal, if any, erosion of the slope protected by the sandbags" (GEL, pg. 49). At lot 52 on Harbor Island, "the sandbags and underlying sand slumped because of the excessively steep slope at which these sandbags and underlying sand were initially placed" (GEL, pg. 49).

- At Beachwood East, "the wave action between the March and April surveys resulted in recession of the MHW contour along the WDS by an average of 8 feet. In contrast, the MHW contour to the east moved seaward by an average of 3 feet in this time period. Over the whole study period between March and July, the MHW contour along the WDS segment eroded by an average of 6 feet, while the MHW contour east of the WDS moved seaward by an average of 38 feet. The accretion pattern east of the WDS is the result of the spreading of sand from the attaching shoal east of the BE project site. Scarp lines experienced only minor changes during the monitoring period. The stability of scarp along the east end is due to the accretion from the shoal attachment and spreading. The stability of the scarp line on the landward side of the WDS despite the recession of the MHW contour in this area can be attributed to the combination of the WDS and the large sandbags that protect a majority of the scarp line along this segment of the beach (GEL, pg. 67).

- At Ocean Club and Seascape Villas, "the wave activity between the March and April surveys caused recession of the MHW shoreline along the entire study area…. The MHW contour along the WDS receded by an average of 32 feet. The areas to the east and west receded by 22 and 19 feet, respectively, on average. During the subsequent survey periods, the wave climate was milder, and the MHW contour shifted seaward" (GEL, pg. 80). "The landward most top-of-scarp line surveyed in March remained mostly stable throughout the study period. A small section of this scarp adjacent to the east side of the OC building receded about 4 feet over the course of the study" (GEL, pg. 82).

DHEC-OCRM Observations and Conclusion

- The WDS did not maintain the scarp line or MHW positions. While the scarp line position did not change drastically during GEL's study, which covered the time period between March and July 2016, the scarp did erode significantly at each WDS site after the structures were installed and before GEL began their study. This earlier scarp line movement was documented by The Citadel. Severe scarp erosion led to property owners requesting emergency sandbags for scarp protection at different times during the study at all four WDS locations. The sandbags at Harbor Island were already present prior to installation of the WDS at that location, but several renewals of the sandbag Emergency Orders were issued by DHEC-OCRM during the study to allow property owners to continue to protect their property from erosion (Figure 3). At Beachwood East, sandbags have been on the beach landward of the WDS since Fall of 2015 (Figure 4). At Ocean Club Villas, the sandbags were cut open after the broken slab beneath the building was repaired to allow the sand to be added landward of the WDS (Figure 5). The sandbags were subsequently removed from the site. At Seascape Villas, the sandbags were also cut open to allow the sand to be added landward of the WDS. The sandbags were cut open and removed after the second tier of the WDS was installed (Figure 6).

- The WDS dissipates wave energy to an extent, but the effectiveness is greatly reduced when scour appears on both sides of the structure. In some cases, DHEC-OCRM staff observed that the pooling of water on the landward side of the WDS allowed waves to re-form and break higher up on the beach, thus impacting the sandbags or eroding the scarp line. Although the structure itself dissipates some wave energy, the scarp line landward of each WDS installation continued to erode when not protected by sandbags. Therefore, DHEC-OCRM finds that the WDS **does not satisfy** this qualification.

3) A qualified wave dissipation device is designed to minimize scouring seaward of and adjacent to the device by permitting sand to move landward and seaward through the device.

The Citadel

- "To help minimize the negative side effects of hardened structures, the WDS allows water to move behind the system. However, the amount of water allowed through the system should be controlled by renourished sand placed behind the system and dune

rebuilding which the system allows via natural accretion needed for such activities" (The Citadel, pg. 3-4).

- "The only major concern that the research team noted during the study is the temporary local trenching that occurred at times at each site….The trenching appears to be related to scour caused by extreme tides, significant erosion events, and the uncontrolled volume of water that is allowed to pass through the system (this same volume of water must escape as the tide goes back out)" (The Citadel, pg. 4).

- "Removing just the horizontal panels in areas of local trenching almost immediately restores the beach profile by eliminating the trenching effect and the horizontal panels are easily removed for this purpose" (The Citadel, pg. 4).

- At all WDS sites, "Trenching, caused by significant erosion events, and related to the system's allowance of rising tide levels (with moving water) behind the WDS can, when deep enough, become a concern. The study has shown that the system is always self-healing and that the trenching is always temporary. On the contrary, deep trenching on site should not be allowed and must be mitigated anytime it appears on site" (The Citadel, pgs. 16, 19-20, 26).

- At Harbor Island, "Although at first, there was some accretion, the wave energy was not strong enough to push it more than three ft or so beyond the WDS. This led to an unacceptable low space (relative to the accreted area) beyond the accreted sand. It should be noted that the horizontal panel system at Harbor Island was designed to be over two times as flexible as the one installed at Ocean Club (and Seascape in 2013-2014). This flexibility alone did not provide adequate 'breathing' of the ocean such that a more uniform distribution of accreted sand fell behind the system. For that reason, the research team added some trial spacers to encourage more natural sand accretion behind the system. The initial result of the added spacers was an improved distribution of sand behind the system. Soon after, the site developed what has been the biggest issue at Harbor Island. As the beach lowered and the added spacer elevations became too high (relative to the beach profile) to allow for exit water to efficiently leave the area behind the WDS, a trench developed directly under the system. Spacers were located at several locations during the second quarter of this study and it was determined that they are not the ideal solution to trenching. They help at times but they must be constantly adjusted with changing elevations." (The Citadel pgs. 21-24).

GEL Engineering

- "During the typical storm wave conditions that occurred during this monitoring study, the WDS allowed erosion of sand from the landward side of the WDS. In areas where the WDS was at relatively high elevations on the beach, scour holes did not develop that extended below the horizontal members. In these scenarios, transport of sand seaward through the WDS was minor. Figure 5-5 shows an example of erosion on the landward side of a section of the Seascape Villas WDS that occurred after the March through April period when waves caused large amounts of erosion of the entire beach. Areas with the greatest amount of erosion during storm events occurred in areas where the scour passed

beneath the WDS, or the entire beach profile was lowered beneath the WDS, which allowed sand to be transported seaward. When this occurs, large volumes of sand were transported seaward underneath the WDS horizontal panels. During the subsequent natural beach recovery, large volumes were also observed to move landward underneath the WDS horizontal panels" (GEL, pg. 124).

- "Scour occurred at all four WDS sites prior to the April survey, and the beach in these areas subsequently accreted" (GEL, pg. 101). "High tide observations of wave action at these sites confirmed that if the scour hole is deep enough to allow free flow of water beneath the horizontal members, the WDS becomes less effective at attenuating waves (GEL, pg. 107). "Based on our field observations, scour can occur at the WDS when subjected to erosive wave action. This scour is limited to a temporary localized effect that allows greater wave energy to be transmitted to the landward side of the WDS. There is no evidence of adverse impacts other than reduced WDS performance (i.e., reduced wave attenuation" (GEL, pg. 107).

- At Harbor Island, "the WDS allows some transport of accreting sand through the WDS. However, given the buildup of sand observed on the seaward side of the WDS, it appears that the WDS can inhibit the amount of natural landward migration of sand during mild wave conditions" (GEL, pg. 55).

- At Harbor Island, "The fact that the upper beach showed a small net loss of sand behind the WDS (-0.2 cy/ft) while the entire beach down to the low tide line showed accretion (1.1 cy/ft), indicates that the accretion in the WDS beach segment shown in Table 4-3 and Figure 4-33 occurred on the seaward side of the WDS" (GEL, pg. 65).

- At Beachwood East, "Similar to the observations at Harbor Island, the upper beach showed a small net loss of sand on the landward side of the WDS over the March to July period (-0.6 cy/ft) while the entire beach down to the low tide line for the same segment showed accretion (1.4 cy/ft) (compare Table 4-5 to Table 4-6). This indicates that the accretion in the WDS beach segment occurred on the seaward side of the WDS" (GEL, pg. 79).

- At Ocean Club and Seascape Villas, "The net change over the study period showed a small amount of accretion to the west of the WDS (0.3 cy/ft, on average), erosion landward of the WDS (-0.7 cy/ft at SV and -0.9 cy/ft at OC, on average), and a small amount of erosion east of the WDS (-0.2 cy/ft, on average)". (GEL, pg. 100).

DHEC-OCRM Observations and Conclusion

- As noted by GEL, "sand often migrates onshore through a process of landward movement of ridge-and-runnel features that gradually merge onto and widen the dry beach" (GEL, pg. 96). Figure 9 is an example of a ridge-and-runnel feature moving onto the beach in November 2016 northeast of the Ocean Club WDS on Isle of Palms. The ridge of accreting sand is the light colored smooth surface to the right of the photograph. Another example from Folly Beach in December 2015 is also shown in Figure 9. The Folly Beach photograph was taken around the same time that several horizontal panels

were removed from the Beachwood East WDS to allow the naturally accreting sand to move landward of the WDS. The landward movement of ridge-and-runnel features occurs during calm conditions and is a natural process.

- Figure 10 compares typical beach cross-section profiles during storm conditions, after storm conditions, and during calm conditions. During storm conditions, the beach profile lowers and the berm (dry sand beach) erodes as waves and currents transport sand seaward. After a storm, the eroded sand has been deposited just offshore or in the intertidal zone as sand bars. During calm conditions, the sand that has been deposited on the sand bars is gradually pushed back towards the beach by gentle wave action, forms ridge-and-runnel features, and then fully welds onto the berm and widens it. Again, this process of beach erosion during storm conditions followed by accretion during calm conditions is a natural phenomenon and cannot be attributed to the presence of the WDS.

- Where the WDS is present during calm conditions, sand that is naturally moving landward (up the beach profile) becomes trapped on the seaward side of the WDS. This results in the need for spacers and periodic panel removal to allow the trapped sand to move to the landward side of the WDS (Figure 12). Limited sand is able to be pushed by waves and tides through the panels, but this sand would have moved up the beach profile naturally if the WDS were not obstructing it (Figure 13). Where the WDS is present during storm conditions, scour on both sides of the WDS allows more water to reach the scarp and erode it when the scarp is not protected by sandbags. <u>Net accretion observed by GEL during their study at the WDS sites was always on the seaward side of the structure (not on the landward side).</u> Since the WDS blocks the natural accretion of sand on the shoreline during calm conditions and is ineffective without sandbags during storm conditions, DHEC-OCRM finds that the WDS **does not satisfy** this qualification.

4) A qualified wave dissipation device has horizontal panels that can be deployed within one-hundred twenty hours or less and can be removed within one-hundred twenty hours or less.

The Citadel

- The Citadel documented the dates on which installation of each WDS began and the dates on which installation was completed.

GEL Engineering

- "GEL did not directly observe horizontal panels deployed or removed, although GEL did observe trenching in preparation for panel installation. During the monitoring period, segments of the WDS at Ocean Club and the WDS at Beachwood East were lowered 2 feet in response to decreasing beach elevations. This involved removal of the horizontal panels, lowering the piles, trenching the beach and reinstalling the horizontal panels. This process required about one work week (about 5 days) to lower the landward tier of the OC installation. Given that horizontal panel removal, vertical pile lowering, trenching and horizontal panel redeployment of 13 horizontal panel segments required about one week of on-site work, then certainly some horizontal panels can be deployed or removed within 120 hours or less, assuming a contractor can be mobilized to the site within this

time frame and assuming the vertical piles are already in place. The exact number of horizontal panels that can be installed in this time frame is unknown. The time required to deploy or remove horizontal panels for an entire WDS is dependent on the total length of the system" (GEL, pgs. 130-131).

DHEC-OCRM Observations and Conclusion

- Since all components of the WDS structures, including vertical pilings and horizontal panels, were installed at once and have not been removed, it is difficult to assess whether the horizontal panels alone can be deployed or removed within one-hundred twenty hours or less. One-hundred twenty hours is the equivalent of five 24-hour days. The entire structure at Ocean Club took approximately 40 days to install (4/27/2015 to 6/5/2015), the entire structure at Harbor Island took approximately 24 days to install (5/11/2015 to 6/3/2015), and the entire structure at Beachwood East took approximately 45 days to install (7/28/2015 to 9/10/2015). DHEC-OCRM finds that **it has not been demonstrated whether or not the WDS satisfies** this qualification.

5) A qualified wave dissipation device does not negatively impact or inhibit sea turtle nesting or other fauna.

The Citadel

- "It is recommended that the system be installed with the horizontal panels fully in place during times outside of turtle season. During turtle season, it is recommended that the system be completely open (only vertical elements in place) except when the structure behind the system is in immediate danger of losing structural support" (The Citadel, pg. 37).

GEL Engineering

- "There have been false crawls caused by sea turtles encountering the WDS. Evaluation of false crawl data along Harbor Island and IOP indicates that there was a higher rate of false crawls along the segments of shoreline with the WDS than the remainder of the island. However, given the conditions of the shoreline on the landward side of the WDSs, there is no evidence that the WDSs caused a significant increase in the incidence of false crawls as compared to what may have occurred in the absence of the WDSs. The adverse effect on turtles associated with a false crawl at a WDS is uncertain. After returning to the water from an aborted attempt, the turtle typically returns to the same beach or area where they first emerged on the same or the following night (Miller 1997). Therefore, if a sea turtle makes a non-nesting emergence at a WDS location, it will most likely nest nearby on the same or following night. We found no evidence that the false crawls at the WDS locations result in a decrease in the total number of nests on Harbor Island or IOP. The WDS was not observed to adversely interact with other fauna" (GEL, pg. 132).

DHEC-OCRM Observations and Conclusion

- Nesting sea turtles interacted with the WDS twice at Ocean Club, once at Beachwood East, and four times at Harbor Island during the study period. In all cases, based on the tracks left in the sand, the sea turtles bumped into the WDS and eventually returned to the ocean without laying their eggs (Figure 19).

- It can be debated whether these sea turtle interactions with the WDS were "false crawls," where the turtle would not have laid her eggs regardless of the presence of the WDS, or if the WDS interrupted a nesting attempt. It has been stated that nesting sea turtles are not negatively impacted by the WDS because the shoreline landward of the structures is heavily eroded and not conducive to sea turtle nesting. However, DHEC-OCRM has photographic evidence of sea turtle nests being laid in less than optimal areas, including at the base of erosional scarps (Figure 20). When a sea turtle nest is laid in an area with little chance for successful hatching, Nest Protection Project Leaders and volunteers (which are active on Isle of Palms and Harbor Island) relocate the eggs to a more ideal location along the shoreline. The sea turtle interactions that occurred at the WDS may have been false crawls or they may have been legitimate nesting attempts. Since the WDS presents a potential harm associated with continued nesting attempts of sea turtles, DHEC-OCRM finds that the WDS **does not satisfy** this qualification.

6) A qualified wave dissipation device can be adjusted after initial deployment in response to fluctuations in beach elevations.

The Citadel

- "The main issue to note is that the WDS is a dynamic system that must be configured appropriately for optimal performance and that its use will require modifications and some degree of sand replenishing after severe erosion events. OCRM did not allow most of the recommendations presented in this report to be applied or adhered to during the study since they claimed the results (to be reflected in the surveys) would be affected. As a result, optimal performance could not be maintained throughout the study" (The Citadel, pg. 2).

- "It is also important for the reader to note that Citadel researchers were not permitted by OCRM to optimize the system's performance and that the way the systems were tested over the last year is in no way indicative of how they should be used in practice. On the other hand, even though not optimize for performance, the WDS did protect the structures behind the systems for the duration of the study period described in this report" (The Citadel, pg. 3).

- "The research team has always stressed that the WDS is dynamic and needs to be built and modified as often as necessary to address changing beach elevations and dune situations behind the system" (The Citadel, pg. 3).

- "The Citadel researchers want to make it very clear, as they always have, that the system is not a one-size fits all solution and that it is a dynamic system that must be designed separately for each particular site, and monitored/adjusted as necessary to optimize its performance" (The Citadel, pgs. 4, 36).

- "The [Vertical Porous Panels] VPPs are experimental prototypes that must be studied to determine their optimal configuration, hole pattern, length, etc. and the typical sketch given to OCRM was intended to provide an idea of what the panels should like [sic]

during the first installation. During construction of the panel, the research team found that drilling slots was too difficult (and was damaging the panel) and that holes would work better. Hence the team made the decision to move forward with holes instead of slots. In addition, the actual as constructed version of the panel was actually more porous than the proposed version considering its overall purposely placed installation configuration. The goal of studying the vertical panels was to determine the optimal porosity and configuration. The research team spent hours designing different details for the porosity prior to OCRM saying that the VPPs could no longer be tested. We are very disappointed that the research team's main proposed method (prior to the expensive option of lowering of the system) for removing the team's one major concern from the study at Ocean Club and Seascape was not allowed to be studied for stated technical reasons that are not justified nor based on engineering mechanics, coastal engineering, or coastal geology principals" (The Citadel, pg. 10-11).

- At Ocean Club, "although the system is extremely self-healing after significant erosion events, around mid-April 2016 and mid-May 2016 the piles in the row closest to the ocean in front of the building and much of the entire back row (around the building corner) were lowered 2 ft to improve performance" (The Citadel, pg. 12).

- "It has always been known that flooding the system using isolated panel removal can easily remove trenching and is almost instantaneous" (The Citadel, pgs. 16, 20).

- At Beachwood East, "noticing the enormous level of accretion the research team forecast for several more weeks of accretion, Dr. Mays acted quickly and notified OCRM that the team wanted to test (as shown clearly during the previous Seascape study) that the sand accreting behind the system could be pushed back to allow the homeowners to reclaim the sand they lost from the 1,000 year event, to rebuild the dune to its initial configuration prior to the 1,000 year event, and to allow the removal of sandbags (which served no purpose) that the homeowners bought as added protection after the 1,000 year event damage to their property. It seemed like a perfect win-win for the research team and the community. However, OCRM did not allow the research team to prove that it could function in this capacity. This was disappointing since it is very important to prove that the system can perform as advertised" (The Citadel, pg. 19).

GEL Engineering

- At Ocean Club, "the waves between March and April eroded and lowered the beach profile in this area to the point that the bottom of the WDS horizontal members were above the beach. In response, sections of the OC WDS system were lowered by 2 feet in April. Additional sections were lowered in May…. Typically, during lowering of the WDS, a trench is excavated along the WDS, and the sand is placed on the landward side" (GEL, pg. 82).

DHEC-OCRM Observations and Conclusion

- The WDS can be adjusted after initial deployment by lowering the pilings, lowering or raising the panels, adding spacers between panels, or temporarily removing the panels altogether. All of these adjustments were requested by The Citadel researchers and

approved by DHEC-OCRM during the study period. Making these kinds of adjustments results in temporary impacts to the beach (Figure 17 and Figure 21).

- The Citadel researchers installed "Vertical Porous Panels" (VPP's) at certain locations at Ocean Club and Beachwood East below grade. DHEC-OCRM approved a conceptual drawing of slotted VPP's (Figure 16), but the installed VPP's had very small drill holes instead of slats, resulting in a sheet pile structure below grade with minimal porosity (Figure 17). Since the installed panels did not match the approved panel, DHEC-OCRM informed The Citadel researchers that those VPP's could not be installed at additional locations. DHEC-OCRM also informed The Citadel researchers that the installed VPP's could remain in place due to the physical alterations to the beach that would occur if they were dug up and removed. After some VPP's were dislodged by wave action (Figure 18), The Citadel researchers voluntarily removed the VPP's that were still in place.

- The Citadel researchers also requested to bulldoze sand on the landward side of the WDS at Beachwood East to build a dune, but DHEC-OCRM denied the request for two reasons: 1.) Bulldozing the sand would have altered the study data. Beach profile data (elevations and scarp line positions) were collected monthly throughout the study by both The Citadel and by GEL to determine the effects of the WDS on the beach. Artificially altering the beach profile by bulldozing or minor renourishment would have resulted in an inconclusive study, and 2.) During the first WDS study at Seascape Villas in 2014, The Citadel researchers bulldozed the sand behind that WDS installation without prior DHEC-OCRM authorization, and the piled up sand eroded away in a matter of days (Figure 11). Lowering the beach profile landward of the WDS by bulldozing allowed the waves to reach higher up the beach and erode the sand more quickly.

- As acknowledged by The Citadel, the WDS would require continual maintenance and attention to ensure that it is configured optimally. The structure can be adjusted. However, it requires these adjustments to allow sand to move landward up the beach profile and to reduce the effects of scouring. Since spacers between horizontal pipes are needed during calm conditions to allow sand to pass through the WDS, and gaps from the spacers are not desirable during rough conditions, the WDS requires almost daily attention to ensure that the necessary components are in place to respond to daily changes in tides, waves, and wind speeds and directions. DHEC-OCRM finds that the WDS **satisfies** this qualification but is concerned that the need for frequent adjustments to the system would be difficult to anticipate and manage.

7) A qualified wave dissipation device otherwise prevents down-coast erosion, protects property, and limits negative impacts to public safety and welfare, beach access, and the health of the beach dune system.

The Citadel

- "At all sites, the WDS protected the structures behind the system and when used as recommended (not as detailed in this study) the results will be even better" (The Citadel, pgs. 4, 36).

- At all sites, The Citadel stated that "our review of the surveys and the related data (sand volumes gained and lost over time) leads to the conclusion that there is no negative or significant impact by the WDS on the adjacent beach profile" (The Citadel, pgs. 16, 19, and 26).

GEL Engineering

- At Harbor Island, "the erosion downdrift of the WDS, in the adjacent lot west of the WDS, is evident in Figures 4-33 and 4-34 (see changes at alongshore distances between 400 and 500 feet). The fraction of this erosion attributable to the WDS cannot be quantified, but the pattern suggests that the WDS may contribute to scarp erosion within a short distance (i.e., mostly within 100 feet) of the end of the structure (GEL, pg. 66).

- "At Harbor Island, beach walkers cannot pass the WDS on dry beach more than 35 percent of the time…. Beach walkers at [Beachwood East] may not be able to pass seaward of the WDS more than 50 percent of the time…. In April, beach walkers at [Seagrove Villas] may not be [sic] have been able to pass seaward of the WDS more than 34 percent of the time, although this decreased to one percent by July due to accretion…. At [Ocean Club], beach walkers at [sic] may not be able to pass seaward of the WDS more than 58 percent of the time" (GEL, pg. 114).

DHEC-OCRM Observations and Conclusion

- The WDS does not prevent erosion of the shoreline on the "down-coast" side of the structure. In fact, where the WDS terminates, increased erosion was observed on unprotected properties immediately adjacent to the WDS (Figure 22).

- When used as the sole erosion mitigation technique, the WDS does not protect property landward of it either. At Beachwood East and Harbor Island, sandbags were requested and employed by property owners for the duration of the study to stabilize the scarp line and protect their property. At Ocean Club, sandbags were deployed for part of the study. When sandbags were not present at that location, the three-walled system of the WDS was sufficient to break enough wave energy to minimize damage to the building. However, the parking slab beneath the building collapsed and had to be replaced, and the scarp continued to move landward beneath the building (Figure 8).

- No injuries were reported to DHEC-OCRM as a result of the WDS being located on the active beach. Warning signs were erected by The Citadel research team in the vicinity of each WDS indicating the potential danger of venturing too close to the structures, and some members of the public voices their concerns to DHEC-OCRM staff regarding the potential hazard that the structures presented. The Citadel did not assess impacts of the WDS on public safety and welfare.

- Throughout the study, DHEC-OCRM received complaints from members of the public regarding their inability to walk past the WDS structures at high tide. GEL's final report summarizes the percentage of time that lateral access along the beach is not possible due to the WDS. Although the WDS is placed mostly parallel to the shoreline, it is important to note that it extends a significant distance out onto the beach (approximately 40 feet

seaward of the building at Ocean Club, approximately 30 feet seaward of sandbags at Beachwood East, and approximately 13 feet seaward of sandbags at Harbor Island) (GEL, pg. 114). The Citadel did not assess impacts of the WDS on beach access.

- The WDS causes additional impacts to the health of the beach dune system that would not occur if the structure was not present. In particular, the WDS results directly in persistent scouring (trenching) of the beach at all locations. Excavations to periodically lower pilings or panels also results in negative impacts to the health of the beach dune system.

- Since the WDS does not prevent down-coast erosion, protect property, or limit negative impacts to public safety and welfare, beach access, and the health of the beach dune system, DHEC-OCRM finds that the WDS **does not satisfy** this qualification.

Current Emergency Order Options

The term "emergency" is defined in the S.C. Coastal Tidelands and Wetlands Act as "any unusual incident resulting from natural or unnatural causes which endanger the health, safety, or resources of the residents of the State, including damages or erosion to any beach or shore resulting from a hurricane, storm, or other such violent disturbance" (S.C. Code Ann. §48-39-10(U)). Emergency situations, either prior to or after a storm event, may prompt local governments or DHEC-OCRM to issue Emergency Orders, which allow property owners to construct temporary barriers against wave uprush through sandbagging, sand scraping, or minor renourishment (S.C. Code Ann. Regs. 30-15.H). Regarding sandbags, the owners of property being protected by sandbags are responsible for the maintenance of the bags to ensure that they remain in place and in good repair, and they are also responsible for the complete removal of the bags when so ordered by the Department (S.C. Code Ann. Regs. 30-15.H(1)(f)).
Historically, the use of sandbags in South Carolina has presented some management challenges including increased loss of public access, recreational beach, and habitat over time, debris at the site and along both adjacent and far-off shorelines from structural failure, and a lack of incentives to fully consider and devise a long-term erosion control plan due to practically unlimited sandbag use. Recognizing these challenges, a State-supported Shoreline Change Advisory Committee, and later, a Blue Ribbon Committee on Shoreline Management recommended a number of changes to the sandbag regulations. The Blue Ribbon Committee was a bipartisan group consisting of State legislators, mayors, attorneys, legal and scientific professors, real estate interests, and environmental interests who gathered over two years to review the recommendations of the Shoreline Change Advisory Committee and make final recommendations to the State Legislature. The Blue Ribbon Committee unanimously decided to recommend to the Legislature to adopt the Shoreline Change Advisory Committee's process for issuing Emergency Orders for sandbags to include sole issuance authority by the Department, bonds for sandbag removal, and discretion by the Department for determining size and material of sandbags.

In the 2015-2016 Legislative Session, Bill R211/S139 was ratified and included a new requirement that property owners must now provide a bond that is reasonably estimated to cover the cost of removal of sandbags before the sandbags may be placed on the beach. The bonding requirement will help ensure that sandbags are maintained and removed from the beach when the shoreline is no longer experiencing an emergency situation due to erosion. Sandbags are intended to be a short-term solution to provide temporary protection while a long-term plan to deal with the erosion issue is being developed. Sandbags are not intended to remain on the beach for years at a time.

The Citadel research team sought to demonstrate that the WDS is a viable alternative to sandbags in emergency situations. However, as discussed in this document, sandbags were employed at each study site to keep the scarp from continuing to erode landward of the WDS. The WDS is not an alternative to sandbags because sandbags were used in conjunction with the WDS during the study. If the sandbags were not requested by property owners and issued by DHEC-OCRM, data suggests the scarp line would have continued to erode further landward of the WDS.

DHEC-OCRM Staff's Recommendation to the Board

Due to the fact that the Wave Dissipation System has not been successful in addressing an erosional issue, and results in negative impacts to the beach, DHEC-OCRM Staff's Recommendation to the Board is to not approve the WDS for future use and to require the existing structures to be removed from the beach following the Board's final decision. DHEC-OCRM is committed to working with property owners during the WDS removal process to continue to afford erosion protection under existing Emergency Order provisions.

To ensure that the general public and potential affected parties have the opportunity to provide input to the Board regarding the Staff Recommendation, DHEC-OCRM also requests that the Board grant approval to publish the Staff Recommendation for a 45-day public comment period. Following the public comment period staff requests that the Board conduct a public hearing to receive additional information for consideration in determining a final agency decision.

Appendix A

Relevant Authorities

Per S.C. Code Ann. § 48-39-130(D)(2) and S.C. Code Ann. Regulation § 30-5(A)(2), the WDS did not require a permit because The Citadel is a State educational institution and the WDS study was considered a research activity, which is exempt from the typical permitting requirements.

Statutes

- S.C. Code Ann. § 48-39-130(D)(2) provides, "(D) It shall not be necessary to apply for a permit for the following activities: (2) Hunting, erecting duckblinds, fishing, shellfishing and trapping when and where otherwise permitted by law; the conservation, replenishment and research activities of state agencies and educational institutions or boating or other recreation provided that such activities cause no material harm to the flora, fauna, physical or aesthetic resources of the area."

- S.C. Code Ann. § 48-39-320(C) provides, "(C) Notwithstanding any other provision of law contained in this chapter, the board, or the Office of Ocean and Coastal Resource Management, may allow the use in a pilot project of any technology, methodology, or structure, whether or not referenced in this chapter, if it is reasonably anticipated that the use will be successful in addressing an erosional issue in a beach or dune area. If success is demonstrated, the board, or the Office of Ocean and Coastal Resource Management, may allow the continued use of the technology, methodology, or structure used in the pilot project location and additional locations."

Regulations

- S.C. Code Ann. Regulation § 30-5(A)(2): Exceptions (to permitting requirement). Provides that (2) Hunting, erecting duckblinds, fishing, shellfishing and trapping when and where otherwise permitted by law; the conservation, replenishment and research activities of State agencies and educational institutions; or boating or other recreation provided that such activities cause no material harm to the flora, fauna, physical, or aesthetic resources of the area.

Budget Provisos

- *Budget Proviso 34.51 of the 2014-2015 General Appropriations Act*
  (DHEC: Wave Dissipation Device) From funds appropriated to the department for the Coastal Resource Improvement program, the department shall permit a Wave Dissipation Device pilot program to be initiated.

  The deployment of a qualified wave dissipation device seaward of the setback line or baseline pursuant to a study conducted by the Citadel or a research university is not construction and meets the permitting exception contained in Section 48-39-130(D)(2). Prior to deploying or expanding a qualified wave dissipation device, a person proposing to deploy or expand the device must pay the department a fee of ten cents per linear foot of the proposed deployment or expansion. The department may order the removal of all or any portion of a qualified wave dissipation device that the department determines

causes material harm to the flora, fauna, physical or aesthetic resources of the area under Section 48-39-130(D)(2) of the 1976 Code.

A ‘qualified wave dissipation device’ is a device that:
(1) is placed mostly parallel to the shoreline;
(2) is designed to dissipate wave energy;
(3) is designed to minimize scouring seaward of and adjacent to the device by permitting sand to move landward and seaward through the device;
(4) can be deployed within seventy-two hours or less and can be removed within seventy-two hours or less;
(5) does not negatively impact or inhibit sea turtle nesting or other fauna;
(6) can be adjusted after initial deployment in response to fluctuations in beach elevations; and
(7) otherwise prevents down-coast erosion, protects property, and limits negative impacts to public safety and welfare, beach access, and the health of the beach dune system.

- *Budget Proviso 34.48 of the 2015-2016 General Appropriations Act*
(DHEC: Wave Dissipation Device) From funds appropriated to the department for the Coastal Resource Improvement program, the department shall permit a Wave Dissipation Device pilot program to be initiated.

The deployment of a qualified wave dissipation device seaward of the setback line or baseline pursuant to a study conducted by the Citadel or a research university is not construction and meets the permitting exception contained in Section 48-39-130(D)(2). Prior to deploying or expanding a qualified wave dissipation device, a person proposing to deploy or expand the device must pay the department a fee of ten cents per linear foot of the proposed deployment or expansion. The department may order the removal of all or any portion of a qualified wave dissipation device that the department determines causes material harm to the flora, fauna, physical or aesthetic resources of the area under Section 48-39-130(D)(2) of the 1976 Code.

A ‘qualified wave dissipation device’ is a device that:
(1) is placed mostly parallel to the shoreline;
(2) is designed to dissipate wave energy;
(3) is designed to minimize scouring seaward of and adjacent to the device by permitting sand to move landward and seaward through the device;
(4) the horizontal panels designed to dissipate wave energy can be deployed within one-hundred twenty hours or less and can be removed within one-hundred twenty hours or less;
(5) does not negatively impact or inhibit sea turtle nesting or other fauna;
(6) can be adjusted after initial deployment in response to fluctuations in beach elevations; and
(7) otherwise prevents down-coast erosion, protects property, and limits negative impacts to public safety and welfare, beach access, and the health of the beach dune system.

The South Carolina Legislature ratified the 2015-2016 General Appropriations Act on June 23, 2015. Budget Proviso 34.48 of that Act altered qualification number 4 above. This change is significant because the initial proviso contemplated an entire structure that could be deployed or removed in seventy-two hours or less, whereas the new proviso only specified deployment or removal timeframes for the horizontal panel components.

As previously stated, the Department is tasked with determining whether the Wave Dissipation System (WDS) has been successful in addressing an erosional issue and whether it is qualified for future use in emergency situations, pursuant to S.C. Code Ann. Regulation § 30-15(H). In order to be a qualified device, the WDS must meet the criteria spelled out in the above Statutes, Regulations, and Provisos.

ATTACHMENT B
THE CITADEL: WAVE DISSIPATION SYSTEM – OC/SS/BWE/HI REPORT

December 8, 2016

The Citadel
Department of Civil and Environmental Engineering
171 Moultrie Street
Charleston, SC 29409

August 28, 2016

Deron Nettles
SI Seawall and Fencing Systems, LLC
1466 Fiddlers Marsh Drive
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Re: Wave Dissipation System – OC/SS/BWE/HI
Report – August 28, 2016

Mr. Nettles:

This report is The Citadel research team's "OCRM requested" report on the Wave Dissipation System's (WDS's) one-year study at Ocean Club/Seascape (OC/SS), Beachwood East (BWE), and Harbor Island (HI). It is important to mention upfront that the entire study and associated parameters as described in this report are not in line with how the Citadel research team envisioned the study would take place. The research team strongly believes that the fictitious constraints assigned throughout the study period made performing research unreasonable at best and impossible at worst. Had the research team been allowed to perform the research as described in meetings prior to the study and in conversations and reports during the study, a plethora of data would be available and the WDS would be optimized for the site conditions at the sites described in this report.

The purpose of this report is to present a summary of the performance of the system at each site and to discuss how the system compares to sandbags. As you are aware, our previous study results (2013-2014) led us, in a report dated 11/28/2014, to conclude that:

> "…the Wave Dissipation System is able to:
> 1) protect structures, dunes, flora, and fauna that are landward of the system
> 2) minimize the potential for negative impacts that are associated with hardened devices, and
> 3) allow for natural beach elevation changes while providing better protection of dune lines by using a two tier system with slots in the front WDS line and a second WDS line to stop the erosion effects of fast moving water through or under the front WDS line."

I am happy to report that the results of this additional OCRM requested 4 site study have not changed the conclusions made in the 11/28/2014 report and that the research team believes that the WDS should be allowed as an alternative to sandbags (in emergency situations) along the coast in South

Carolina. On the contrary, please note that we have many recommendations regarding its use that should be adhered to in order to ensure the optimal performance of the system. The main issue to note is that the WDS is a dynamic system that must be configured appropriately for optimal performance and that its use will require modifications and some degree of sand replenishing after severe erosion events. OCRM did not allow most of the recommendations presented in this report to be applied or adhered to during the study since they claimed the results (to be reflected in the surveys) would be affected. As a result, optimal performance could not be maintained throughout the study.

The report contains the following sections:

I.	Executive Summary
II.	Ocean Club / Seascape Performance Summary
III.	Beachwood East Performance Summary
IV.	Harbor Island Performance Summary
V.	Sandbags vs. WDS
VI.	Conclusions and Recommendations
Appendix A.	Environmental Impact Sample Calculations

Executive Summary

Although it was the opinion of Citadel researchers that the 2013-2014 studies performed at Seascape showed clearly that the WDS should be considered a viable alternative to sandbags for emergency use in South Carolina, OCRM staff maintained that more studies at different sites were needed before they could reach a definite opinion. Therefore, SI Systems, LLC, without the help of The Citadel, began to try to find the type of sites that OCRM was requesting and homeowners willing to pay for such a study. The three sites mentioned in this report (OC/SS, BWE, and HI) were proposed to OCRM and approved.

Any good research project requires a hypothesis, and since the study was being performed solely for the benefit and demand of OCRM, Citadel researchers formally approached OCRM about providing a definition of "success". During the kickoff meeting on July 6, 2015, the WDS research team and OCRM agreed to meet together to jointly define what "success" would mean. The research team made it very clear that doing a study without a goal was unreasonable and that the definition needed to be defined immediately. Although further discussion never took place, all parties seemed to agree that something related to "as good as sandbags" would be part of the formal definition. At a follow up formal meeting (October 30, 2015) where Dr. Mays discussed his concerns over no guidance from OCRM as to what success actually means, OCRM updated the team saying they would consider, per Dr. Mays' request, the "as good as sandbags" language as they review project results, but that they would not come up with an agreed upon definition but would instead base their decision on how well the system adheres to the language in the regulations (which is how they view their charge).

The performance summaries presented in the subsequent three sections of this report are intended to describe and detail the overall performance of the system at each of the three study sites. Although researchers are happy with the overall performance of the system and its ability to dissipate energy from waves, some concerns are expressed in the recommendations and conclusions section of this report. Readers should carefully note that unlike research at other universities where structures can be tested in a university wave pool where wave period, wave height, and tide levels can be controlled, these structures were completely loaded by whatever events God allowed to occur at each site over a one year period. As such, the now infamous 1,000 year storm, many nor'easters, and several tropical storms impacted the system. The WDS survived all the events, some of which were beyond levels considered in the original design of the system. It is also important for the reader to note that Citadel researchers were not permitted by OCRM to optimize the system's performance and that the way the systems were tested over the last year is in no way indicative of how they should be used in practice. On the other hand, even though not optimized for performance, the WDS did protect the structures behind the systems for the duration of the study period described in this report.

It is the opinion of the project's principal investigator that OCRM has always had the overall mindset (regarding a study) that the system should be built and then the research team should just step back and watch what happens over the next year. This approach is not applicable to sandbags and should not be applied to the WDS. The research team has always stressed that the WDS is dynamic and needs to be built and modified as often as necessary to address changing beach elevations and dune situations behind the system. To help minimize the negative side effects of hardened structures, the WDS allows

water to move behind the system. However, the amount of water allowed through the system should be controlled by renourished sand placed behind the system and dune rebuilding which the system allows via natural accretion needed for such activities.

The only major concern that the research team noted during the study is the temporary local trenching that occurred at times at each site. The trenching never occurred in the previous Seascape studies nor at Ocean Club this year until the last portion of the study period covered in this report. The trenching appears to be related to scour caused by extreme tides, significant erosion events, and the uncontrolled volume of water that is allowed to pass through the system (this same volume of water must escape as the tide goes back out). Although the system is self-healing in all cases, the time required to self-heal after event related local trenching is site specific, and it is the opinion of Citadel researchers that self-healing should not be permitted in all cases. Removing just the horizontal panels in areas of local trenching almost immediately restores the beach profile by eliminating the trenching effect and the horizontal panels are easily removed for this purpose. Researchers spent a lot of time developing vertical panel designs and prototypes for removing the trench since this alternate approach would be much more cost effective (particularly during a study) than complete lowering of the system and since vertical panels could be installed in isolated locations as needed versus lowering which requires a significant portion of the system to be lowered at one time. The use of the vertical panels was not permitted by OCRM. Although an earlier Citadel report stated that "although lowering may alleviate the trenching, we are not planning that this will be the solution. We only propose it to increase energy dissipation," OCRM correspondence to Dr. Mays did not permit the vertical panels and instead OCRM suggested the use of lowering the system which no one was willing to pay for during a short term study. If the sand elevations behind the WDS are maintained on a bimonthly schedule or so, some of this beach compatible sand can be easily and quickly moved to eliminate any potential concerns caused by the temporary trenching on site.

Based on the results of all tests performed to date, the Citadel researchers have concluded that the Wave Dissipation System is able to:

1) protect structures, dunes, flora, and fauna that are landward of the system
2) minimize the potential for negative impacts that are associated with hardened devices, and
3) allow for natural beach elevation changes while providing better protection of dune lines by using a multi-tier system in areas of higher wave energy and a single line system in areas of lower wave energy

At all sites, the WDS protected the structures behind the system and when used as recommended (not as detailed in this study) the results will be even better.

However, The Citadel researchers want to make it very clear, as they always have, that the system is not a one-size fits all solution and that it is a dynamic system that must be designed separately for each particular site, and monitored/adjusted as necessary to optimize its performance.

Ocean Club / Seascape Performance Summary

Installation of the WDS at Ocean Club (see Figure 1) began on April 27, 2015 and continued through the end of June 2015. Although we were not happy with how long it took to install the system, it must be noted that this was the first time the system was installed by the chosen local contractor at Ocean Club and that the tolerance for pile placement is very tight given that the horizontal panels must be placed just right so that they lock into the system. The research team was very disappointed in the small number of piles the contractor was able to install per day (4 or less typical; 8-12 expected) and the precision in which they were located. Many piles were placed incorrectly and had to be reinstalled. Another challenging task was the depth to which the back line of the system was installed. The ocean had not completely lowered the back area closest to the building during the initial install and placing all the housing units back there required a construction excavation area that was challenging to work within. In fact, the contractor didn't even install the full originally proposed footprint since installing housing units and horizontal panels along some portions of the back line was deemed unsafe. On the contrary, the piles for the proposed footprint area were installed, but it was decided that the housing units and horizontal panels would be installed at a later time (after the project kickoff meeting) once the beach lowered the beach elevation in that area. OCRM was notified at the appropriate time and the remaining members were added (see Figure 2). There were also general delays by the contractor where they would have to take days off at a time for scheduling conflicts. Regarding scheduling conflicts, please keep in mind that this is a study and the permitting and approval process (although fully justified and understood) leads to scheduling uncertainty for the contractor making it difficult for them to be able to commit to full time installation services. One could argue that permitting should be done earlier, but the issue the team faces there (on a research project; not on future operations for SI Systems, LLC) is that the property owner has to agree to fund the material and installation costs prior to applications being submitted. These applications (at least for the Corps of Engineers' approval process) require detailed surveys that take additional time. By the time all steps are complete, the property owner is likely in a worse position than when they originally considered doing the study and the team is unfortunately left at the mercy of the contractor's available time.

The baseline configuration for the system was chosen based on the most economical configuration that the research team believed *might* temporarily meet the overall performance objective for the project at this site. It was anticipated that continued beach lowering would require additional tiers of the system since each tier purposely allows some degree of moving water through it. Figure 3 illustrates the research team objective for the WDS at Ocean Club. The site at Ocean Club was not initially inundated by tide waters. As mentioned by the research team during the kickoff meeting, the goal of the Ocean Club study was survival; literally. The purpose of the study was to show that the system can be installed and increased in magnitude to the degree necessary to protect the building similar to the role played by sandbags.

Figure 1. Wave Dissipation System near project start date (photos taken: July 9 (L) and July 19 (R), 2015).

Figure 2. Wave Dissipation System prior to (8/14/15) and after (9/3/15) installation of horizontal panels in area where piles where not covered with housing units during initial construction. Note exposed piles following erosion event on left.

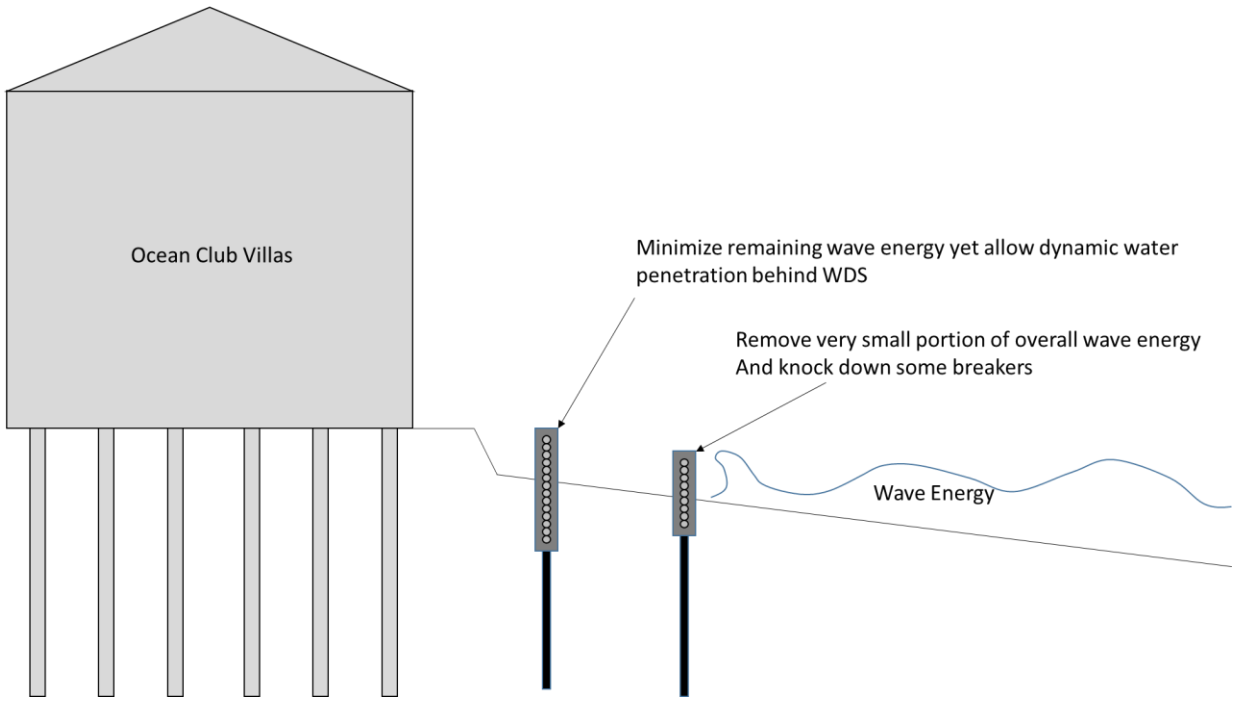


Figure 3. Overall project goal at Ocean Club: minimize energy associated with wave induced moving water behind the WDS.

During the initial part of the study the front line was effectively reducing some of the initial wave energy and the back wall (although it allows complete penetration as designed) kept the wave energy away from the building as much as possible without adding the third tier. Next, the Citadel research team formally requested to make the changes shown in Figure 4. Although OCRM approved the changes (which were always planned), Ocean Club property owners decided to hold off on the third Tier until it was proven that it would be needed and wanted to hold off on extending all the way to the property lines at that time. Dr. Mays made OCRM aware that the overall addition would be only partial due to lack of funding.

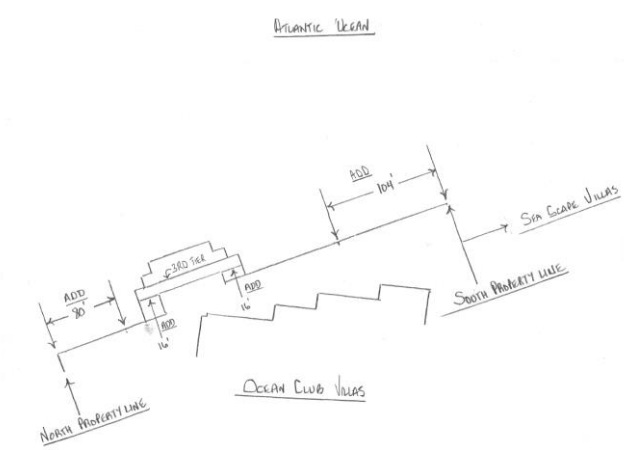


Figure 4. Proposed changes to OCRM dated 9/3/15.

A few negative issues were discovered during the initial portion (1st quarter) of the study. Issue number one was that The Citadel research team and SI Systems, LLC did not, amongst themselves, appropriately communicate the need for the coupling reinforcement (discussed in the Seascape studies of 2013-2014) for all horizontal panels in the project. The Citadel position was that all WDS panels that would see direct hits from breaking waves would need this reinforcement. SI Systems, LLC only placed the coupling reinforcement in the front wall under the assumption that the back wall would not be hit directly by breaking waves but by the run up after the breaking wave (i.e., by broken waves). The back wall was hit by breaking waves and a few panels cracked during the study (at the ends as expected and as discussed in the Seascape studies of 2013-2014). This failure mechanism was listed during the first study as the theoretical controlling mechanism for the panels when couplings were not added. Figure 5 shows one cracked panel. Figure 6 shows the back line receiving breaking wave demands.

The second issue was the extreme tide and extreme surf (relative to typical conditions at Ocean Club) that impacted the area at the end of September (i.e., the since coined "1,000 year storm"). The elevation of the tide was so extreme that waves were actually going over the system. In the best interest of the property owners, the research team recommended that the property owners provide temporary additional protection in the form of sandbags directly in front of the property. Figure 7 shows the advancing scarp line at Ocean Club towards the end of September.

Figure 5. Cracked panel following direct wave hits associated with extreme tides.

Figure 6. Breaking wave hitting area of WDS with only one line of resistance. Significant penetration is expected without controlled fill behind the WDS (see recommendations and conclusions section).

Figure 7. Advancing scarp adjacent to WDS and insufficient return of WDS (9/23/15). This figure shows how the WDS is intended to work where the scarp line behind the system is reduced relative to the adjacent property. Had the third tier as proposed been provided prior to this figure, the scarp line at the building corner would have been further from the building.

Figure 8 shows the completed WDS installation on site as of 11/19/15. Note that the third tier (2nd line of resistance in picture was added as shown in Figure 9). The system was also extended closer to the property line relative to the 1st quarter of the study.

Figure 8. 2nd quarter configuration on site (with all proposed modifications except full extension to the property line as necessitated by the lowering beach; photo taken: 11/19/15).

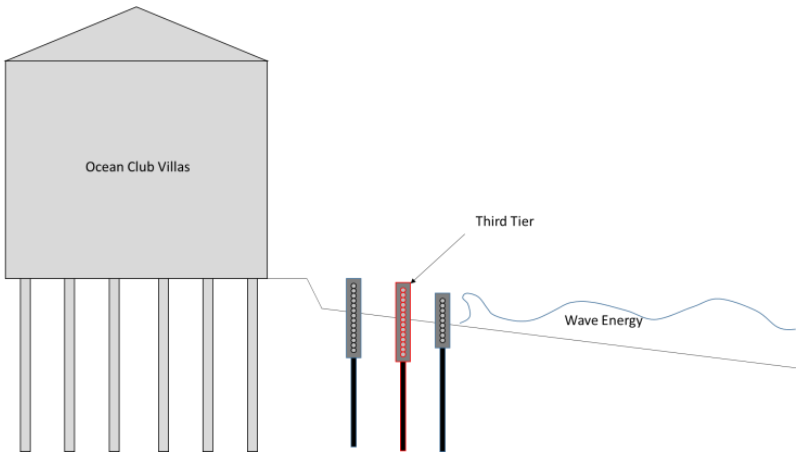


Figure 9. Third Tier installed at Ocean Club (building corner only).

Given the significantly larger wave impacts at OC versus those at the other research sites, the horizontal panels took a beating and the ends of the panels, where they bear on the housing units, and wear down over time. Hence the research team spent time during the third quarter trying several different spacer types made of different materials on the front line of the WDS at Ocean Club during the third quarter of the study. No structural or system changes were made in the process, but the horizontal panels were removed and reset during low tide to see if they would spin less in the slots when the spacers were built of different materials and installed differently.

Ocean club was extended closer to the property line and the Seascape system was installed during third quarter as well. Construction (in two phases) began on December 1, 2015 and ended on February 3, 2015 (see Figure 10).

Due to cost and resource constraints, it was decided by the project team that the vertical panels (that were designed over many months) would first be tested on the Isle of Palms. OCRM was notified that the panels would be installed on the Isle of Palms. After the installation of the first basic configuration at one isolated location along the Ocean Club project site, Dr. Mays was sent the letter shown in Figure 11 which stated that vertical panels could no longer be used during the study.

The letter states "Regarding the VPPs, the Department has learned that the panels installed at the Ocean Club WDS site are not the design originally proposed and authorized. The installed version is much less porous than the original proposal." The VPPs are experimental prototypes that must be studied to determine their optimal configuration, hole pattern, length, etc. and the typical sketch given to OCRM was intended to provide an idea of what the panels should like during the first installation. During construction of the panel, the research team found that drilling slots was too difficult (and was damaging the panel) and that holes would work better. Hence the team made the decision to move forward with holes instead of slots. In addition, the actual as constructed version of the panel was actually more porous than the proposed version considering its overall purposely placed installation configuration. The goal of studying the vertical panels was to determine the optimal porosity and configuration. The research team spent hours designing different details for the porosity prior to OCRM

saying that the VPPs could no longer be tested. We are very disappointed that the research team's main proposed method (prior to the expensive option of lowering of the system) for removing the team's one major concern from the study at Ocean Club and Seascape was not allowed to be studied for stated technical reasons that are not justified nor based on engineering mechanics, coastal engineering, or coastal geology principals.

It was further stated in the letter that . . . "the installation process caused significant impacts to the beach and altered the beach profile both seaward and landward of the WDS." From a technical and engineering position, the installation sequence has a trivial impact on the surrounding beach profile. One tide cycle later, any offset areas are automatically corrected by the dynamic movement of water on site at Ocean Club.

Finally, the letter states that "since removal of the seven existing VPPs at the Ocean Club WDS study site would result in the same significant impacts to the beach, the Department is not requiring their removal at this time. However, for the remainder of the study, no additional VPP's may be installed at any of WDS sites." On the contrary, the research team decided that a partially installed test configuration cannot be studied and could eventually yield artificially poor results local to the panels. The team notified OCRM of this position and removed the partially installed vertical panels immediately.

Figure 10. OC north extension (1-14-16) and Seascape during installation yet prior to 3nd tier completion (1-9-16).

D H E C

PROMOTE PROTECT PROSPER

Catherine E. Heigel, Director

Promoting and protecting the health of the public and the environment

February 10, 2016

Dr. Timothy Mays
Department of Civil and Environmental Engineering
171 Moultrie Street
Charleston, SC 29409

RE: Wave Dissipation System Study Notification Process and "Vertical Porous Panels"

Dear Dr. Mays,

I am writing to reiterate the required notification process between The Citadel and the Department for modifications to the Wave Dissipation System (WDS) at each of the four sites and to clarify the Department's position regarding the use of "Vertical Porous Panels" (VPPs).

As discussed in prior meetings, and included as a requirement of the WDS research activities, the Department requires documentation of all adjustments to the WDS and advance notification from The Citadel before the WDS is significantly modified. Significant modifications include extending wing walls, adding tiers, removing horizontal panels to allow sand to move further landward, resetting the system after erosion events, bringing in sand, and installing VPPs. The dates of all modifications and adjustments must be fully documented by The Citadel in quarterly reports, and photographs taken before and after the modifications and adjustments must be included.

Regarding the VPPs, the Department has learned that the panels installed at the Ocean Club WDS site are not the design originally proposed and authorized. The installed version is much less porous than the original proposal. Furthermore, the installation process caused significant impacts to the beach and altered the beach profile both seaward and landward of the WDS. Since removal of the seven existing VPPs at the Ocean Club WDS study site would result in the same significant impacts to the beach, the Department is not requiring their removal at this time. However, for the remainder of the study, no additional VPP's may be installed at any of the WDS sites.

Please feel free to contact Blair Williams at 843-953-0232 or williabn@dhec.sc.gov with any questions or concerns.

Sincerely,

Rheta G. DiNovo, Director
Regulatory Division

cc: Elizabeth Von Kolnitz, SCDHEC OCRM
Blair N. Williams, SCDHEC OCRM

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
2600 Bull Street • Columbia, SC 29201 • Phone: (803) 898-3432 • www.scdhec.gov

Figure 11. Letter from OCRM stating vertical panels could not be tested.

During the 4th quarter of the study, The Citadel recommended a 2 ft reset of many piles downward as the beach had reached it most severe lowering to date (see Figure 12). Although the system is extremely self-healing after significant erosion events (see Figure 13), around mid-April 2016 and mid-May 2016 the piles in the row closest to the ocean in front of the building and much of the entire back row (around the building corner) were lowered 2 ft to improve performance. The back row piles were also spliced using a bolted pile segment with new housing units to keep the top of the pile near its originally installed elevation (see Figure 14). The bolted pile segments performed optimally for the remaining portion of the study period discussed in this report.

As a final note regarding the WDS at OC, just to show how the system performs over a monthly cycle, Figure 15 presents 11 pictures taken over a one and one-half month period where significant erosion, self-healing, and accretion can be clearly seen. If The Citadel had not received the letter stating the study must end on July 28, 2016, they would have recommended dune rebuilding given the huge amount of accreted sand flowing on the test site at that time (similar to BWE recommendation made in December 2015 which was denied by OCRM).

Figure 12. Severe beach lowering at OC prior to pile lowering (picture taken 2/25/16).

Figure 13. Self-healing of WDS (picture taken 3/7/16).

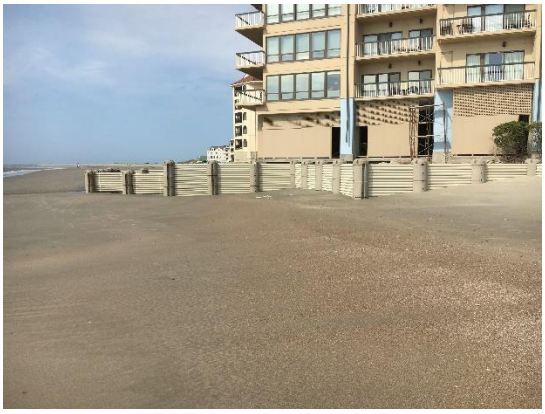


Figure 14. WDS at OC after lowering of front line and back line with extensions at select backline elements (picture taken 5/2/16).

Figure 15. WDS self-healing and accretion following severe erosion event with trenching at WDS line.

Throughout the entire study, The Citadel research team was very happy with the WDS performance as installed *without modification* at Seascape. Figure 16 shows the typical condition of the WDS on site and Figure 17 shows the significant accretion on site at the end of July 2016.

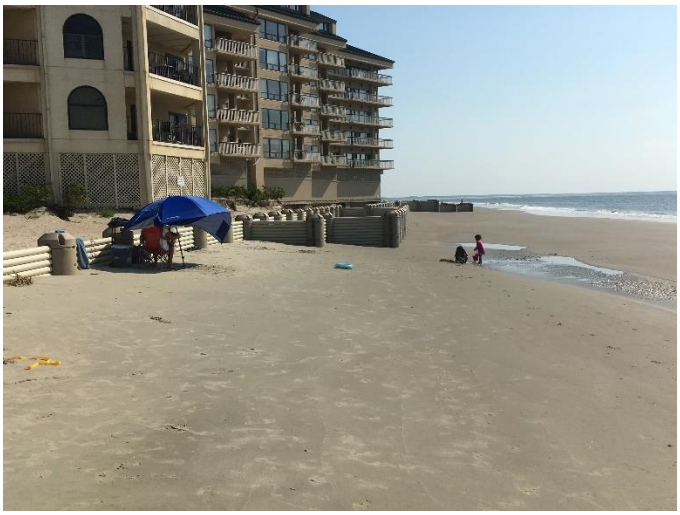


Figure 16. Typical Seascape performance during study (picture taken 6/3/16).

Figure 17. Seascape performance at end of July 2016 (picture taken 7/30/16). Note significant accretion.

Survey data for the OC/SS site is provided as separate files along with this report. Our review of the surveys and the related data (sand volumes gained and lost over time) leads to the conclusion that there is no negative or significant impact by the WDS on the adjacent beach profile at the OC/SS site. The only noted issue is the very temporary occurrence of trenching at isolated locations on the OC side of the site. Trenching, caused by significant erosion events, and related to the system's allowance of rising tide levels (with moving water) behind the WDS can, when deep enough, become a concern. The study has shown that the system is always self-healing and that the trenching is always temporary. On the contrary, deep trenching on site should not be allowed and must be mitigated anytime it appears on site. OCRM did not permit the removal or mitigation of trenching using research means planned for the study and for some reason only permitted the extremely expensive and much more significant site altering option of lowering the entire system. It has always been known that flooding the system using isolated panel removal can easily remove trenching and is almost instantaneous. Citadel recommendations regarding simple trench mitigation (outside of fictitious study constraints) are provided in the overall conclusions to this report.

Beachwood East Performance Summary

Installation of the WDS at Beachwood East (see Figure 18) began on July 28, 2015 and continued through October 20, 2015. We were not happy with the required installation time which was extended as a result of the overall length of the system, coordination with an existing illegal revetment on the project site, working between tides in a relatively low lying area, overall scheduling with the available contractor, and most importantly, issues with the installation which included an improper elevation at the south end and a lack of openings in the housing units to allow them to fill with sand and water.

The baseline configuration for the system was chosen based on the most economical configuration that the research team believed *might* temporarily meet the overall performance objective for the project at this site. It was anticipated that continued beach lowering could require a second tier for the system since each tier purposely allows some degree of moving water through it. Figure 19 illustrates the research team objective for the WDS at Beachwood East. The site at Beachwood East is more complex than Ocean Club and Harbor Island since it is both tidal and subject to larger waves. It was selected as a study site for that reason.

Figure 18. Wave Dissipation System at Beachwood East (10/11/15).

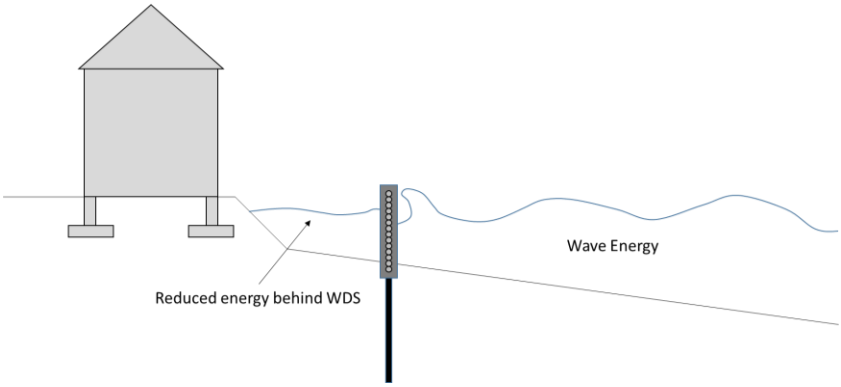


Figure 19. Overall project goal at Beachwood East: minimize energy associated with wave induced moving water behind the WDS.

The only plans for Beachwood East for the 2nd quarter research were to observe performance of the WDS during various tide cycles and wave conditions and to design and test feasible solutions (vertical panels were the primary focus) for removing the trench that had previously appeared (see Figure 20) and sometimes to unacceptable depths and to possibly add a 2nd tier if funding became available. Due cost and resource constraints, it was decided by the project team that the vertical panels would first be tested on the Isle of Palms. OCRM was notified that the panels would be installed on the Isle of Palms. After the installation of the first basic configuration at one isolated location along the Ocean Club project site, Dr. Mays was sent the letter shown in Figure 11 and discussed in the previous section.

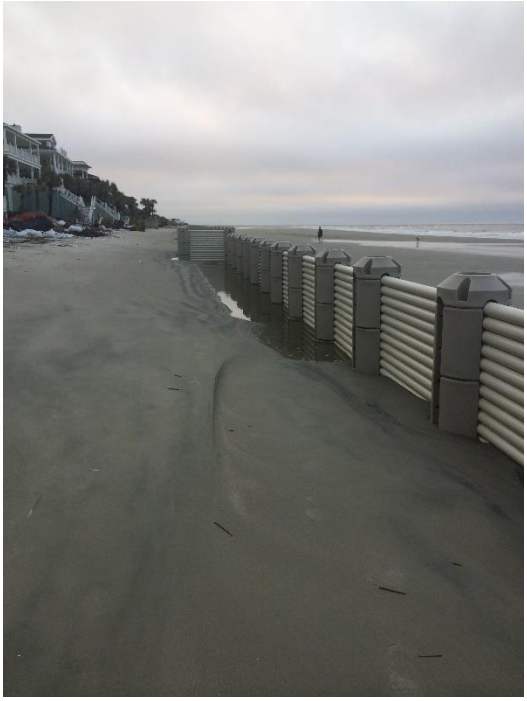


Figure 20. Typical trench at Beachwood East during the previous quarter report period (caused by scour as water exits the WDS; photo taken: 11/4/15).

During the first two weeks of the 2nd quarter, the team quickly discovered that closing all of the slots was causing the trench to quickly subside. A period of massive accretion in front of and behind the system then began and the team quickly provided slots and removed select panel locations for three days to more quickly expedite the accretion behind the wall (see Figure 21). The lightweight, dynamic components making up the system allowed for this action. All slots and openings were then closed to slow the release of the accreted sand. The slots were 4 inches high and placed in every 10th panel (on average) over part of the system length. The slots were placed at or above grade (see Figure 22).

Figure 21. Significant accretion through the WDS during the 2nd quarter. The figures from left to right are dated 11-30-15, 12-8-15, and 12-24-15.

Figure 22. Typical opening used as Beachwood East.

Noticing the enormous level of accretion (as shown in Figure 21) and the research team forecast for several more weeks of accretion, Dr. Mays acted quickly and notified OCRM that the team wanted to test (as shown clearly during the previous Seascape study) that the sand accreting behind the system could be pushed back to allow the homeowners to reclaim the sand they lost from the 1,000 year event, to rebuild the dune to its initial configuration prior to the 1,000 year event, and to allow the removal of sandbags (which served no purpose) that the homeowners bought as added protection after the 1,000 year event damage to their property. It seemed like a perfect win-win for the research team and the community. However, OCRM did not allow the research team to prove that it could function in this capacity. This was disappointing since it is very important to prove that the system can perform as advertised.

With the trenching issue unresolved due to permission denied by OCRM for the vertical panel installation study (which would have been extremely economical) and funding not available to do one of two larger secondary Citadel recommendations which included either lowering the entire system (very expensive) or adding a 2nd tier and opening up the first tier (even more expensive and similar to OCs initial installation), the research team decided to simply watch the system during the final two quarters of the study period covered in this report. The only modification applied in the final two quarters of the study was to extend the wing wall on the north end of the site during turtle season due to concerns that a sea turtle might otherwise get trapped behind the system (see Figure 23).

The performance at Beachwood East was not optimal due to the continued trenching (on and off yet self-healing over time). Recommendations for optimal performance and for simple trenching mitigation methods are made in the conclusions to this report.

Survey data for the BWE site is provided as separate files along with this report. Our review of the surveys and the related data (sand volumes gained and lost over time) leads to the conclusion that there is no negative or significant impact by the WDS on the adjacent beach profile at the BWE site. The only noted issue is the off and on occurrence of trenching at isolated yet significant locations along the site. Trenching, caused by significant erosion events, and related to the system's allowance of rising tide levels (with moving water) behind the WDS can, when deep enough, become a concern. The study has

shown that the system is always self-healing and that the trenching is always temporary. On the contrary, deep trenching on site should not be allowed and must be mitigated anytime it appears on site. OCRM did not permit the removal or mitigation of trenching using research means planned for the study and for some reason only permitted the extremely expensive and much more significant site altering option of lowering the entire system. It has always been known that flooding the system using isolated panel removal can easily remove trenching and is almost instantaneous. Citadel recommendations regarding simple trench mitigation (outside of fictitious study constraints) are provided in the overall conclusions to this report.

Figure 23. Sandbag extension on north end to allow for access to sandbags behind the WDS and provide closure to sea turtle access.

Harbor Island Performance Summary

Installation of the WDS at Harbor Island (see Figure 24) began on May 11, 2015 and continued through the end of June 2015. Since the parts were custom ordered, material delays played some role in the longer than anticipated installation time. Getting approval and scheduling were the major hurdles at this site. There was also (a) some initial confusion over whether or not we would be able to protect the open lot between homes, (b) a delay due to a homeowners request to avoid getting too close to a palm tree on site, (c) a delay due to scheduling with ARB on access approval and actually building the walkway over the WDS, and (d) general delays by the contractor where they would have to take days off at a time for scheduling conflicts. Regarding scheduling conflicts, please keep in mind that this is a study and the permitting and approval process (although fully justified and understood) leads to scheduling uncertainty for the contractor being able commit to full time installation services.

The baseline configuration for the system was chosen based on the most economical configuration that the research team believed *might* satisfactorily meet the overall performance objective for the project at this site. Figure 25 illustrates the research team objective for the WDS at Harbor Island. The site on Harbor Island is tidal in that 2-5 ft of water behind the system is typical at high tide and the actual height varies with the site's tide chart. The tide presented new challenges not studied during the 2013-2014 Seascape research projects as discussed below.

Figure 24. Wave Dissipation System near project start date (photos taken: August 8, 2015).

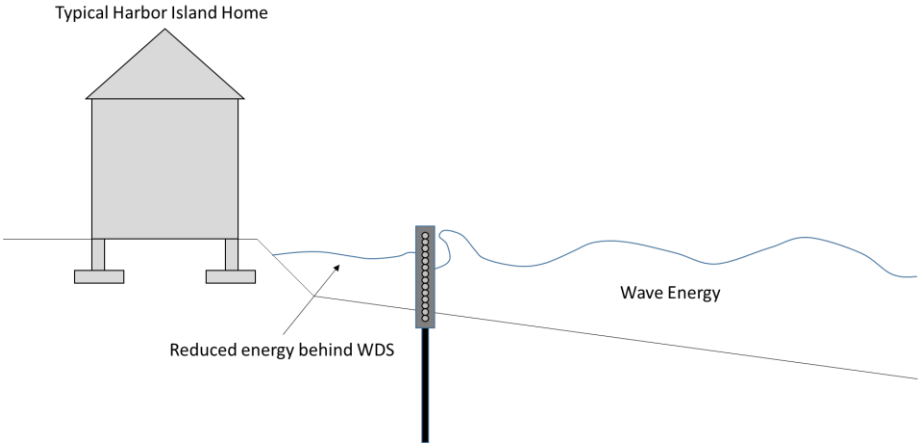


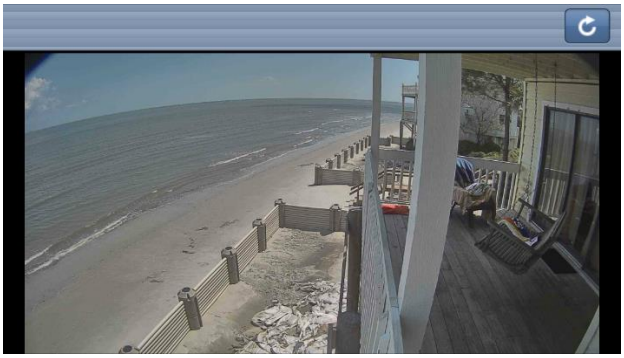
Figure 25. Overall project goal at Harbor Island: minimize energy associated with wave induced moving water behind the WDS.

It was decided that the baseline WDS would have no spacers (see Figure 26) between horizontal panels at project initiation. Although at first, there was some accretion, the wave energy was not strong enough to push it more than three ft or so beyond the WDS (see Figure 27). This led to an unacceptable low space (relative to the accreted area) beyond the accreted sand. It should be noted that the horizontal panel system at Harbor Island was designed to be over two times as flexible as the one installed at Ocean Club (and Seascape in 2013-2014). This flexibility alone did not provide adequate "breathing" of the ocean such that a more uniform distribution of accreted sand fell behind the system. For that reason, the research team added some trial spacers to encourage more natural sand accretion behind the system. The initial result of the added spacers was an improved distribution of sand behind the system as shown in Figure 28.

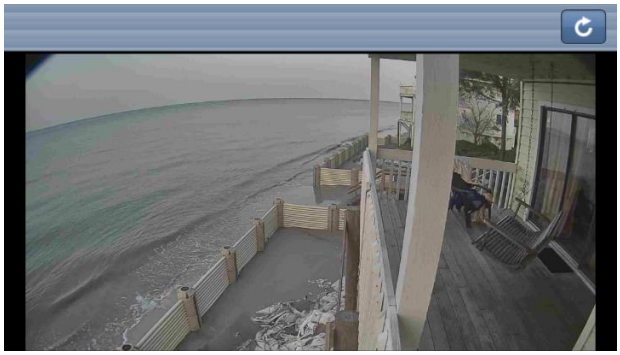
Soon after, the site developed what has been the biggest issue at Harbor Island. As the beach lowered and the added spacer elevations became too high (relative to the beach profile) to allow for exit water to efficiently leave the area behind the WDS, a trench developed directly under the system (See Figure 29).

Figure 26. Close-up of typical spacer used in the study.

Figure 27. Initial, very localized, accretion (typical with no spacers) behind WDS (photo taken: 7/17/15).



(A)



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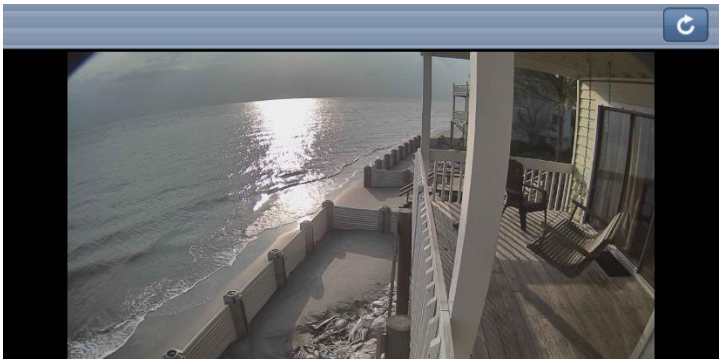

(C)

Figure 28. Only adjustment made at Harbor Island in First Quarter and results from the modification. (A) prior to installation of slots on 8/25/15; (B) 24 hours later; (C) 36 hours later. Note that significant sand accretion occurred after the slots were added.

Figure 29. Typical temporary trench issue on site (caused by scour as water exists the WDS and insufficient spacers; photo taken: 9/8/15).

Figure 30 shows the typical trench on site as of 11/20/15. Spacers were located and several locations during the second quarter of this study and it was determined that they are not the ideal solution to trenching. They help at times but they must be constantly adjusted with changing elevations. It should be noted that the entire study area did not trench significantly. The side toward the Hampton's residence didn't trench like the rest of the study area.

Figure 30. Typical trench issue on site (caused by scour as water exits the WDS and insufficient spacers; photo taken: 11/20/15).

One of the biggest issues with Harbor Island involved the lack of funding for changes since the natural scarp retreat caused by the 1,000 year flood event resulted in a definite need for the WDS to extend back to the new scarp location. The team was told that the homeowners wouldn't pay for any changes prior to scraping which was understood since scraping was to occur only a few months later.

The only plans for Harbor Island for the 3rd quarter research were to observe performance of the WDS during various tide cycles and wave conditions, to design and test feasible solutions (vertical panels were the primary focus) for removing the temporary trench that had previously appeared too often (see Figure 30) and sometimes to unacceptable depths, and to temporarily remove panels as needed in conjunction with the island's proposed scraping project. Due to cost and resource constraints, it was decided by the project team that the vertical panels would first be tested on the Isle of Palms. OCRM

was notified that the panels would be installed on the Isle of Palms. After the installation of the first basic configuration at one isolated location along the Ocean Club project site, Dr. Mays was sent the letter shown in Figure 11 and discussed in a previous section.

Although the trench remained a temporary issue throughout the 3rd and 4th quarter, it was not present for most of the study and when it did form it was self-correcting over the next few tide cycles as shown in Figure 31. During a site visit purposely made when the trench appeared to be at its deepest level, it was found to be less than 2 ft deep.

Figure 31. Typical trench self-healing and accretion over a three day period (January 25-January 27, 2016). Note bags being covered by accreting sand.

The new scarp location was assessed after the scraping (entire month of February; see Figure 32) was completed and it was determined that the WDS needed extensions. Being as study, the team proposed using alternate materials for the vertical members back into the retreated scarp line (see previous discussion regarding 1,000 year event) since these members wouldn't affect the study, would save thousands of dollars (no funding was available), and could be added more quickly since the plastic elements would require a custom special order be placed. OCRM denied this request and the team was told that all the material would have to be the same as installed for all other vertical elements.

Figure 33 shows the typical scraping size used for the island at participating home sites. The scraping was a pile of sand 12 to 15 ft wide by 5 to 6 ft tall on average.

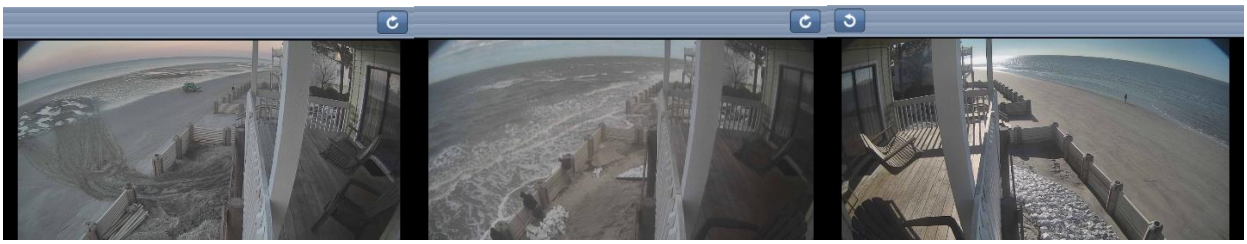

Figure 32. Scraping behind WDS at Gardner's residence (February 29 – March 4, 2016).

Figure 33. Typical scraping adjacent to WDS (February 5, 2016).

Survey data for the HI site is provided as separate files along with this report. Our review of the surveys and the related data (sand volumes gained and lost over time) leads to the conclusion that there is no negative or significant impact by the WDS on the adjacent beach profile at the HI site. The only noted issue is the temporary occurrence of trenching at isolated locations along the site. Trenching, caused by significant erosion events, and related to the system's allowance of rising tide levels (with moving water) behind the WDS can, when deep enough, become a concern. The study has shown that the system is always self-healing and that the trenching is always temporary. On the contrary, deep trenching on site should not be allowed and must be mitigated anytime it appears on site. OCRM did not permit the removal or mitigation of trenching using research means planned for the study and for some reason only permitted the extremely expensive and much more significant site altering option of lowering the entire system. It has always been known that flooding the system using isolated panel removal can easily remove trenching and is almost instantaneous. Citadel recommendations regarding simple trench mitigation (outside of fictitious study constraints) are provided in the overall conclusions to this report.

Sandbags vs. WDS

The purpose of this section of the report is to compare and contrast the subjective and objective relative merit of sandbags versus the WDS in regards to beach erosion. Currently, in South Carolina, minor renourishment, sand scraping, and the use of sandbags are permitted, but only under emergency order regulations. For some property owners, the only feasible and permitted solution is often the continuous and expensive stacking and replacing of large (or small in some cases) sandbags in front of their threatened structure. See Figure 34 for a side by side comparison of a sandbag versus WDS applications on the Isle of Palms.

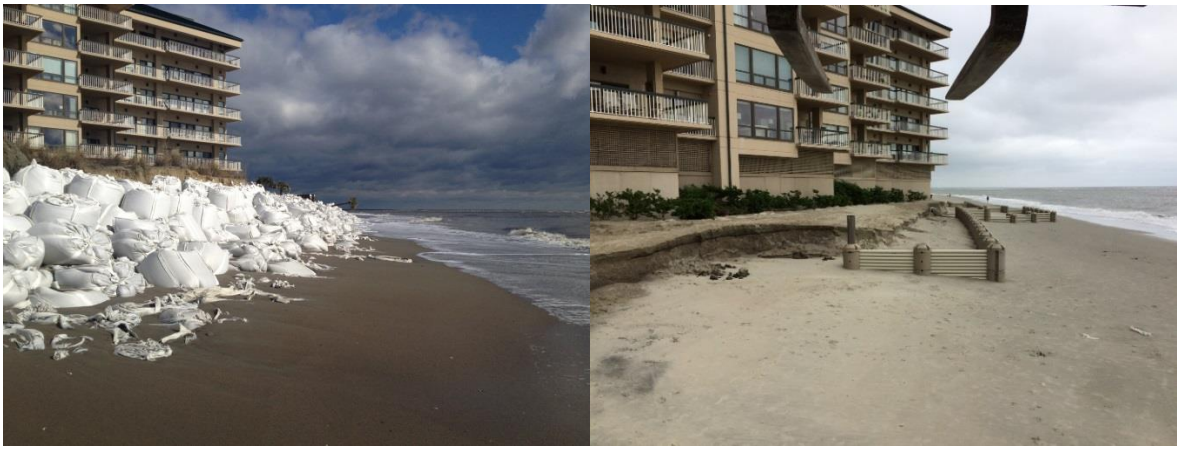

Figure 34. Sandbags and WDS providing erosion and building foundation protection.

Although Figure 34 shows clearly the aesthetic benefit of the WDS, the situation with sandbags can very quickly deteriorate as sandbags fall apart, fall over, or become buried as dynamic surf pounds the bags. Although the home and building owners are ultimately responsible for their removal, the bags often times wind up permanently buried or floating out to sea (see Figure 35).

The previous sections of this report attempted to show that the WDS could provide a similar level of protection and erosion control to that provided by sandbags. The results are somewhat misleading since the WDS was not tested in the manner recommended by The Citadel but rather using fictitious constraints mandated by OCRM. The remaining portion of this section provides a more quantitative environmental comparison of sandbags versus the WDS.

Figure 35. Deteriorated/buried sandbags and individuals pulling sandbags from the surf.

Environmental Impact

Beyond technical effectiveness, environmental impact is an important factor in selecting an erosion mitigation strategy. One measure of environmental impact is the lifecycle embodied energy of a product, which includes the initial embodied energy associated with raw materials and installation, the recurrent embodied energy associated with operation and maintenance, as well as the final disposal energy (Masters 2001, Crawford 2012). Indeed, a "cradle-to-grave" approach can be used to compare the environmental impacts of competing product alternatives based on overall energy intensity (Meyer, Creux et al. 2006, McAlinden 2015). When conducting a comparative embodied energy analysis, it is important to consider the durability of each product. For instance, a low embodied energy product that has to be frequently replaced may be more detrimental to the environment than a product with high embodied energy that lasts for a long period of time. Consequently, embodied energy per lifetime has been suggested as a more meaningful indicator of environmental impact than total embodied energy (Kibert 2008). Environmental impact of both the WDS and sandbags was captured by considering embodied energy per lifetime over each product's life cycle, as installed at the three experimental sites (Figure 36). Calculations are intended to be order-of-magnitude estimates. Sample calculations comparing the WDS to sandbags at the BWE site are included in Appendix A.

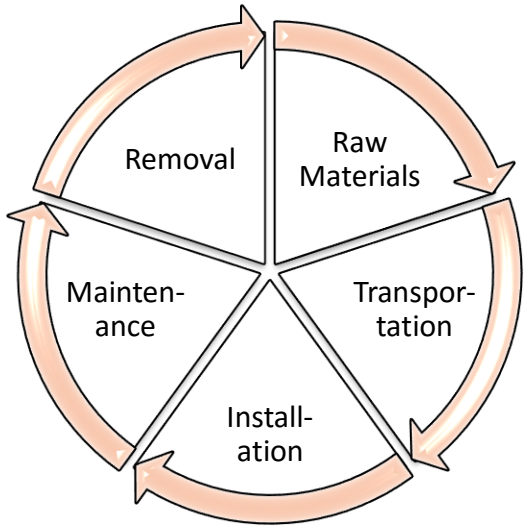

Figure 36. Life cycle of WDS and sandbags for erosion mitigation.

Functional Unit of Analysis

A functional unit is often used during lifecycle analysis in order to compare two different products (Horne, Grant et al. 2009). The WDS functional unit protects approximately 8 ft of coastline at OC/SS and 10 ft at HI. At BWE and HI, the functional unit includes one tier of a single FRP pile and two sets of horizontal panels (one on either side of the pile). At OC/SS, a two-tiered configuration was assumed. For sandbag analysis, the number of sandbags required to protect 8 or 10 ft of coastline, depending on the site, was considered as a functional unit. Initial, functional sandbag configurations were estimated for each site based on observations and photographs. Accordingly, OC/SS, BWE, and HI were assumed to require 4, 4, and 30 sandbags/ft to provide reasonable shoreline protection. "Large" (3000 lb) sandbags were used at OC/SS and BWE, while "small" (50 lb) sandbags were used at HI.

Raw Materials

The raw materials that compose a product contribute to initial embodied energy (Tables 1-2). The WDS is composed primarily of plastic components, including polyvinyl chloride (PVC), high density polyethylene (HDPE), and fiber-reinforced plastic. Given the energy-intensive requirements of manufacturing fossil-fuel-based plastics, the raw materials embodied energy of WDS components is fairly high. However, the relatively long life of plastic components results in a more favorable embodied energy per lifetime. Despite the large quantity of sand required at each site (up to 96,000 lb), the raw materials embodied energy of sandbags is much lower than for the plastic-derived WDS. However, given that the large sandbags begin to photodegrade after 1200 hr, the WDS is less energy intensive on a per lifetime basis.

Table 1. Initial embodied energy (EE) associated with WDS raw materials.

	Tier Weight per Unit (lb)		Coeff-icient[3] (MJ/kg)	Life (yr)	Raw Materials EE (MJ)			Normalized Raw Materials EE (MJ/yr)		
	OC/SS[1]/ BWE[2]	HI[2]	All	All	OC/ SS	BWE	HI	OC/ SS	BWE	HI
FRP Pile	183	183	103	50	83,036	41,518	41,518	1,661	830	830
Panels	192	240	70	2	59,208	29,604	37,004	29,604	14,802	18,502
Housing	210	210	103	25	95,286	47,643	47,643	3,811	1,906	1,906
Cap	10	10	103	25	4,538	2,269	2,269	181	91	91
WDS	595	643	-	-	242,066	121,033	128,434	**35,257**	**17,629**	**21,329**

[1]Two tiers used for calculation of EE.

[2]One tier used for calculation of EE.

[3]From Grams (2005).

Table 2. Initial embodied energy (EE) associated with sandbag raw materials.

	Quantity (#/ft)	Total Weight (lb/unit)	Raw Materials EE Coefficient (MJ/kg)	Estimated Lifetime (yr)	Raw Materials EE (MJ)	Normalized Raw Materials EE (MJ/yr)
OC/SS	4	96,000	0.1	0.137	21,145	**154,361**
BWE	4	96,000	0.1	0.137	21,145	**154,361**
HI	30	15,000	0.1	0.137	3,304	**24,119**

Transportation

Initial embodied energy also includes transportation of raw materials (Tables 3-4). The WDS components arrived via heavy truck from Pennsylvania, Ohio, or Minnesota, while sand for most of the sites originated from Summerville, SC. Energy associated with transportation of freight is weight-dependent (approximately 0.002 MJ/kg-mi) (Cambridge Systematics 2013). Due to the large amount of sand that must be transported and the short sandbag lifetime, both the total embodied energy and embodied energy per lifetime associated with transportation of raw materials is higher for the use of sandbags, as compared to the WDS.

Table 3. Initial embodied energy (EE) associated with transportation of WDS components.

	Origin	Total Distance to SC[1]	Transportation EE (MJ)	Normalized Transportation EE (MJ/yr)
FRP Pile	PA	700	94	2
Panels	OH	600	84	42
Housing	MN	1400	216	9
Cap	MN	1400	10	0
WDS	-	-	404	**53**

[1]Estimated from Google Maps (Search = Origin to SC).

Table 4. Initial embodied energy (EE) associated with transportation of sandbags.

	Origin	Total Distance to SC[1]	Transportation EE (MJ)	Normalized Transportation EE (MJ/yr)
OC/SS	Summerville, SC	40	2,816	**20,555**
BWE	Summerville, SC	40	2,816	**20,555**
HI	Summerville, SC	40	440	**3,212**

[1]Estimated from Google Maps (Search = Summerville to Site) for OC/SS and BWE. Comparable distance assumed for HI.

Installation

The final contributor to initial embodied energy is installation of product components (Tables 5-6). At OC/SS and BWE, setting FRP piles and housing units was completed using a 6,000 lb forklift and an 18,500 lb mini-excavator. At HI, only a 15,000 lb mini-excavator was used. On average, WDS machinery operates for only 20 minutes during the installation of one functional unit. Installation of all other WDS components was completed without the use of machinery.

Several pieces of equipment were assumed to fill sandbags at OC/SS and BWE. An 18,500 lb mini-excavator was used to fill sandbags that were held by a forklift (approximately 4000 lb). A second forklift (approximately 6,000 lb) was assumed to run along the beach to place filled sandbags. It was estimated that each of the three pieces of equipment operated continuously for approximately 7 minutes to fill and place a single sandbag. Only a skid steer (100 hp) was used to facilitate placement of small sandbags at HI. Due to the often continuous operation of machinery and large number of sandbags, the installation embodied energy (both total and normalized) is higher for the use of sandbags, as compared to the WDS.

Table 5. Initial embodied energy (EE) associated with installation of WDS.

	Machinery Operation Time[1] (hr/unit)	Forklift[2] Energy (MJ)		Excavator Energy (MJ)		Total Installation EE (MJ)		Normalized Installation EE (MJ/yr)	
	All	OC/SS/BWE	HI	OC/BWE[3]	HI[4]	OC/SS/BWE	HI	OC/SS/BWE	HI
FRP Pile	0.33	88.8	0	32.4	25.2	121	25	2	1
Housing	0.33	88.8	0	32.4	25.2	121	25	5	1
WDS	0.7	177.6	0	64.8	50.4	242	50	**7**	**2**

[1]Estimated 20 min of operation time per WDS functional unit.

[2]74 kW, based on representative 6,000 lb forklift.

[3]27 kW, based on representative 18,500 lb mini-excavator.

[4]21 kW, based on representative 15,000 lb mini-excavator.

Table 6. Initial embodied energy (EE) associated with installation of sandbags.

	Machinery Operation Time (hr/unit)	Lg Forklift[1] Energy (MJ)	Sm Forklift[2] Energy (MJ)	Excavator[3] Energy (MJ)	Skid Steer Energy[4] (MJ)	Total Installation EE (MJ)	Normalized Installation EE (MJ/yr)
OC/SS	0.117	994.6	658.6	362.9	0	2,016	**14,717**
BWE	0.117	994.6	658.6	362.9	0	2,016	**14,717**
HI	0.0167	0	0.0	0.0	1350	1,350	**9,855**

[1]74 kW, based on representative 6,000 lb forklift.

[2]49 kW, based on representative 4,000 lb forklift.

[3]27 kW, based on representative 18,500 lb mini-excavator.

[4]75 kW, based on representative 100 hp skid steer.

Maintenance

Recurring embodied energy results from regular product maintenance (Tables 7-8). While maintenance events can vary depending on weather and coastal patterns, the most likely energy-consuming event for the WDS is use of a mini-excavator (18500 lb) to vibrate down uplifted piles. One vibration event per year was assumed. In contrast, maintenance of sandbags is more energy intensive (on a per lifetime basis), as a forklift (6000 lb) is required to lift large, sunken sandbags. While the number of lifting maintenance events can also vary widely, it was estimated that on average it takes two weeks for a large sandbag to sink. In addition, it was estimated that it requires approximately 30 hr of operation time to lift 1000 ft of sunken sandbags (depends highly on number of sunken sandbags and degree of sinking). Small sandbags at HI were assumed to be lifted without machinery. Total and normalized recurring embodied energy is lower for the WDS, as compared to sandbags.

Table 7. Recurring embodied energy (EE) associated with vibrating down WDS FRP piles.

	Excavator[1] Operation Time (hr/unit)	Maintenance Events[2] (#/lifetime)	Total Maintenance EE (MJ)	Normalized Maintenance EE (MJ/yr)
OC/SS	0.033	50	160	**3**
BWE	0.033	50	160	**3**
HI	0.033	50	160	**3**

[1]27 kW, based on representative 18,500 lb mini-excavator.

[2]Conservative estimate of one vibration maintenance event per year.

Table 8. Recurring embodied energy (EE) associated with lifting sandbags.

	Forklift[1] Operation Time[2] (hr/unit)	Maintenance Events[3] (#/lifetime)	Total Maintenance EE (MJ)	Normalized Maintenance EE (MJ/yr)
OC/SS	0.24	4	256	**1,867**
BWE	0.24	4	256	**1,867**
HI	0	0	**0**	**0**

[1]74 kW, based on representative 6000 lb forklift.

[2]Lifting assumed to take 5 days (6 hr/day) per 1000 ft. Rough estimate, since maintenance is highly variable.

[3]Required lifting assumed to be needed every two weeks, although could be required sooner or later.

Removal

After the useful life of a product, it must be removed (Tables 9-10). To remove the WDS from the beach, a mini-excavator (15,000 lb) and a forklift (6,000 lb) were used to remove the FRP piles and housing units. On average, WDS machinery operated for 25 min during the removal of one functional unit. Removal of all other WDS components is completed without the use of machinery.

Large sandbags at OC/SS and BWE were removed using two mini-excavators (52,410 and 15,000 lbs). It was estimated that 1.5 min of machine operation time was required to remove a single large sandbag from the beach. Due to the continuous operation of machinery and large number of sandbags, the removal embodied energy (both total and normalized) is higher for the use of sandbags, as compared to the WDS. No machinery was used for filling and placement of small sandbags at HI.

The ultimate fate of waste materials also differs between the WDS and sandbags. When WDS elements are replaced or removed, plastic components are easily collected and recycled. However, even with systematic removal of sandbags, the bags themselves are shredded and often remain on the beach or are washed away by the tides. Consequently, continued use of sandbags can lead to accumulation of solid waste both on the beach and in the ocean.

Table 9. Embodied energy (EE) associated with WDS removal.

	Machinery Operation Time[1] (hr/unit)	Forklift[2] Energy (MJ)	Excavator[3] Energy (MJ)	Total Installation EE (MJ)	Normalized Installation EE (MJ/yr)
FRP Pile	0.42	111.0	31.5	143	**3**
Housing	0.42	111.0	31.5	143	**6**
WDS	0.7	122.0	63.0	285	**9**

[1]Assumed 25 min for FRP pile and 25 min for housing units.

[2]74 kW, based on representative 6000 lb forklift.

[3]21 kW, based on representative 15,000 lb mini-excavator.

Table 10. Embodied energy (EE) associated with WDS removal.

	Machinery Operation Time[1] (hr/unit)	Lg Excavator[2](MJ)	Sm Excavator[3] (MJ)	Total Installation EE (MJ)	Normalized Installation EE (MJ/yr)
OC/SS	0.8	385.9	60.5	**446**	**3,259**
BWE	0.8	385.9	60.5	**446**	**3,259**
HI	0	0	0	**0**	**0**

[1]Estimated 1.5 min/sandbag. Machinery operation time (hr/unit) estimated based on sandbag configuration at each site.
[2]134 kW, based on representative 52,410 lb mini-excavator.
[3]21 kW, based on representative 15,000 lb mini-excavator.

Lifecycle Embodied Energy

On a per lifetime basis, the WDS is less energy-intensive than the use of sandbags at the OC/SS, BWE, and HI sites (Figure 37). In fact, at OC/SS, BWE, and HI the WDS embodied energy per lifetime was 82, 91, and 42% lower than the use of sandbags. For both the WDS and sandbags, the primary contributor to embodied energy was the extraction and production of raw materials. Despite the fact that plastics have a considerably higher embodied energy per mass (70 – 103 MJ/kg) than sand (0.1 MJ/kg), the normalized raw materials embodied energy was higher for the use of sandbags, due to the high mass of sand required to protect the shoreline and the short lifetime of the sandbags. Based on these three experimental sites, it is expected that use of the WDS will result in less overall energy utilization (and subsequently CO_2 emissions), as compared to the use of sandbags, for erosion mitigation.

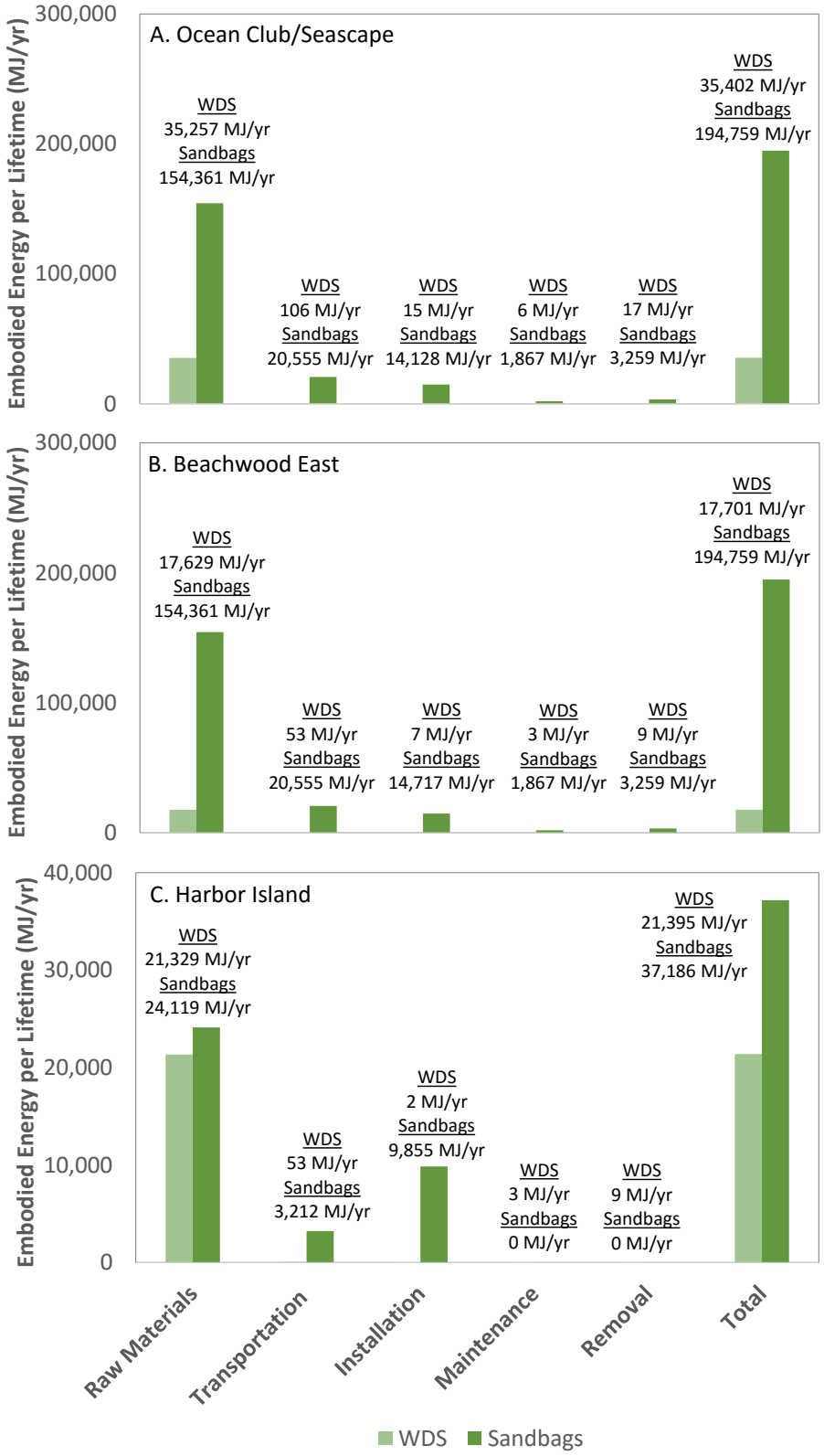

Figure 37. Comparison of life cycle embodied energy per lifetime between WDS and sandbags at (A) OC/SS, (B) BWE, and (C) HI sites. Assumes all components are used for their entire lifetimes.

Conclusions and Recommendations

Conclusions:
Based on the results of all tests performed to date, the Citadel researchers have concluded that the Wave Dissipation System is able to:

1) protect structures, dunes, flora, and fauna that are landward of the system
2) minimize the potential for negative impacts that are associated with hardened devices, and
3) allow for natural beach elevation changes while providing better protection of dune lines by using a multi-tier system in areas of higher wave energy and a single line system in areas of lower wave energy

At all sites, the WDS protected the structures behind the system and when used as recommended (not as detailed in this study) the results will be even better.

However, The Citadel researchers want to make it very clear, as they always have, that the system is not a one-size fits all solution and that it is a dynamic system that must be designed separately for each particular site, and monitored/adjusted as necessary to optimize its performance.

Recommendations:

1. The WDS should be used in conjunction with sand renourishment behind the system. This renourishment is necessary to help minimize the volume of water that gets behind the WDS. The renourshment can be brought in as beach compatible sand or reclaimed using the natural accretion that occurs at different times. Note that the research team requested the use of sand behind the system several times during the study. At the beginning of the study, OCRM was told that sand would be required to be brought in after significant erosion events in the same way that sand is placed behind sandbags. This action was not permitted. After the 1,000 year event, researchers informed OCRM that the site had changed considerably and that sand should be brought in to provide a similar baseline as was anticipated for the study. This action was denied. When significant accretion occurred on site at BWE, the research team requested the opportunity to show that dune rebuilding could be performed (as was shown in the earlier studies). This action was denied.
2. The local trenching that has occurred at times at all three sites is a significant concern to Citadel researchers. Local trenching never occurred in the previous Seascape studies nor at Ocean Club this year until the final portion of the study period covered in this report. It appears to be related to scour caused by extreme tides, significant erosion events, and the volume of water that is allowed to pass through the system (this same volume of water must escape as the tide goes back out). Although the system is self-healing, the time required to self-heal after event related local trenching is site specific, and it is the opinion of The Citadel researchers that self-healing should not be permitted in all cases. Opening up of the entire system in areas of local trenching has immediately restored the beach profile by quickly mitigating the trenching effect and the horizontal panels can be easily removed for this purpose. The research team spent a lot of time developing vertical panels for removing the trench since this approach would be much more cost effective (during a study)

than complete lowering of the system and since vertical panels could be installed in isolated locations as needed versus lowering which requires a significant portion of the system to be lowered at one time. The use of the vertical panels was not permitted by OCRM. Although our earlier report stated that "although lowering may alleviate the trenching, we are not planning that this will be the solution. We only propose it to increase energy dissipation," OCRM correspondence to Dr. Mays did not permit the vertical panels as discussed earlier in this report and instead OCRM suggests the use of lowering the system which no one was willing to pay for during a short term study. Finally, in conjunction with item 1 above, if the sand elevations behind the WDS are maintained on a bimonthly schedule or so, some of this beach compatible sand can be easily and quickly moved to eliminate any concerns caused by the temporary trenching on site.

3. During significant accretion events behind the system, dune rebuilding by moving sand already behind the system should be utilized. This will help eliminate the need for bringing in beach compatible sand. The system's capability was shown clearly in the earlier Seascape studies, but was not permitted by OCRM during these studies when requested by the research team.
4. It is recommended that the system be installed with the horizontal panels fully in place during times outside of turtle season. During turtle season, it is recommended that the system be completely open (only vertical elements in place) except when the structure behind the system is in immediate danger of losing structural support. During the turtle season as occurring during the studies discussed in this report, the system was completely closed off due to concerns over turtles getting trapped behind the system and since OCRM would not allow us to follow this recommendation since much of the system would have been wide open which would have "manipulated results."
5. The horizontal panels have performed well overall but the longevity of the panels, if left unmodified, in areas of significant daily wave impacts was brought into question during the study. SI Systems, LLC needs to develop a better material wrapping of the ends of the panels to reduce the spinning and banging of the panels against the housing units in these areas. This is a simple engineering fix that will cost SI Systems, LLC additional money when constructing similar lines of resistance.
6. For the two homes on Harbor Island, readers of this report should note the serious concerns that the principal investigator has regarding the shallow foundations on which these structures are built. The principal investigator is an expert in coastal construction, a licensed engineer (structural) in South Carolina, a foundation expert, an author or contributing author on V Zone construction and he has been shocked regarding some of the discussions about sandbags around the foundations of these structures (that don't consider the structural ramifications of moving the bags or removal actions). The discussions are not presented in this report. To the best of his knowledge, at the time these homes were constructed, the shallow foundations supporting these structures were approved by the local jurisdiction. Although as a Citadel employee, the project principal investigator is not able to represent these homeowners as their structural engineer, the homeowners are advised to seek options regarding long term solutions in their special case situation which is

very unique and requires input from experts in coastal construction, V Zone regulations, and structural engineering.

References

Crawford, R. (2012). Lifecycle energy analysis. Environment Design Guide.

Grams, G. (2005). Policies and strategies for ecological building design. British Columbia, Canada, Red Eye Publications.

Horne, R., T. Grant and K. Verghese (2009). Life cycle assessment: Principles, practice and prospects. Collingwood, Australia, Csiro Publishing.

Kibert, C. J. (2008). Sustainable construction: Green building design and delivery. Hoboken, NJ, John Wiley & Sons, Inc.

Masters, N. (2001). Sustainable use of new and recycled materials in coastal and fluvial construction: A guidance manual. Reston, VA, ASCE Press.

McAlinden, B. (2015). Embodied Energy and Carbon. Westminster, London, Institution of Civil Engineers.

Meyer, U. B., S. E. Creux and A. K. W. Marin (2006). Process Oriented Analysis: Design and Optimization of Industrial Production Systems. New York, NY, CRC Press.

Cambridge Systematics (2013). Freight transportation modal shares: Scenarios for a low-carbon future. Transportation Energy Future Series, U.S. Department of Energy.

Very truly yours,

Timothy W. Mays, Ph.D., P.E., Professor, P.I.

Mary K. Watson, Ph.D., Assistant Professor

Appendix A:
Environmental Impact Sample Calculations

Wave Dissipation System (All calculations are on a per functional unit basis for BWE)

1. Raw Materials

   A. Fiber-reinforced plastic (FRP) piles:
      → Embodied energy (EE) for HDPE assumed as a conservative value (103 MJ/kg) (Grams 2005).
      → Given 183 lb/pile.
      → Given 50 yr life for pile.
      → Given 1 item/unit.

$$EE = 1 item \left(\frac{183\ lb}{item}\right)\left(\frac{103\ MJ}{kg\ plastic}\right)\left(\frac{kg}{0.454\ lb}\right) = 41{,}518\ MJ$$

$$\frac{EE}{life} = \frac{41{,}518\ MJ}{50\ yr} = 830\,\frac{MJ}{yr}$$

   B. Pipe/panels:
      → EE for PVC (70 MJ/kg) (Grams 2005).
      → Given 12 lb/item.
      → Given 2 yr life.

$$EE = 16\ items \left(\frac{12\ lb}{item}\right)\left(\frac{70\ MJ}{kg\ PVC}\right)\left(\frac{kg}{0.454\ lb}\right) = 29{,}604\ MJ$$

$$\frac{EE}{life} = \frac{29{,}604\ MJ}{2\ yr} = 14{,}802\,\frac{MJ}{yr}$$

   C. Housing units:
      → EE for HDPE used (103 MJ/kg) (Grams 2005).
      → Given 70 lb/item.
      → Given 25 yr life.

$$EE = 3\ items \left(\frac{70\ lb}{item}\right)\left(\frac{103\ MJ}{kg\ HDPE}\right)\left(\frac{kg}{0.454\ lb}\right) = 47{,}643\ MJ$$

$$\frac{EE}{yr} = \frac{46{,}643\ MJ}{25\ yr} = 1{,}906\,\frac{MJ}{yr}$$

D. Locking cap:
   → EE for HDPE used (103 MJ/kg) (Grams 2005).
   → Given 10 lb/item.
   → Given 25 yr life.

$$EE = 1\ item\left(\frac{10\ lb}{item}\right)\left(\frac{103\ MJ}{kg\ HDPE}\right)\left(\frac{kg}{0.454\ lb}\right) = 2{,}269\ MJ$$

$$\frac{EE}{yr} = \frac{2{,}269\ MJ}{25\ yr} = 91\frac{MJ}{yr}$$

E. WDS unit:

$$EE = (41{,}518 + 29{,}604 + 47{,}643 + 2{,}269)MJ = 121{,}033MJ$$

$$\frac{EE}{life} = (830 + 14{,}802 + 1{,}906 + 91)\frac{MJ}{yr} = 17{,}629\ \frac{MJ}{yr}$$

2. Transportation to Site

A. FRP pile:
   → Given transported from PA.
   → Estimated travel distance from PA to SC of 700 mi (Google Maps).
   → Estimated transported by heavy truck (1390 BTU/short ton-mi) (Cambridge Systematics 2013).

$$EE = 1\ item\left(\frac{183\ lb}{item}\right)\left(\frac{1390\ BTU}{short\ ton - mi}\right)\left(\frac{short\ ton}{2000\ lb}\right)\left(\frac{MJ}{947.8\ BTU}\right)(700\ mi) = 94\ MJ$$

$$\frac{EE}{life} = \frac{94\ MJ}{50\ yr} = 2\frac{MJ}{yr}$$

B. Pipe/panels:
   → Given transported from OH.
   → Estimated travel distance from OH to SC of 600 mi (Google Maps).
   → Estimated transported by heavy truck (1390 BTU/short ton-mi) (Cambridge Systematics 2013).

$$EE = 16\ item\left(\frac{12\ lb}{item}\right)\left(\frac{1390\ BTU}{short\ ton - mi}\right)\left(\frac{short\ ton}{2000\ lb}\right)\left(\frac{MJ}{947.8\ BTU}\right)(600\ mi) = 84\ MJ$$

$$\frac{EE}{life} = \frac{84\ MJ}{2\ yr} = 42\frac{MJ}{yr}$$

C. Housing units:
   → Given transported from MN.
   → Estimated travel distance from MN to SC of 1400 mi (Google Maps).
   → Estimated transported by heavy truck (1390 BTU/short ton-mi) (Cambridge Systematics 2013).

$$EE = 3\ items\left(\frac{70\ lb}{item}\right)\left(\frac{1390\ BTU}{short\ ton - mi}\right)\left(\frac{short\ ton}{2000\ lb}\right)\left(\frac{MJ}{947.8\ BTU}\right)(1400\ mi) = 216\ MJ$$

$$\frac{EE}{life} = \frac{216\ MJ}{25\ yr} = 9\frac{MJ}{yr}$$

D. Locking cap:
   → Given transported from MN.
   → Estimated travel distance from MN to SC of 1400 mi (Google Maps).
   → Estimated transported by heavy truck (1390 BTU/short ton-mi) (Cambridge Systematics 2013).

$$EE = 1\ item\left(\frac{10\ lb}{item}\right)\left(\frac{1390\ BTU}{short\ ton - mi}\right)\left(\frac{short\ ton}{2000\ lb}\right)\left(\frac{MJ}{947.8\ BTU}\right)(1400\ mi) = 10\ MJ$$

$$\frac{EE}{life} = \frac{10\ MJ}{25\ yr} =< 1\frac{MJ}{yr}$$

E. WDS unit:

$$EE = (94 + 84 + 216 + 10)MJ = 404\ MJ$$

$$\frac{EE}{life} = (2 + 42 + 9)\frac{MJ}{yr} = 53\frac{MJ}{yr}$$

3. Installation

A. FRP Pile
   → WDS forklift power estimated as 74 kW, based on representative 6,000 lb forklift.
   → WDS large excavator power estimated as 27 kW, based on representative 18,500 lb mini-excavator.
   → Forklift and excavator operation times estimated as 20 min per WDS unit.

$$Forklift\ energy\ consumption = \left(\frac{74\ kJ}{s}\right)(20\ min)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 88.8\ MJ$$

$$Excavator\ energy\ consumption = \left(\frac{27\ kJ}{s}\right)(20\ min)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 32.4\ MJ$$

$$EE = (88.8 + 32.4)MJ = 121.2\ MJ$$

$$\frac{EE}{life} = \frac{121.2\ MJ}{50\ yr} = 2\frac{MJ}{yr}$$

B. Housing units:
   - → WDS forklift power estimated as 74 kW, based on representative 6,000 lb forklift.
   - → WDS large excavator power estimated as 27 kW, based on representative 18,500 lb mini-excavator.
   - → Forklift and excavator operation times estimated as 20 min per WDS unit.

$$Forklift\ energy\ consumption = \left(\frac{74\ kJ}{s}\right)(20\ min)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 88.8\ MJ$$

$$Excavator\ energy\ consumption = \left(\frac{27\ kJ}{s}\right)(20\ min)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 32.4\ MJ$$

$$EE = (88.8 + 32.4)MJ = 121.2\ MJ$$

$$\frac{EE}{life} = \frac{121.2\ MJ}{25\ yr} = 5\frac{MJ}{yr}$$

C. WDS unit:

$$EE = (121.2 + 121.2)MJ = 242.4\ MJ$$

$$\frac{EE}{life} = (2 + 5)\frac{MJ}{yr} = 7\frac{MJ}{yr}$$

4. Maintenance

A. FRP Pile
   → Major maintenance event assumed to vibrating down FRP piles.
   → Assumed 1 maintenance event per year.
   → WDS mini-excavator power estimated as 27 kW, based on representative 18,500 lb forklift.
   → Assumed 2 min per WDS unit for maintenance.

$$EE = \frac{27\ kJ}{s}\left(\frac{0.033\ hr}{event}\right)\left(\frac{3600\ s}{hr}\right)\left(\frac{MJ}{1000\ kJ}\right)(50\ events) = 160MJ$$

$$\frac{EE}{life} = \frac{160\ MJ}{50\ yr} = 3\frac{MJ}{yr}$$

5. Removal

A. FRP pile:
   → WDS forklift power estimated as 74 kW, based on representative 6,000 lb forklift.
   → WDS mini-excavator power estimated as 21 kW, based on representative 15,000 lb mini-excavator.
   → Assumed 25 min machine operation time per unit.

$$Forklift\ energy\ consumption = \left(\frac{74\ kJ}{s}\right)(25\ min)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 111.0\ MJ$$

$$Excavator\ energy\ consumption = \left(\frac{21\ kJ}{s}\right)(25\ min)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 31.5\ MJ$$

$$EE = (111.0 + 31.5)MJ = 142.5\ MJ$$

$$\frac{EE}{life} = \frac{142.5\ MJ}{50\ yr} = 3\frac{MJ}{yr}$$

B. Housing units:
   → WDS forklift power estimated as 74 kW, based on representative 6,000 lb forklift.
   → WDS mini-excavator power estimated as 21 kW, based on representative 15,000 lb mini-excavator.
   → Assumed 25 min machine operation time per unit.

$$Forklift\ energy\ consumption = \left(\frac{74\ kJ}{s}\right)(25\ min)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 111.0\ MJ$$

$$Excavator\ energy\ consumption = \left(\frac{21\ kJ}{s}\right)(25\ min)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 31.5\ MJ$$

$$EE = (111.0 + 31.5)MJ = 142.5\ MJ$$

$$\frac{EE}{life} = \frac{142.5\ MJ}{25\ yr} = 6\frac{MJ}{yr}$$

C. WDS unit:

$$EE = (142.5 + 142.5)MJ = 285\ MJ$$

$$\frac{EE}{life} = (3 + 6)\frac{MJ}{yr} = 9\frac{MJ}{yr}$$

6. Total

$$EE = (121{,}033 + 404 + 242 + 160 + 285)MJ = 122{,}125\ MJ$$

$$\frac{EE}{life} = (17{,}629 + 53 + 7 + 3 + 9)\frac{MJ}{yr} = 17{,}701\frac{MJ}{yr}$$

Sandbags (All calculations are on a per functional unit basis for BWE)

1. Raw Materials
   - → 4 sandbags/ft
   - → 3000 lb/sandbag
   - → EE for sand (0.1 MJ/kg) (Grams 2005)
   - → Lifetime = 1200 hr
   - → Unit = 8 ft of sandbags

$$Unit\ weight = (3000\ lb)\left(\frac{4\ bags}{ft}\right)(8\ ft) = 96{,}000\ lb$$

$$EE = (96{,}000\ lb)\left(\frac{0.1\ MJ}{kg}\right)\left(\frac{kg}{0.454\ lb}\right) = 21{,}145\ MJ$$

$$\frac{EE}{life} = \frac{21{,}145\ MJ}{0.137\ yr} = 154{,}361\frac{MJ}{yr}$$

2. Transportation to Site
   - → Given transported from Summerville, SC.

→ Estimated travel distance from PA to SC of 40 mi (Google Maps).
→ Estimated transported by heavy truck (1390 BTU/short ton-mi) (Cambridge Systematics 2013).

$$EE = (96{,}000\ lb)\left(\frac{1390\ BTU}{short\ ton - mi}\right)\left(\frac{short\ ton}{2000\ lb}\right)\left(\frac{MJ}{947.8\ BTU}\right)(40\ mi) = 2{,}816\ MJ$$

$$\frac{EE}{life} = \frac{2{,}816\ MJ}{0.137\ yr} = 20{,}555\frac{MJ}{yr}$$

3. Installation
   → Sandbag large forklift power estimated as 74 kW, based on representative 6,000 lb forklift.
   → Sandbag small forklift power estimated as 49 kW, based on representative 4,000 lb mini-excavator.
   → Sandbag mini-excavator power estimated at 27 kW based on 18,500 lb mini-escalator.
   → Assumed 7 min machine operation time to fill and place large sandbag.

$$Time\ per\ unit = \left(\frac{7\ min}{bag}\right)\left(\frac{4\ bags}{ft}\right)(8\ ft)\left(\frac{hr}{60\ min}\right) = 3.73hr$$

$$Lg\ Forklift\ energy\ consumption = \left(\frac{74\ kJ}{s}\right)(3.73\ hr)\left(\frac{60\ min}{hr}\right)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 994.6\ MJ$$

$$Sm\ Forklift\ energy\ consumption = \left(\frac{49\ kJ}{s}\right)(3.73\ hr)\left(\frac{60\ min}{hr}\right)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 658.6\ MJ$$

$$Excavator\ energy\ consumption = \left(\frac{27\ kJ}{s}\right)(3.73\ hr)\left(\frac{60\ min}{hr}\right)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 362.9\ MJ$$

$$EE = (994.6 + 658.6 + 362.9)MJ = 2{,}016\ MJ$$

$$\frac{EE}{life} = \frac{2{,}016\ MJ}{0.137\ yr} = 14{,}717\frac{MJ}{yr}$$

4. Maintenance
   → Assumed 6000 lb forklift (74 kW) 5 days at 6 hr/day to lift 1000 ft run of large sandbags.
   → Assumed maintenance event approximately every two weeks (4 events).

$$\left(\frac{5\ days}{1000\ ft - event}\right)\left(\frac{6\ hr}{day}\right)(8\ ft) = 0.24\ hr$$

$$EE = \left(\frac{74\ kJ}{s}\right)\left(\frac{0.24\ hr}{event}\right)\left(\frac{60\ min}{hr}\right)\left(\frac{60\ s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right)(4\ events) = 256\ MJ$$

$$\frac{EE}{life} = \frac{256\ MJ}{0.137\ yr} = 1{,}867\,\frac{MJ}{yr}$$

5. Removal
   - → Sandbag large excavator power estimated as 134 kW, based on representative 52,410 excavator.
   - → Sandbag small excavator power estimated as 21 kW, based on representative 15,000 lb mini-excavator.
   - → Assumed 1.5 min/sandbag operation time for removal.

$$\left(\frac{1.5\ min}{bag}\right)\left(\frac{4\ bags}{ft}\right)(8\ ft)\left(\frac{hr}{60\ min}\right) = 0.80\ hr$$

$$Lg\ excavator\ energy\ consumption = \left(\frac{134\ kJ}{s}\right)(0.80\ hr)\left(\frac{60\ min}{hr}\right)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 385.9\ MJ$$

$$Sm\ excavator\ energy\ consumption = \left(\frac{21\ kJ}{s}\right)(0.80\ hr)\left(\frac{60\ min}{hr}\right)\left(\frac{60s}{min}\right)\left(\frac{MJ}{1000\ kJ}\right) = 60.5\ MJ$$

$$EE = (385.9 + 60.5)MJ = 446\ MJ$$

$$\frac{EE}{life} = \frac{446\ MJ}{0.137\ yr} = 3{,}259\,\frac{MJ}{yr}$$

6. Total

$$EE = 21{,}145 + 2{,}816 + 2{,}016 + 256 + 446 = 26{,}679\ MJ$$

$$\frac{EE}{yr} = (154{,}361 + 20{,}555 + 14{,}717 + 1{,}867 + 3{,}259) = 194{,}759\,\frac{MJ}{yr}$$

References

Cambridge Systematics, C. (2013). Freight transportation modal shares: Scenarios for a low-carbon future. Transportation Energy Future Series, U.S. Department of Energy.

Grams, G. (2005). Policies and strategies for ecological building design. British Columbia, Canada, Red Eye Publications.

ATTACHMENT C
GEL ENGINEERING: WAVE DISSIPATION SYSTEM MONITORING REPORT

December 8, 2016

GEL Engineering LLC

Environmental | Engineering | Surveying

Wave Dissipation System Monitoring Report

Submitted to:

SC DHEC - Ocean and Coastal Resource Management
Coastal Services Division
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October 31, 2016

Wave Dissipation System Monitoring Report

Prepared for:

South Carolina Department of Health and Environmental Control
Office of Ocean and Coastal Resource Management
Charleston, SC

Prepared by:

GEL Engineering
Charleston, SC

October 31, 2016

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Executive Summary

GEL Engineering, LLC (GEL) was contracted by the South Carolina Department of Health and Environmental Control, Office of Ocean and Coastal Resource Management (SCDHEC-OCRM or Department) to review four experimental Wave Dissipation System (WDS) installations (one on Harbor Island and three on Isle of Palms). This work included field data collection, a review of the reports from the academic sponsor (The Citadel), and a professional and objective third-party review of the design and functionality of the WDS structures. GEL performed a field data collection program that included five topographic and photographic surveys of the four sites between March and July 2016. The monitoring period covered a range of wave and tide conditions that included storm waves that eroded sand from the beach face, as well as milder wave conditions during which sand migrated onshore.

GEL analyzed the monitoring data and reviewed the academic study to respond, to the extent possible, to a list of 18 questions provided by SCDHEC-OCRM in the scope of work. GEL was not asked to determine whether the WDS is "qualified" for use in future emergency situations, per Budget Proviso 34.48 of the 2015-2016 General Appropriations Act. The conclusions from this study are the responses to the Department's questions as presented below:

1. **Do the quarterly and final reports from the academic sponsor contain sufficient data to: 1.) conclude whether the WDS qualifies under Proviso 34.51; and 2.) conclude whether the WDS meets the purpose of the academic pilot project?**

In general, yes, the quarterly and final reports contain sufficient data.

The aforementioned Proviso 34.51 defined a "qualified wave dissipation device" as a device that:

1) is placed mostly parallel to the shoreline;
2) is designed to dissipate wave energy;
3) is designed to minimize scouring seaward of and adjacent to the device by permitting sand to move landward and seaward through the device;
4) can be deployed within seventy-two hours or less and can be removed within seventy-two hours or less [subsequently amended by Provisio 34.48 to now read "the horizontal panels designed to dissipate wave energy can be deployed within one-hundred twenty hours or less and can be removed within one-hundred twenty hours or less"];
5) does not negatively impact or inhibit sea turtle nesting or other fauna;
6) can be adjusted after initial deployment in response to fluctuations in beach elevations; and
7) otherwise prevents down-coast erosion, protects property, and limits negative impacts to public safety and welfare, beach access, and the health of the beach dune system.

In regard to item 1, the reported survey data are sufficient to determine the fraction parallel to the shoreline.

In regard to item 2, the reports clearly convey that the intent of the design is to dissipate wave energy.

In regard to item 3, the reports discuss scour and scour management alternatives. The reports also discuss increasing sand movement through the WDS using spacers or temporary removal of horizontal panels to remove scour.

In regard to item 4, the reports do not explicitly state the number of hours required to deploy or remove the horizontal panels, and therefore do not contain sufficient information to assess this criterion.

In regard to item 5, the reports do not address potential impacts to turtles or other fauna in detail. The final report recommends removing the horizontal panels during turtle nesting season to avoid impacts. The report also discusses maintenance of wing walls to avoid turtle entrapment.

In regard to item 6, the final report discusses lowering of the WDS in response to changes in beach elevation.

In regard to item 7, the reports do not discuss public safety or beach access. The researchers provided survey data that can be used to evaluate impacts to downdrift properties. Similar to the limitations associated with the monitoring conducted for this study, the survey data are not ideal for quantifying downdrift impacts from the WDS apart from the natural background erosion trends. The monitoring data do not include sufficient pre-project data or control area monitoring, and the site locations are in areas with gradients in the background erosion rates that confound attempts separate the project impacts from the background erosion.

It is our understanding that the purpose of the academic study was not to conclude whether the WDS qualifies under Proviso 34.51. The RFP for GEL's contract states that "the purpose of the academic study is to determine the performance of the WDS under various wave loading and the resulting effects on the beach." The RFP states that, according to the academic sponsor, the purpose of the Harbor Island study location is to "determine and subsequently describe the performance of the [WDS] under less extreme loading (more tidal in this location due to low beach elevation and smaller waves with possible periods of respite)." The RFP states that, according to the academic sponsor, the purpose of the Harbor Island study location is to "determine and subsequently describe the performance of the [WDS] under less extreme loading (more tidal in this location due to low beach elevation and smaller waves with possible periods of respite)." The RFP states that, according to the academic sponsor, the purpose of the Ocean Club study location is to "determine and subsequently describe the performance of the [WDS] under extreme loading that is imminent as the beach continues to lower and the adjacent scarp line continues to retreat." Mays and Watson (2016) state that the purpose of the Ocean Club study was "to show that the system can be installed and increased in magnitude to the degree necessary to protect the building similar to the role played by sandbags." The RFP states that, according to the academic sponsor, the purpose of the Beachwood East study location is to "determine and subsequently describe the performance of the [WDS] under less extreme loading than the installation at Ocean Club yet more extreme loading, and not as tidal, as the installation at Harbor Island." Finally, the RFP states that, according to the academic sponsor, the purpose of the Seascape Villas study location is to "determine and subsequently describe the performance of the [WDS] under extreme loading that is imminent as the beach continues to lower and the adjacent scarp line continues to retreat."

The second part of the above question is: "do the quarterly and final reports from the academic sponsor contain sufficient data to...conclude whether the WDS meets the purpose of the academic pilot project? The purpose of the pilot project is to study the WDS, and therefore, yes, the WDS meets the purpose of the academic pilot project.

2. What type of metrics or criteria should be developed to judge success for future experimental shoreline management proposals?

Specific metrics or criteria should depend on project-specific goals and site-specific factors. Future experimental shoreline management proposals should start with an accurate problem statement that describes the characteristics of the site and the needs of the property owners and/or shoreline user community. The site characterization should include a description of the coastal processes causing the problem. This should be followed by a statement of the experimental shoreline management project goals that describes:

- Performance (benefits) expected from the project;
- Durability of the project (how long the structure will last, and the expected maintenance);
- Anticipated environmental impacts caused by the project; and
- Expected response of the sand transport system to the project.

Those funding the project should also have a clear understanding of lifecycle costs for the experimental management proposal versus alternative approaches, including traditional management methods.

Specific metrics or criteria used to judge success of the project can then be developed based on the project-specific goals and potential impacts.

In order to determine if the project meets these success criteria, and to track the effects on the coastal environment, the project should include a monitoring program. To obtain meaningful results from the monitoring program, it is important to carefully design the experiment before constructing the project, including determination of the analysis methods that will be used to quantify the project impacts. The monitoring program should include both pre- and post-project monitoring, both at the project site and at a nearby, unaltered shoreline (i.e., a control area) for comparison. Project-specific relevant processes should be measured (e.g., waves, water levels, storms, and currents), and project-specific relevant responses should be measured (e.g., topography, bathymetry, and sediments). These monitoring data allow for a before-and-after, impact-and-control type of analysis that is necessary to separate the project effects from the natural background effects. Attempts to determine project impacts without sufficient data to determine the natural background effects can lead to incorrect conclusions.

Unfortunately, it is not always practical to conduct an ideal monitoring program because of time and cost constraints. For example, property owners willing to fund such experimental shoreline management projects often already have structures threatened by erosion and may not have time for sufficient pre-project monitoring. Also, properties with threatened structures may not be in locations that have suitable control areas for comparison. Control areas should be subjected to the same wave and sediment transport conditions at the project area. An ideal experimental location would be along a

straight segment of shoreline with a relatively uniform background erosion/accretion rate. This type of environment allows for estimation of project impacts apart from the background effects. Project locations in inlet areas often have curved shorelines, large gradients in sediment transport rates and rapidly varying erosion/accretion patterns. This type of environment can confound attempts to estimate project impacts apart from natural background changes. When monitoring does not include pre-project and/or control area data, it is important to interpret the monitoring results with recognition of the study limitations and avoid attributing positive or negative impacts to a project when they may in fact be caused by natural processes. For instance, placement of an erosion control device on the beach after a storm will most likely be followed by a period of natural accretion on the beach as some of the sand migrates back onto the dry beach. This accretion should not be attributed to the erosion control device.

3. Is the WDS placed mostly parallel to the shoreline? What percentage is parallel?

Yes, the WDSs at all four locations are oriented parallel to the shoreline, with the exception of perpendicular segments that tie-back the WDS to the scarp or dune line, and perpendicular segments that connect parallel tiers in areas with multi-tier WDS designs.

4. Is the WDS designed to dissipate wave energy? If yes, does it actually dissipate wave energy in the field?

Yes, the WDS is designed to dissipate wave energy through wave breaking (including water jetting between the horizontal panels) and structure deflection (i.e., flexing or movement of the structure). In the field, the predominant dissipation mechanism observed was from wave breaking and water jetting through the horizontal panels. The horizontal panels are relatively rigid, and minimal structure deflection was observed during typical wave conditions.

5. Is the WDS designed to minimize scouring seaward of and adjacent to the device by permitting sand to move landward and seaward through the device?

Yes, although the WDS does not prevent scouring. Temporary scour along the toe of the horizontal panels was observed at all four sites following periods during which they were subjected to storm waves. The observed scour holes had maximum depths up to about 2 to 2.5 feet below the surrounding grade. Based on these observations, the design of the WDS, as deployed during the monitoring study, does not preclude scouring. When scour holes did occur, they were limited to areas within a few feet of the WDS, and there was no evidence of adverse impacts other than reduced WDS performance (i.e., reduced wave attenuation).

The question regarding *minimization* of scour requires a reference for comparison. The WDSs cause more scour (limited to areas immediately around them) than adjacent areas with no type of erosion control device. However, the scour at the WDS is not necessarily an indication of an overall net increase in beach erosion as compared to what may have occurred in the absence of the WDS. That is, the WDS did not necessarily increase overall beach erosion simply because there was scour along the structure. Also, the amount of scour caused by the WDS as compared to other structures (such as seawalls or

bulkheads) is uncertain because there are no experiments showing the difference between the WDS and alternative structures subjected to the same wave conditions and on the same beach profile.

Mays and Watson (2016) state that temporary removal of panels will quickly eliminate scour holes. They also state that periodic placement of beach compatible sand on the landward side of the WDS would provide a source of sand that could be placed in scoured areas, as necessary. If the WDS is actively managed as compared to a passive seawall or bulkhead, then the effects of scour could be minimized as compared to a passive seawall or bulkhead.

6. Has scouring occurred seaward of, landward of, or adjacent to the WDS?

Yes, limited scour along the toe of the horizontal panels was observed at all four sites, at some point in time during the monitoring study. The scour was typically a trench beneath the horizontal panels and generally affecting the beach both on the seaward and landward sides of the WDS.

7. To what extent has sand been able to move through the device?

When the beach is not scoured beneath the horizontal panels, the WDS allows some sand to move through the horizontal panels, the extent of which is dependent on the presence/absence of spacers between the horizontal members and the wave and water level conditions. During mild wave conditions when sand is naturally migrating onshore, the WDS allows a small amount of sand to move landward through the device. This sand was observed to typically deposit within about 10 feet of the structure.

Observed buildup of sand (typically less than 1 foot) on the seaward side of the WDS in some areas during these conditions indicates that WDS can obstruct the natural landward transport to some degree at times. During these conditions, active management of the WDS (i.e., adding spacers between horizontal members or temporary removal of the horizontal panels) was used to allow more landward transport of sand behind the WDS.

During the typical storm wave conditions that occurred during this monitoring study, the WDS allowed erosion of sand from the landward side of the WDS. In areas where the WDS was at relatively high elevations on the beach, scour holes did not develop that extended below the horizontal members. In these scenarios, transport of sand seaward through the WDS was minor.

Areas with the greatest amount of erosion during storm events occurred in areas where the scour passed beneath the WDS, or the entire beach profile was lowered beneath the WDS, which allowed sand to be transported seaward. When this occurs, large volumes of sand were transported seaward underneath the WDS horizontal panels. During the subsequent natural beach recovery, large volumes were also observed to move landward underneath the WDS horizontal panels.

8. Has the scarp landward of the WDS continued to erode?

During the monitoring period, March through July, the scarp was stable in areas where the WDS was used in combination with sandbags (except where small sandbags or fill material were stacked at an excessively steep angle). In some areas fronted only by the WDS, scarp erosion was observed following the storm wave action that occurred between the March and April surveys. The survey data collected by

The Citadel researchers shows large amounts of scarp erosion at the Beachwood East and Ocean Club/Seascape Villas site following the initial installation of the WDSs.

9. Throughout the study duration, was there a difference in elevation between the sand on the seaward side of any WDS wall and on the landward side of any WDS wall?

Yes, small differences in elevation were observed that were typically 0.5 feet or less. In a few instances, differences in elevation were slightly larger, up to about 1 foot.

10. Does the WDS increase erosion rates on adjacent properties that are not protected?

The WDS may cause minimal or insignificant erosion on adjacent properties. In theory, there is a potential for limited increases in erosion on adjacent properties. If a coastal structure traps incoming sand, or if it retains sand by preventing upland areas on the landward side of the structure from eroding, then it prevents that sand from reaching downdrift shorelines, such as those on adjacent properties. The degree to which this causes any potential erosion depends on the amount of sand trapped or retained, as well as site specific conditions. If the amount of sand trapped or retained is a very small fraction of the total sediment transport along the shoreline, then the erosion may be so small as to be undetectable apart from the background erosion/accretion patterns along the shoreline.

The active beach profile where sediment transport occurs extends from the dune to beyond the surf zone, and most of this transport occurs in the surf zone. The WDS is typically landward of the MHW line, and therefore it affects only a small fraction of the active beach profile where sediment transport occurs. As a result, the potential impacts of the WDS should be much smaller than other structures that affect a greater portion of the active beach profile, such as a groin.

For the four WDS installations monitored in this study, the amount of erosion caused by the WDS along adjacent properties is uncertain. The observed erosion pattern at Harbor Island suggests that the WDS may contribute to scarp erosion within a short distance (i.e., mostly within 100 feet) of the northwest end of the WDS, although the fraction of this erosion attributable to the WDS cannot be quantified apart from the natural background erosion, and most of the scarp erosion may be the result of natural background erosion. At Beachwood East, a small amount of erosion of the upper beach occurred within a short distance just east of the WDS. The fraction of the erosion in this area caused by the WDS, if any, cannot be separated from the natural background erosion/accretion pattern associated with the shoal attachment processes. At Ocean Club/Seascape Villas, any downdrift erosion effect near the end of the WDS was not large enough to be distinguished apart from the larger erosion/accretion trends along the shoreline. Altogether the impacts of the WDS on adjacent properties appear to be minor, and they are small enough that they are difficult to distinguish apart from the background erosion rates.

11. Does the WDS prevent down-coast erosion?

No, the WDS does not prevent “down-coast” erosion. Natural background erosion will continue along shorelines downdrift from the WDS. In addition, if the WDS is effective at retaining or trapping sand, then may be some downdrift erosion caused by the WDS, although these effects may be minor and small enough that they are difficult to distinguish apart from the background erosion rates.

12. Does the WDS protect the property behind the system?

Yes, it does to some extent. The ability of the WDS to protect property on the landward side of the system is dependent on site-specific conditions, the design of the WDS, and the active management of the WDS after it is installed. No shoreline management approach is best for all locations, and no shore protection measure will work equally well in all situations. At some locations and for some conditions, the WDS can provide short-term reduction in erosion, and thus some increased level of protection, of the upland property.

For the sites monitored for this study, the WDS reduced the amount of wave energy transmitted landward of the system during typical wave activity. This increased the stability of sand bags on the landward side of the WDS which can increase the short-term stability of the scarp line and the associated structure(s) on the landward side of the WDS during typical conditions. Erosion of unprotected scarps on the landward side of the WDS was observed. However, the reduction in wave energy caused by the WDS supports the conclusion that scarp erosion likely would have been greater in the absence of the WDS.

The WDS designs observed during this study will not provide long-term protection for property subjected to long-term beach erosion. The overall stability of the beach is dictated by sand transport that occurs over the entire active beach profile, extending from the dune to beyond the seaward side of the surf zone. The WDS affects only the upper-most part of the beach profile and does not reduce erosion along the majority of the profile. Long-term beach erosion results in a landward translation of the beach profile, which is seen as a lowering of the beach seaward of the WDS. Over the long-term, this would require continual lowering of the WDS, eventual elimination of dry beach seaward of the WDS, and eventual erosion of the property on the landward side of the WDS, regardless of its presence.

13. How does the WDS impact any of the following:

- **a. Public safety and welfare**
- **b. Lateral beach access at any tide stage**
- **c. The health of the beach dune system**

There are many public safety hazards at the ocean beach, and the WDS does not appear to be more of a safety hazard to the beach-going public than other coastal structures, such as rock groins or pile supported piers. The power of breaking waves has caused many injuries to swimmers, including spinal cord injuries. Spinal cord injuries most often occur when diving headfirst into the water or being tumbled in the waves by the force of the waves (NOAA 2016). It is conceivable that a breaking wave could push a swimmer into the WDS. Signs were placed at the Beachwood East and Ocean Club/Seascape Villas sites warning beachgoers of potential injuries from the WDS.

Some coastal structures have exposed bolts or other metal that cause lacerations to swimmers. The metal nuts and bolts securing the WDS are recessed into the housing which reduces this safety hazard.

Pipes that comprise the horizontal panels may be dislodged from the structure during storm wave conditions. The dislodged pipes are negatively buoyant (sink) and are unlikely to be a significant hazard to swimmers during non-storm conditions.

During high tide conditions, the WDS may obstruct emergency vehicles traveling along the beach. This does not adversely affect public safety as long as either the WDS does not project out onto the beach far enough to obstruct emergency vehicles, or emergency access points are available on the adjacent shorelines on either side of the WDS.

The WDS may obstruct beach walkers during high tide conditions. The degree to which the WDS is an obstruction depends on the location of the WDS on the beach and the lowest elevation of the beach at the WDS relative to the tidal conditions at each site.

At Harbor Island, beach walkers cannot pass the WDS on dry beach more than 35 percent of the time. However, wave heights are typically small at this location, and beach walkers can walk through shallow water seaward of the WDS much of the time that there is no dry beach. Given that the WDS is in close proximity to the houses and sandbags on the landward side of the WDS (at the narrowest part of the Harbor Island beach the WDS is within 5 feet of sandbags placed at lot 52 and within 13 feet of sandbags at lot 49), the WDS is only a minor obstruction to beach walkers as compared to the beach that would exist without the WDS.

Beach walkers at Beachwood East may not be able to pass seaward of the WDS more than 50 percent of the time. However, they can walk along the beach on the landward side of the WDS nearly all of the time. As a result, the Beachwood East WDS causes minimal restrictions to beach walkers.

In April, beach walkers at Seascape Villas may not be have been able to pass seaward of the WDS more than 34 percent of the time, although this decreased to one percent by July due to accretion. Beach walkers can walk on the landward side of the WDS at Seascape Villas, and therefore, the WDS causes minimal restrictions to beach walkers at Seascape Villas.

At Ocean Club, beach walkers at may not be able to pass seaward of the WDS more than 58 percent of the time. Furthermore, there is no alternative route on the landward side of the WDS to allow access to the beach on the opposite side of the structure. Therefore, the WDS at Ocean Club obstructs beach walkers and public access along the beach a majority of the time unless the property owners provide an alternate upland route.

The “health of the beach dune system” was not defined in the RFP. We interpret this to mean the ability of the beach dune system to provide the desired level of ecological habitat, storm protection to structures, and public recreational opportunities.

From storm damage protection perspective, a sufficiently wide berm and a dune to avoid erosion-related damage to upland structures during an extreme storm event are considered part of a healthy beach in South Carolina. The WDS does not adversely affect the beach berm width or dune, with the exception of possible minor erosion of the upper beach that may take place on adjacent shorelines. If this adverse effect occurs, it could be offset by placement of compatible beach sand in these areas.

From an ecological habitat perspective, the WDS was not observed to have a significant adverse effect on any fauna at the monitored sites. The primary concerns related to impacts to fauna are the potential effects of the WDS on nesting sea turtles and hatchlings, which is addressed in detail below.

14. Can the horizontal panels be deployed within 120 hours or less and removed within 120 hours or less?

Generally speaking, yes. GEL did not directly observe horizontal panels deployed or removed, although GEL did observe trenching in preparation for panel installation. During the monitoring period, segments of the WDS at Ocean Club and the WDS at Beachwood East were lowered 2 feet in response to decreasing beach elevations. This involved removal of the horizontal panels, lowering the piles, trenching the beach and reinstalling the horizontal panels. This process required about one work week (about 5 days) to lower the landward tier of the Ocean Club installation. Given that horizontal panel removal, vertical pile lowering, trenching and horizontal panel redeployment of 13 horizontal panel segments required about one week of on-site work, then certainly some horizontal panels can be deployed or removed within 120 hours or less, assuming a contractor can be mobilized to the site within this time frame and assuming the vertical piles are already in place. The exact number of horizontal panels that can be installed in this time frame is unknown. The time required to deploy or remove horizontal panels for an entire WDS is dependent on the total length of the system.

15. Can the WDS be adjusted after initial deployment in response to fluctuations in beach elevations?

Yes. As mentioned above, the WDS was adjusted during the monitoring period in response to fluctuations in beach elevations. Segments of the WDS at Ocean Club and the WDS at Beachwood East were lowered 2 feet in response to decreasing beach elevations. This involved removal of the horizontal panels, lowering the piles, trenching the beach and reinstalling the horizontal panels.

16. If any major storms occurred during the study period, does the WDS remain intact?

Major storms did not occur during the study period. However, prior to this monitoring program, Hurricane Joaquin dislodged pipes from at least 11 horizontal panels. Also, a few pipes were observed beneath the WDS at Ocean Club in April 2016 and are assumed to have been from storm wave action in the March to April 2016 time period. Given these observations, it is likely that at least some portions of WDS systems would be dislodged during moderate to large storm events. The first version of the WDS installed at SV was damaged by a Nor'Easter on March 1, 2014, and removed from the beach. However, it is noted that this was an initial design that was different from that monitored for this study.

17. Does the WDS negatively impact or inhibit sea turtle nesting or other fauna?

The WDS does not appear to significantly affect sea turtle nesting or other fauna. The condition of the shoreline in the absence of the WDS must be considered when evaluating potential impacts to nesting habitat. Most of the shorelines evaluated in this study were poor habitat for nesting (i.e., either armored with sandbags, obstructed by debris, or having little to no dry beach), although the WDS did preclude nesting in some small areas with suitable habitat. No nesting was observed along the shorelines protected by the WDS for at least one nesting season prior to the installation of the WDS, indicating that

these areas are likely less attractive to nesting turtles than other areas along the islands. Overall, the WDS installations caused very small reductions of access (if any) to suitable nesting habitat, as compared to the available habitat on the islands.

It is conceivable that a nesting adult or a hatchling could become trapped on the landward side of the WDS if there is no lateral wing wall above the existing grade or sand bags that tie back to the dune or scarp line. All four WDS installations include some type of tie back to the dune or scarp. Mays and Watson (2016) state that the WDS at Beachwood East was modified to extend the wing wall on the north end due to concerns that a sea turtle might otherwise get trapped on the landward side of the system. The maintenance of lateral wing walls above the existing grade should be effective at preventing nesting adults from crawling behind the WDS at the ends of the structures, and similarly, wing walls should also be effective at blocking hatchlings from these areas. There is no evidence to-date that the WDS is a significant risk of adult turtle or hatchling mortality due to entrapment.

Some emergences from the sea by adult females do not result in nesting. These non-nesting emergences are commonly referred to as false crawls. In South Carolina, about 48% of emergences were false crawls in 2016. Reasons for false crawls likely have to do with some sort of distasteful characteristic being found on the potential nesting site by the turtle, such as light, debris, compacted sand, signs of predators, presence of human observers, or other factors related to nest site selection listed above.

There have been false crawls caused by sea turtles encountering the WDS. Evaluation of false crawl data along Harbor Island and IOP indicates that there was a higher rate of false crawls along the segments of shoreline with the WDS than the remainder of the island. However, given the conditions of the shoreline on the landward side of the WDSs, there is no evidence that the WDSs caused a significant increase in the incidence of false crawls as compared to what may have occurred in the absence of the WDSs.

The adverse effect on turtles associated with a false crawl at a WDS is uncertain. After returning to the water from an aborted attempt, the turtle typically returns to the same beach or area where they first emerged on the same or the following night (Miller 1997). Therefore, if a sea turtle makes a non-nesting emergence at a WDS location, it will most likely nest nearby on the same or following night. We found no evidence that the false crawls at the WDS locations result in a decrease in the total number of nests on Harbor Island or IOP.

The WDS was not observed to adversely interact with other fauna.

18. Does the WDS meet the regulatory definition of a seawall, found in the SC Code of Regulations, R.30-1(D)(22)(a)?

No. A seawall is a traditional coastal armoring structure that is typically a massive, concrete structure with its weight providing stability. The primary purpose of a seawall is to prevent inland flooding from major storm events with large waves, and the seawall crest elevation is typically designed to minimize overtopping from storm surge and wave runup (USACE 2002). The South Carolina Code of Regulations [R. 30-1(D)(22)(a)] defines a seawall as a special type of retaining wall that is specifically designed to withstand wave forces. The WDS does not meet the South Carolina Code of Regulations definition of a

seawall because it is not a retaining wall. A retaining wall has an increase in ground elevation from the front side to the back side of the structure, and it is designed to resist the lateral pressure from the backfilled soils.

1 Introduction

This report provides the results of a third party study conducted to monitor and evaluate the performance of four Wave Dissipation System (WDS) installations (three on Isle of Palms and one on Harbor Island). GEL Engineering, LLC (GEL) was retained by the South Carolina Department of Health and Environmental Control, Office of Ocean and Coastal Resource Management (SCDHEC-OCRM or Department) to evaluate the WDS installations, including: 1) independent field data collection, 2) review of reports from the academic sponsor of these experimental installations, and 3) an objective review of the design and functionality of the WDS structures.

The WDS is an experimental device intended to reduce wave energy and its erosive effects on the beach while also protecting landward elements. The WDS structures were tested at four locations along the South Carolina coast through a pilot study sponsored by The Citadel. This pilot study was conducted pursuant to the South Carolina Legislature Budget Proviso 34.51 of the 2014-2015 General Appropriations Act. That Proviso defined a "qualified wave dissipation device" as a device that:

1) is placed mostly parallel to the shoreline;
2) is designed to dissipate wave energy;
3) is designed to minimize scouring seaward of and adjacent to the device by permitting sand to move landward and seaward through the device;
4) can be deployed within seventy-two hours or less and can be removed within seventy-two hours or less;
5) does not negatively impact or inhibit sea turtle nesting or other fauna;
6) can be adjusted after initial deployment in response to fluctuations in beach elevations; and
7) otherwise prevents down-coast erosion, protects property, and limits negative impacts to public safety and welfare, beach access, and the health of the beach dune system.

The South Carolina Legislature ratified the 2015-2016 General Appropriations Act on June 23, 2015. Budget Proviso 34.48 of that Act altered qualification number 4 above to now read: "the horizontal panels designed to dissipate wave energy can be deployed within one-hundred twenty hours or less and can be removed within one-hundred twenty hours or less." This change is significant because the initial proviso contemplated an entire structure that could be deployed or removed in seventy-two hours or less, whereas the new proviso only specified deployment or removal timeframes for the horizontal panel components.

1.1 Wave Dissipation System Description

The WDS consists of several elements, including: Fiber-Reinforced Plastic (FRP) piles installed vertically into the beach, High Density Polyethylene (HDPE) housing units mounted around the exposed piles, and 4-inch diameter Polyvinyl Chloride (PVC) horizontal panels extending laterally between the housing units (Figure 1-1). The vertical piles are installed using a water jet and vibratory driver. The vibratory driver is mounted to an excavator, as shown in Figure 1-2. The vibratory driver may also be used for maintenance

to lower the WDS elevation or adjust for uneven settling of the individual piles. An excavator may also be used during installation and maintenance of the WDS (Figure 1-3).

Figure 1-1. Photograph of WDS installation with annotation indicating WDS elements

Figure 1-2. Compact excavator with vibratory driver attachment used for WDS installation

Figure 1-3. Compact excavator used for WDS installation

1.2 Project Purpose

In its Scope of Work for review of the WDS structures, the Department asked GEL to answer the following specific questions:

1. Do the quarterly and final reports from the academic sponsor contain sufficient data to: 1.) conclude whether the WDS qualifies under Proviso 34.51; and 2.) conclude whether the WDS meets the purpose of the academic pilot project?
2. What type of metrics or criteria should be developed to judge success for future experimental shoreline management proposals?
3. Is the WDS placed mostly parallel to the shoreline? What percentage is parallel?
4. Is the WDS designed to dissipate wave energy? If yes, does it actually dissipate wave energy in the field?
5. Is the WDS designed to minimize scouring seaward of and adjacent to the device by permitting sand to move landward and seaward through the device?
6. Has scouring occurred seaward of, landward of, or adjacent to the WDS?
7. To what extent has sand been able to move through the device?
8. Has the scarp landward of the WDS continued to erode?

9. Throughout the study duration, was there a difference in elevation between the sand on the seaward side of any WDS wall and on the landward side of any WDS wall?
10. Does the WDS increase erosion rates on adjacent properties that are not protected?
11. Does the WDS prevent down-coast erosion?
12. Does the WDS protect the property behind the system?
13. How does the WDS impact any of the following:
    d. Public safety and welfare
    e. Lateral beach access at any tide stage
    f. The health of the beach dune system
14. Can the horizontal panels be deployed within 120 hours or less and removed within 120 hours or less?
15. Can the WDS be adjusted after initial deployment in response to fluctuations in beach elevations?
16. If any major storms occurred during the study period, does the WDS remain intact?
17. Does the WDS negatively impact or inhibit sea turtle nesting or other fauna?
18. Does the WDS meet the regulatory definition of a seawall, found in the SC Code of Regulations, R.30-1(D)(22)(a)?

The purpose of this project is to review the academic study, conduct the field monitoring program prescribed by the Department, and analyze the available data to respond to the above questions to the extent possible. GEL was not asked to determine whether the WDS is "qualified" for use in future emergency situations, per Budget Proviso 34.48 of the 2015-2016 General Appropriations Act.

1.3 Report Outline

This report documents the monitoring and analysis in the following sections:

- Section 2 - Background - describes the general shoreline environment at the project locations, and provides a description of recent erosion countermeasures employed at each location prior to the start of this study.
- Section 3 - Study Methodology - describes the methodology for field monitoring and data analysis.
- Section 4 - Results - describes analysis results, particularly related to: scarp and shoreline response; sand volume response; scour; wave attenuation; public safety; impacts to fauna; public access; and project performance.
- Section 5 - Conclusions - provides a summary of the overall conclusions of the study.

2 Background

2.1 Project Locations

The four WDS structures evaluated include one at Harbor Island and three at Isle of Palms. This subsection describes the general characteristics of the shoreline environment at these project locations, including the tides, waves, and long-term erosion patterns. Also included is a description of recent erosion countermeasures employed at each location prior to and after the start of this monitoring study, which began in March 2016.

2.1.1 Harbor Island

Harbor Island is a sea island just north of Hunting Island, both of which are located on the south side of St. Helena Sound (Figure 2-1). The island is bounded by Harbor River to the west and Johnson Creek to the south. The island is a private residential and resort community with no public beach access.

The mean tide range is 6.0 feet. The tidal datums relative to the North American Vertical Datum of 1988 (NAVD88) are listed in Table 2-1 below. These datums were calculated using the National Oceanic and Atmospheric Administration's (NOAA) vertical datum transformation software VDATUM.

Table 2-1. Tidal datums at Harbor Island

Datum	Elevation (ft NAVD88)	Description
MHHW	2.96	Mean Higher-High Water
MHW	2.57	Mean High Water
MTL	-0.40	Mean Tide Level
MSL	-0.28	Mean Sea Level
MLW	-3.38	Mean Low Water
MLLW	-3.58	Mean Lower-Low Water
NAVD88	0	North American Vertical Datum of 1988

The US Army Corps of Engineers (USACE) Engineering Research and Development Center (ERDC) provides high-quality coastal wave hindcast model estimates through the Wave Information Studies (WIS) program. WIS long-term wave statistics were obtained from the USACE for the WIS station closest to the project site (Station 63357), located approximately 16 miles east-southeast of Harbor Island. Based on this data, the offshore wave climate is typically relatively mild, with mean significant wave height of 3.3 ft and a mean peak wave period of 8.7 seconds (ERDC 2016).

The dominant wave directions are shown by the wave rose for WIS Station 63357 in Figure 2-2. The wave rose shows the frequency of occurrence of wave heights from each direction over the period from 1980 through 2012. As shown in this figure, the waves predominantly approach from the southeast

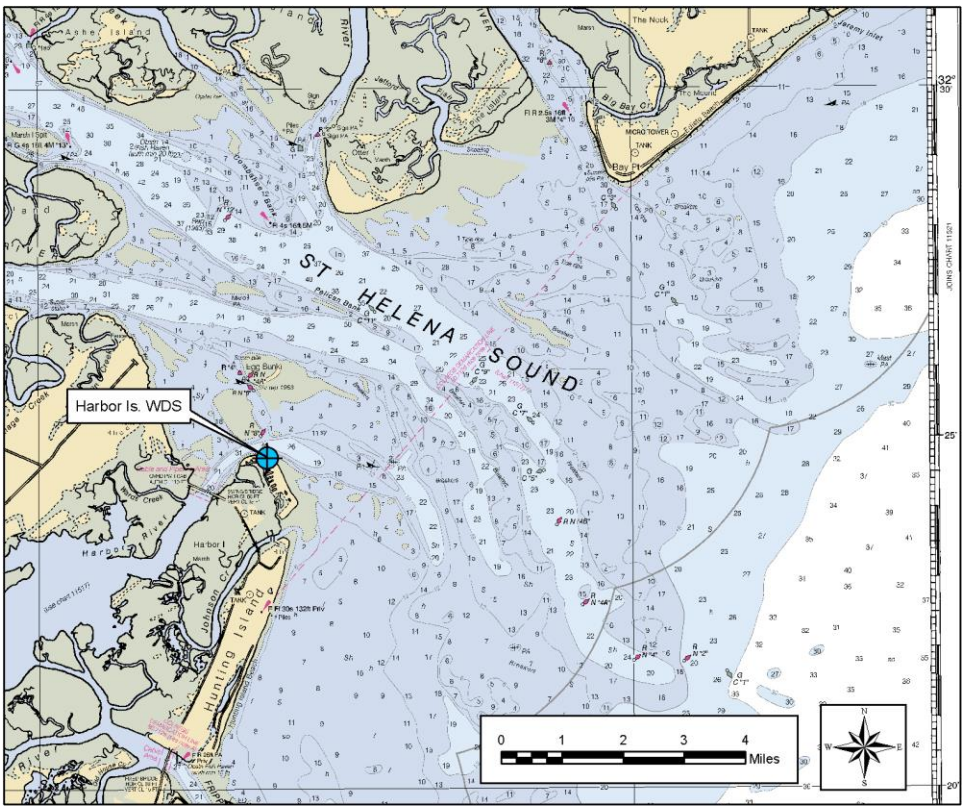

Figure 2-1. Harbor Island WDS location

through east directions. The waves are milder in the summer (with the exception of extreme tropical storm events) and larger in the winter. Also, although the southeast direction is still the dominant direction in the winter, there is an increased frequency of waves approaching from the east and northeast during the winter months.

The waves reaching Harbor Island are typically much smaller than those offshore because of the sheltering effect of the St. Helena Sound and Johnson Creek Inlet ebb shoal complexes. In particular, shoals to the southeast shelter Harbor Island from the most predominant wave directions. The most energetic ocean waves reaching the project site occur from waves approaching from the east and east-northeast directions. The site is also subjected to wind waves from the local fetch within the sound: the fetches from the north-northwest through the northeast directions range from 4 to 7 miles in length and can generate wave heights on the order of 2 to 3 feet during sustained 30 mph wind speed conditions.

Harbor Island has over 2 miles of beach. The existing beach is composed of sands derived from the former north end of Hunting Island. Johnson Creek breached the north end of Hunting Island in the early 20th century (Kana et al. 2013) and the separated spit migrated westward onto Harbor Island. Today, the net sand transport along the northern two-thirds of Hunting Island is toward the northeast. This sand is transported to the northeast into Johnson Creek and St. Helena Sound at a rate of 100,000 to 160,000 cy/yr (Traynum et al. 2010), and some of the sand from Hunting Island ultimately reaches Harbor Island.

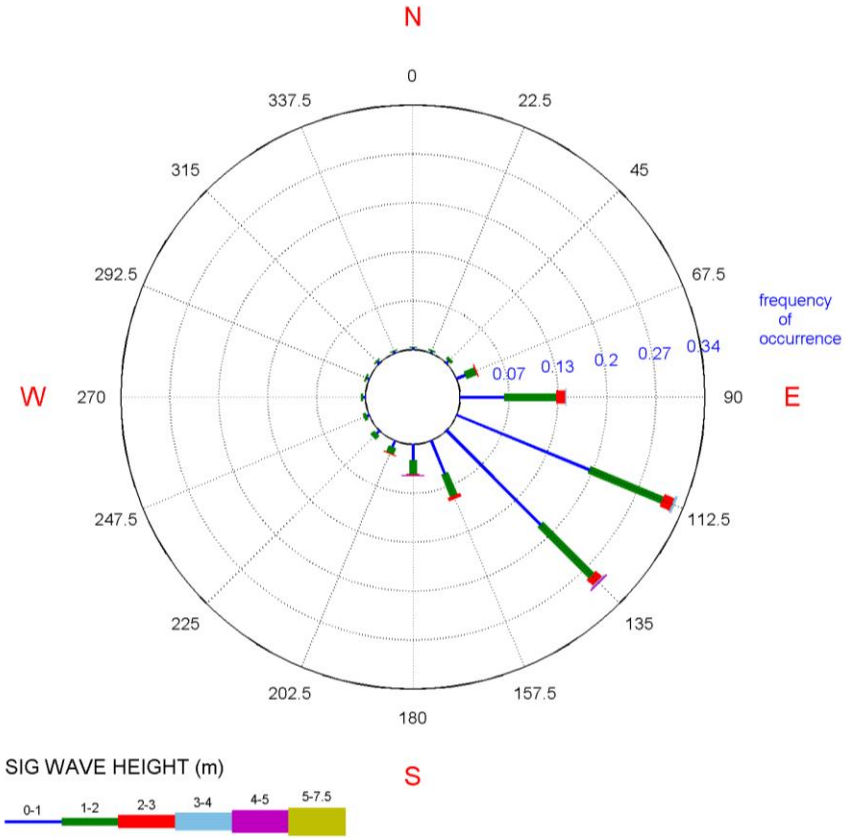

Figure 2-2. Wave rose for all months, years 1980 - 2012, at WIS Station 63357 (source: ERDC 2016)

According to SCDHEC-OCRM (2009), all of Harbor Island's beaches are "*classified as an unstabilized inlet zone, and while the shoreline is very dynamic it can be generally accretional in the long term.*" However, while there have been high rates of accretion along the southern half of the island, the north-central part of the island (in the vicinity of the WDS) has a long-term erosion rate of about 2 feet per year. SCDHEC-OCRM (2009) explains that this section of the beach "*goes through cycles of erosion and accretion that typically last for a few years. It was erosional during the late 1990's, stabilized in 2001, accreted some during 2002, and now appears to be somewhat erosional again*." Inspection of aerial photographs dating back to 2005 indicates that erosion has generally persisted at the project site over the past 11 years. Long-term shoreline change rates adopted by SCDHEC-OCRM are shown in Figure 2-3 (negative values indicate erosion).

The net longshore sand transport near the WDS site is directed toward the northwest. This is predominantly caused by waves approaching from the Atlantic Ocean to the east. These waves break obliquely to the shoreline, and the wave action and longshore current they generate results in net transport of sand along the shoreline toward the northwest. At the same time, the tidal current velocities near the shoreline are flood dominant (i.e., toward the northwest), which also contributes to the net transport of sand toward the northwest. The erosion in the vicinity of the WDS site is not likely caused by a deficit of sand reaching the island, given the stability or long-term accretion rates along the southeastern portion of the island. The erosion along the shorelines near the WDS site is likely caused by

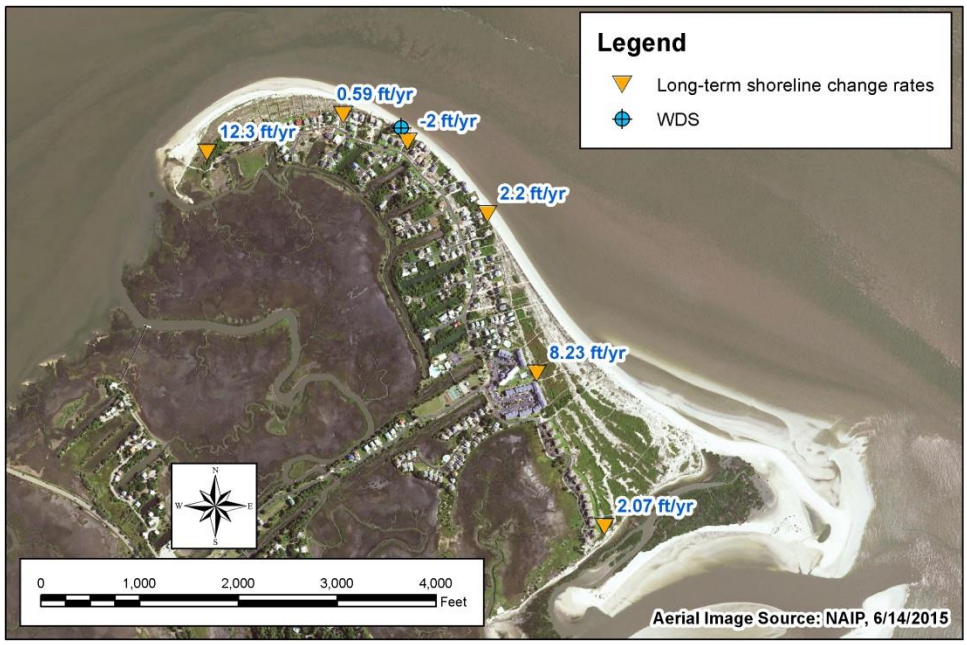

Figure 2-3. Long-term shoreline change rates at Harbor Island

a gradient in the longshore sediment transport rate. The current and wave induced sediment transport rate increases along the shoreline from southeast to northwest, and as a result sand is eroded from the beach (in general, given a sufficient supply of sand, a decrease in the longshore sediment transport rate along a beach segment causes shoreline accretion, and an increase in the sediment transport rate along a beach segment causes erosion). Without more detailed wave analysis studies, the pattern of wave height and direction changes along the shoreline cannot be characterized in detail; however, in general, the gradient in the longshore sediment transport rate in this area is likely caused by changes along the shoreline in the incident wave height and breaking wave angle relative to the shoreline. The breaking wave angle relative to the shoreline increases along the shoreline from southeast to the northwest, which causes an increase in the longshore sediment transport rate. This pattern can evolve over time because the incoming waves refract (i.e., bend) around and break on the shoals in the entrance to St Helena Sound, which shift over time. Northwest of the WDS site, wave heights diminish as they wrap around the north end of Harbor Island, which results in shoreline accretion at the north end.

As a result of chronic erosion, there are multiple structures on the beach exposed to the tides and wave action. Figure 2-4 shows an aerial view from June 2015 of the shoreline segment with homes threatened by erosion. One residence has a bulkhead that is now in the surf zone at high tide (Figure 2-5). Two other residences have erosion extending completely underneath the pile supported structures (Figure 2-6). Other residential structures have employed emergency countermeasures to protect their property, including: minor beach renourishment with truck hauled sand; scraping of sand from the lower beach and placement in a dune at the scarp line (Figure 2-7); and placement of sand bags along the scarp line. In addition, some property owners are participating in the pilot study of the WDS.

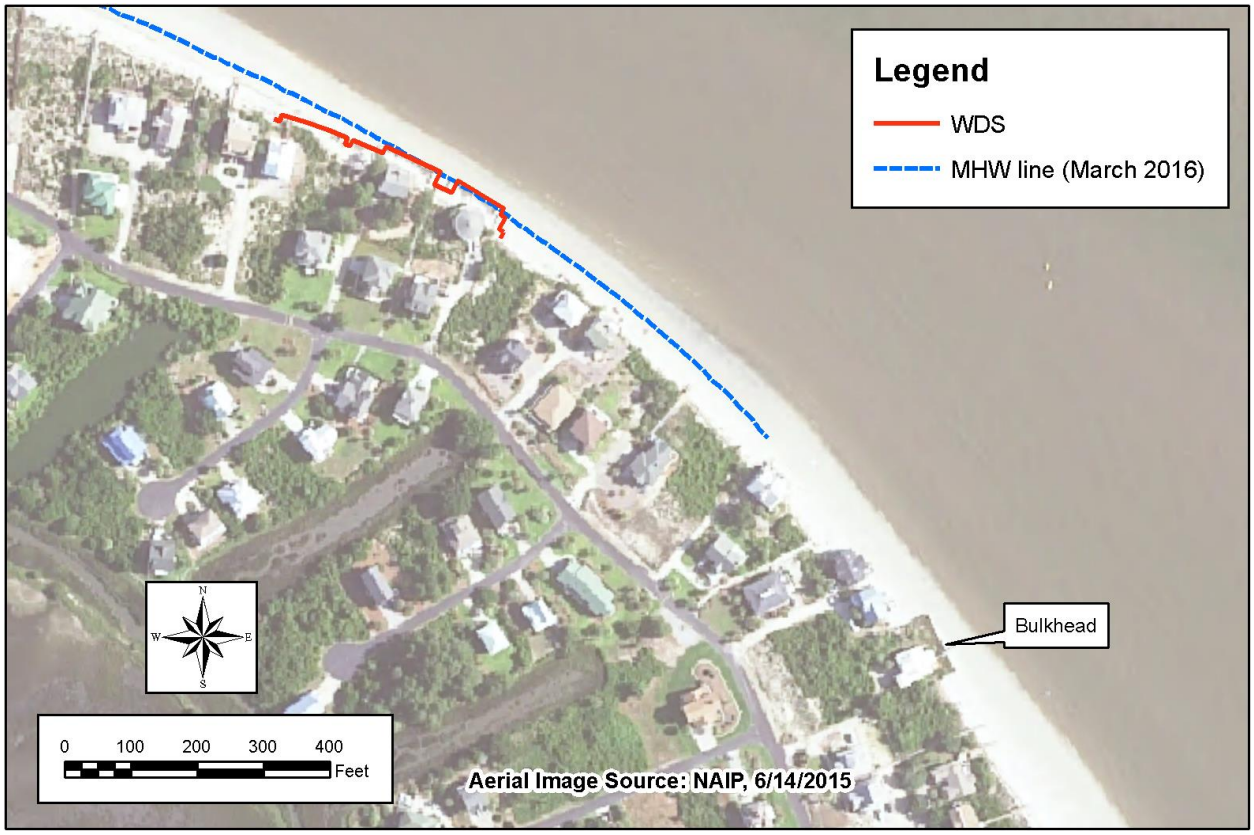

Figure 2-4. Aerial view of eroding shoreline segment and WDS location at Harbor Island

Figure 2-5. Bulkhead on the beach below the high tide line (April 19, 2016)

Figure 2-6. Residences undermined by erosion (April 19, 2016)

Figure 2-7. Minor renourishment sand placed in dune north of WDS (March 24, 2016)

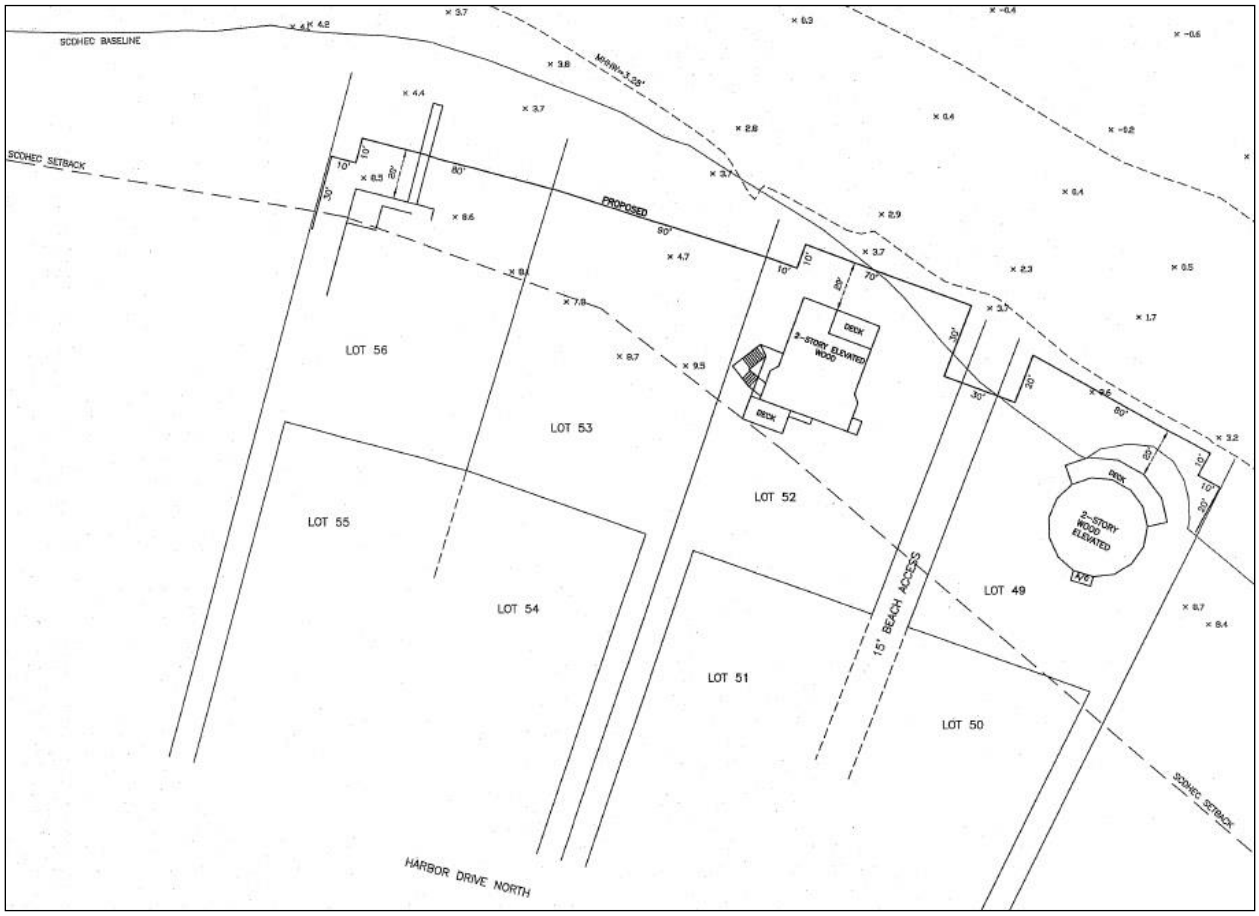

Figure 2-8. Plan view schematic of lots and WDS installation submitted with initial pilot study request

The Harbor Island WDS was installed in May 2015 along approximately 380 linear feet of shoreline to protect three houses on four residential lots (lots 49, 52, 53 [vacant], and 56) as part of a pilot study. The plan view schematic for the WDS installation is shown in Figure 2-8. The shoreline conditions at lots 49 and 52 prior to WDS installation are shown in Figures 2-9 and 2-10, respectively. The sandbags at these lots were allowed to remain on the landward side of the installed WDS to protect the shallow house foundations.

Following installation of the WDS, some additional erosion countermeasures were employed. A timeline based on information provided by SCDHEC-OCRM regarding WDS-related activities and other erosion countermeasure activities at Harbor Island is listed in Table 2-2.

Figure 2-9. Shoreline conditions at lot 49 prior to WDS installation

Figure 2-10. Shoreline conditions at lot 52 prior to WDS installation

Table 2-2. Harbor Island timeline

Date	Action
4/7/2015	DHEC-OCRM received request from The Citadel to install WDS in front of lots 49, 52, 53, and 56 on Harbor Island as part of pilot project/study. Sandbags allowed to remain at lots 49 and 52 behind WDS to protect shallow foundations.
5/4/2015	DHEC-OCRM acknowledged The Citadel's request to install WDS as part of pilot project/study.
5/11/2015	Installation of WDS began.
6/3/2015	Installation of WDS completed.
7/9/2015	Minor spacer changes between WDS horizontal panels.
8/25/2015	Minor spacer changes between WDS horizontal panels.
9/8/2015	Minor spacer changes between WDS horizontal panels.
9/30/2015	Emergency Order for sandbags behind the WDS issued by DHEC-OCRM after requests received from property owners at Lots 49 and 52.
10/5/2015	Sandbags used to extend the wing wall return on the eastern side of lot 49 after requested by Deron Nettles (inventor of the WDS).
10/7/2015	Emergency Order for sandbags amended to also include filter cloth and renourishment behind the WDS after requests received from property owners at lots 49 and 52. Minor spacer changes between horizontal panels.
12/4/2015	Additional sandbags added behind the WDS at Lot 49 bring the total number of sandbags from 1362 to 2000.
12/8/2015	SCDHEC letter indicating that further expansion of the WDS at Harbor Island will not be considered.
2/16/2016	Emergency order issued for minor renourishment and sandbags for lot 49.
2/17/2016	2-4 horizontal panels in front of Lots 53 and 56 will be removed in advance of the sand scraping.
2/17/2016	Sand scraping performed on Lots 53 and 56 behind the WDS.
2/19/2016	Emergency order issued for minor renourishment and sandbags at Lot 52.
2/25/2016	Sand scraping performed at Lot 52 behind the WDS.
5/23/2016	Wing wall at northwestern end of WDS extended back to scarp line using WDS materials.
6/10/2016	Emergency order for minor renourishment and sandbags at Lots 49 and 52 extended until June 30, 2016.
6/30/2016	Emergency order for minor renourishment and sandbags at Lots 49 and 52 extended until July 31, 2016.

2.1.2 Isle of Palms

Isle of Palms is a 7 mile long barrier island located southwest of Dewees Island and Dewees Inlet, and it is northeast of Sullivan's Island and Breach Inlet. The Atlantic Intracoastal Waterway, Hamlin Creek and an extensive intertidal marsh lie between Isle of Palms and Mount Pleasant to the northwest.

Isle of Palms is primarily developed with residential units. The eastern end of the island consists of the Wild Dunes private gated community, within which the three WDS sites are located (Figure 2-11). Note

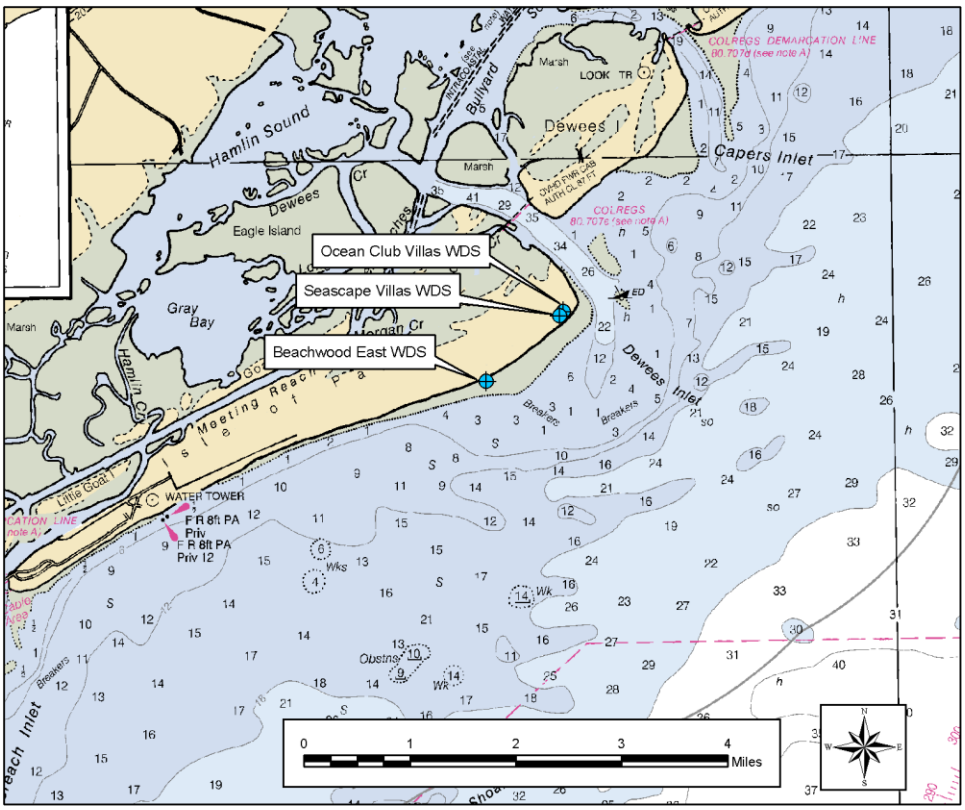

Figure 2-11. Isle of Palms WDS locations

that Seascape Villas and the Ocean Club are considered two separate WDS sites and have a varied history of erosion control measures despite being adjacent to one another. In the context of this evaluation, the two sites share a single continuous WDS structure, and the effects of the WDS are evaluated jointly at this site.

There are 56 public access points to the beach along the western 69 percent of the island, but no public access is provided within the Wild Dunes community along the east end of the island. The eastern-most public access point is about 0.4 miles southwest of the WDS installed at the Beachwood East (BE) site. This is within walking distance, and therefore, the public from outside of the Wild Dunes community may interact with the WDS at this site. The eastern-most public access point is about 1.4 miles southwest of the WDSs at the Seascape Villas (SV) and Ocean Club (OC) sites, which are also within walking distance of the public from outside of the Wild Dunes community. Thirteen community access points are provided within Wild Dunes (City of Isle of Palms 2008).

The mean tide range is 4.8 feet. The tidal datums relative to NAVD88 calculated using the VDATUM software are listed in Table 2-3 below.

Similar to Harbor Island, the offshore wave climate is typically relatively mild, with mean significant wave height of 3.6 ft and a mean peak wave period of 8.4 seconds. This is based on WIS Station 63346, located less than 13 miles southeast of Isle of Palms.

Table 2-3. Tidal datums at Isle of Palms

Datum	Elevation (ft NAVD88)	Description
MHHW	2.43	Mean Higher-High Water
MHW	2.05	Mean High Water
MTL	-0.35	Mean Tide Level
MSL	-0.3	Mean Sea Level
MLW	-2.75	Mean Low Water
MLLW	-2.92	Mean Lower-Low Water
NAVD88	0	North American Vertical Datum of 1988

The dominant wave directions are shown by the wave rose for WIS Station 63346 in Figure 2-12. The wave rose shows the frequency of occurrence of wave heights from each direction over the period from 1980 through 2012. Similar to Harbor Island, the offshore waves predominantly approach from the southeast through east directions. The waves are milder in the summer (with the exception of tropical storm events) and larger in the winter. Also, although the southeast direction is still the dominant direction in the winter, there is an increased frequency of waves approaching from the east and northeast during the winter months.

The island shorelines are generally accretional; however, the northeastern end of the island is classified by SCDHEC-OCRM as an unstabilized inlet zone. This end of the island is extremely dynamic and can experience hundreds of feet of shoreline erosion or accretion over a few years. As described in the Local Comprehensive Beach Management Plan (City of Isle of Palms 2008), "*The most significant local beach management issue facing Isle of Palms is the erosion threat to buildings and infrastructure, particularly along the eastern third of the island which is affected by Dewees Inlet shoal migration and attachment."* The recent erosion at the WDS project sites are related to this episodic erosion problem.

Kana and Williams (1985 *in* City of Isle of Palms 2008) developed a conceptual model for typical shoal attachment processes affecting the east end of Isle of Palms (Figure 2-13). Stage one begins when an ebb shoal bypassing Dewees Inlet approaches the Isle of Palms shoreline and causes refraction (bending) of breaking waves around the shoal. This wave pattern causes shoreline erosion on either side of the shoal and accretion behind the shoal. In stage 2 of the process, the shoal migrates onshore and begins attaching to the shoreline. This is typically the period when the greatest erosion occurs along the adjacent shorelines. With the presently ongoing erosion problem, the BE site is located within the erosion zone west of the shoal feature, and the OC and SV sites are located within the erosion zone east of the shoal. In stage 3, the sand from the shoal spreads laterally from the point of attachment and renourishes the adjacent eroded beaches.

This episodic shoal attachment process occurs at irregular intervals. Gaudiano and Kana (2001) found that shoal attachments over a period spanning more than 50 years occurred on average about every 6.6 years with a standard deviation of ±2.1 years. The volumes of the ebb shoals varied widely, with an average volume of ~412,000 cy and a standard deviation of about ±373,000 cy.

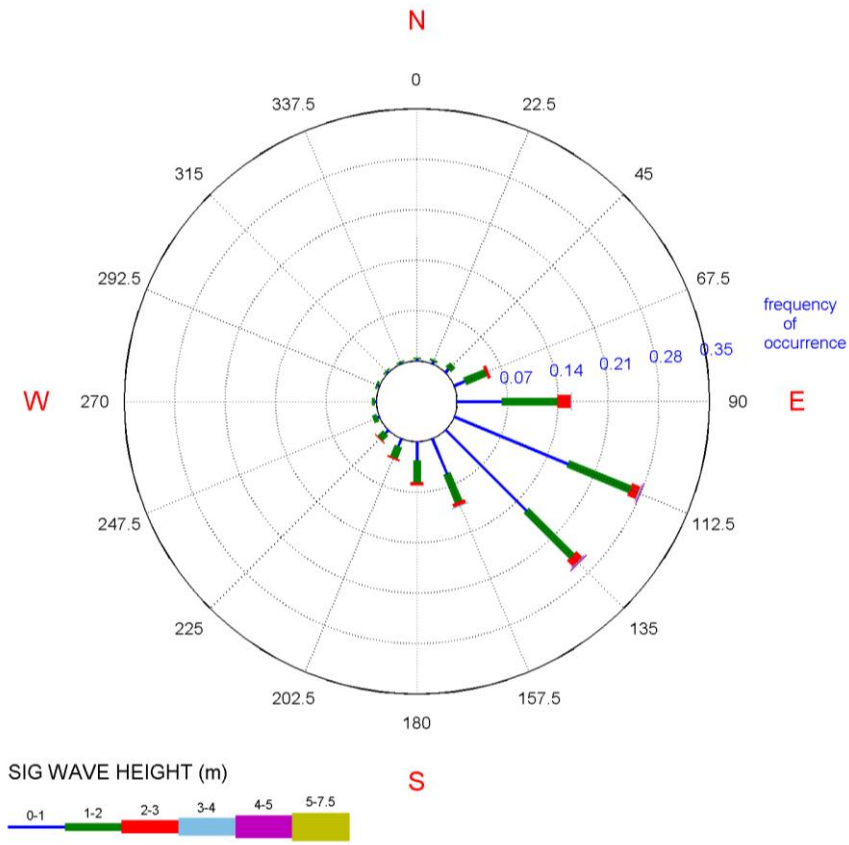

Figure 2-12. Wave rose for all months, years 1980 - 2012, at WIS Station 63346 (source: ERDC 2016)

Coastal Science and Engineering (CSE) summarized the findings of multiple studies of the Dewees Inlet bypassing processes (CSE 2012):

- *"The portion of a beach near an inlet is typically the most dynamic area of an island.*
- *Inlet shoals are periodically released from the ebb-tidal delta and merge with the beach.*
- *Shoals add sand to Isle of Palms and spread quickly to other areas, leaving a net sand deficit at the east end.*
- *Erosion and accretion associated with the bypassing shoals are highly localized and can move the shoreline hundreds of feet in any given year.*
- *Localized erosion has necessitated remedial action including constructing seawalls, sand scraping, and nourishment.*
- *Borrowing sand from accretional areas for restoration of the erosional areas is the most cost-effective and least environmentally impacting alternative."*

Over the years, many erosion countermeasure projects have been implemented in response to episodic erosion on the east end of the island. As catalogued by Applied Technology and Management (City of Isle of Palms 2008), there are 21 parcels protected by several rock revetments along the eastern third of

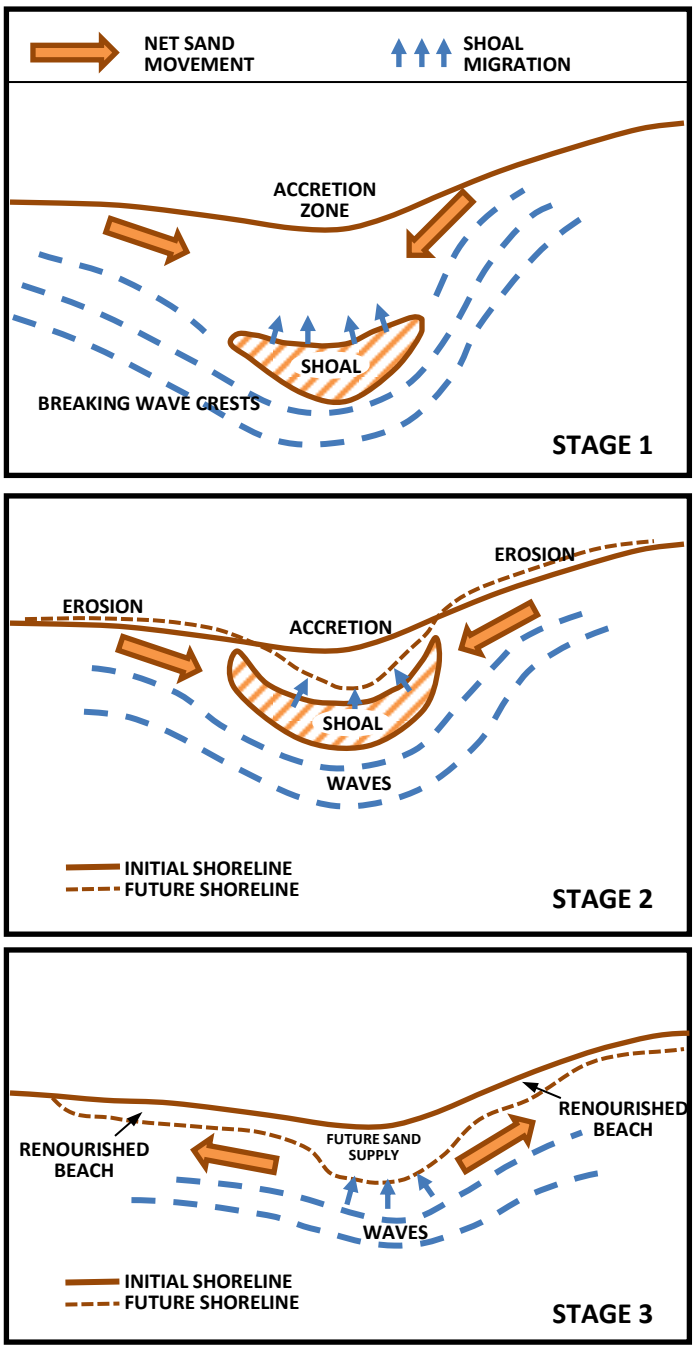

Figure 2-13. Typical shoal attachment process (after Kana and Williams 1985)

the island. These structures pre-date current beach management regulations and are grandfathered; new revetments or seawalls are not permitted by state law. Of particular relevance to the BE site, there is a rock revetment presently exposed along approximately 700 feet of shoreline immediately west of the WDS at this site.

These revetments are typically buried and become exposed during episodic erosion events. Since 1980, other erosion mitigation projects have included: construction of a terminal groin at the northeast end of the island in 1981; seawall construction and sand scraping in 1983; approximate 350,000 cubic yard beach nourishment in 1984; sand scraping in 1997; approximate 900,000 cubic yard beach nourishment in 2008; and shoal management projects in 2012 (~80,000 cubic yards) and 2014 (~240,000 cubic yards) that transferred sand from the shoal attachment area to adjacent eroded shoreline areas (CSE 2016).

The most recent shoal bypassing event has gone through stages 1 and 2 over the past 6 years and is approaching stage 3 as it merges with the shoreline. The shoal feature is expected to continue to cause erosion to the adjacent shorelines for an extended period of time, and therefore, the SCDHEC-OCRM permit for the shoal management projects was amended in April 2016 to increase the total allowable sand relocation up to 814,000 cubic yards during the life of the permit (SCDHEC-OCRM 2016). This amendment will allow for additional shoal management projects to address the present erosion problems caused by the on-going shoal attachment. The City is also pursuing a permit for a large-scale nourishment project.

2.1.2.1 Seascape Villas

The location of the existing WDS system at SV is shown in Figure 2-14. The SV and OC sites are located within an area that experiences episodic high rates of erosion associated with inlet shoal attachment, and they are in an erosional area northeast of the present shoal attachment location. Although the island experiences a net gain in sand volume from the inlet bypassing, the northeast end of the island is also estimated to have a long-term erosion rate resulting from a net deficit of sand on the order of 15,000 to 30,000 cy/yr (CSE 2007 *in* CSE 2015). As shown by Figure 2-14, the shoreline in this area, as represented by the MHW contour, is a concave arc that impinges on the WDS at OC.

The first version of the WDS was installed at SV on November 16, 2013. The original installation consisted of a 56-ft long shore-parallel structure with two 8-ft long shore-perpendicular wing walls. This system was damaged by a Nor'Easter on March 1, 2014, and removed from the beach. A new WDS was installed on May 15, 2014, that included several design changes: the vertical pilings were extended deeper (15 feet below grade); the horizontal members were embedded below grade to varying depths, and the system used longer wing walls at either end. The system was subsequently modified to include a 30-ft long secondary WDS segment landward of the primary segment. In November 2014 the WDS was completely removed in preparation for placement of sand during the 2014 shoal management project.

Figure 2-15 shows large sand bags in front of the eastern end of the SV building in September 2015. In early October 2015, the eye of Hurricane Joaquin passed approximately 275 nautical miles east of the South Carolina shoreline (the hurricane did not make landfall on the eastern seaboard). This storm produced large waves and tides more than 2 feet above predicted tides. During this storm, the area fronting Port O'Call, SV, OC, and the 18th hole lost up to 60 ft of dry sand or dunes, much of which was sand remaining from the shoal management project completed the previous winter (Traynum 2015).

Figure 2-14. Aerial view of eroding shoreline segment and WDS location at Ocean Club / Seascape Villas

Figure 2-15. Sand bags in front of Seascape Villas prior to 2015 WDS installation (source: SCDHEC-OCRM)

The existing WDS at Seascape Villas was installed between November 30, 2015, and February 3, 2016. The WDS was installed in two tiers: construction of the first tier began on November 30, 2015, and the second tier began on January 11, 2016. Figure 2-16 shows a plan view schematic of the WDS, and Figure 2-17 is a photograph taken two days after installation of the WDS. Note that the horizontal members are 4-inches in diameter. Based on this photograph, the tops of the WDS panels at SV are 1.5 to 2 ft above grade. Therefore, the horizontal panels were initially embedded up to approximately 2.5 ft for the 48-inch units and up to 4.5 ft for the 72-inch units. A timeline based on information provided by SCDHEC-OCRM regarding the most recent WDS-related activities and other erosion countermeasure activities is listed in Table 2-4.

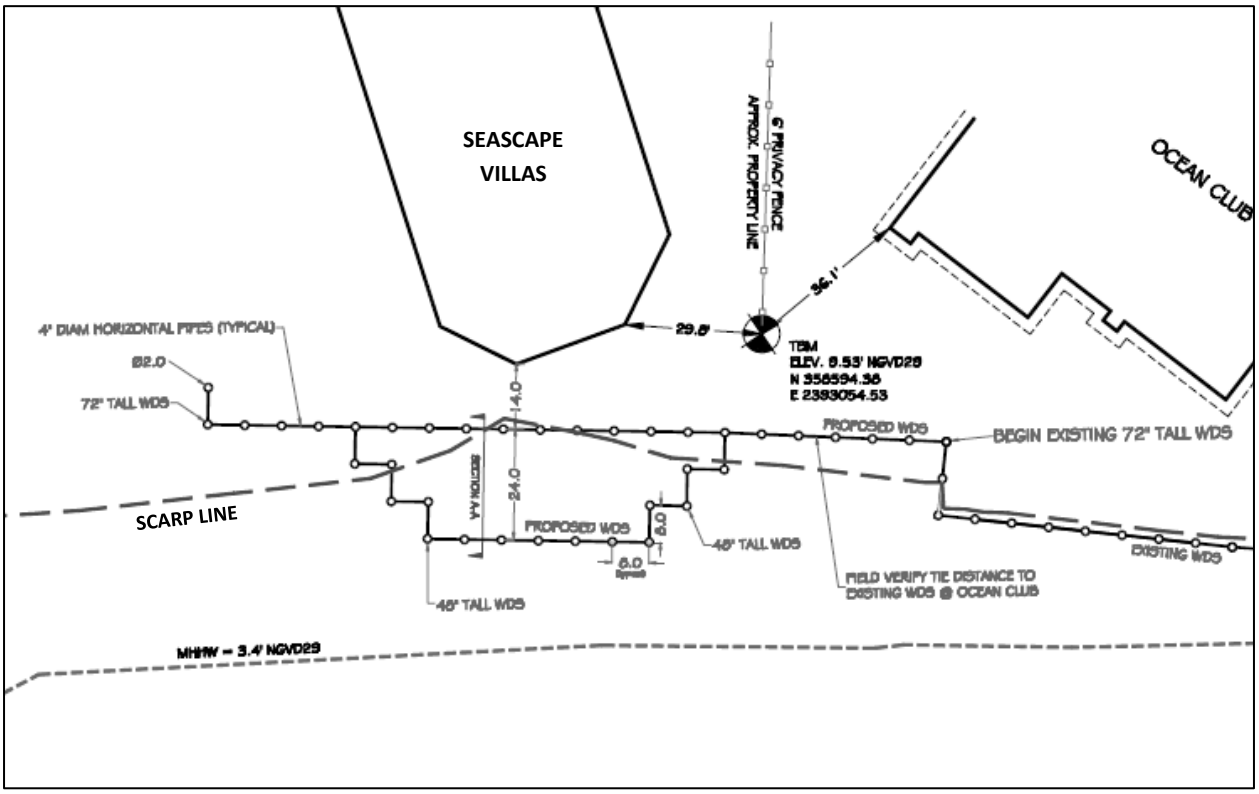

Figure 2-16. Plan view schematic of Seascape Villas WDS installation submitted with 2015 installation request

Figure 2-17. WDS at Seascape Villas following February 2016 installation; view toward northeast (source: SCDHEC-OCRM)

Table 2-4. Seascape Villas timeline

Date	Action
9/22/2015	Request received from The Citadel to begin study.
9/28/2015	Emergency Order for sandbags issued by DHEC-OCRM.
11/12/2015	DHEC-OCRM sends authorization letter to The Citadel to begin study at the Seascape Villas location. Study end date is specified as July 28, 2016.
11/30/2015	First tier of WDS begins to be installed.
12/8/2015	Letter from DHEC – OCRM indicating that further expansion of the WDS will not be considered.
12/22/2015	Emergency Order for sandbags issued by DHEC-OCRM.
1/11/2016	Second tier of WDS begins to be installed.
1/28/2016	Seascape Villas requested Emergency Order for minor renourishment behind the WDS, but minor renourishment never occurred.
2/3/2016	Installation of WDS completed.

2.1.2.2 Ocean Club

In response to the most recent erosion following the last shoal management project, sandbags were placed at Ocean Club on March 20, 2015, followed by installation of the WDS between April 27 and June 5, 2015. The initial WDS installation was a two-tiered system, as shown in Figures 2-18 and 2-19. The system was later expanded to include a third tier and expanded toward the southwest (September and November 2015) and the northeast (January 2016), as shown in Figure 2-20.

Figure 2-18. WDS at Ocean Club following June 2015 installation; view toward northeast (source: SCDHEC-OCRM)

Figure 2-19. WDS at Ocean Club following June 2015 installation; view toward west (source: SCDHEC-OCRM)

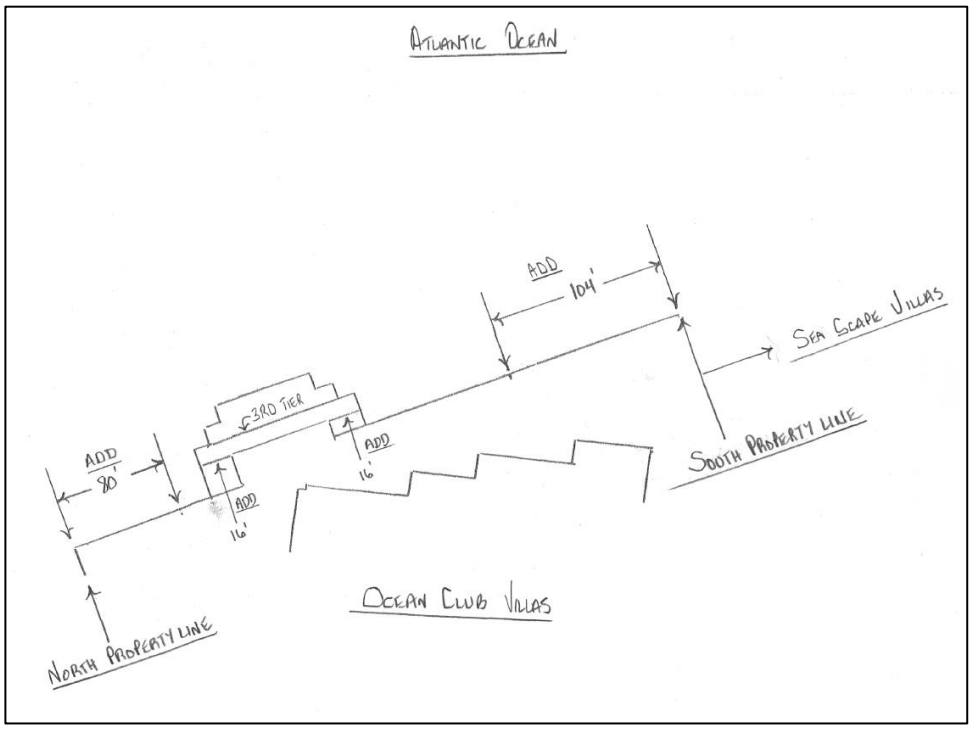

Figure 2-20. Plan view schematic of WDS installation submitted with initial Ocean Club WDS expansion request

During this period, the Ocean Club No. 1 Building was significantly undermined by erosion (Figure 2-21). By November 2015, continued erosion resulted in the collapse of the concrete slab for the parking garage under the building (Figure 2-22). Construction of a replacement parking garage floor was completed during March and April 2016.

In January 2016, the Ocean Club system was modified to include experimental vertical panels (referred to as “vertical porous panels” [VPPs]) installed beneath the horizontal members and extending below the existing grade (Figures 2-23 and Figure 2-24). One section of the VPPs was dislodged by wave action (Figure 2-25). On February 10, 2016, SCDHEC-OCRM prohibited installation of additional VPPs, citing that the installed panels were not consistent with the proposed designs. The previously installed vertical panels were removed in February 2016 because “the research team decided that a partially installed test configuration cannot be studied and could eventually yield artificially poor results local to the panels” (Mays and Watson 2016).

Table 2-5 summarizes the timeline of actions at the OC site, based on information provided by SCDHEC-OCRM. During the course of this monitoring study, additional revisions were made to the WDS at OC. This included lowering various sections of the WDS by 2 feet in April and May, as listed in Table 2-2. This also included opening of some sections to allow sand to move to the landward side of the structure.

Figure 2-21. Erosion at Ocean Club building following Hurricane Joaquin (source: SCDHEC-OCRM)

Figure 2-22. Undermining of Ocean Club building and collapse of slab in parking garage (source: SCDHEC-OCRM)

Figure 2-23. Vertical porous panels installed beneath horizontal WDS members at Ocean Club (source: SCDHEC-OCRM)

Figure 2-24. Vertical porous panels installed beneath horizontal WDS members at Ocean Club (source: SCDHEC-OCRM)

Figure 2-25. Dislodged vertical porous panels at Ocean Club on February 25, 2016 (source: SCDHEC-OCRM)

Table 2-5. Ocean Club timeline

Date	Action
3/20/2015	Emergency Order for sandbags issued by DHEC-OCRM after request received from Ocean Club Property Manager.
3/25/2015	DHEC-OCRM received request from The Citadel to install WDS in front of Ocean Club No. 1 as part of pilot project/study.
4/17/2015	DHEC-OCRM acknowledged The Citadel's request to install WDS as part of pilot project/study.
4/27/2015	Installation of WDS began.
6/5/2015	Installation of WDS completed (initially two-tiered structure).
9/10/2015	Seven additional panel sections added to extend the WDS towards the southwest.
9/28/2015	Emergency Order for sandbags behind the WDS issued by DHEC-OCRM after request received from Ocean Club Property Manager.
10/6/2015	Ocean Club No. 1 Building significantly undermined by erosion.
10/7/2015	Damaged panels removed for inspection and replaced as needed.
10/21/2015	WDS re-set and reinstalled.
10/26/2015	Third tier of WDS added across central portion of the structure.
11/9/2015	DHEC-OCRM received request for minor renourishment behind the WDS from the inventor of the WDS.
11/10/2015	Emergency Order for minor renourishment behind the WDS issued by DHEC-OCRM. Ocean Club management decided not to act under this Emergency Order due to the collapsed slab in the parking garage beneath the building. No sand was added at this point.

Date	Action
11/12/2015	Additional pilings and panels installed to extend the WDS to the southwestern property line with Seascape Villas to connect to the WDS at Seascape Villas.
12/8/2015	DHEC – OCRM sends letter that further expansion of the WDS at Wild Dunes will not be considered.
12/18/2015	Emergency Order for sandbags and minor renourishment behind the WDS issued by DHEC-OCRM. Sandbags have been placed at the northern property line, but minor renourishment has not yet occurred due to the collapsed slab in the parking garage beneath the building.
1/11/2016	Additional pilings and panels installed to extend the WDS to the northeastern property line.
1/12/2016	"Vertical Porous Panels" (VPP) installed below grade at some sections of the WDS.
2/10/2016	DHEC- OCRM letter sent in response to the VPP design and installation. No further VPPs will be allowed.
2/19/2016	Emergency Order for sandbags and minor renourishment behind the WDS issued by DHEC-OCRM. Renourishment did not occur prior to amendment of this EO on February 29, 2016 (see below).
2/25/2016	Field report received from Stantec showing continued erosion of the beach behind the WDS and scouring in the vicinity of the WDS. One section of VPP was completely dislodged by wave action.
2/26/2016	Citadel research team decides to remove the VPPs. Team states removal of VPPs is not based on performance.
2/29/2016	2/19/16 EO amended to allow beach-compatible sand to be placed beneath the collapsed slab in the parking garage, filter cloth to be placed beneath sandbags, and sandbags to be placed to protect the formwork of the new concrete slab. The sand beneath the building, the filter cloth, and the sandbags have all been placed. The additional minor renourishment has not yet occurred.
4/19/2016	Citadel research team begins removing horizontal panels in order to lower 3rd tier of system (most landward) by 2 feet. Lowering completed on April 29, 2016.
5/16/2016	Citadel research team lowered and extended additional pilings and panels by 2 feet. Locations were the shore-perpendicular parts of the 2nd tier and the wall connecting Ocean Club and Seascape.
5/26/2016	Citadel research team opened 3 sections of the WDS during high tide to "flood" the area behind the WDS to allow sand to move from the seaward side of the structure to the landward side of the structure. The sand was trapped on the seaward side.
6/13/2016	Citadel research team opened a few more sections of the WDS during high tide to "flood" the area behind the WDS to allow sand to move from the seaward side of the structure to the landward side of the structure. The sand was trapped on the seaward side.
7/8/2016	Citadel research team added spacer to allow sand to move from the seaward side of the structure to the landward side of the structure.
7/16 - 7/17/2016	Citadel research team added several more spacers to allow sand to move from the seaward side of the structure to the landward side of the structure.

2.1.2.3 Beachwood East

The location of the existing WDS system at Beachwood East is shown in Figure 2-26. This area is located within the erosion zone west of the shoal attachment location. As shown by Figure 2-27, the WDS is located near the MHW shoreline, and it is immediately adjacent to a revetment to the west. Also, there is one parcel on the landward side of the WDS that is protected by a bulkhead.

The WDS at Beachwood East was installed between July 28 and September 10, 2015. Figure 2-27 shows a plan view schematic of the WDS that was submitted with the installation request. Figures 2-28 and 2-29 show a segment of the WDS during and after installation. Prior to installation, many parcels along Beachwood East already had sandbags placed along the scarp line (as seen by the sand bags in Figure 2-28). The sandbags were subsequently removed when the WDS installation was completed (Figure 2-30).

Less than one month following completion of the WDS installation, wave action from Hurricane Joaquin caused significant damage to the system. Based on the photos in Figures 2-31 and 2-32, horizontal members were missing from at least eleven 8-foot sections (about 10 percent of the total WDS length along the shoreline). Emergency Orders for sandbags were issued by SCDHEC – OCRM following requests from property owners on the landward side of and adjacent to the WDS (lots 11, 13, 14, 15, 16, 17, 19, and 20). New sandbags can be seen in Figures 2-31 and 2-32. A timeline based on information provided by SCDHEC-OCRM regarding WDS-related activities and other erosion countermeasure activities at BE is listed in Table 2-6.

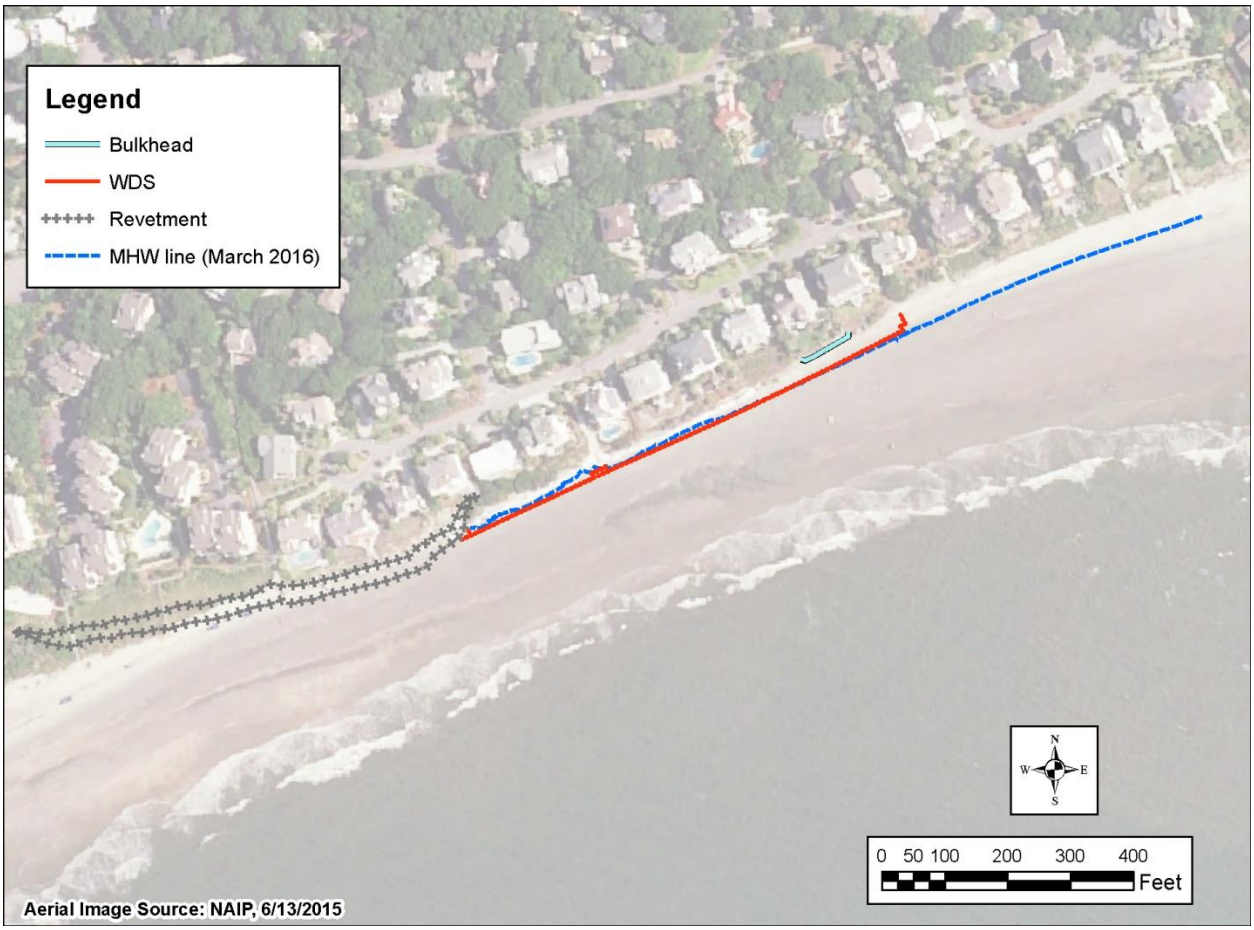

Figure 2-26. Aerial view of eroding shoreline segment and WDS location at Beachwood East

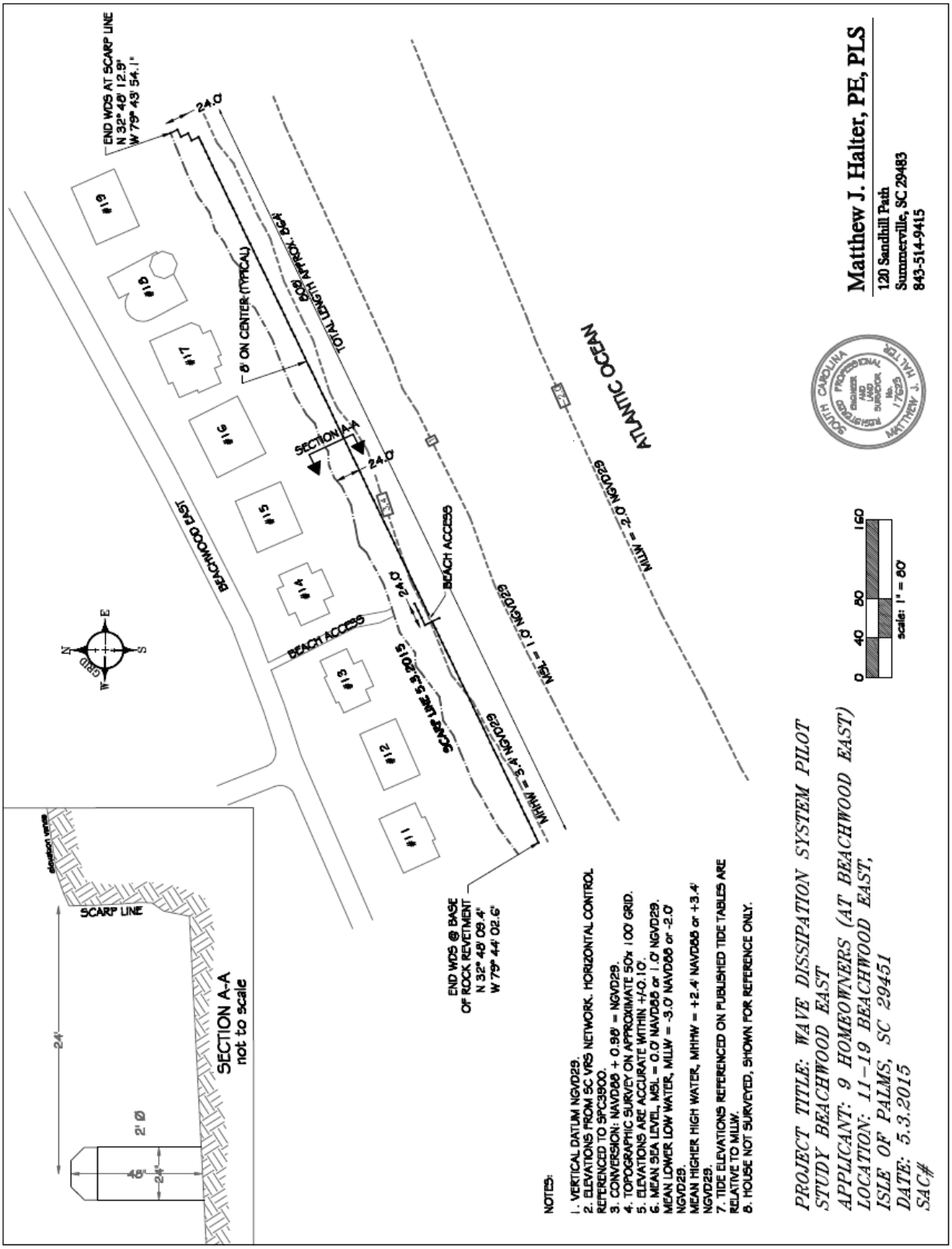

Figure 2-27. Plan view schematic of Beachwood East WDS installation submitted with 2015 installation request

Figure 2-28. WDS at Beachwood East during August 2015 installation (source: SCDHEC-OCRM)

Figure 2-29. WDS at Beachwood East following August 2015 installation (source: SCDHEC-OCRM)

Figure 2-30. WDS at BE in September 2015 following removal of sandbags (source: SCDHEC-OCRM)

Figure 2-31. WDS at Beachwood East following Hurricane Joaquin; view towards the northeast (source: SCDHEC-OCRM)

Figure 2-32. WDS at Beachwood East following Hurricane Joaquin; view towards the southwest (source: SCDHEC-OCRM)

Table 2-6. Beachwood East timeline

Date	Action
5/6/2015	DHEC-OCRM received request from The Citadel to install Wave Dissipation System (WDS) in front of lots 11 through 19 Beachwood East as part of pilot project/study.
6/2/2015	DHEC-OCRM acknowledged The Citadel's request to install WDS as part of pilot project/study.
7/28/2015	Installation of WDS began.
9/10/2015	Installation of WDS complete.
9/23/2015	Southwestern end of WDS installed at incorrect elevation; fixed by contractor.
9/28/2015	Emergency Order for sandbags behind the WDS issued by DHEC-OCRM after requests from property owners at 11, 13, and 14 Beachwood East.
9/29/2015	WDS significantly damaged by wave action. Emergency Order for sandbags behind the WDS issued by DHEC-OCRM after requests from property owners at 15 and 16 Beachwood East.
10/7/2015	Emergency Order for sandbags behind the WDS issued by DHEC-OCRM after requests from property owner at 17 Beachwood East.
10/20/2015	WDS re-set and reinstalled; minor spacer changes between panels.
11/12/2015	"Vertical Porous Panels" installed below grade at some sections.
11/24/2015	Emergency Order for sandbags behind the WDS issued by DHEC-OCRM after requests from property owners at 19 and 20 Beachwood East.
12/12/2015	Several horizontal panels removed to allow sand that was trapped on the seaward side

Date	Action
	of the WDS to move further landward.
12/17/2015	Emergency Order for sandbags behind the WDS issued by DHEC-OCRM after requests from property owners at 11, 13, 14, 15, 16, 17, 19, and 20 Beachwood East.
3/8/2016	Sandbags maintained/added at 11, 13, 16, 17, and 20 Beachwood East. Unauthorized sandbags removed from 18 Beachwood East and placed at 13 Beachwood East.
3/31/2016	Emergency Order extended for sandbags behind the WDS at 11, 13, 14, 15, 16, 17, 19, and 20 Beachwood East. New expiration date is July 28, 2016.
4/13/2016	Wing wall at northeastern end of WDS extended back to scarp line using large sandbags.
5/20/2016	Citadel research team lowered the WDS along several panels where differential settlement occurred.

2.2 Previous studies on seawalls and bulkheads

The WDS is a unique system, and the research studies completed by The Citadel are the first to document the effects of the WDS. However, the WDS is similar to other coastal armoring measures, such as seawalls and bulkheads, in that it is a shore-parallel structure that interacts with waves and sand transport on the upper beach with the goal of reducing erosion of upland areas.

Seawalls and bulkheads are traditional coastal armoring structures. A seawall is typically a massive, concrete structure with its weight providing stability. The primary purpose of a seawall is to prevent inland flooding from major storm events with large waves, and the seawall crest elevation is typically designed to minimize overtopping from storm surge and wave runup (USACE 2002). The South Carolina Code of Regulations [R. 30-1(D)(22)(a)] defines a seawall as a special type of retaining wall that is specifically designed to withstand wave forces.

Bulkheads are vertical retaining walls that hold or prevent soil from sliding seaward, and their main purpose is to reduce land erosion and loss to the sea, not to mitigate coastal flooding and wave damage. A secondary purpose is to protect the land from wave attack (USACE 2002). South Carolina [R. 30-1(D)(22)(b)] defines a bulkhead as a retaining wall designed to retain fill material, but not to withstand wave forces on an exposed shoreline.

The WDS does not meet the definition of a seawall or a bulkhead because it is not a retaining wall. A retaining wall has an increase in ground elevation from the front side to the back side of the structure, and it is designed to resist the lateral pressure from the backfilled soils. Also, the WDS does not meet the definition of a seawall given by the USACE (2002), because it is not intended to prevent inland flooding during major storm events.

Coastal armoring structures (i.e., seawalls, bulkheads and revetments) can be effective at reducing or eliminating erosion on the landward side of the structure, while at the same time, these structures can potentially cause other effects elsewhere on the beach. These potential effects were examined by Dean (1987), who considered conservation of sediment mass, laboratory and field data, and the theory of sediment transport in his evaluation. Literature reviews by Kraus (1988) and Kraus and McDougal (1996)

examined over 140 papers, which in general, support Dean's (1987) conclusions regarding which commonly expressed concerns are true and which are probably false. The USACE's Coastal Engineering Manual (2002) provides a review of these and other studies in detail. Based on these studies, there is evidence that seawalls may result in the following impacts on the beach:

- Storms may cause localized scour in front of and at the lateral ends of the structure. The causes of these effects are uncertain. Dean (1978) hypothesized that this type of erosion is the result of preventing movement of sand from the upper beach to an offshore bar during storm conditions. Kraus and McDougal (1996) conclude that toe scour is more dependent on local sediment transport gradients and the return of overtopping water (through permeable revetments or beneath walls) than a result of direct, cross-section wave action.

- As ongoing erosion continues, the dry-beach width accessible to the public seaward of the structure will decrease because the landward limit of the accessible beach is held in place by the structure.

- As the beach continues to erode, the structures will retain sand on their landward side that would otherwise be transported to downdrift beaches. In general, any measure to artificially retain sand on one beach segment will necessarily prevent that sand from reaching downdrift beaches and may affect downdrift shoreline change rates.

- Increased downdrift erosion may also result in the structures protruding into the surf zone and creating a partial barrier to longshore transport, trapping sand on their updrift side and accelerating erosion on their downdrift side (an effect similar to a groin).

As noted by the USACE (2002), field research efforts have yet to confirm the theory that sand trapped by a seawall has corresponding downdrift impacts. If the trapped volume is only a small percentage of the total, active sand volume in the profile, the downdrift impacts may be undetectable.

Given that the WDS is also a shore-parallel structure that interacts with wave and sand transport on the upper beach, these potential effects associated with seawalls should also be evaluated for the WDS.

3 Study Methodology

3.1 Topographic Survey

Data collection and processing is critical for quantifying effects of the WDS on wave and erosion patterns in the vicinity of each WDS installation. In accordance with the Department's scope of work, detailed topographic surveys were conducted on a monthly basis (Table 3-1) to calculate shoreline position and sand volume changes over time. These surveys were conducted with a high degree of accuracy (vertical and horizontal) and repeatability (i.e., along the same exact transect lines each month).

Table 3-1. Survey dates

Month	Beachwood East	Ocean Club / Seascape Villas	Harbor island
March	3/21 - 3/22	3/23	3/24
April	4/18 - 4/19	4/19 - 4/20	4/21
May	5/23 - 5/24	5/26	5/25
June	6/21 - 6/22	6/17	6/16
July	7/8[1], 7/14 - 7/15	7/15	7/12 - 7/13

Note: 1. Only upland areas on the landward side of the scarp line surveyed on 7/8/16.

GEL survey crews used state-of the-art survey equipment that includes Trimble S6 Robotic Total Stations, Trimble R8 GPS Receivers, and associated gear well-suited for accurate and precise surveying under all types of conditions. The topographic data collected in the field were post-processed using Trimble Business Center software and AutoCAD Civil 3D. The table below summarizes GEL's equipment and software used for the data collection and processing.

Table 3-2. Survey data collection and processing software

	Equipment/Software	Version
Data Acquisition	Trimble S6 Robotic Total Station	
	Trimble R8 GPS Receiver	
	HYPACK	2011
	Teledyne Odom Echotrac CVM	2013
	Panasonic Toughbook Computer	
	Hewett-Packard Computer	
	Verizon VZ Access	n/a
	GNSS Internet Radio	1.4.11
Data Processing	Digibar Pro Profiler	2011
	HYPACK	2011
	AutoCAD Civil 3D	2010/2013
	ArcGIS	9.3/10.1
	MS Office	2007

To facilitate efficient data collection with a high density of data points along the relatively flat beach slopes, GEL used a custom built survey cart (Figure 3-1) for data collection following the initial March 2016 survey. Data points were collected automatically at a 3-ft interval as the cart was moved along the survey transect lines.

Figure 3-1. Cart used for survey of beach transects on flat beach slopes

The coverage and types of data collected by the monthly topographic surveys are described below:

- Shore perpendicular transects started a minimum of 25 feet landward of the scarp, and continued seaward to the low tide water line. Transects were 20 feet apart within the lateral extents of the WDS and extended 100 feet on either side of the WDS. The remaining 400 feet on either side were collected at 50 foot spacing. The measurements for the portions of the transects that were landward of each WDS and immediately seaward of each WDS were collected at intervals not exceeding approximately 3 ft. Smaller intervals were used as necessary near the WDS panels to measure the maximum depth of any scour holes, when present. Per the scope of work, all other portions of the transects were collected at intervals not exceeding 15 ft, although use of the cart on the beach transects allowed collection of higher density data (i.e., 3-ft intervals).

- The scarp line was surveyed on the landward side of each WDS, as well as the scarp line as it extended along adjacent properties 500 feet in either direction. Where the scarp line was blocked by sand bags, data along the toe and crest of the sand bags was collected. In general, the scarp line or sand bag line was recorded at the beach transect locations, although

intermediate data points were collected where field observations indicated that linear interpolation between transects was not reasonably representative of actual conditions.

- At the second visit to each of the WDS installations, the wet/dry line was survyed at each WDS, extending the 500 feet in either direction.

In addition, the initial topographic survey included the collection of appropriate base map information, including: WDS pile and panel locations, buildings in the immediate vicinity of the WDS, benchmark locations and any infrastructure or other hard features that may interact with the beach.

All survey data was collected using the SC State Plane NAD83 (2011) horizontal datum (with units of international feet) and the NAVD88 vertical datum (latest geoid), with units of feet.

After each survey was conducted, GEL's survey crews reviewed the data with a South Carolina Licensed Professional Land Surveyor (PLS). GEL's PLS analyzed the data to confirm accuracy and precision had been achieved. The required minimum horizontal and vertical accuracy for this project was established by SCDHEC-OCRM as less than 5 cm (0.16 ft).

The beach profile transect lines surveyed for each site are shown in Figures 3-2 through 3-4.

Figure 3-2. Beach profile survey transect lines at Harbor Island

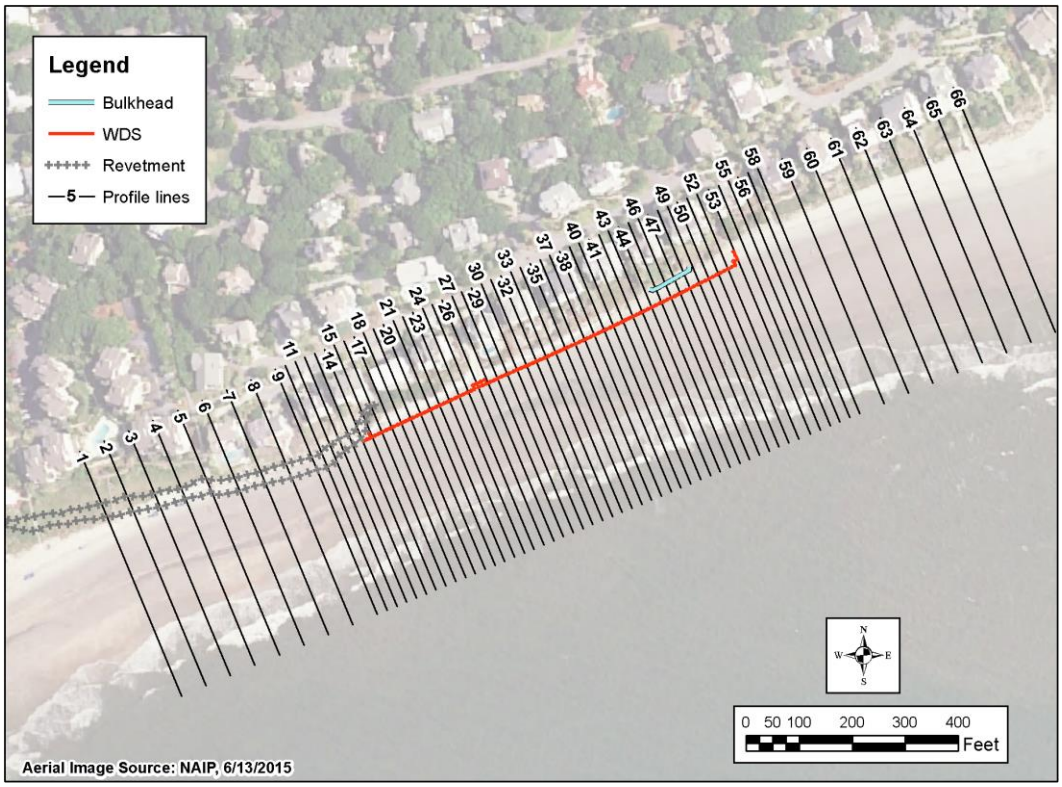

Figure 3-3. Beach profile survey transect lines at Beachwood East

Figure 3-4. Beach profile survey transect lines at Ocean Club/Seascape Villas

3.2 Photographic and Video Documentation

The monitoring included photographic and video documentation to qualitatively assess the effect of the structures on waves and near-shore hydrodynamics, as well as the impacts to property, public access, and the dune system. This documentation was collected monthly (Table 3-3).

Table 3-3. Photo/video documentation dates

Month	Beachwood East	Ocean Club / Seascape Villas	Harbor island
March	3/21 - 3/22	3/21 - 3/22	3/24
April	4/18	4/18	4/19
May	5/20	5/20	5/19
June	6/15	6/15	6/16
July	7/13	7/13	7/14

Digital photos were taken during each low-tide site visit to fully capture: the landward and seaward side of each WDS, the scarp on the landward side of each WDS, and the properties immediately adjacent on either side of each WDS. The photos were taken at the same locations (established by hand-held GPS) for each low-tide site visit in order to allow for comparison of the same view point over time. The locations and photo directions for the low-tide photos at each site are shown in Figures 3-5 through 3-7.

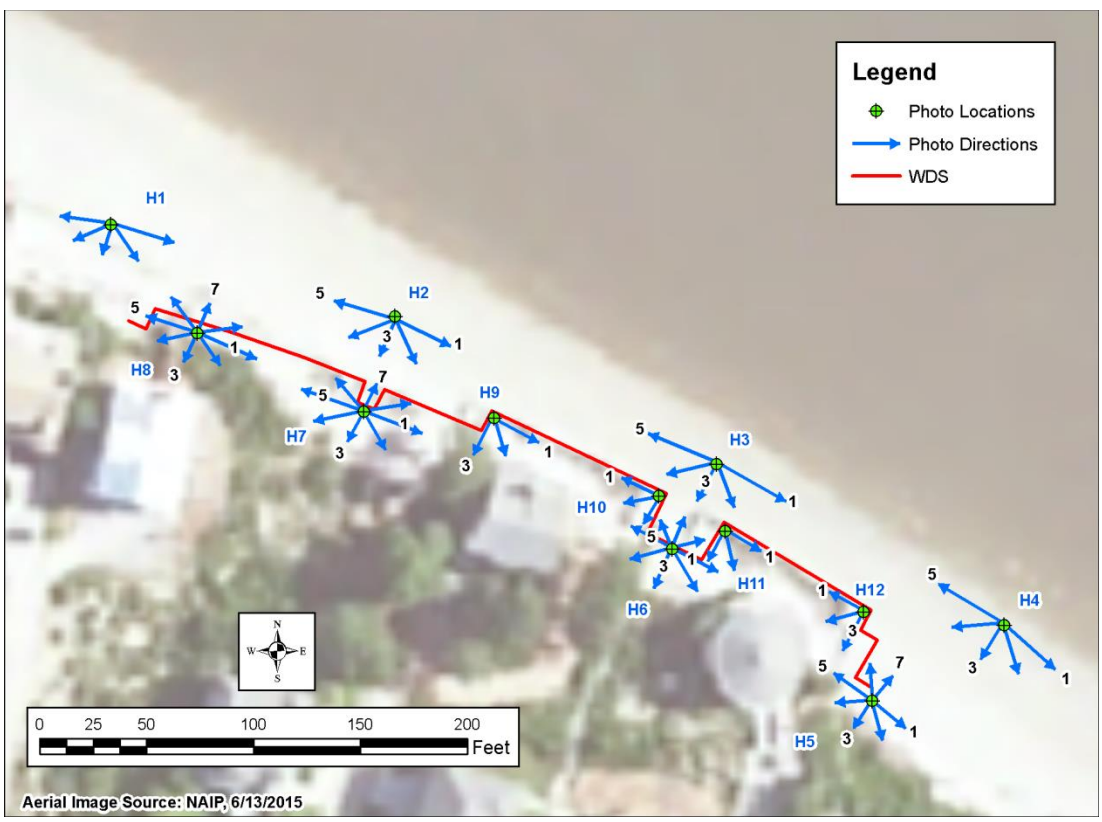

Figure 3-5. Harbor Island photo locations and directions

Figure 3-6. Beachwood East photo locations and directions

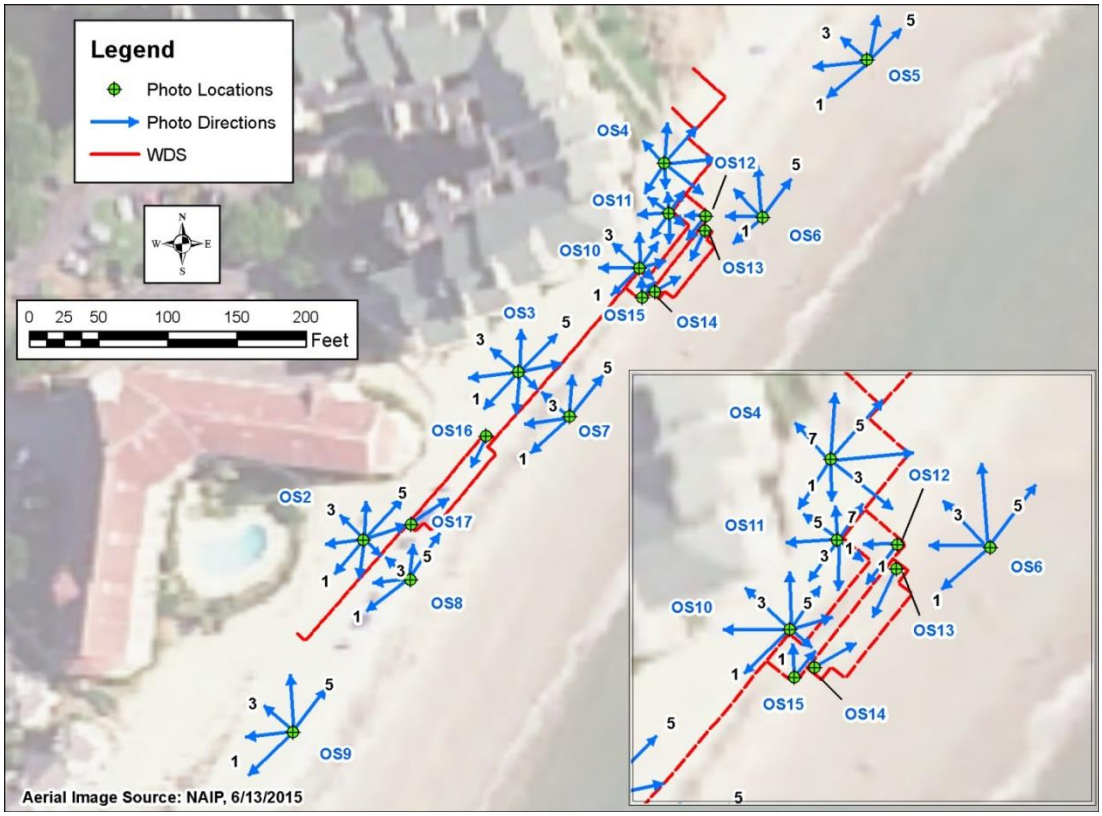

Figure 3-7. Ocean Club / Seascape Villas photo locations and directions

High tide monitoring included photo and video documentation of the water level, wave and current environment along the study area shorelines, both on the seaward and landward sides of the WDS. One high tide monitoring event at each site (on April 18-19) included use of an aerial drone to capture images from above the WDS.

3.3 Data Analysis

GEL post-processed the survey data to provide the deliverables defined by the Department's Request for Proposals (RFP). This included importing to Excel to create spreadsheets with the topographic data, and importing to ArcMap to create shapefiles (for transect data, scarp lines, MHW shorelines and wet/dry shorelines). A metadata file for each GIS file was created that included information required by the SCDHEC-OCRM (description and purpose of the data collection; who collected the data [company name and crew members]; when the data was collected; how the data was collected [all equipment used]; and spatial reference). The monitoring data was then analyzed to assess: scarp and shoreline response; sediment volume response; scour; wave attenuation and project performance.

Scarp and Shoreline Response

GEL evaluated the shoreline response based on the position of the shoreline defined by the MHW line. The SCDHEC-OCRM scope of work required collection of the wet/dry shoreline. However, the wet/dry shoreline is dependent on tidal and meteorological conditions and was not used for quantitative assessment of shoreline evolution and project impacts. The MHW line was calculated based on a Triangular Irregular Network (TIN) created from the survey points. GEL imported the MHW contour data to the Regional Morphology Analysis Package (RMAP) software developed by ERDC. RMAP is a collection of automated tools to analyze morphologic and dynamic properties of shorelines and beach profiles. Using the RMAP software, GEL quantified shoreline change rates for three areas: the shorelines north of the WDS structures, the shorelines south of the WDS structures, and the shorelines within the WDS structure extents. The movement of the scarp line, when and where present, was also evaluated.

Sediment Volume Response

GEL used the RMAP software to analyze the transect data and quantify the changes in beach volume along the study area. As specified by the RFP, the surveys extended seaward past the low tide water line. However, the active beach profile (i.e., the region within which sand is shifting during a typical year) extends to much deeper water, and significant sand transport occurs in these deeper areas, particularly within the surf zone seaward of the low tide water line. For example, the active beach profile extends to approximately -10 ft NAVD88 at the IOP study areas (CSE 2016). Therefore, the volume change analysis conducted for this study is for the beach landward of the low tide line (the area potentially affected by the WDS) and not the entire active beach.

To calculate volume changes, GEL used RMAP to quantify cross-sectional areas for each beach profile, and the average end-area method was used to quantify volumes (this method multiplies the length between two parallel transects by the average cross-sectional area of the two transects to obtain an estimate of the volume). The minimum and maximum cross-shore distances used during these

calculations were based on the minimum envelope of survey coverage for all five surveys at each profile location. Using this approach, the horizontal extents of the analysis areas were exactly the same for all time periods to ensure accurate assessment of volume change within these areas over time.

Volume changes were identified along the segment of beach with the WDS, east of the WDS, and west of the WDS. This was done for the entire beach down to the low tide line, and it was also done for the upper beach on the landward side of the WDS structure. For comparison to the adjacent upper beach areas east and west of the WDS, the upper beach in these adjacent areas was delineated as the area above (landward of) the average elevation of the neighboring WDS (as surveyed in March). For example, the average elevation of the WDS at BE is 1.9 ft NAVD88. For the beach to the east of the WDS, the volume changes above the 1.9 ft NAVD88 contour were also calculated for comparison to the beach volume changes that occurred landward of the WDS.

GEL also created plan-view plots of beach elevation changes. These plots were made by interpolating the surveyed beach elevation data points onto a 5-foot by 5-foot grid using an inverse distance weighting interpolation in ArcMap. These grids were then subtracted in order to calculate the change in elevation over time.

Scour

GEL quantified the maximum and average depth of scour, if any, in front and behind the WDS structures based on the topographic survey data.

Wave Attenuation

Wave attenuation and wave reflection were evaluated qualitatively based on visual inspection at each high tide event. Quantitative assessment of WDS effects on waves (e.g., quantifying the fraction of wave energy reflected from the structure, fraction transmitted through the structure and fraction dissipated) would require additional work outside that requested by the RFP, such as wave gage monitoring on both sides of a WDS panel either in the field or in a laboratory wave tank.

WDS Performance

GEL reviewed and analyzed the data to assess the WDS performance, as determined by the ability of the system to reduce erosion of the protected shorelines, while avoiding adverse impacts and maintaining structural stability. A major challenge is to isolate the effects of the WDS (the “impacts”) apart from other factors controlling sand erosion/accretion at the beach (the “background effects”). The changes observed in shoreline position and sediment volumes included not only those caused by the WDS, but also included background changes due to cross-shore processes (e.g., redistribution of sand placed on the beach, seasonal beach profile change, storm-induced beach erosion, and migration of sand onshore during mild wave conditions) and due to longshore processes (e.g., natural gradients in longshore sand transport, and interruption of sand transport by structures or sandbags).

Ideally, if a study intends to distinguish project impacts from natural background changes, the study should be designed to monitor beach conditions before and after installation of the experimental device. The study should also include monitoring of impact and control areas, with a control area being subject to similar wave and sediment transport processes as the impact area. The project should also be located along a straight shoreline away from inlet effects such that the wave and sediment transport is relatively uniform along the monitored segment of the beach. If the background effects can be assumed to be uniform, they can more easily be separated from the project impacts.

In this case, the study design specified by the RFP does not meet these requirements, which is understandable given the limitations of where the WDS systems were installed and the circumstances (emergency response in erosional areas) under which they were installed. The most problematic issue is that the sites are located in areas with strong gradients in the wave and sediment transport conditions along the shoreline. The Harbor Island site is located along a curved shoreline and background sediment transport patterns that result in long-term erosion at the WDS site and long-term accretion short distances north and south of the site. At the IOP study sites, there are strong gradients in wave, sediment conditions and resulting background erosion/accretion patterns associated with the ongoing shoal attachment process. GEL attempted to identify suitable control areas to use for the analysis, but the sediment transport patterns at all sites were dominated by these non-uniform background trends. Given this limitation, this assessment does not statistically or quantitatively separate WDS impacts apart from the natural background erosion rates.

3.4 Reports by Academic Sponsor

Per the scope of work, this evaluation includes a review of the quarterly and final reports from the academic sponsor to determine if these contain sufficient data to: 1.) conclude whether the WDS qualifies under Proviso 34.51; and 2.) conclude whether the WDS meets the purpose of the academic pilot project.

GEL reviewed the quarterly reports prepared for each WDS installation, the survey data collected by the research team, and the single final report for all sites dated August 28, 2016. Based on our review, the question above is addressed in the conclusions section of this report (Section 5).

4 Results

4.1 Wave and Water Level Conditions

The study did not include wave gages to monitor waves incident to each site. However, a buoy owned and maintained by the National Data Buoy Center (NBDC) is located 41 nautical miles southeast of Charleston (NBDC Station 41004), which is used here to provide an indication of the level of offshore wave activity during the study. The offshore wave conditions measured at this buoy during the study are shown in Figure 4-1. These data are hourly significant wave heights, calculated as the average of the highest one-third of all of wave heights during a 20-minute sampling period. The average of these wave heights in between the beach survey events is also shown in Figure 4-1 and listed in Table 4-1.

Table 4-1. Average offshore significant wave heights for periods between surveys

Period between surveys	Average Significant Wave Height (ft)
3/24 - 4/18	5.2
4/21 - 5/23	3.2
5/26 - 6/16	3.4
6/22 - 7/12	3.6

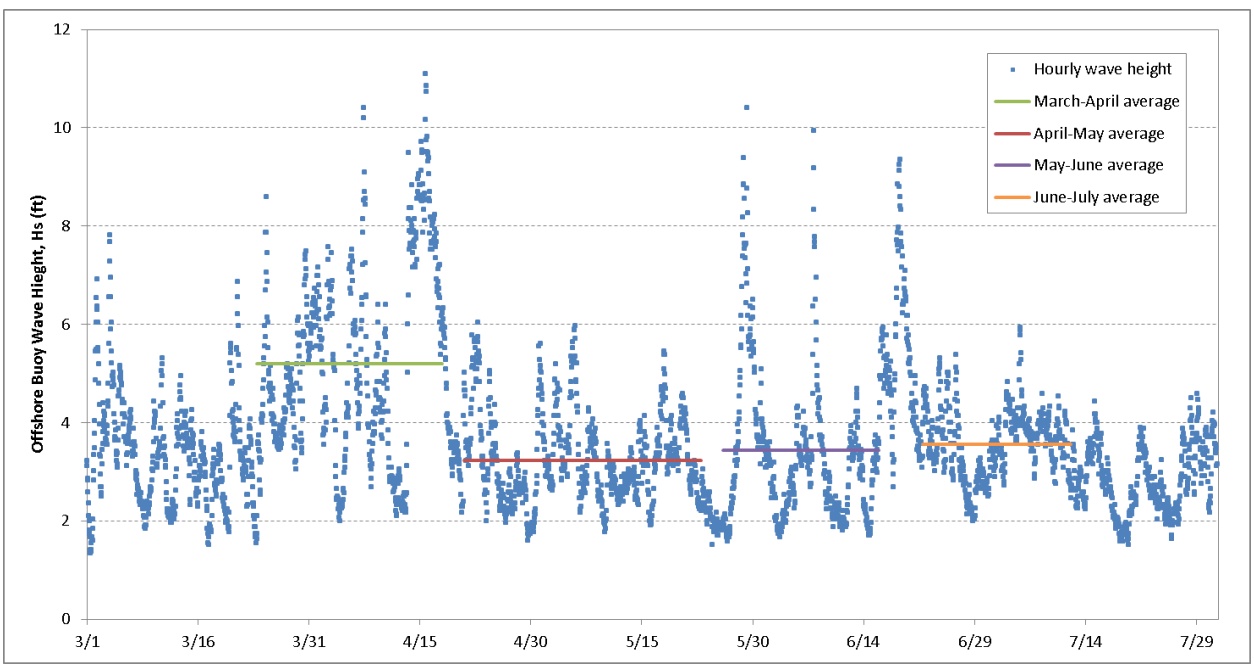

Figure 4-1. Offshore hourly significant wave heights and average heights for periods between surveys

In general, storm waves erode the upper beach and rapidly move sand offshore to submerged bar formations. During mild wave conditions, sand gradually migrates onshore, eventually widening the dry

beach. The wave conditions between the March and April survey events were much larger than the remainder of the study period. The week prior to the April survey included several days with large waves from the northeast direction, which resulted in substantial erosion of the upper beach in the study areas, as discussed in the following sections. This was followed by milder wave conditions between the April and May surveys during which sand to migrated back onshore. May and June also included three events with large waves. Therefore, the study period included a range of wave conditions with both erosive storm waves that moved sand from the beach face to offshore bar features, and milder wave conditions that allowed sand to migrate onshore.

The tidal water levels that occurred during the study period were measured by two NOAA gages: the Charleston Customs House gage (Station 8665530), which is representative of conditions at the Isle of Palms sites; and the Fort Pulaski, GA gage (Station 8670870). The Harbor Island site is approximately midway between these to gage locations.

The measured water levels are shown in Figures 4-2 and 4-3 for the Charleston and Fort Pulaski gages, respectively. In addition to the measured water levels, the plots include the difference between the predicted astronomical tides and the measured water levels, which is labeled as the residual. This illustrates that the water levels throughout the study period were, on average, about 0.4 ft above the long-term mean water level, and short term fluctuations caused water levels more than 2 ft above the long-term mean water level. The low-frequency (e.g., monthly) variations in the residual are caused by irregular fluctuations in coastal ocean temperatures, salinities, and ocean currents. Short-term variations are caused by meteorological conditions, such as variations in wind and atmospheric pressure. The highest residuals are associated with storm events. The large wave event that occurred in mid-April prior to the April survey was also accompanied by mean water levels more than 1.5 feet above the long-term mean.

Based on the March survey, the mean beach elevation along WDS at each location is summarized in Table 4-2. For the OC site, elevations are included for both the landward and seaward tiers of the WDS. The percentage of time that the WDS was below the stillwater level (i.e., the water level not including waves, wave setup effects or wave runup) is also shown in Table 4-2. For the Harbor Island site, the average of the Charleston and Fort Pulaski water levels was used to estimate the stillwater levels. Based on the observed water levels during the monitoring period, the fraction of the time the WDS is below the stillwater level ranges from zero at the SV site to 48 percent at the seaward edge of the OC site.

Table 4-2. March 2016 average beach elevation at each WDS and percent time below tide level

Location	Average beach elevation at WDS (ft NAVD88)	Percent time WDS is below tide level
BE	1.9	27
SV	4.7	0
OC landward	3.4	3
OC seaward	0.6	48
Harbor Island	3.1	10

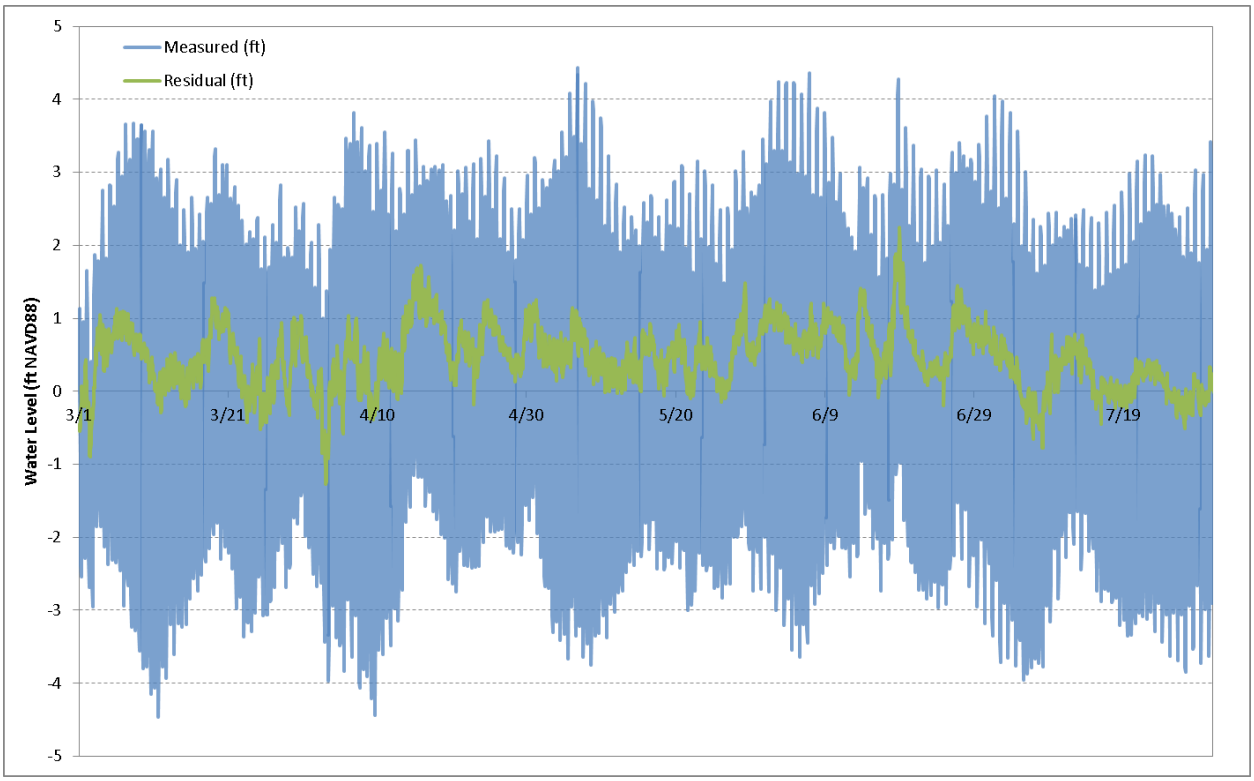

Figure 4-2. Measured water levels at Charleston Customs House gage

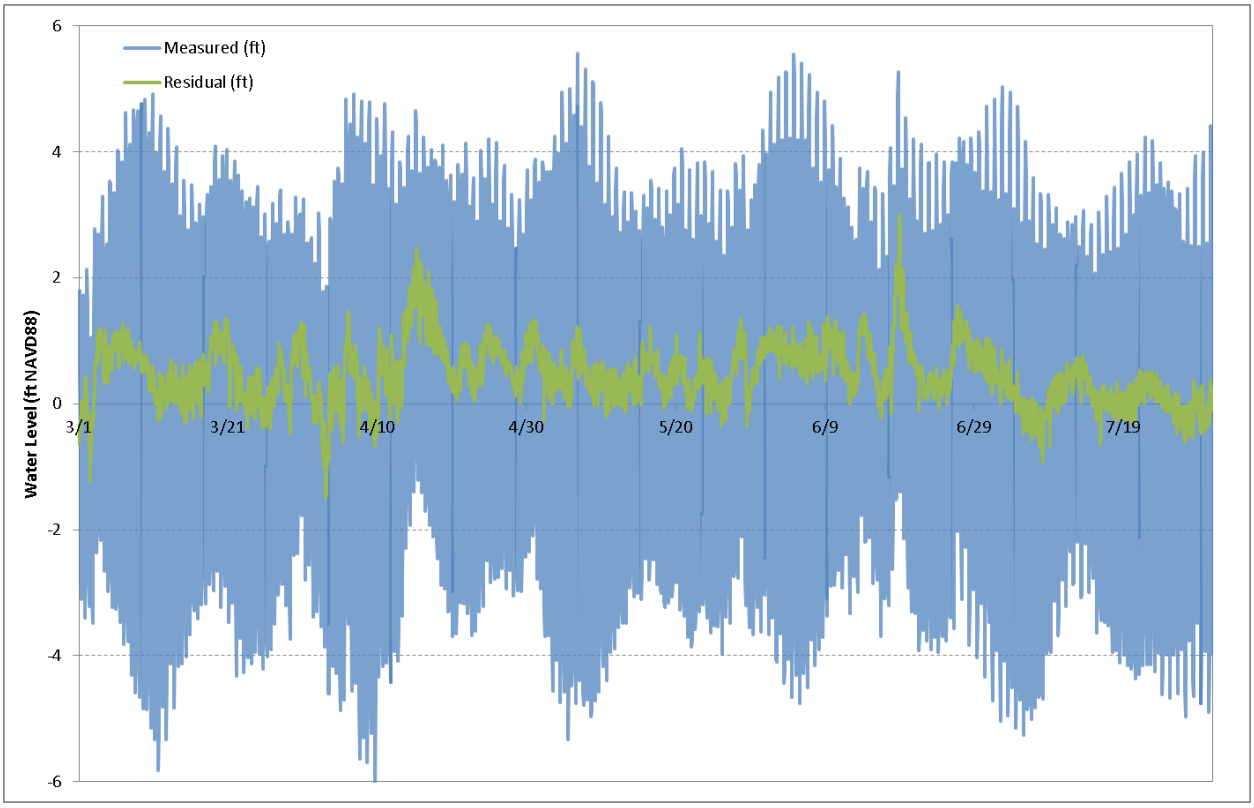

Figure 4-3. Measured water levels at Fort Pulaski gage

4.2 Scarp, Shoreline and Beach Volume Changes

4.2.1 Harbor Island

The surveyed MHW contour positions at the Harbor Island study area are shown in Figure 4-4. The changes in these contours positions in between each survey are shown in Figure 4-5. The heavy black line in Figure 4-5 illustrates the change in the contour position over the entire March through July study period. The wave activity between the March and April surveys caused recession of the MHW shoreline along the entire study area. The WDS did not prevent erosion of the MHW contour landward of the WDS. The MHW contour along the WDS receded by an average of 24 ft, a similar amount as the average recession to the east (24 ft) and the west (23 ft). During the subsequent survey periods, the wave climate was milder, and the MHW contour shifted seaward. Over the entire study period (the heavy black line in Figure 4-5), nearly the entire area exhibited a net seaward shift in the MHW contour. There is a strong trend along the shoreline showing increasing amounts of accretion from the east end of the study area toward the west end. The net sediment transport direction at this site is from the east to the west, and if the WDS protruding onto the beach significantly interrupted the net flow of sand along the beach, the expected response would be impoundment of sand on the updrift (i.e., east) side and corresponding erosion on the downdrift (i.e., west) side. This type of signature is not apparent in the MHW contour data and can't be detected apart from the background trend.

Figure 4-4. MHW contours at Harbor Island

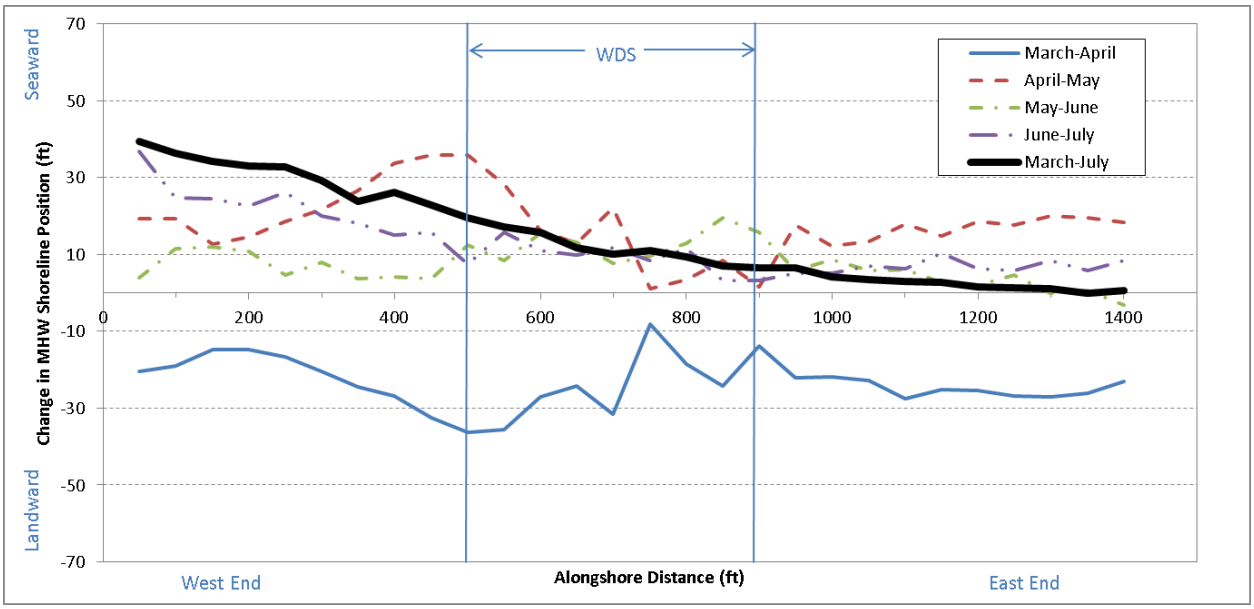

Figure 4-5. Change in MHW contours at Harbor Island

The scarp line on the landward side of the WDS during this period was relatively stable, as shown Figure 4-6. In these areas, the top of the sandbagged slopes in front of the two buildings on the landward side of the WDS (lots 49 and 52) were included as the top of scarp. Although the tops of these slopes remained relatively stable, the sandbags and underlying sand at lot 52 slumped because of the excessively steep slope at which these sandbags and underlying sand were initially placed. Shorelines adjacent to the WDS had placed fill material at the scarp line, and in these areas the toe of the fill was used to indicate the location of the scarp. In the March to April period, the placed fill along shorelines both east and west of the WDS eroded. This erosion of the scarp line along these adjacent shorelines continued through July, although to a lesser degree.

Figures 4-7 through 4-10 show the shoreline adjacent to the east end of the WDS. The placed sand along the scarp in this area eroded slightly during the March to April time period (Figures 4-7 and 4-8), although higher rates of erosion of fill material occurred at the next house (the pink house in the figures). The scarp line in this area continued to erode through July (Figure 4-10).

Figures 4-11 through 4-14 are photographs of the area in front of lot 49. There was erosion on the landward side of the WDS in this area during the March to April time period (Figures 4-11 and 4-12), but the sandbags and the top of the scarp remained stable. Small sand bags such as those deployed here do not remain stable when subjected to any significant wave action. The overall stability of the sandbags at lot 49 during the March to April timeframe demonstrates that the WDS was effective at attenuating wave action sufficiently such that there was only minimal, if any, erosion of the slope protected by the sandbags. The recovery of the beach during the mild wave conditions (Figures 4-13 and 4-14) filled in the scour hole along the WDS, and sand accreted landward of the WDS.

Figures 4-15 and 4-16 show the failure of the lot 52 sandbagged slope between the March and April surveys. These figures also show erosion of the beach and scour near the WDS as a result of the erosive

Figure 4-6. Scarp lines at Harbor Island

Figure 4-7. March 24 photograph of shoreline adjacent to east end of WDS

Figure 4-8. April 19 photograph of shoreline adjacent to east end of WDS

Figure 4-9. May 19 photograph of shoreline adjacent to east end of WDS

Figure 4-10. July 24 photograph of shoreline adjacent to east end of WDS

Figure 4-11. March 24 photograph looking southeast in front of lot 49

Figure 4-12. April 19 photograph looking southeast in front of lot 49

Figure 4-13. May 19 photograph looking southeast in front of lot 49

Figure 4-14. July 14 photograph looking southeast in front of lot 49

Figure 4-15. March 24 photograph looking northwest in front of lot 52

Figure 4-16. April 19 photograph looking northwest in front of lot 52

wave conditions between the March and April surveys. One month later, the scour holes along the WDS were mostly filled in (Figure 4-17), and by July the beach had recovered (Figure 4-18).

Figures 4-19 through 4-20 are photographs with a view on the landward side of the WDS towards lot 52 to the southeast. Figure 4-20 shows erosion of the sand from beneath the trees on the edge of the scarp. Sand was placed at an extremely steep angle beneath these trees (Figure 4-19), and exposure to high tides predictably washed out the sand from this area. During the subsequent natural recovery of the beach (Figures 4-21 and 4-22), sand accumulated along both sides of the WDS. These figures show that the WDS allows some transport of accreting sand through the WDS. However, given the buildup of sand observed on the seaward side of the WDS, it appears that the WDS can inhibit the amount of natural landward migration of sand during mild wave conditions. This observation is based on the static WDS configuration in place during the monitoring study, and it is recognized that the horizontal panels could be actively managed to allow sand to migrate farther landward (e.g., such as the temporary removal of panels described by Mays and Watson [2016]).

Figures 4-23 through 4-26 show the view on the landward side of the WDS looking northwestward towards lot 56. These figures show the stability of the sand placed on the landward side of the WDS in this area throughout the monitoring period.

Figures 4-27 through 4-30 show the view from the WDS in lot 56 looking northwestward past the end of the structure and along the adjacent shoreline. These figures show the erosion of the placed fill along

Figure 4-17. May 19 photograph looking northwest in front of lot 52

Figure 4-18. July 14 photograph looking northwest in front of lot 52

Figure 4-19. March 24 photograph looking southeast toward lot 52

Figure 4-20. April 19 photograph looking southeast toward lot 52

Figure 4-21. May 19 photograph looking southeast toward lot 52

Figure 4-22. July 14 photograph looking southeast toward lot 52

Figure 4-23. March 24 photograph looking northwest toward lot 56

Figure 4-24. April 19 photograph looking northwest toward lot 56

Figure 4-25. May 19 photograph looking northwest toward lot 56

Figure 4-26. July 14 photograph looking northwest toward lot 56

Figure 4-27. March 24 photograph looking northwest from lot 56

Figure 4-28. April 19 photograph looking northwest from lot 56

Figure 4-29. May 19 photograph looking northwest from lot 56

Figure 4-30. July 14 photograph looking northwest from lot 56

the adjacent shoreline throughout the monitoring period. This effect occurs within a short distance (a single lot) of the end of the structure. This downdrift erosion pattern is common for structures that interrupt a fraction of the sediment transport along the shoreline. In this case, the WDS reduces erosion of the upper portion of the beach landward of the MHW line. The protrusion of the WDS onto the beach can reduce the amount of net sand transport from the southeast to the northwest on the upper part of the beach landward of the MHW contour. This reduction in sand transport into the adjacent lot may contribute to the observed erosion pattern. However, as compared to a shore perpendicular structure, such as a groin, that typically affects a large fraction of the active beach profile, the WDS affects only a very small fraction of the active beach. Therefore, the amount of erosion along the adjacent shoreline is comparatively small (as illustrated by the fact that erosion pattern predominantly affects only one adjacent lot). It is further noted that similar levels of erosion of the scarp line occurred to the southeast of the WDS (i.e., on the updrift side), indicating that some or most of this erosion may be from natural background erosion.

The changes in beach elevation between the March and April surveys are shown in Figure 4-31. This figure should not be used to evaluate individual points of change. Although the surveys were collected along the same profile lines, the locations of the individual survey points are not exactly the same. Also, different surveys also collected various points along the upper beach in between the profile lines. As a result, the plotted individual points of change between surveys may not be valid. Instead, this plot is useful for illustrating broad areas of erosion and accretion that occurred in the study area. As shown by this figure, the waves eroded the upper beach (as shown by the red and yellow colors) and deposited sand lower on the beach profile (as shown by the blue colors).

Figure 4-32 shows the change over the entire March through July monitoring period. The beach over the western half of the area shows general accretion just below the MHW contour. This figure also shows the upper beach erosion adjacent to the west end of the WDS.

The profile volume changes calculated with RMAP are summarized in Figure 4-33. This figure shows the volumetric change, in cubic yards per linear foot of shoreline (cy/ft), along the study area. Lines are plotted for each time period between surveys, and the heavy black line is for the entire period from March through July. Table 4-3 lists the average volumetric change for each beach segment: west of the WDS, the segment with the WDS, and east of the WDS. Interestingly, although the shoreline showed erosion during the March to April time period, the entire beach down to the low tide line gained sand for two of the three segments. Over the entire monitoring period, the west end and the beach segment with the WDS experienced net accretion, while the area to the east experienced erosion (see the last column in Table 4-3).

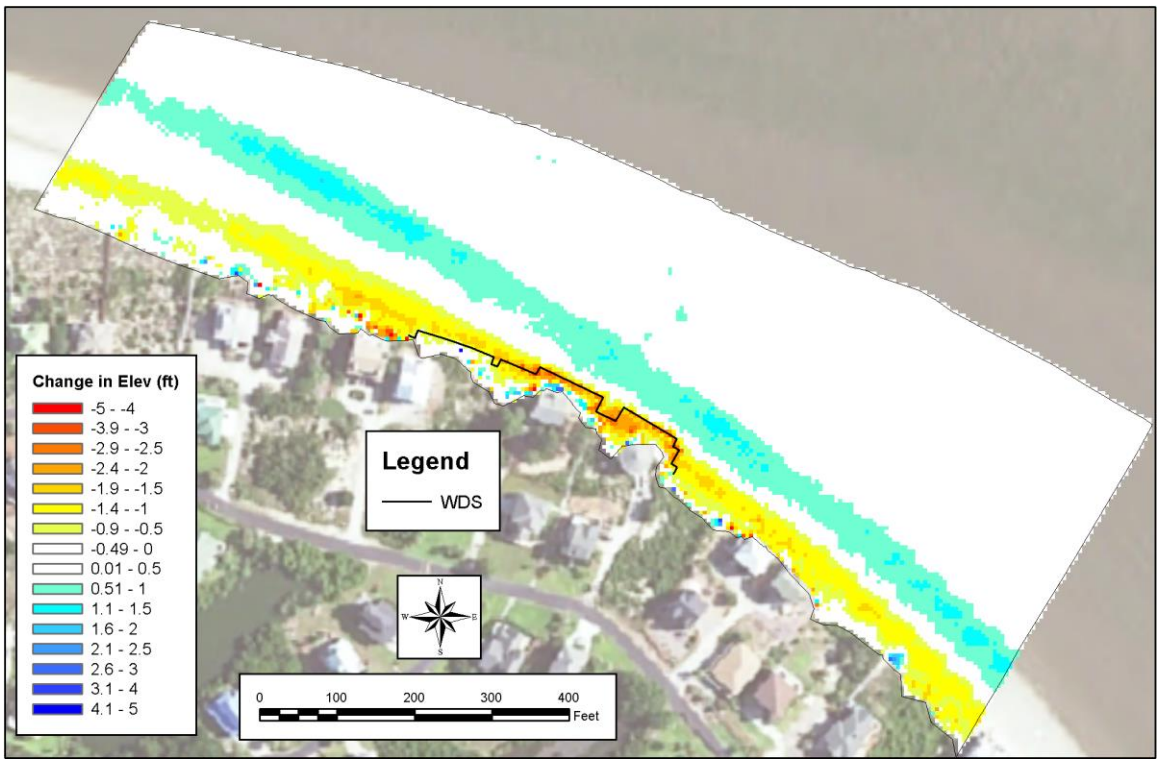

Figure 4-31. Changes in beach elevation between March and April Harbor Island surveys

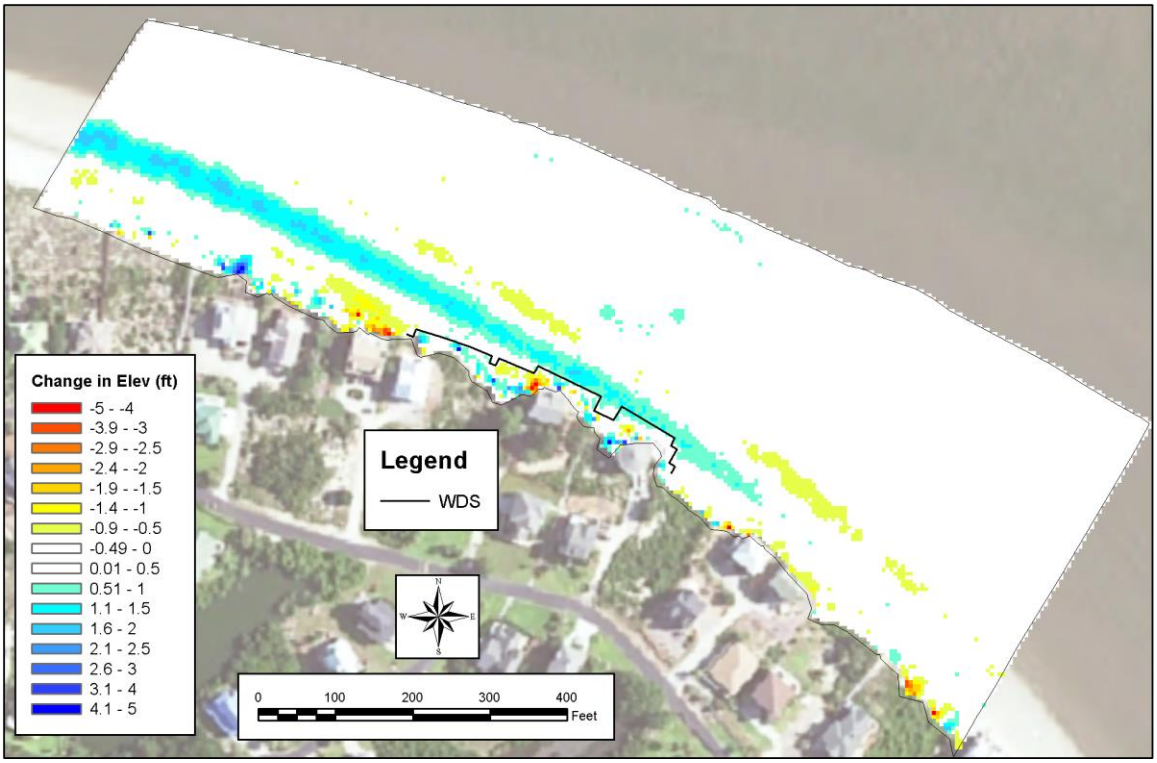

Figure 4-32. Changes in beach elevation between March and July Harbor Island surveys

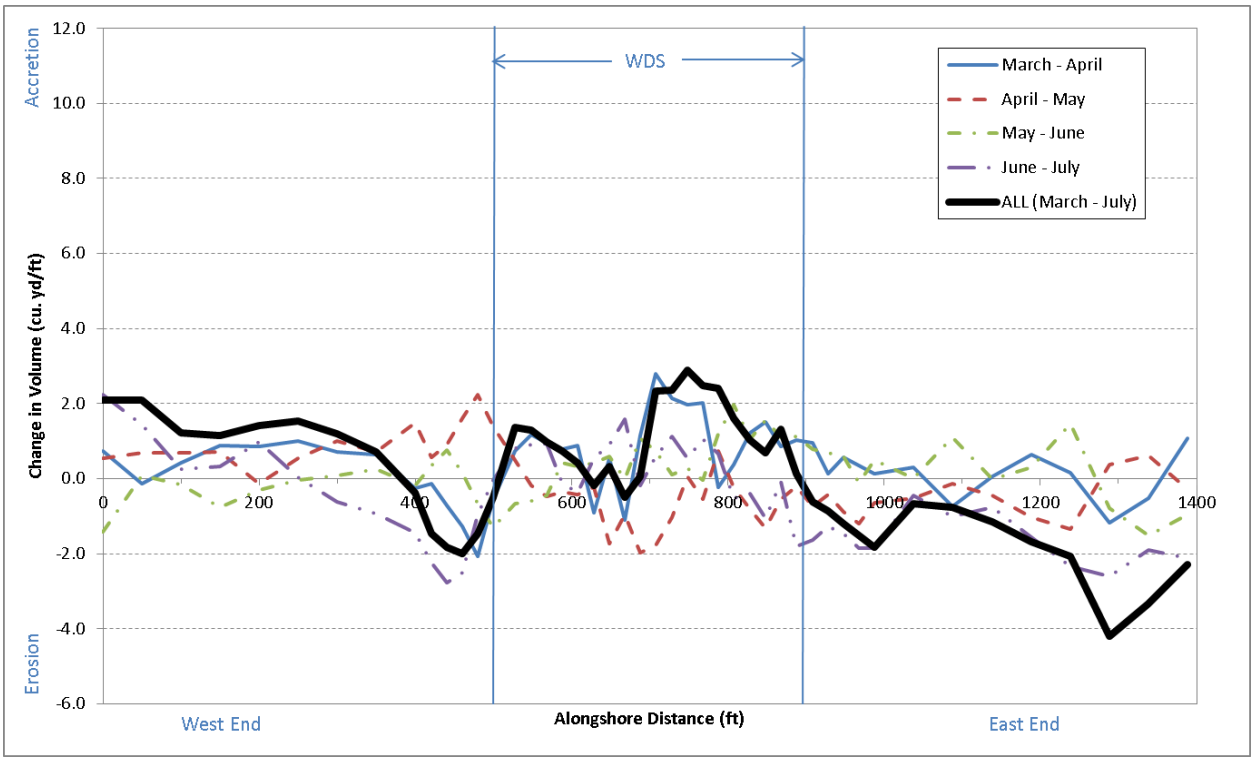

Figure 4-33. Changes in beach sand volume at Harbor Island

Table 4-3. Changes in Harbor Island beach volume landward of the low tide line

	Average Volume Change per Linear Foot (cy/ft)				
Area	**March - April**	**April - May**	**May - June**	**June - July**	**ALL (March - July)**
West end	0.3	0.8	-0.2	-0.2	0.7
WDS	0.9	-0.5	0.4	0.3	1.1
East end	0.0	-0.4	0.1	-1.6	-1.8

Figure 4-34 and Table 4-4 provide the volumetric changes for the upper beach on the landward side of the WDS. The upper beach in all three segments lost sand during the March to April time period, with the east end eroding the most and the upper beach protected by the WDS eroding the least (Table 4-3). The upper beach subsequently gained sand, and over the entire monitoring period, the upper beach segment with the WDS showed less net erosion (-0.2 cy/ft) than the areas to the east or west (both showed -1.0 cy/ft). The fact that the upper beach showed a small net loss of sand on the landward side of the WDS (Table 4-4) while the entire beach down to the low tide line showed accretion (1.1 cy/ft), indicates that the accretion in the WDS beach segment shown in Table 4-3 and Figure 4-33 occurred on the seaward side of the WDS.

The erosion downdrift of the WDS, in the adjacent lot west of the WDS, is evident in Figures 4-33 and 4-34 (see changes at alongshore distances between 400 and 500 feet). The fraction of this erosion attributable to the WDS cannot be quantified, but the pattern suggests that the WDS may contribute to scarp erosion within a short distance (i.e., mostly within 100 feet) of the end of the structure.

Table 4-4. Changes in Harbor Island beach volume landward of the WDS

	Average Volume Change per Linear Foot (cy/ft)				
Area	**March - April**	**April - May**	**May - June**	**June - July**	**ALL (March - July)**
West end	-1.7	0.8	0.6	-0.7	-1.0
WDS	-1.1	0.6	0.4	-0.1	-0.2
East end	-2.1	1.2	0.5	-0.6	-1.0

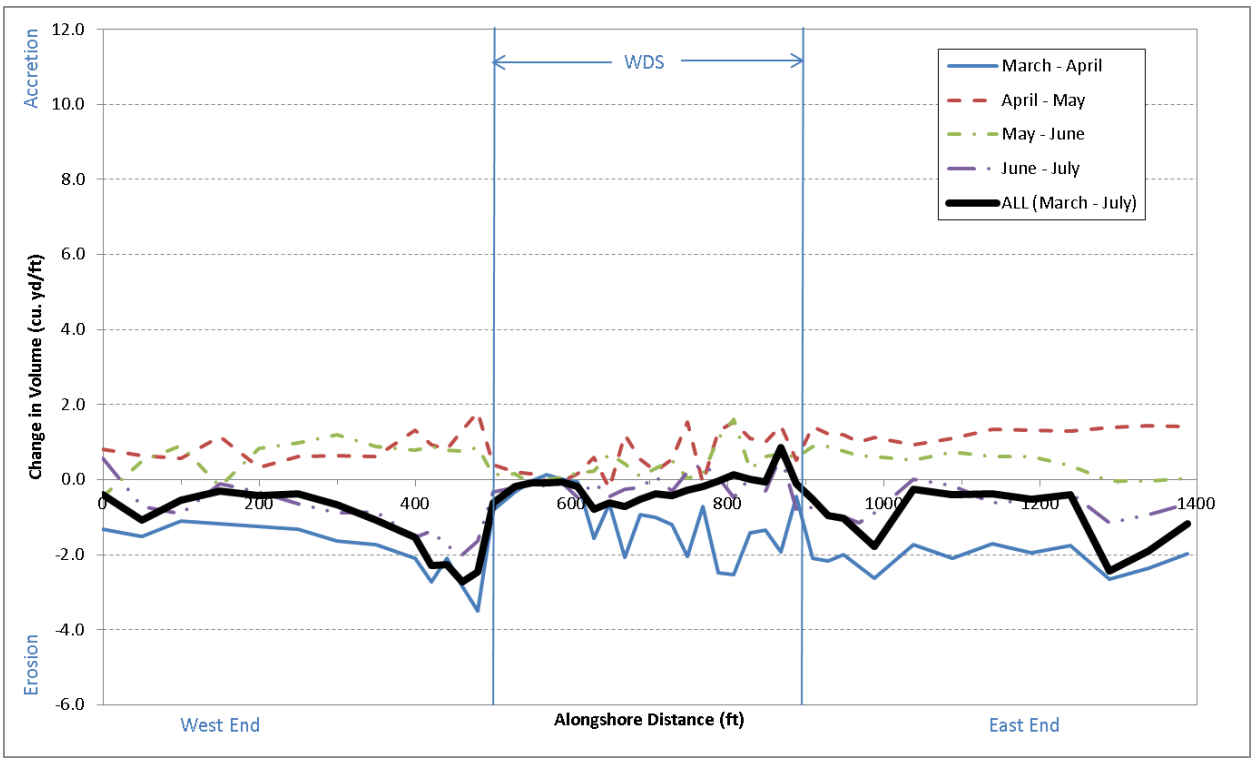

Figure 4-34. Changes in beach sand volume on the landward side of the WDS at Harbor Island

4.2.2 Beachwood East

The surveyed MHW contour positions at the BE study area are shown in Figure 4-35. The changes in these contours positions in between each survey are shown in Figure 4-36. Note that the revetment west of the WDS extends below the MHW contour, and therefore the MHW contour is not plotted along the west end of the study area. The average beach elevation of the WDS was approximately 1.9 ft NAVD88 in March, which is close to the MHW contour elevation of 2.05 ft NAVD88. As seen in Figure 4-

35, the MHW contour was mostly at or landward of the WDS throughout the study. The wave action between the March and April surveys resulted in recession of the MHW contour along the WDS by an average of 8 feet. In contrast, the MHW contour to the east moved seaward by an average of 3 feet in this time period. Over the whole study period between March and July, the MHW contour along the WDS beach segment eroded by an average of 6 feet, while the MHW contour east of the WDS moved seaward by an average of 38 feet. This accretion pattern east of the WDS is the result of the spreading of sand from the attaching shoal east of the BE project site.

Scarp lines experienced only minor changes during the monitoring period (Figure 4-37). The stability of scarp along the east end is due to the accretion from the shoal attachment and spreading. The stability of the scarp line on the landward side of the WDS despite the recession of the MHW contour in this area can be attributed to the combination of the WDS and the large sandbags that protect a majority of the scarp line along this segment of the beach.

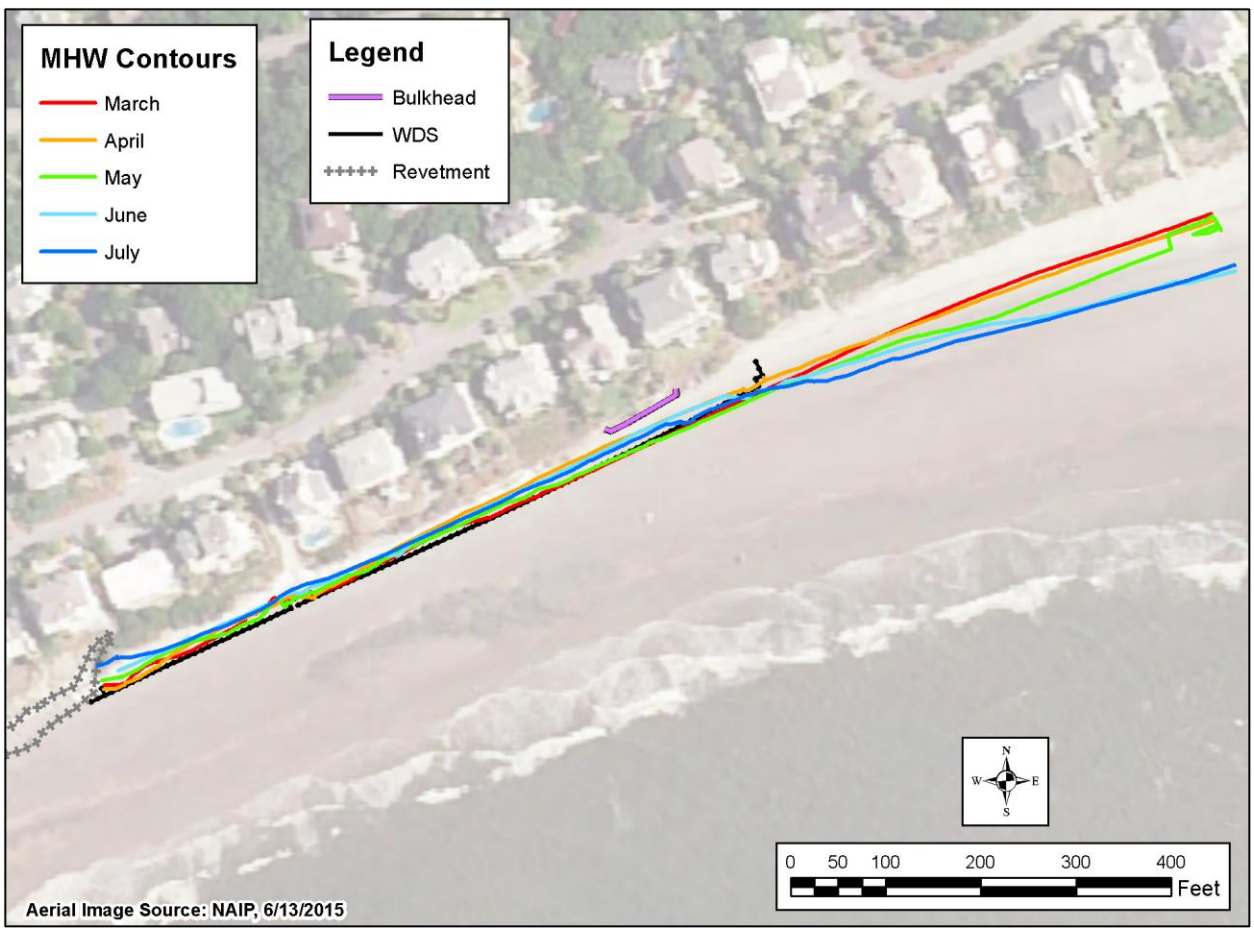

Figure 4-35. MHW contours at BE

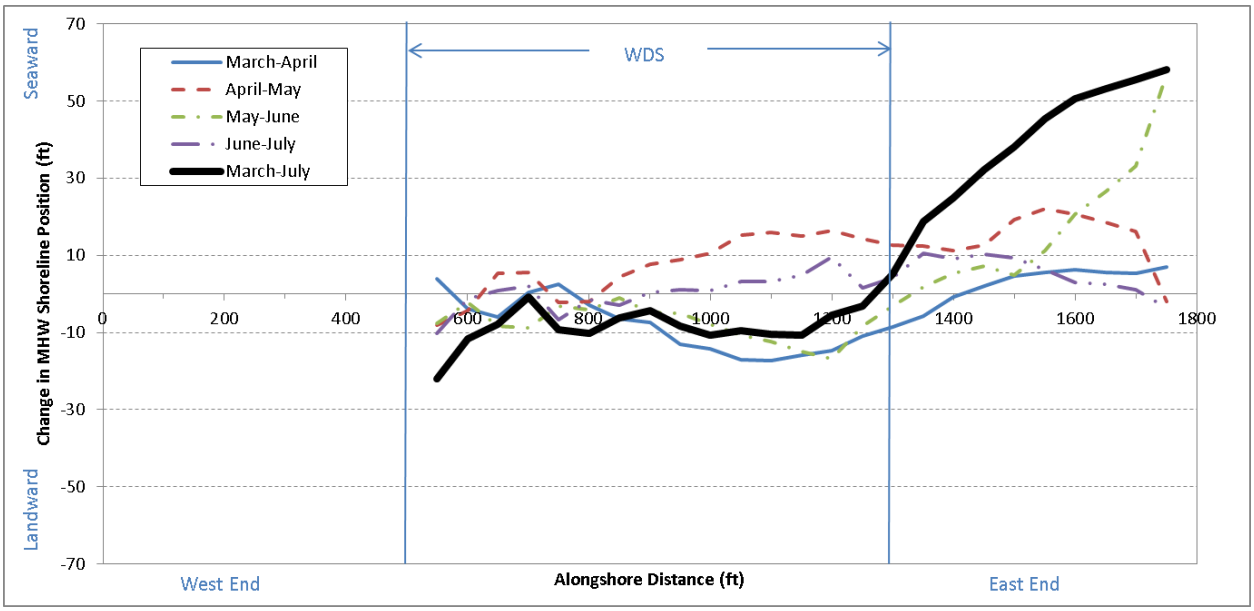

Figure 4-36. Change in MHW contours at BE

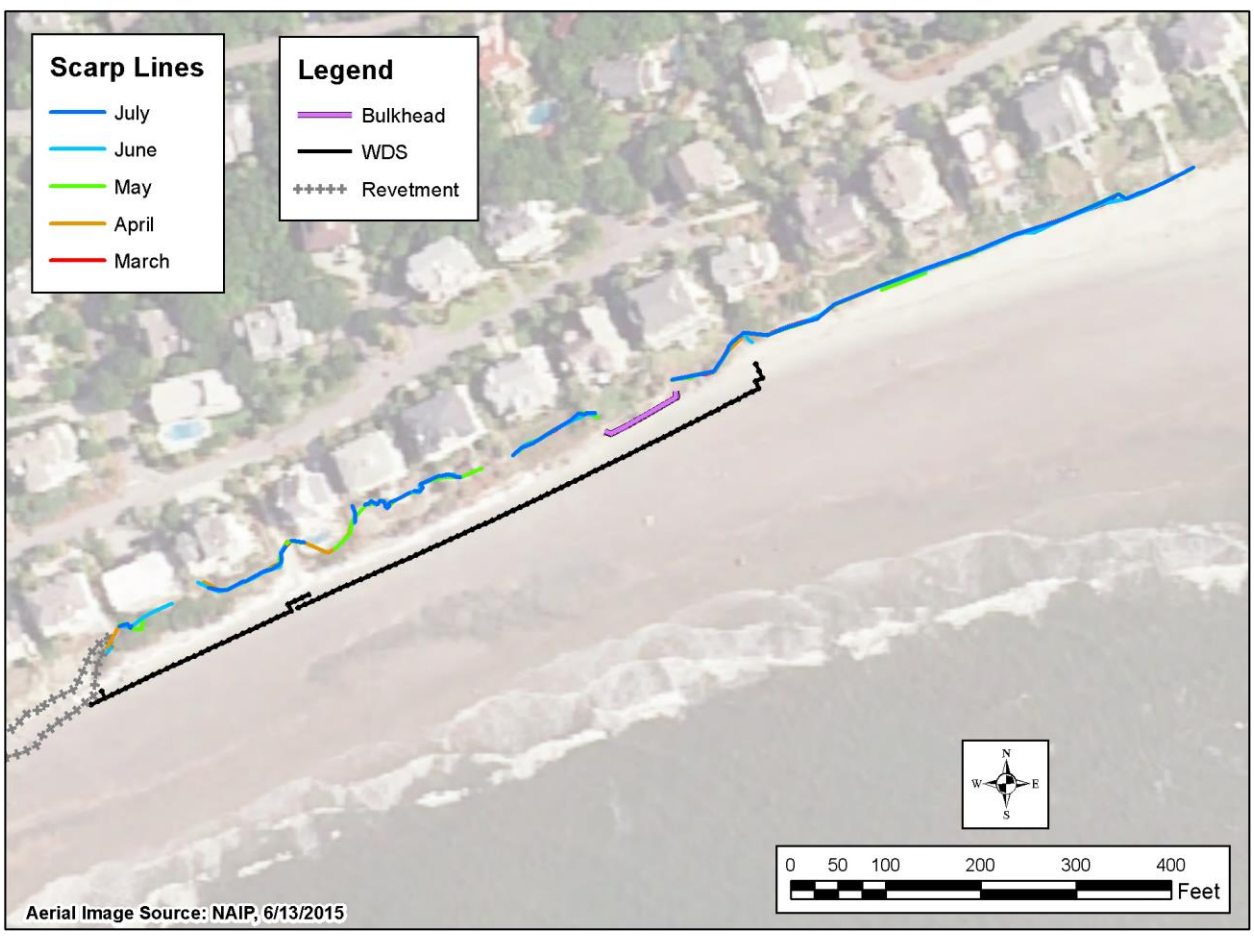

Figure 4-37. Scarp lines contours at BE

The shoreline from near the west end of the WDS looking towards the northeast is shown in Figures 4-38 through 4-41. These photographs were taken in March, April, May and July. The May photograph (Figure 4-40) shows the lowering of the WDS in an area where there was differential settlement that caused some piles to be higher than others. This required removal of the horizontal members and vibratory driving of the piles, and trenching of the beach to reinstall the horizontal members at the new elevation.

Figures 4-42 through 4-45 show the view from the community access point looking toward the northeast. Figure 4-44 shows the addition of sandbags to this shoreline prior to the May survey.

Figures 4-46 through 4-49 show the view from south of the bulkhead towards the northeast. The erosion of the beach on the landward side of the WDS between March and April is shown by Figures 4-46 and 4-47. The beach scoured along the WDS during this period, as seen near the WDS in Figure 4-47. The scour hole filled in naturally within the next month (Figure 4-48).

Figures 4-50 through 4-53 show the view from the east end of the WDS looking northeast. The wave action in April caused flow of water around the east end of the structure (Figure 4-51). Sandbags were subsequently placed to prevent sea turtles from crawling behind the WDS (Figure 4-53). As shown in these photographs, the scarp line along the next lot east of the WDS is also protected by large sandbags. It is not possible to determine what fraction of the erosion in this area, if any, can be attributed to the WDS interrupting longshore sand transport, versus the natural background erosion associated with the shoal attachment processes.

The changes in beach elevation between the March and April BE surveys are shown in Figure 4-54. The waves eroded the beach along the eastern two-thirds of the WDS (as shown by the red and yellow colors) and deposited sand lower on the beach profile (as shown by the blue colors). The beach seaward of the revetment to the west experienced a higher rate of erosion than the other parts of the study area.

Figure 4-55 shows the change over the entire March through July monitoring period. The dominant net change over the monitoring period was the accretion of the beach on the east end of the study area. Smaller changes include accretion of sand seaward of the WDS, erosion along the WDS, and erosion seaward of the revetment.

The changes in beach volumes during the monitoring period are summarized in Figure 4-56. Table 4-5 lists the average volumetric change for each beach segment. Between the March and April surveys, wave action caused an average erosion of 2.3 cy/ft along the beach west of the WDS. The net erosion was zero along the WDS beach segment (areas with erosion were offset by areas with accretion), and the area east of the WDS experienced a net accretion of 2.1 cy/ft. Wave action before the July survey caused erosion along the entire monitoring area. Over the entire monitoring period, the west end experienced net erosion, while the WDS beach segment and the area to the east experienced accretion (see the last column in Table 4-5). Overall, there was a strong pattern of erosion at the west end of the study area trending to accretion at the east end of the study area.

Figure 4-38. March 21 photograph from south end of WDS towards northeast

Figure 4-39. April 18 photograph from south end of WDS towards northeast

Figure 4-40. May 20 photograph from south end of WDS towards northeast

Figure 4-41. July 13 photograph from south end of WDS towards northeast

Figure 4-42. March 21 photograph from the community access point looking northeast

Figure 4-43. April 18 photograph from the community access point looking northeast

Figure 4-44. May 18 photograph from the community access point looking northeast

Figure 4-45. July 13 photograph from the community access point looking northeast

Figure 4-46. March 21 photograph south of the bulkhead looking northeast

Figure 4-47. April 18 photograph south of the bulkhead looking northeast

Figure 4-48. May 20 photograph south of the bulkhead looking northeast

Figure 4-49. July 13 photograph south of the bulkhead looking northeast

Figure 4-50. March 20 photograph from east end of WDS looking northeast

Figure 4-51. April 18 photograph from east end of WDS looking northeast

Figure 4-52. May 20 photograph from east end of WDS looking northeast

Figure 4-53. July 13 photograph from east end of WDS looking northeast

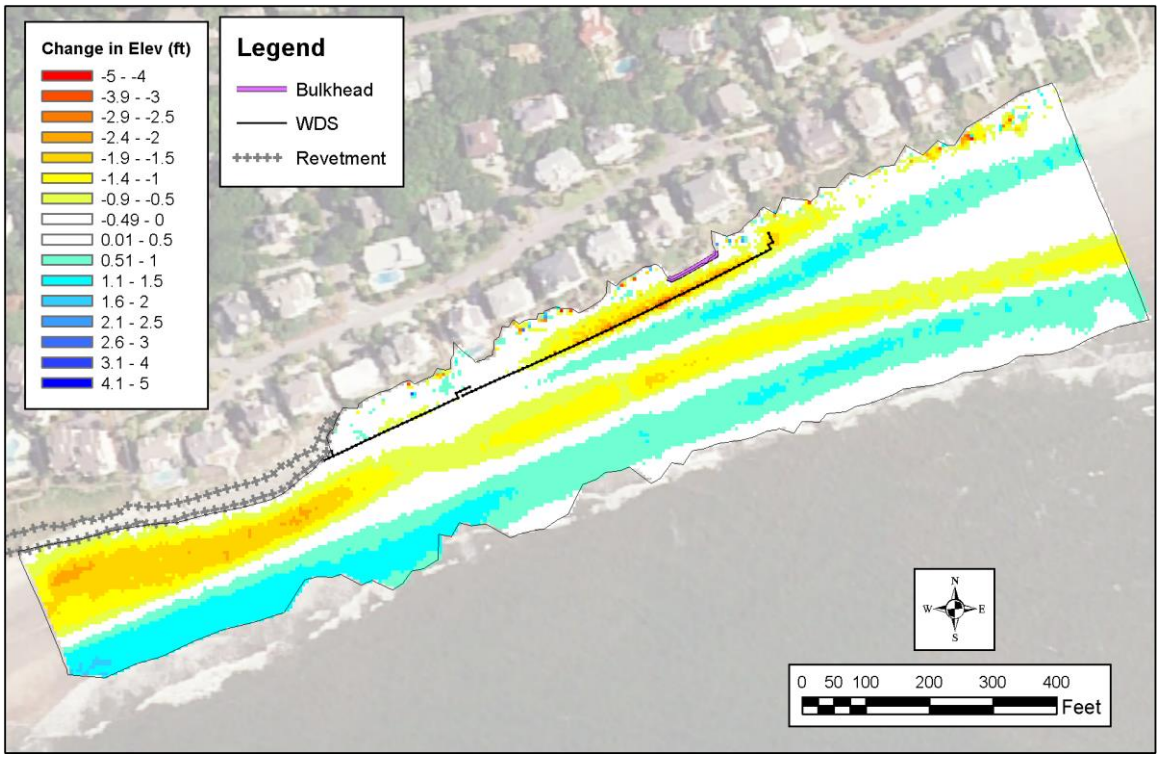

Figure 4-54. Changes in beach elevation between March and April BE surveys

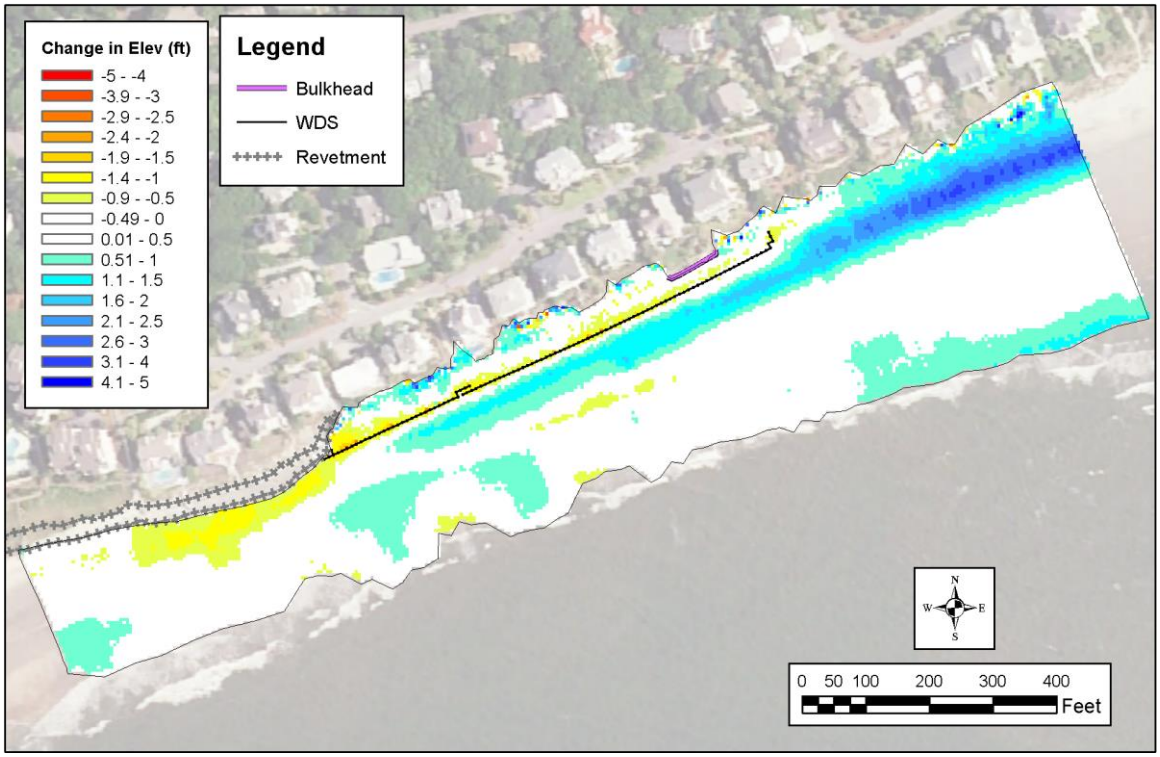

Figure 4-55. Changes in beach elevation between March and July BE surveys

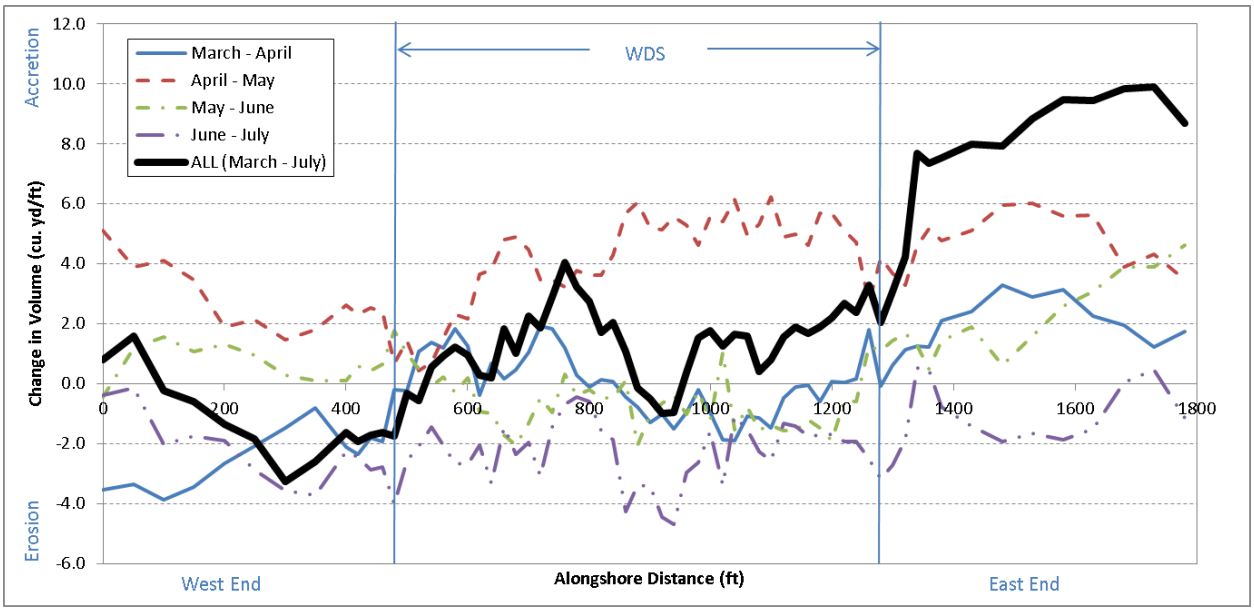

Figure 4-56. Changes in beach sand volume at BE

Table 4-5. Changes in BE beach volume landward of the low tide line

	Average Volume Change per Linear Foot (cy/ft)				
Area	**March - April**	**April - May**	**May - June**	**June - July**	**ALL (March - July)**
West end	-2.3	2.7	0.8	-2.3	-1.2
WDS	0.0	4.3	-0.7	-2.2	1.4
East End	2.1	4.9	2.3	-1.1	8.2

Figure 4-57 and Table 4-6 provide the volumetric changes for the upper beach on the landward side of the WDS. The changes in the upper beach along the west end are zero because of the revetment in this area and are not included in Table 4-6. The changes to the upper beach area are small (mostly less than ± 2 cy/ft) as compared to the changes to the beach extending to the low tide line shown in Figure 4-56 (ranging from almost -5 cy/ft to +10 cy/ft). The upper beach on the landward side of the WDS and along the beach segment to the east lost sand during the March to April time period (-0.6 and -0.2 cy/ft, respectively). Over the entire period, the beach on the landward side of the WDS eroded (-0.6 cy/ft), while the upper beach to the east accreted (1.3 cy/ft).

Similar to the observations at Harbor Island, the upper beach showed a small net loss of sand on the landward side of the WDS over the March to July period (-0.6 cy/ft) while the entire beach down to the low tide line for the same segment showed accretion (1.4 cy/ft) (compare Table 4-5 to Table 4-6). This indicates that the accretion in the WDS beach segment occurred on the seaward side of the WDS.

Table 4-6. Changes in BE beach volume landward of the WDS

	Average Volume Change per Linear Foot (cy/ft)				
Area	March - April	April - May	May - June	June - July	ALL (March - July)
WDS	-0.6	0.7	-0.6	-0.1	-0.6
East End	-0.2	0.7	0.6	0.2	1.3

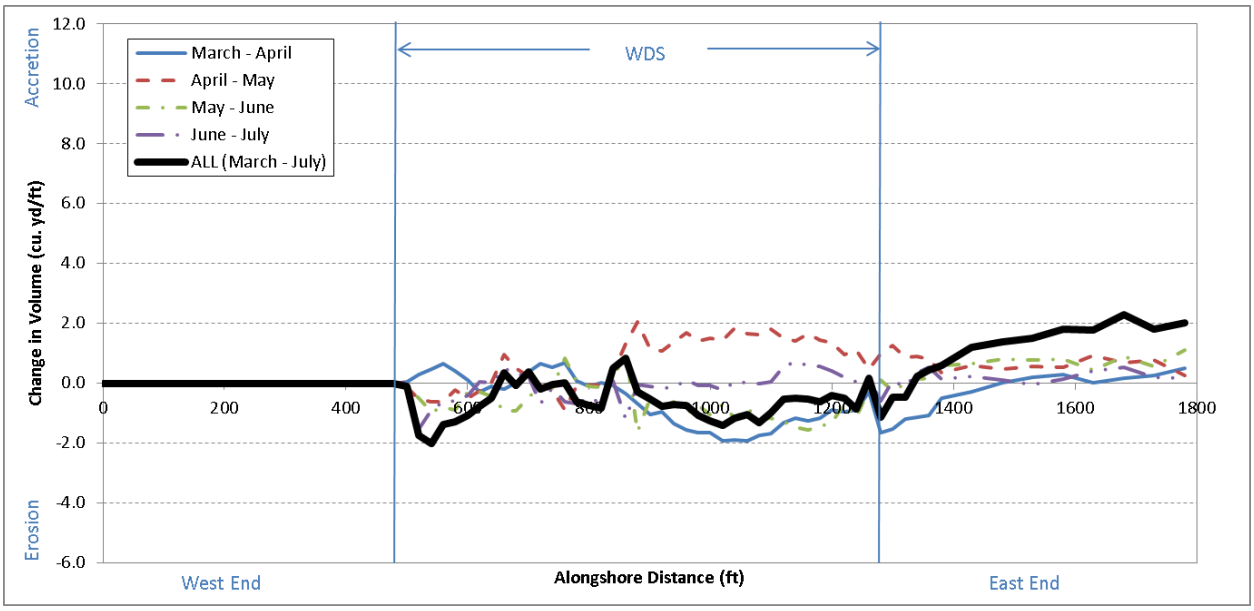

Figure 4-57. Changes in beach sand volume on the landward side of the WDS at BE

A small amount of erosion of the upper beach occurred within a short distance just east of the WDS (Figure 4-57). Again, the fraction of the erosion in this area caused by the WDS interrupting longshore sand transport, if any, cannot be separated from the natural background erosion/accretion pattern associated with the shoal attachment processes.

4.2.3 Ocean Club and Seascape Villas

The surveyed MHW contour positions at the OC and SV study area are shown in Figure 4-58. The changes in these contours positions in between each survey are shown in Figure 4-59. The wave activity between the March and April surveys caused recession of the MHW shoreline along the entire study area. In March, the MHW contour was seaward of the WDS except at the three-tiered section (the red line in Figure 4-58). By the April survey, the MHW contour receded up to the WDS at SV and landward of the WDS at OC (the orange line in Figure 4-58). The MHW contour along the WDS receded by an average of 32 ft. The areas to the east and west receded by 22 and 19 feet, respectively, on average. During the subsequent survey periods, the wave climate was milder, and the MHW contour shifted seaward.

Over the entire March to July study period, the area west of the WDS exhibited a net seaward shift in the MHW contour by an average of 14 feet. Figure 4-59 shows that the MHW contour receded at the three-tier WDS section and just east of this area (the three-tier WDS section is between alongshore

Figure 4-58. MHW contours at OC and SV

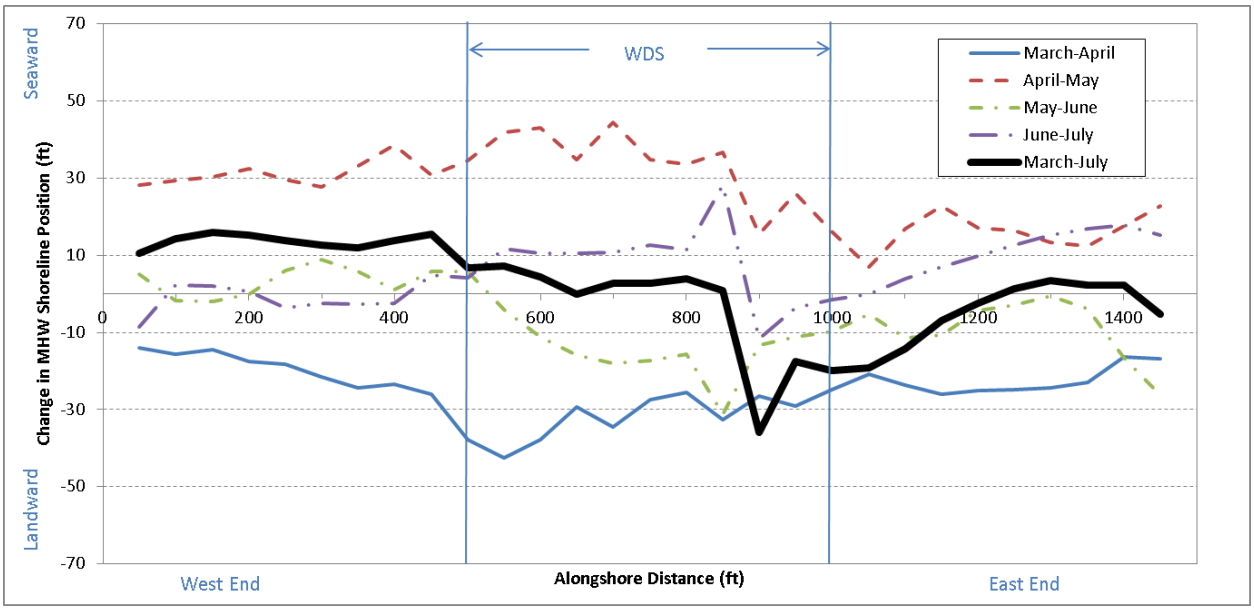

Figure 4-59. Change in MHW contours at OC and SV

distances 840 and 920 feet in this figure). The net sediment transport direction during the June to July period appears to be towards the east at this location. This resulted in sand accumulating on the updrift side (i.e., to the west) of the three-tier WDS section, while the MHW contour just downdrift (i.e., to the east) of this area receded. This pattern could be from the WDS protruding onto the beach sufficiently to partially interrupt the net flow of sand along the beach and cause erosion over a short distance on the downdrift side of the structure. Alternatively, the accretion shown in July may be sand spreading from the shoal attachment processes (the shoal attachment is west of the OC/SV site and the accretion from attachment will spread from west to east at this site). The July survey may have been a snap-shot of the accretion spreading from west to east, and sand may have subsequently spread east of OC. Given that the MHW contours for the other time periods did not show a significant offset between updrift and downdrift sides of the WDS, the MHW contours do not provide sufficient evidence to conclude that the WDS caused downdrift erosion at this site.

The scarp lines are shown in Figure 4-60. The landward most top-of-scarp line surveyed in March remained mostly stable throughout the study period. A small section of this scarp adjacent to the east side of the OC building receded about 4 feet over the course of the study. An additional scarp line just landward of the WDS was surveyed in April, and other small scarp features were surveyed in May, June and July.

Figures 4-61 through 4-64 show the view looking west from the beach on the landward side of the WDS near the west end of the structure. The wave action that eroded the beach between March and April caused minor erosion of the sand landward of the WDS (note the erosion seaward of the WDS in Figure 4-62 and the comparatively small amount of erosion on the landward side). Figures 4-63 and 4-64 show the subsequent recovery of the beach in this area.

The view from SV looking east toward OC is shown in Figures 4-65 through 4-68. Minor erosion occurred landward of the single-tier WDS between March and April (Figure 4-66). The two-tier WDS in front of SV was more effective at reducing erosion, as seen by the sand remaining in this area landward of the WDS.

Figures 4-69 through 4-72 show the WDS on the west side of OC, looking eastward. Following repair of the ground-level floor of the building the sandbags were removed. The waves between March and April eroded and lowered the beach profile in this area to the point that the bottom of the WDS horizontal members were above the beach. In response, sections of the OC WDS system were lowered by 2 feet in April. Additional sections were lowered in May. Note the difference in top elevation from lowering of the WDS between Figures 4-70 and 4-71. Typically, during lowering of the WDS, a trench is excavated along the WDS, and the sand is placed on the landward site. For example, note the pile of sand on the left side of Figure 4-73, which shows some of the excavation that occurred during lowering of the landward WDS tier at OC on April 22, 2016. This mechanically transfers some sand to the landward side of the WDS, but it appears to be a relatively small volume of sand, and it has no net effect on the total beach sand volume.

Figure 4-60. Scarp lines at OC and SV

Figure 4-61. March 24 photograph looking past the west end of the WDS

Figure 4-62. April 18 photograph looking past the west end of the WDS

Figure 4-63. May 20 photograph looking past the west end of the WDS

Figure 4-64. July 13 photograph looking past the west end of the WDS

Figure 4-65. March 24 photograph looking east from SV

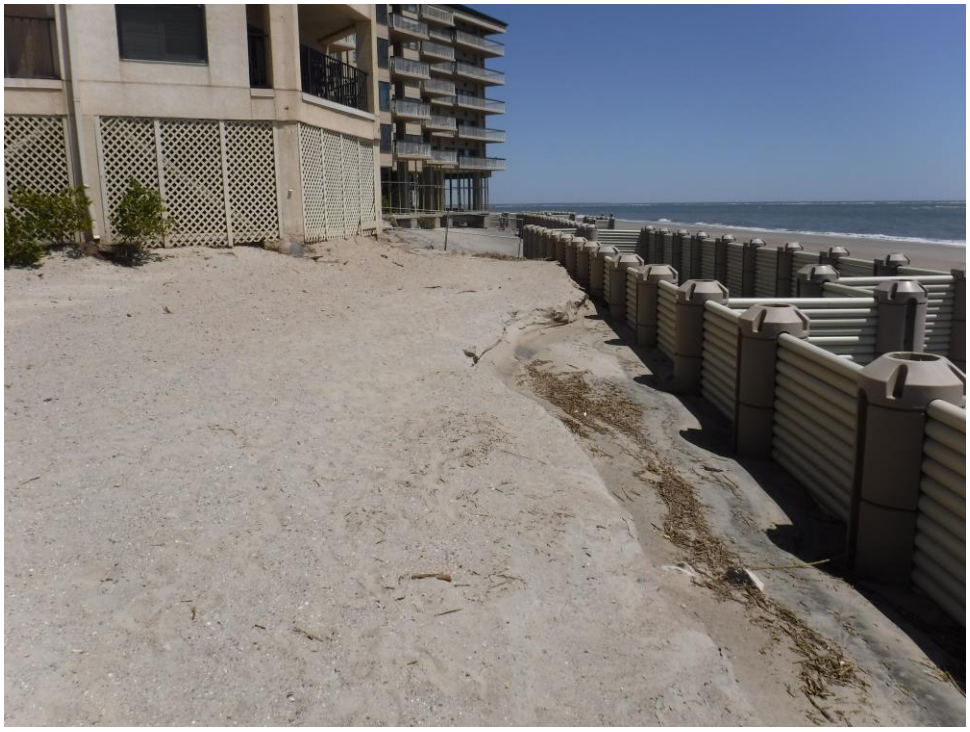

Figure 4-66. April 18 photograph looking east from SV

Figure 4-67. May 20 photograph looking east from SV

Figure 4-68. July 13 photograph looking east from SV

Figure 4-69. March 24 photograph looking east toward OC building

Figure 4-70. April 18 photograph looking east toward OC building

Figure 4-71. May 20 photograph looking east toward OC building

Figure 4-72. July 13 photograph looking east toward OC building

Figure 4-73. Compact excavator used for WDS installation

The area landward of the three-tiered section of the WDS is shown in Figures 4-74 through 4-77, as viewed from the east side of OC, looking south. Figure 4-75 shows the erosion in this area caused by the waves during the March through April period. Figure 4-76 shows this area following lowering of the landward tier of the WDS. The accumulated sand landward of the WDS in this photograph is both accretion from natural beach recovery, as well as some mechanical landward transfer of sand from the WDS lowering process. By July, some of this material was lost in the area near the seaward-most corner of the OC building (Figure 4-77).

Figures 4-78 through 4-81 show the east end of the WDS and the beach to the east. The scarp receded a few feet on the east side of the OC building between March and April (Figures 4-78 and 4-79).

The view from the seaward side of the three-tiered WDS section is shown in Figures 4-82 through 4-85. The lowering of the scouring of the beach below the horizontal panels is shown in Figure 4-83. The localized scour holes gradually fill in, but by July the overall beach elevation in this area remained lower than in March.

Figure 4-74. March 24 photograph from east side of OC looking south

Figure 4-75. April 18 photograph from east side of OC looking south

Figure 4-76. May 20 photograph from east side of OC looking south

Figure 4-77. July 13 photograph from east side of OC looking south

Figure 4-78. March 20 photographs from east side of OC looking east

Figure 4-79. April 18 photograph from east side of OC looking east

Figure 4-80. May 20 photograph from east side of OC looking east

Figure 4-81. July 13 photographs from east side of OC looking east

Figure 4-82. March 20 photographs of southeast corner of three-tier WDS section

Figure 4-83. April 18 photograph of southeast corner of three-tier WDS section

Figure 4-84. May 20 photograph of southeast corner of three-tier WDS section

Figure 4-85. July 13 photograph of southeast corner of three-tier WDS section

The changes in beach elevation between the March and April OC/SV surveys are shown in Figure 4-86. The waves eroded the upper beach (as shown by the red and yellow colors) and deposited sand lower on the beach profile (as shown by the blue colors). The highest rates of erosion occurred along the WDS in front of the OC building. The natural contours of the beach bend towards the corner of the OC building, and therefore, this is the area where the WDS is in the deepest water at high tide and exposed to the largest waves (see plot of March beach elevations in Figure 4-87).

Figure 4-88 shows the change from April to May. The milder wave action during this period moved sand landward, as shown by the broad accretion along the shoreline, particularly on the western side of the study area. In addition to the natural accretion from sand migrating onshore, some sand was mechanically transferred landward of the WDS during the WDS lowering processes.

A ridge and runnel feature (i.e., a bar and trough parallel to the shoreline) formed on the lower beach in July, as shown by the beach elevations in Figure 4-89. These features are more pronounced on the southern side of the study area. Sand often migrates onshore through a process of landward movement of ridge-and-runnel features that gradually merge onto and widen the dry beach.

Figure 4-90 shows the net change over the entire March through July monitoring period. This plot shows accretion of sand along the seaward boundary of the survey area, near the low tide line. This accretion is from sand migrating onshore. This plot also shows an area of accretion near the MHW line along the western half of the study area, and it shows erosion to the northeast of the three-tier section of the WDS at OC. This pattern may be due, in part, from the WDS accumulating sand on the updrift (i.e., west)

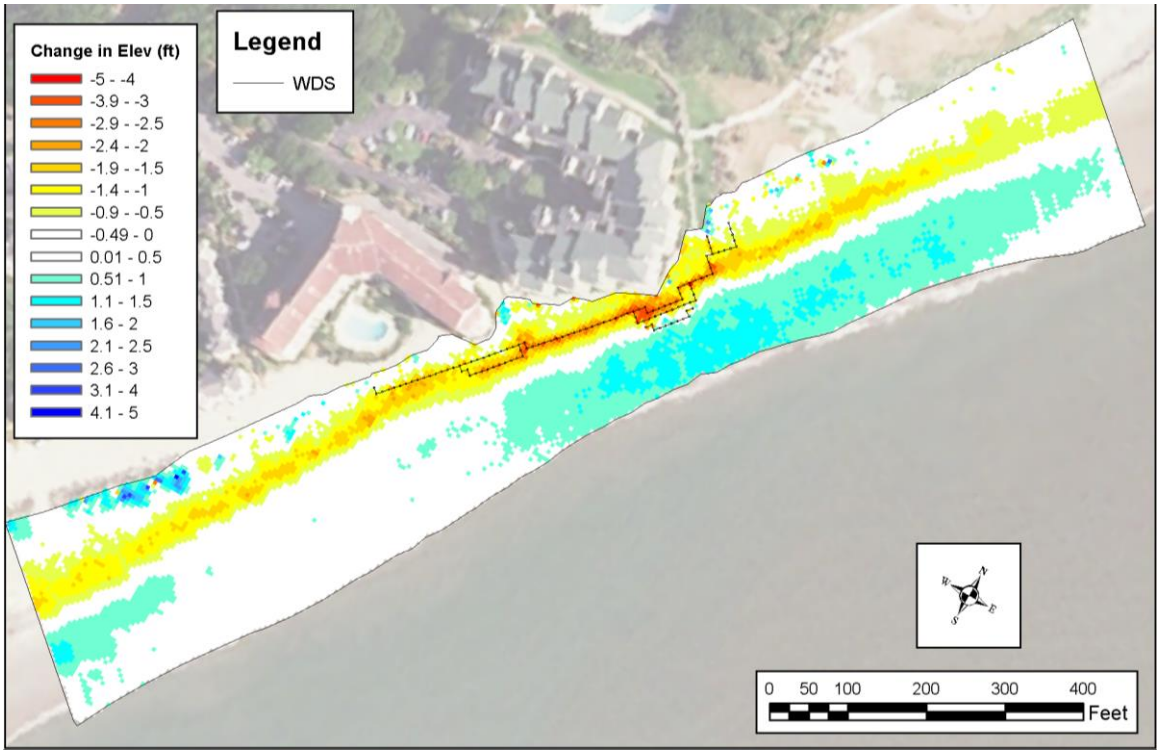

Figure 4-86. Changes in beach elevation between March and April OC/SV surveys

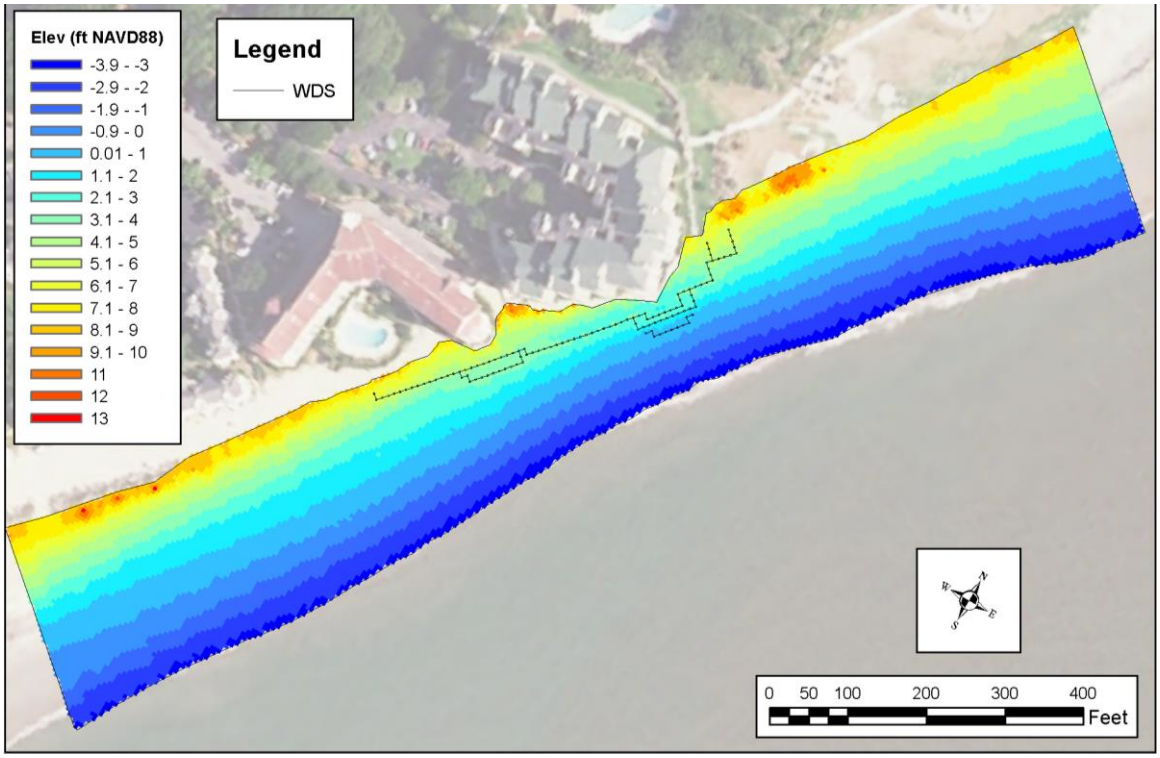

Figure 4-87. March beach elevation at OC/SV study area

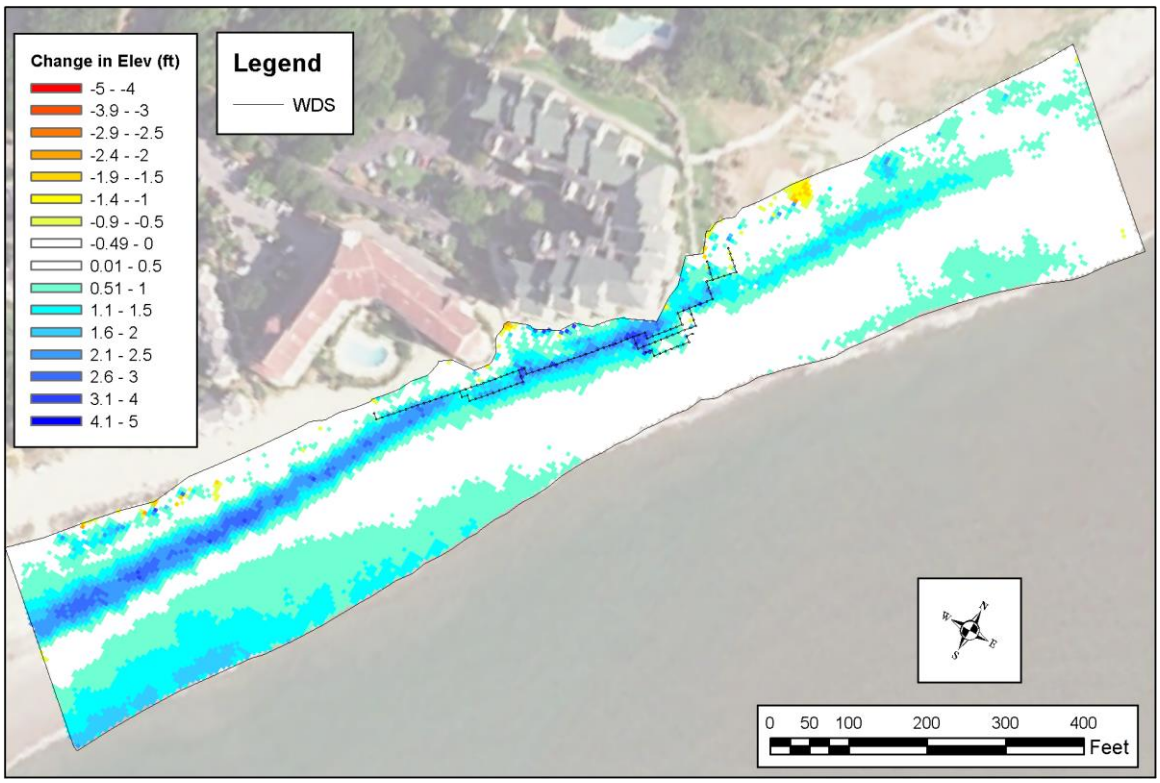

Figure 4-88. Changes in beach elevation between April and May OC/SV surveys

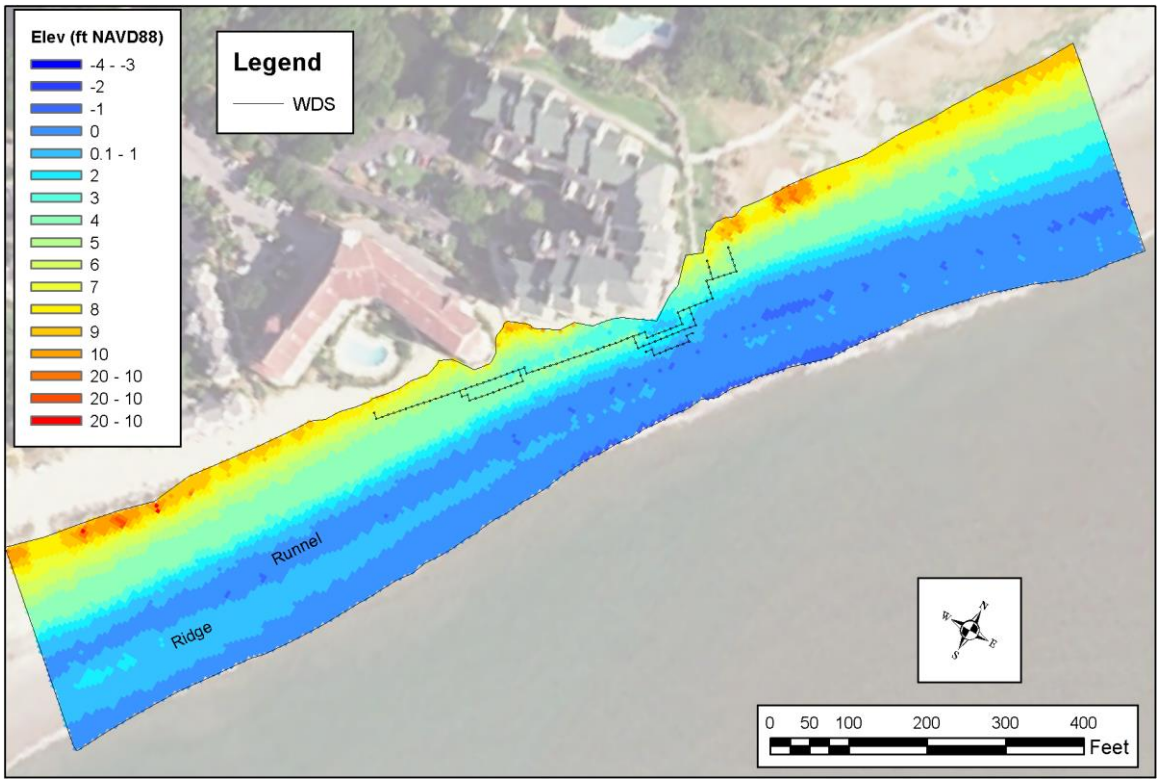

Figure 4-89. July beach elevation at OC/SV study area

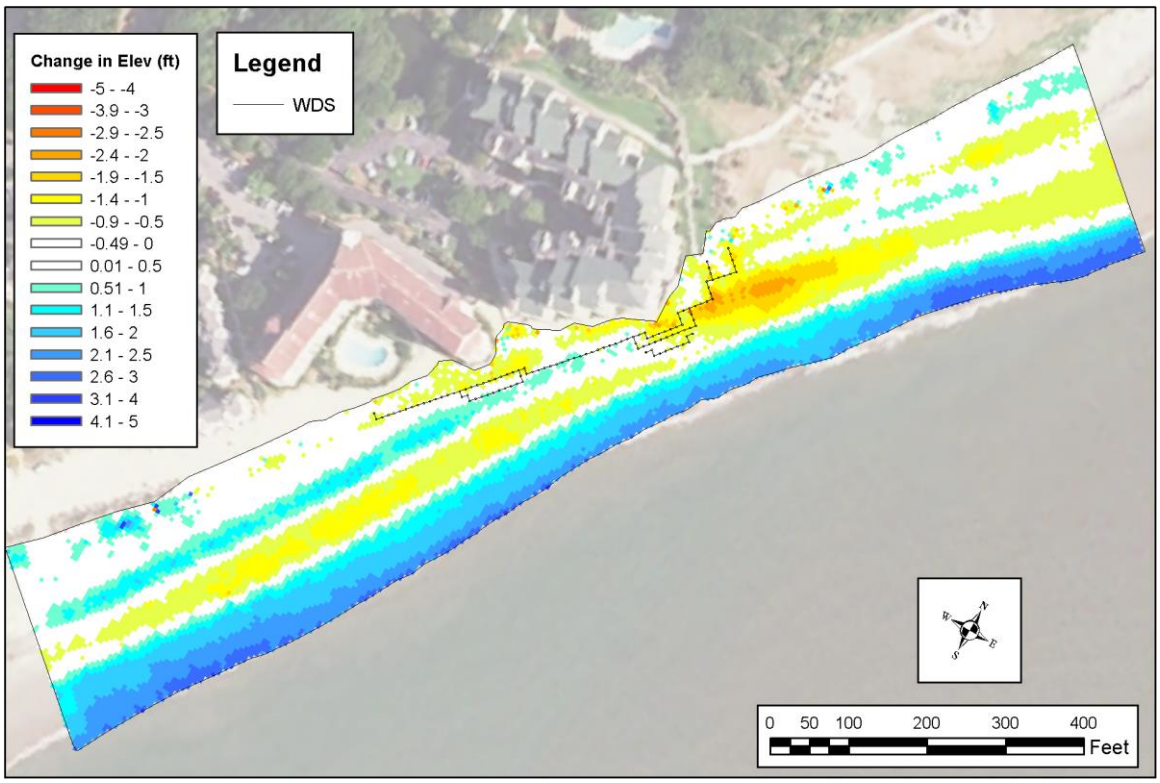

Figure 4-90. Changes in beach elevation between March and July OC/SV surveys

side and causing a similar amount of erosion on the downdrift (i.e., east) side. However, this may be a transient pattern associated largely with the ridge and runnel formation in July (Figure 4-89) and other factors that result in greater accretion on the west side of the study area than on the east side. Continued monitoring after July 2016 would have identified if this pattern of erosion downdrift from the three-tier section of the WDS persisted.

Changes in beach volume along the OC/SV shoreline area shown in Figure 4-91 and average changes for each beach segment are listed in Table 4-7. It should be noted that 58 large sandbags placed along the corner of OC on February 29th were cut and dumped onto the beach at some point in March following completion of repairs to the building. This is a net addition of sand to the beach of about 39 cy, or about 0.6 cy/ft along the 60 ft of shoreline where the bags were placed. In addition, an unknown quantity of beach quality sand was placed underneath the OC building during the repair of the ground floor slab, and some of this sand was subsequently washed onto the beach by wave action.

The dominant feature in Figure 4-91 is the large amount of accretion between the April and May surveys. The west end of the study area gained the most (6.3 cy/ft, on average), while the other segments gained smaller amounts, in a decreasing trend toward the east. This gain in sand volume is primarily from sand moving onshore. Over the entire study period, there was a net increase in sand volume along the beach, with the exception of a short segment near the east end of the WDS.

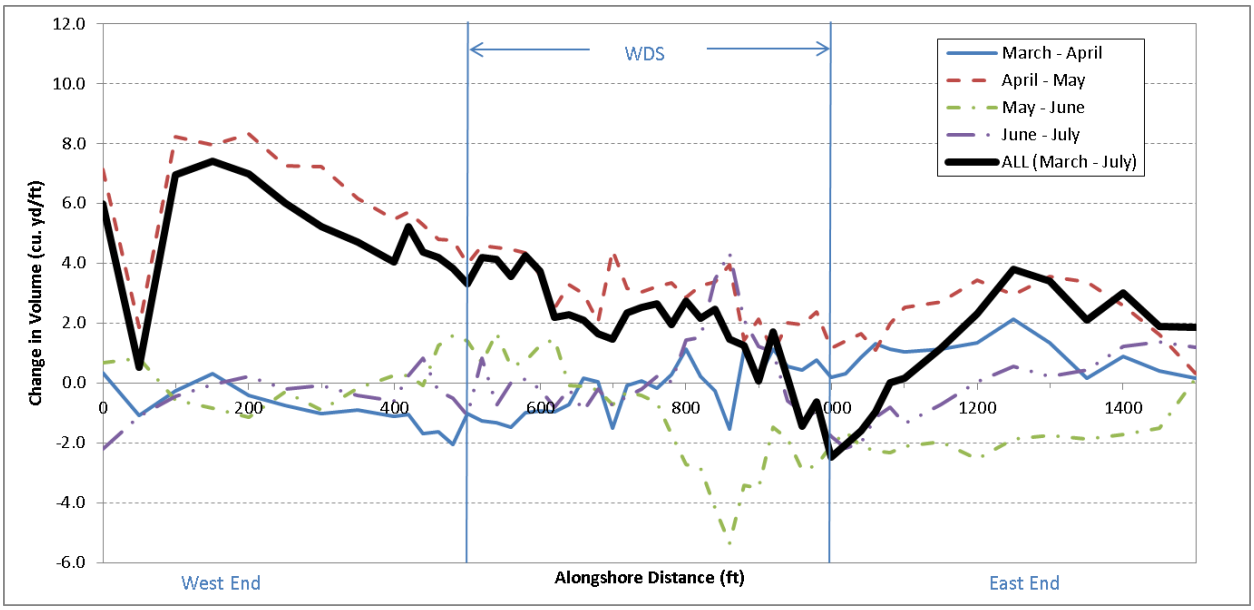

Figure 4-91. Changes in beach sand volume at OC/SV

Table 4-7. Changes in OC/SV beach volume landward of the low tide line

	Average Volume Change per Linear Foot (cy/ft)				
Area	**March - April**	**April - May**	**May - June**	**June - July**	**ALL (March - July)**
West end	-0.7	6.3	-0.1	-0.4	5.1
WDS - SV	-0.9	3.7	0.6	-0.3	3.1
WDS - OC	0.2	2.7	-2.4	0.7	1.3
East End	1.0	2.5	-1.8	0.0	1.6

Changes landward of the WDS were much smaller than changes over the entire profile, as shown in Figure 4-92 and in Table 4-8. The area landward of the WDS was more dynamic (i.e., greater amounts of both accretion and erosion) than the adjacent areas to the east and west. A fraction of the accretion landward of the WDS between the April and May surveys can be attributed to the mechanical transfer of sand during the WDS lowering process. The net change over the study period showed a small amount of accretion to the west of the WDS (0.3 cy/ft, on average), erosion landward of the WDS (-0.7 cy/ft at SV and -0.9 cy/ft at OC, on average), and a small amount of erosion east of the WDS (-0.2 cy/ft, on average). As shown in Figure 4-92, any downdrift erosion effect near the end of the WDS is not large enough to be distinguished apart from the larger erosion/accretion trends along the shoreline.

Table 4-8. Changes in OC/SV beach volume landward of the WDS

	Average Volume Change per Linear Foot (cy/ft)				
Area	March - April	April - May	May - June	June - July	ALL (March - July)
West end	-0.3	0.2	0.8	-0.4	0.3
WDS - SV	-0.4	0.0	0.2	-0.4	-0.7
WDS - OC	-1.3	1.0	-0.3	-0.3	-0.9
East End	-0.3	0.3	0.2	-0.5	-0.2

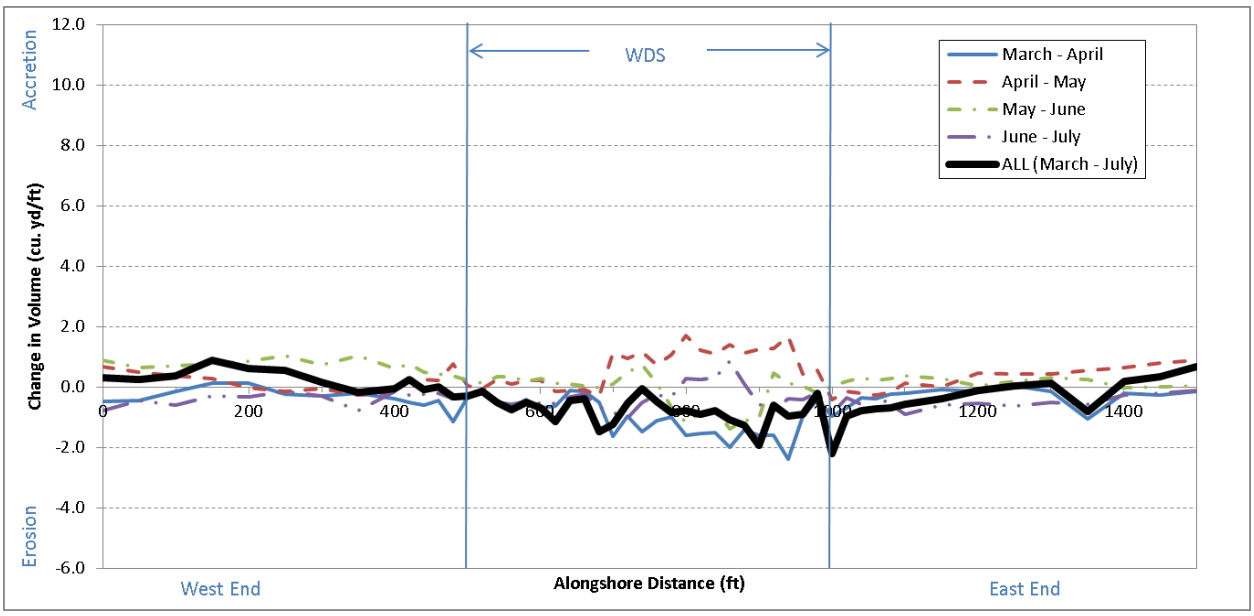

Figure 4-92. Changes in beach sand volume landward of the WDS at OC/SV

4.3 Scour

As mentioned previously, storms may cause localized scour seaward of and at the lateral ends of seawalls or bulkheads. An example is shown in Figure 4-93, which shows scour along one end of a bulkhead southeast of the Harbor Island WDS site. The scour was caused by northeasterly wave action prior this April 19 photograph, and the scour was temporary.

Scour occurred at all four WDS sites prior to the April survey, and the beach in these areas subsequently accreted. Figures 4-95 through 4-102 show evidence of localized scour and beach recovery along the WDS at Harbor Island, BE, SV and OC, respectively. Figure 4-95 shows scour along the WDS at lot 49 at Harbor Island. A much smaller amount of scour was observed at this location in May, and the scour was gone by the June survey event (Figure 4-96). An example of scour along the WDS at BE observed in April is shown in Figure 4-97. By May, the scour at BE had disappeared (Figure 4-98). The seaward second-tier at SV showed evidence of scour in April (Figure 4-99), and the scour was gone by May (Figure 4-100). At OC, there was a localized scour surrounding the three-tier WDS in April (Figure 4-101). In addition to the localized scour, the entire beach profile was lowered in this area. The scour in this area took longer to

Figure 4-93. Scour at bulkhead on the beach (April 19, 2016)

Figure 4-94. Scour at bulkhead on the beach (June 16, 2016)

Figure 4-95. Scour at the Harbor Island WDS (April 19, 2016)

Figure 4-96. Beach without scour at the Harbor Island WDS (June 16, 2016)

Figure 4-97. Scour at the BE WDS (April 18, 2016)

Figure 4-98. Beach without scour at the BE WDS (May 20, 2016)

Figure 4-99. Scour at seaward tier of the SV WDS (April 18, 2016)

Figure 4-100. Beach without scour seaward tier of the SV WDS (May 20, 2016)

Figure 4-101. Scour at the OC WDS (April 18, 2016)

Figure 4-102. Beach with minimal scour at the OC WDS (July 13, 2016)

recover than at the other sites. By July, the beach in this area accreted substantially, and only minimal scour was observed near a few piles on the seaward-most tier of the WDS (Figure 4-102).

High tide observations of wave action at these sites confirmed that if the scour hole is deep enough to allow free flow of water beneath the horizontal members, the WDS becomes less effective at attenuating waves. Mays and Watson (2016) refer to this scour as trenching, and they state that "trenching, caused by significant erosion events, and related to the system's allowance of rising tide levels (with moving water) behind the WDS can, when deep enough, become a concern." The authors do not elaborate on why deep scour is a concern, and therefore it is not clear if, in addition to reduced efficacy, their concerns include structural stability issues or other potential adverse impacts. Mays and Watson (2016) note that "removing just the horizontal panels in areas of local trenching almost immediately restores the beach profile by eliminating the trenching effect." They also recommend periodic sand renourishment on the landward side of the WDS and movement of this sand, as necessary, to address concerns from temporary trenching.

Based on our field observations, scour can occur at the WDS when subjected to erosive wave action. This scour is limited to a temporary localized effect that allows greater wave energy to be transmitted to the landward side of the WDS. There is no evidence of adverse impacts other than reduced WDS performance (i.e., reduced wave attenuation).

4.4 Wave Attenuation

In general, when a wave interacts with a coastal structure such as the WDS, some of the wave energy is dissipated through wave breaking or structure deflection (i.e., flexing or movement of the structure), some of the wave energy is reflected, and some of the wave energy is transmitted landward of the structure. Wave interaction with the WDS is dependent on the water level and offshore wave conditions. As the tide rises and the stillwater level approaches the WDS, the WDS is within the swash zone, which is the area of the beach where waves run up the beach after breaking. During these conditions, the WDS is effective at blocking the uprush of the wave, either dissipating or reflecting all of the wave energy when there are no spacers between the horizontal members. Figure 4-103 shows an example of the WDS in the swash zone near the stillwater level. The WDS was observed to block all of the wave uprush on the beach during these conditions. A small amount of water and sediment passed through the WDS, but no wave energy passed through when the WDS was in the swash zone or in a few inches of water. Figure 4-104 shows the reflected wave energy during these conditions.

When the WDS is in deeper water (e.g., at the seaward-most tier of the OC WDS, or during very high tide conditions at the other WDS sites), the fraction of transmitted wave energy increases. The amount of wave energy transmitted depends on the presence of spacers between the horizontal members, the water depth, the incident wave characteristics and the presence/absence of scour beneath the WDS.

Figure 4-105 shows an example of wave breaking at the BE WDS in April. This photograph shows water jetting between the horizontal members and water jetting vertically. Note that this configuration includes no spacers between the horizontal members, and the April conditions included a scour hole

Figure 4-103. Example of WDS in the swash zone at BE

Figure 4-104. Example of reflected wave in the swash zone

underneath the WDS. The same wave roughly one second later is shown in Figure 4-106. This figure shows the transmitted and reflected waves. The reflected wave is coincident with the next incoming wave, which is shown by the amplified wave height at the time of the photograph. The transmitted wave surged up the beach and was largely caused by transmission of wave energy underneath the WDS because of the scour hole. Mays and Watson (2016) explain that this condition can be avoided by active management of the WDS through periodic placement of sand on the landward side of the structure or temporary removal of the horizontal panels to allow the scour hole to fill in.

Figures 4-107 and 4-108 show an aerial view of a wave breaking at the west end of BE (Figure 4-107) and the reflected wave roughly one second later (Figure 4-108). The reflected wave energy does not adversely affect the beach, because the reflected waves are not a significant factor in beach profile change or toe scour (Kraus and McDougal 1996).

During energetic wave conditions, wave overtopping was observed (Figure 4-107). The return flow of water from wave overtopping likely contributes to the creation of scour holes beneath the WDS during high tides with energetic waves. The transport of overtopping water laterally along the shoreline can also contribute to erosion landward of the WDS.

4.5 Public Safety

The power of breaking waves has caused many injuries swimmers, including spinal cord injuries. Spinal cord injuries most often occur when diving headfirst into the water or being tumbled in the waves by the force of the waves (NOAA 2016). It is conceivable that a breaking wave could push a swimmer into the WDS. No swimmers were observed by the study team in breaking waves near the WDS installations. Warning signs were placed at the BE and OC/SV sites warning beachgoers of potential injuries from the WDS (Figure 4-110).

Some coastal structures have exposed bolts or other metal that cause lacerations to swimmers. The metal nuts and bolts securing the WDS are recessed into the housing reducing this potential hazard.

Marine debris is a common hazard to swimmers and beach walkers. According to NOAA (2016), "*huge amounts of consumer plastics, metals, rubber, paper, textiles, derelict fishing gear, vessels, and other lost or discarded items enter the marine environment every day, making marine debris one of the most widespread pollution problems facing the world's oceans and waterways.*" The WDS is designed to withstand common storm wave conditions, although in more than one instance the pipes that comprise the horizontal panels were dislodged from the structure. This occurred at BE during Hurricane Joaquin, where at least 11 panels had pipes dislodged. Also, a few pipes were observed beneath the WDS at OC in April 2016 (Figure 4-111) and are assumed to have been dislodged by the wave action in mid-April. The dislodged pipes are negatively buoyant (PVC has a specific gravity of 1.4), and are unlikely to be a significant hazard to swimmers during non-storm conditions.

Coastal structures can obstruct the movement of emergency vehicles along the beach. The WDS structures are located relatively high on the beach and are above the stillwater level through much of the tidal cycle. Therefore, during part of the tidal cycle, emergency vehicles can pass on the seaward

Figure 4-105. Example of wave breaking and water jetting through WDS at BE

Figure 4-106. Example of transmitted and reflected waves from same incident wave in Figure 4-105

Figure 4-107. Aerial view of breaking wave at west end of BE

Figure 4-108. Aerial view of reflected wave at west end of BE

Figure 4-109. Example of overtopping at BE

Figure 4-110. Warning sign

Figure 4-111. Pipes beneath WDS at Ocean Club (April 18, 2016)

side of the WDS installations. During high tide there is no dry beach at the WDS sites and vehicles cannot pass along the seaward side of the WDS. During these times, emergency vehicles must find access to the beach on either side of the WDS. This does not adversely affect public safety as long as either the WDS does not project out onto the beach far enough to obstruct emergency vehicles, or emergency access points are available on the adjacent shorelines on either side of the WDS.

4.6 Public Access

The WDS sites have various degrees of public access. Harbor Island is a private residential and resort community with no upland public beach access, although the public could access the beach via boat. At IOP, the eastern-most public access point is about 0.4 miles southwest of the WDS installed at the BE site and 1.4 miles southwest of the OC/SV site, which are within walking distance of the public access point.

The primary concern related to public access is the potential for obstructing beach walkers. SCDHEC-OCRM received an emailed complaint from a beach walker who wrote that they were obstructed by the WDS at Ocean Club during high tide and was prevented by security personnel from using a sidewalk as a short detour around the WDS. To estimate how frequently the WDS becomes an obstruction, GEL evaluated the fraction of time that the WDSs are below tidal water levels.

The WDS is below the tidal stillwater level varying amounts of time, depending on the location. GEL identified the lowest beach elevation along each WDS for each monthly survey and compared these data to the tidal water levels for the study period (described in Section 4.1 of this report) and calculated the percentage of time that the WDS was below the tidal stillwater level. The percentages are summarized in Table 4-9. Note that the tidal stillwater does not include wave setup effects, and

Table 4-9. Percent time lowest section of WDS is below stillwater level

	Percent time below tide level				
Location	**March**	**April**	**May**	**June**	**July**
BE	42	46	46	48	50
SV	6	34	11	15	1
OC	51	48	39	58	54
HI	20	21	27	35	33

therefore these percentages underestimate the percentage of time that the WDS structures are below the stillwater level. Furthermore, even when the WDS is above the tidal stillwater level, the wave runup on the beach will still obstruct beach walkers during energetic wave conditions.

At Harbor Island, beach walkers cannot pass the WDS on dry beach more than 35 percent of the time. However, wave heights are typically small at this location, and beach walkers can walk through shallow water seaward of the WDS much of the time that there is no dry beach assuming water temperatures are conducive to having wet feet. Given that the WDS is in close proximity to the houses and sandbags landward of the WDS (at the narrowest part of the Harbor Island beach the WDS is within 5 feet of sandbags placed at lot 52 and within 13 feet of sandbags at lot 49), the WDS is only a minor obstruction to beach walkers as compared to the beach that would exist without the WDS.

Beach walkers at BE may not be able to pass seaward of the WDS more than 50 percent of the time. However, they can walk along the beach on the landward side of the WDS nearly all of the time. For lots protected by sandbags, the WDS at this site is generally within 20 to 30 feet seaward of the sandbags. The WDS is located 27 to 32 feet seaward of the bulkhead. As a result, the BE WDS causes minimal restrictions to beach walkers.

In April, beach walkers at SV may not be have been able to pass seaward of the WDS more than 34 percent of the time, although this decreased to one percent by July due to accretion. Beach walkers can walk on the landward side of the WDS at SV, and therefore, the WDS causes minimal restrictions to beach walkers at SV. The landward tier of the WDS 38 feet seaward of the scarp line at the narrowest part of the beach, and the seaward tier of the WDS is 52 feet seaward of the scarp at this point.

At OC, beach walkers at may not be able to pass seaward of the WDS more than 58 percent of the time. Furthermore, there is no alternative route on the landward side of the WDS to allow access to the beach on the opposite side of the structure except through the property itself. Therefore, the WDS at OC obstructs beach walkers and public access along the beach a majority of the time, particularly if no alternate upland route is made readily available by the upland property owners. The landward tier of the WDS is approximately 15 feet from the corner of the OC building. The 2nd tier of the WDS is approximately 24 feet seaward from the corner of the OC building, and the 3rd tier of the WDS is approximately 40 feet seaward from the corner of the OC building.

4.7 Impacts to Fauna

The primary concerns related to impacts to fauna are the potential effects of the WDS on nesting sea turtles and hatchlings. Threatened and endangered sea turtle species that have nested in South Carolina include loggerhead sea turtle (*Caretta caretta*), leatherback sea turtle (*Dermochelys coriacea*), green sea turtle (*Chelonia mydas*), and rarely Kemp's ridley sea turtle (*Lepidochelys kempii*). Based on data from Seaturtle.org, 99.9 percent of the nesting species were loggerhead sea turtles in 2016. In 2014, the beaches of Harbor Island were designated by the U.S. Fish and Wildlife Service as critical habitat for the Northwest Atlantic Ocean distinct population segment of the loggerhead sea turtle. The beaches on IOP are not designated as critical habitat for sea turtles.

Nest Site Selection

Factors that affect nest site selection in loggerheads on the beach include beach slope and width (with a preference for narrow beaches), sand texture, dune vegetation, lack of beach lighting from the turtles' perspective, ease of digging the nest, lack of predators, no interruption from observers, olfactory cues, low frequency sound such as surf noise, magnetic fields, offshore current, offshore reefs and rocks and nearshore bathymetry (Weishampel et al. 2003), as well as sand temperature, dune height, visual topographic cues and dune silhouette (Witherington et al. 2011a), and wave height, bathymetry and current velocities (Lamont and Houser 2014). Erosion does not necessarily make a beach undesirable for sea turtle nesting. Lamont and Houser (2014) found that eroding stretches of beach were used more often for nesting emergences.

The locations of sea turtle nests recorded by the SC Department of Natural Resources Marine Turtle Conservation Program for 2009 through 2016 are shown in Figures 4-112 and 4-113 for Harbor Island and IOP, respectively. At Harbor Island, 14 of these nests (4 percent of the 380 total nests on the island) occurred along the shoreline where the WDS is presently located. However, only one nest occurred on this shoreline segment after 2013. The Harbor Island WDS was installed in April 2015. No nests occurred along this segment in 2014 or 2016. The database shows one nest in 2015 located landward of the WDS, about 18 feet from the northwest end of the WDS. The distance of the nest from the end of the WDS is within the error of typical consumer-grade hand-held GPS measurements, and this nest was most likely located seaward of or northwest of the WDS extents. The lack of nesting along this shoreline segment in the season prior to the WDS installation supports the conclusion that the shoreline conditions along the segment where the WDS is presently located became unattractive to nesting turtles prior to installation of the WDS. If a turtle could access the shoreline on the landward side of the WDS, it could conceivably nest in some areas, such as the dune of placed fill material along an empty lot. It is uncertain if these areas would still be suitable habitat in the absence of the WDS, given that this area had a very steep scarp prior to placement of the fill material. Most of the shoreline does not have suitable nesting habitat even if turtles could access these areas on the landward side of the WDS (i.e., areas with no dry beach at high tide, homes protected by sandbags, and unprotected steep scarps). Altogether the WDS causes either no reduction or a small reduction of access to suitable nesting habitat, as compared to the available habitat on Harbor Island.

Figure 4-112. Sea turtle nests on Harbor Island between 2009 and 2016

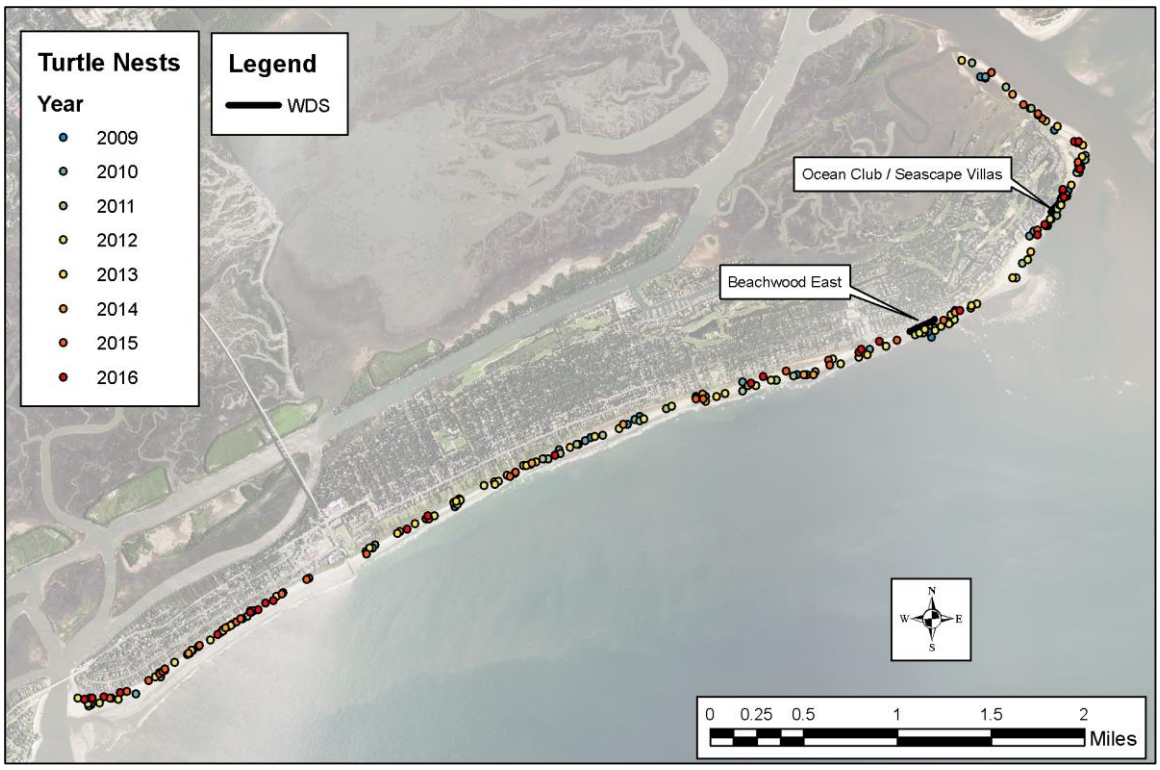

Figure 4-113. Sea turtle nests on IOP between 2009 and 2016

At IOP, 7 nests (3 percent of the 247 total nests on the island) occurred along the shoreline where the OC/SV WDS is located. No nests were located along this segment of shoreline after 2012. The WDS was initially installed at SV on November 15, 2013. Therefore, no nests occurred along this segment of shoreline in the season prior to installation of the WDS. This supports the conclusion that this segment of eroding shoreline was unattractive to nesting turtles in 2013 prior to construction of the WDS. There are areas where a turtle could potentially nest if they could access areas on the landward side of the WDS, particularly the sandy berm areas at SV. The OC property on the landward side of the WDS has very little sandy dry beach that would be suitable for nesting habitat. For both of these areas, it is uncertain if they would retain any suitable nesting habitat in the absence of the WDS. Therefore, the WDS at OC/SV causes either no reduction or a small reduction of access to suitable nesting habitat, as compared to the available habitat on IOP.

At BE, 9 nests (4 percent of the 247 total nests on the island) occurred along the shoreline where the OC/SV WDS is located. No nests were located along this segment of shoreline after 2013, and only one nest was found in this area in 2013. The WDS was installed at BE starting in July, 2015. Therefore, no nests occurred along this segment of shoreline in the season prior to installation of the WDS. Similar to the other WDS sites, this supports the conclusion that this segment of shoreline was unattractive to nesting turtles prior to construction of the WDS. This segment of shoreline is almost entirely armored with sandbags or obstructed by debris, and there is little dry beach suitable for nesting habitat. The WDS at BE causes a very small reduction of access (if any) to suitable nesting habitat, as compared to the available habitat on IOP.

Effects of Coastal Structures

Coastal structures can affect nest site selection. Witherington et al. (2011a) summarized the state of knowledge on the effects of seawalls and other barriers as follows: "*The importance of coastal armoring and other nesting barriers to the conservation of sea turtles is not fully understood. Although it has been shown that these barriers deter sea turtles from nesting (Bouchard et al., 1998, Mosier 1998), cause sea turtles to nest at lower beach elevations where egg mortality is frequently high (Witherington et al 2003), and occasionally entrap nesting turtles (unpublished data from Florida Fish and Wildlife Research Institute Sea Turtle Stranding and Salvage Database), the magnitude of these effects on populations has not been measured.*"

Witherington et al. (2011a) conducted experiments in which researchers placed a wide and tall board as a fake seawall after turtles emerged to nest. They found that turtles tended to nest further seaward as a result of the presence of the fake seawall. In the case of the WDS, the nest monitoring to-date do not provide any evidence that sea turtles are more likely to nest closer to the ocean as a result of the WDS, given that there are no recorded nests seaward of the WDS.

It is conceivable that a nesting adult or a hatchling could become trapped behind the WDS if there is no lateral wing wall above the existing grade or sand bags that tie back to the dune or scarp line. All four WDS installations include some type of tie back to the dune or scarp. Mays and Watson (2016) state that

the WDS at BE was modified to extend the wing wall on the north end due to concerns that a sea turtle might otherwise get trapped behind the system. The maintenance of lateral wing walls above the existing grade should be effective at preventing nesting adults from crawling behind the WDS at the ends of the structures, and similarly, wing walls should also be effective at blocking hatchlings from these areas. There is no evidence to-date that the WDS is a significant risk of adult turtle or hatchling mortality due to entrapment.

False Crawls

Some emergences by adult females do not result in nesting. These non-nesting emergences are commonly referred to as false crawls. On average for all nesting beaches in Florida, approximately 50% of emergences result in nesting and 50% are non-nesting emergences (Witherington et al 2011b). In South Carolina, about 48% of emergences were false crawls in 2016. Reasons for false crawls likely have to do with some sort of distasteful characteristic being found on the potential nesting site by the turtle, such as light, debris, compacted sand, signs of predators, presence of human observers, or other factors related to nest site selection listed above.

Figure 4-114 is an example of a track from a false crawl documented at Harbor Island in 2015. During the 2015 and 2016 nesting seasons following installation of the WDS in 2015, there have been 10 false crawls along the 400 feet of shoreline fronted by the WDS (a rate of 0.025 false crawls per foot). Along the rest of the island (not counting the Johnson Creek shoal), during the same period there were 127 false crawls (a rate of 0.02 false crawls per foot). Therefore, there was a slightly higher rate of false crawls along the segment of shoreline with the WDS than the remainder of the Harbor Island. However, given the conditions of the shoreline on the landward side of the WDS, there is no evidence that the WDS caused a significant increase in the incidence of false crawls as compared to what may have occurred in the absence of the WDS.

During the 2016 nesting season following installation of the Beachwood East WDS in July 28 through September 10, 2015, there were 2 false crawls along the 784 feet of shoreline fronted by the WDS (a rate of 0.003 false crawls per foot). Along the rest of the island, during the same period there were 25 false crawls (a rate of 0.001 false crawls per foot). At OC/SV, there were 2 false crawls along the 496 feet of shoreline fronted by the WDS (a rate of 0.004 false crawls per foot). Therefore, there was higher rate of false crawls along the segment of shoreline with the WDS than the remainder of the island. As with Harbor Island, given the conditions of the shoreline on the landward side of the WDS, there is no evidence that the WDS caused a significant increase in the incidence of false crawls as compared to what may have occurred in the absence of the WDS.

The adverse effect on turtles associated a false crawl at a WDS is uncertain. After returning to the water from an aborted attempt, the turtle typically returns to the same beach or area where they first emerged on the same or the following night (Miller 1997). Therefore, if a sea turtle makes a non-nesting emergence at a WDS location, it will most likely nest nearby on the same or following night. We found

no evidence that the false crawls at the WDS locations result in a decrease in the total number of nests on Harbor Island or IOP.

Figure 4-114. June 12, 2015 false crawl at Harbor Island (source: SCDHEC-OCRM)

5 Conclusions

As noted in the introduction, the purpose of this project is to review the academic study, conduct the field monitoring program prescribed by the Department, and analyze available data to respond to a list of questions specified by the Department to the extent feasible. GEL was not asked to determine whether the WDS is "qualified" for use in future emergency situations, per Budget Proviso 34.48 of the 2015-2016 General Appropriations Act. The conclusions from this study are the responses to the Department's questions as presented below:

1. **Do the quarterly and final reports from the academic sponsor contain sufficient data to: 1.) conclude whether the WDS qualifies under Proviso 34.51; and 2.) conclude whether the WDS meets the purpose of the academic pilot project?**

In general, yes, the quarterly and final reports contain sufficient data.

The aforementioned Proviso 34.51 defined a "qualified wave dissipation device" as a device that:

1) is placed mostly parallel to the shoreline;
2) is designed to dissipate wave energy;
3) is designed to minimize scouring seaward of and adjacent to the device by permitting sand to move landward and seaward through the device;
4) can be deployed within seventy-two hours or less and can be removed within seventy-two hours or less [subsequently amended by Provisio 34.48 to now read "the horizontal panels designed to dissipate wave energy can be deployed within one-hundred twenty hours or less and can be removed within one-hundred twenty hours or less"];
5) does not negatively impact or inhibit sea turtle nesting or other fauna;
6) can be adjusted after initial deployment in response to fluctuations in beach elevations; and
7) otherwise prevents down-coast erosion, protects property, and limits negative impacts to public safety and welfare, beach access, and the health of the beach dune system.

In regard to item 1, the reported survey data are sufficient to determine the fraction parallel to the shoreline.

In regard to item 2, the reports clearly convey that the intent of the design is to dissipate wave energy. A photograph of a wave breaking at the OC WDS is provided.

In regard to item 3, the reports discuss scour and scour management alternatives at length. The reports also discuss sand movement through the WDS using spacers or temporary removal of horizontal panels to remove scour.

In regard to item 4, the reports do not explicitly state the number of hours required to deploy or remove the horizontal panels, and therefore do not contain sufficient information to assess this criterion.

In regard to item 5, the reports do not address potential impacts to turtles in detail. The final report recommends removing the horizontal panels during turtle nesting season to avoid impacts, unless a

structure is in imminent danger of losing structural support. The report also discusses maintenance of wing walls to avoid turtle entrapment. However, analyses or conclusions are not given regarding potential impacts to turtles or other fauna.

In regard to item 6, the final report discusses lowering of the WDS in response to changes in beach elevation.

In regard to item 7, the reports do not discuss public safety or beach access. The researchers provided survey data that can be used to evaluate impacts to downdrift properties. Similar to the limitations associated with the monitoring conducted for this study, the survey data are not ideal for quantifying downdrift impacts from the WDS apart from the natural background erosion trends. The monitoring data do not include sufficient pre-project data or control area monitoring, and the site locations are in areas with gradients in the background erosion rates that confound attempts separate the project impacts from the background erosion.

It is our understanding that the purpose of the academic study was not to conclude whether the WDS qualifies under Proviso 34.51. The RFP for GEL's contract states that "the purpose of the academic study is to determine the performance of the WDS under various wave loading and the resulting effects on the beach." The RFP states that, according to the academic sponsor, the purpose of the Harbor Island study location is to "determine and subsequently describe the performance of the [WDS] under less extreme loading (more tidal in this location due to low beach elevation and smaller waves with possible periods of respite)." The RFP states that, according to the academic sponsor, the purpose of the Harbor Island study location is to "determine and subsequently describe the performance of the [WDS] under less extreme loading (more tidal in this location due to low beach elevation and smaller waves with possible periods of respite)." The RFP states that, according to the academic sponsor, the purpose of the OC study location is to "determine and subsequently describe the performance of the [WDS] under extreme loading that is imminent as the beach continues to lower and the adjacent scarp line continues to retreat." Mays and Watson (2016) state that the purpose of the OC study was "to show that the system can be installed and increased in magnitude to the degree necessary to protect the building similar to the role played by sandbags." The RFP states that, according to the academic sponsor, the purpose of the BE study location is to "determine and subsequently describe the performance of the [WDS] under less extreme loading than the installation at Ocean Club yet more extreme loading, and not as tidal, as the installation at Harbor Island." Finally, the RFP states that, according to the academic sponsor, the purpose of the SV study location is to "determine and subsequently describe the performance of the [WDS] under extreme loading that is imminent as the beach continues to lower and the adjacent scarp line continues to retreat."

The second part of the above question is: "do the quarterly and final reports from the academic sponsor contain sufficient data to...conclude whether the WDS meets the purpose of the academic pilot project? The purpose of the pilot project is to study the WDS, and therefore, yes, the WDS meets the purpose of the academic pilot project.

2. **What type of metrics or criteria should be developed to judge success for future experimental shoreline management proposals?**

Specific metrics or criteria should depend on project-specific goals and site-specific factors. Future experimental shoreline management proposals should start with an accurate problem statement that describes the characteristics of the site and the needs of the property owners and/or shoreline user community. The site characterization should include a description of the coastal processes causing the problem. This should be followed by a statement of the experimental shoreline management project goals that describes:

- Performance (benefits) expected from the project;
- Durability of the project (how long the structure will last, and the expected maintenance);
- Anticipated environmental impacts caused by the project; and
- Expected response of the sand transport system to the project.

Those funding the project should also have a clear understanding of lifecycle costs for the experimental management proposal versus alternative approaches, including traditional management methods.

Specific metrics or criteria used to judge success of the project can then be developed based on the project-specific goals and potential impacts.

In order to determine if the project meets these success criteria, and to track the effects on the coastal environment, the project should include a monitoring program. To obtain meaningful results from the monitoring program, it is important to carefully design the experiment before constructing the project, including determination of the analysis methods that will be used to quantify the project impacts. The monitoring program should include both pre- and post-project monitoring, both at the project site and at a nearby, unaltered shoreline (i.e., a control area) for comparison. Project-specific relevant processes should be measured (e.g., waves, water levels, storms, and currents), and project-specific relevant responses should be measured (e.g., topography, bathymetry, and sediments). These monitoring data allow for a before-and-after, impact-and-control type of analysis that is necessary to separate the project effects from the natural background effects. Attempts to determine project impacts without sufficient data to determine the natural background effects can lead to incorrect conclusions.

Unfortunately, it is not always practical to conduct an ideal monitoring program because of time and cost constraints. For example, property owners willing to fund such experimental shoreline management projects often already have structures threatened by erosion and may not have time for sufficient pre-project monitoring. Also, properties with threatened structures may not be in locations that have suitable control areas for comparison. Control areas should be subjected to the same wave and sediment transport conditions at the project area. An ideal experimental location would be along a straight segment of shoreline with a relatively uniform background erosion/accretion rate. This type of environment allows for estimation of project impacts apart from the background effects. Project locations in inlet areas often have curved shorelines, large gradients in sediment transport rates and rapidly varying erosion/accretion patterns. This type of environment can confound attempts to estimate project impacts apart from natural background changes. When monitoring does not include pre-project and/or control area data, it is important to interpret the monitoring results with recognition of the study limitations and avoid attributing positive or negative impacts to a project when they may in fact be

caused by natural processes. For instance, placement of an erosion control device on the beach after a storm will most likely be followed by a period of natural accretion on the beach as some of the sand migrates back onto the dry beach. This accretion should not be attributed to the erosion control device.

3. Is the WDS placed mostly parallel to the shoreline? What percentage is parallel?

Yes, the WDSs at all four locations are oriented parallel to the shoreline, with the exception of perpendicular segments that tie-back the WDS to the scarp or dune line, and perpendicular segments that connect parallel tiers in areas with multi-tier WDS designs. The fractions of parallel segments are 76%, 77% and 95% for the OC/SV, Harbor Island and BE sites, respectively.

4. Is the WDS designed to dissipate wave energy? If yes, does it actually dissipate wave energy in the field?

Yes, the WDS is designed to dissipate wave energy through wave breaking (including water jetting between the horizontal panels) and structure deflection (i.e., flexing or movement of the structure). In the field, the predominant dissipation mechanism observed was from wave breaking and water jetting through the horizontal panels. The horizontal panels are relatively rigid, and minimal structure deflection was observed during typical wave conditions.

5. Is the WDS designed to minimize scouring seaward of and adjacent to the device by permitting sand to move landward and seaward through the device?

Yes, although the WDS does not prevent scouring. Temporary scour along the toe of the horizontal panels was observed at all four sites following periods during which they were subjected to storm waves. The observed scour holes had maximum depths up to about 2 to 2.5 feet below the surrounding grade. Based on these observations, the design of the WDS, as deployed during the monitoring study, does not preclude scouring. When scour holes did occur, they were limited to areas within a few feet of the WDS, and there was no evidence of adverse impacts other than reduced WDS performance (i.e., reduced wave attenuation).

The question regarding *minimization* of scour requires a reference for comparison. The WDSs cause more scour (limited to areas immediately around them) than adjacent areas with no type of erosion control device. However, the scour at the WDS is not necessarily an indication of an overall net increase in beach erosion as compared to what may have occurred in the absence of the WDS. That is, the WDS did not necessarily increase overall beach erosion simply because there was scour along the structure. Also, the amount of scour caused by the WDS as compared to other structures (such as seawalls or bulkheads) is uncertain because there are no experiments showing the difference between the WDS and alternative structures subjected to the same wave conditions and on the same beach profile.

Mays and Watson (2016) state that temporary removal of panels will quickly eliminate scour holes. They also state that periodic placement of beach compatible sand on the landward side of the WDS would provide a source of sand that could be placed in scoured areas, as necessary. If the WDS is actively

managed as compared to a passive seawall or bulkhead, then the effects of scour could be minimized as compared to a passive seawall or bulkhead.

6. Has scouring occurred seaward of, landward of, or adjacent to the WDS?

Yes, limited scour along the toe of the horizontal panels was observed at all four sites, at some point in time during the monitoring study. The scour was typically a trench beneath the horizontal panels and generally affecting the beach both on the seaward and landward sides of the WDS.

7. To what extent has sand been able to move through the device?

When the beach is not scoured beneath the horizontal panels, the WDS allows some sand to move through the horizontal panels, the extent of which is dependent on the presence/absence of spacers between the horizontal members and the wave and water level conditions. During mild wave conditions when sand is naturally migrating onshore, the WDS allows a small amount of sand to move landward through the device. This sand was observed to typically deposit within about 10 feet of the structure.

An example of sand deposited on the landward side of the WDS at Harbor Island is in Figure 5-1. As shown by the surveyed profiles at this location in Figure 5-2, the amount of accretion directly landward of the WDS was approximately 0.2 cy/ft.

Observed buildup of sand (typically less than 1 foot) on the seaward side of the WDS in some areas during these conditions indicates that WDS can obstruct the natural landward transport to some degree at times. An example is shown in Figures 5-3 and 5-4 for the two-tier section at Seascape Villas, where there was an accumulation of sand on the seaward side. During these conditions, active management of the WDS (i.e., adding spacers between horizontal members or temporary removal of the horizontal panels) was used to allow more landward transport of sand behind the WDS.

During the typical storm wave conditions that occurred during this monitoring study, the WDS allowed erosion of sand from the landward side of the WDS. In areas where the WDS was at relatively high elevations on the beach, scour holes did not develop that extended below the horizontal members. In these scenarios, transport of sand seaward through the WDS was minor. Figure 5-5 shows an example of erosion on the landward side of a section of the Seascape Villas WDS that occurred after the March through April period when waves caused large amounts of erosion of the entire beach.

Areas with the greatest amount of erosion during storm events occurred in areas where the scour passed beneath the WDS, or the entire beach profile was lowered beneath the WDS, which allowed sand to be transported seaward. When this occurs, large volumes of sand were transported seaward underneath the WDS horizontal panels. During the subsequent natural beach recovery, large volumes were also observed to move landward underneath the WDS horizontal panels.

8. Has the scarp landward of the WDS continued to erode?

During the monitoring period, March through July, the scarp was stable in areas where the WDS was used in combination with sandbags (except where small sandbags or fill material were stacked at an excessively steep angle). In some areas fronted only by the WDS, scarp erosion was observed following

Figure 5-1. Sand passed through WDS at Harbor Island during mild wave conditions (July 14, 2016)

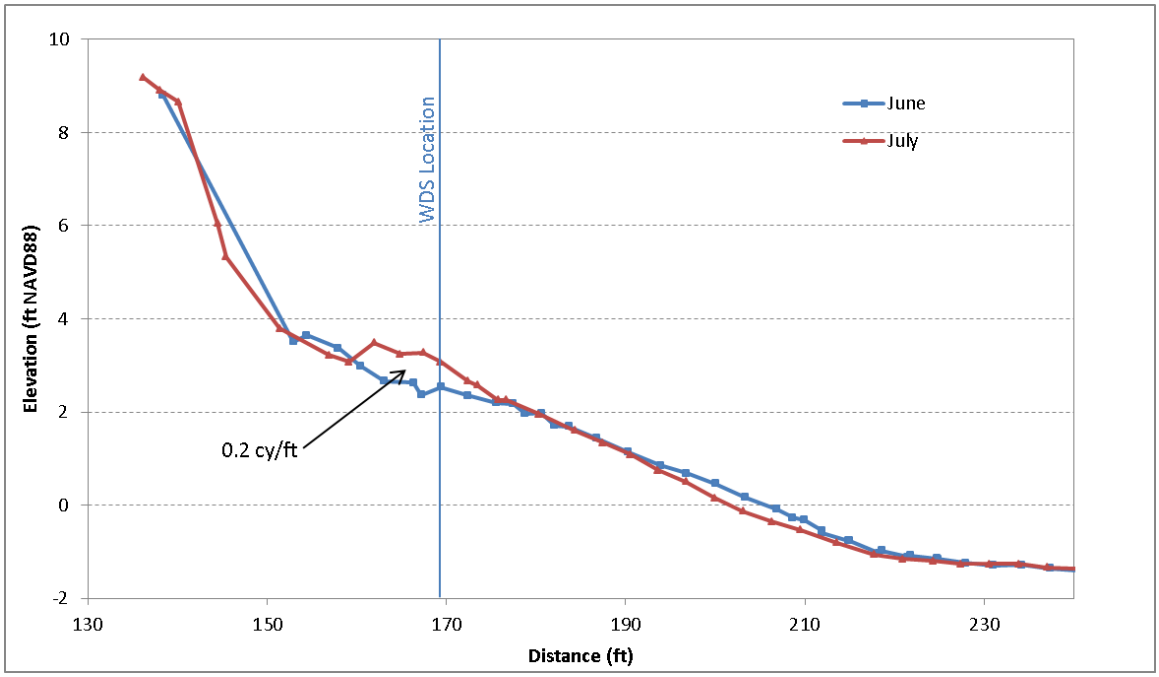

Figure 5-2. Harbor Island profile showing accretion on landward side of WDS (profile 31)

Figure 5-3. Low area between WDS tiers at Seascape Villas (July 13, 2016)

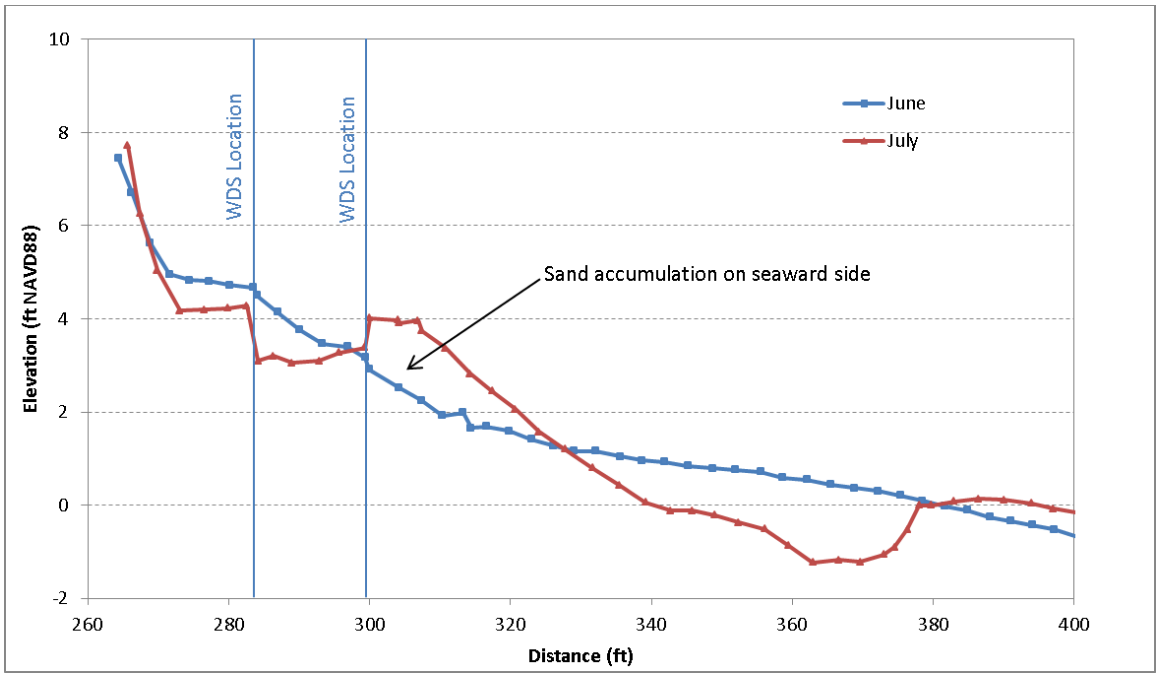

Figure 5-4. Seascape Villas profile showing accretion on seaward side of WDS (profile 22)

Figure 5-5. Erosion at Seascape Villas in area without scour beneath WDS (April 18, 2016)

the storm wave action that occurred between the March and April surveys. The survey data collected by The Citadel researchers shows large amounts of scarp erosion at the BE and OC/SV site following the initial installation of the WDSs.

9. Throughout the study duration, was there a difference in elevation between the sand on the seaward side of any WDS wall and on the landward side of any WDS wall?

Yes, small differences in elevation were observed that were typically 0.5 feet or less. In a few instances, differences in elevation were slightly larger, up to about 1 foot.

10. Does the WDS increase erosion rates on adjacent properties that are not protected?

The WDS may cause minimal or insignificant erosion on adjacent properties. In theory, there is a potential for limited increases in erosion on adjacent properties. If a coastal structure traps incoming sand, or if it retains sand by preventing upland areas on the landward side of the structure from eroding,

then it prevents that sand from reaching downdrift shorelines, such as those on adjacent properties. The degree to which this causes any potential erosion depends on the amount of sand trapped or retained, as well as site specific conditions. If the amount of sand trapped or retained is a very small fraction of the total sediment transport along the shoreline, then the erosion may be so small as to be undetectable apart from the background erosion/accretion patterns along the shoreline.

The active beach profile where sediment transport occurs extends from the dune to beyond the surf zone, and most of this transport occurs in the surf zone. The WDS is typically landward of the MHW line, and therefore it affects only a small fraction of the active beach profile where sediment transport occurs. As a result, the potential impacts of the WDS should be much smaller than other structures that affect a greater portion of the active beach profile, such as a groin.

For the four WDS installations monitored in this study, the amount of erosion caused by the WDS along adjacent properties is uncertain. The observed erosion pattern at Harbor Island suggests that the WDS may contribute to scarp erosion within a short distance (i.e., mostly within 100 feet) of the northwest end of the WDS, although the fraction of this erosion attributable to the WDS cannot be quantified apart from the natural background erosion, and most of the scarp erosion may be the result of natural background erosion. At Beachwood East, a small amount of erosion of the upper beach occurred within a short distance just east of the WDS. The fraction of the erosion in this area caused by the WDS, if any, cannot be separated from the natural background erosion/accretion pattern associated with the shoal attachment processes. At OC/SV, any downdrift erosion effect near the end of the WDS was not large enough to be distinguished apart from the larger erosion/accretion trends along the shoreline. Altogether the impacts of the WDS on adjacent properties appear to be minor, and they are small enough that they are difficult to distinguish apart from the background erosion rates.

11. Does the WDS prevent down-coast erosion?

No, the WDS does not prevent “down-coast” erosion. Natural background erosion will continue along shorelines down drift from the WDS. In addition, if the WDS is effective at retaining or trapping sand, then may be some downdrift erosion caused by the WDS, although these effects may be minor and small enough that they are difficult to distinguish apart from the background erosion rates.

12. Does the WDS protect the property behind the system?

Yes, it does to some extent. The ability of the WDS to protect property on the landward side of the system is dependent on site-specific conditions, the design of the WDS, and the active management of the WDS after it is installed. No shoreline management approach is best for all locations, and no shore protection measure will work equally well in all situations. At some locations and for some conditions, the WDS can provide short-term reduction in erosion, and thus some increased level of protection, of the upland property.

For the sites monitored for this study, the WDS reduced the amount of wave energy transmitted landward of the system during typical wave activity. This increased the stability of sand bags on the landward side of the WDS which can increase the short-term stability of the scarp line and the associated structure(s) on the landward side of the WDS during typical conditions. Erosion of

unprotected scarps on the landward side of the WDS was observed. However, the reduction in wave energy caused by the WDS supports the conclusion that scarp erosion likely would have been greater in the absence of the WDS.

The WDS designs observed during this study will not provide long-term protection for property subjected to long-term beach erosion. The overall stability of the beach is dictated by sand transport that occurs over the entire active beach profile, extending from the dune to beyond the seaward side of the surf zone. The WDS affects only the upper-most part of the beach profile and does not reduce erosion along the majority of the profile. Long-term beach erosion results in a landward translation of the beach profile, which is seen as a lowering of the beach seaward of the WDS. Over the long-term, this would require continual lowering of the WDS, eventual elimination of dry beach seaward of the WDS, and eventual erosion of the property on the landward side of the WDS, regardless of its presence.

13. How does the WDS impact any of the following:

- **g. Public safety and welfare**
- **h. Lateral beach access at any tide stage**
- **i. The health of the beach dune system**

There are many public safety hazards at the ocean beach, and the WDS does not appear to be more of a safety hazard to the beach-going public than other coastal structures, such as rock groins or pile supported piers. The power of breaking waves has caused many injuries to swimmers, including spinal cord injuries. Spinal cord injuries most often occur when diving headfirst into the water or being tumbled in the waves by the force of the waves (NOAA 2016). It is conceivable that a breaking wave could push a swimmer into the WDS. Signs were placed at the BE and OC/SV sites warning beachgoers of potential injuries from the WDS.

Some coastal structures have exposed bolts or other metal that cause lacerations to swimmers. The metal nuts and bolts securing the WDS are recessed into the housing which reduces this safety hazard.

Pipes that comprise the horizontal panels may be dislodged from the structure during storm wave conditions. The dislodged pipes are negatively buoyant (sink) and are unlikely to be a significant hazard to swimmers during non-storm conditions.

During high tide conditions, the WDS may obstruct emergency vehicles traveling along the beach. This does not adversely affect public safety as long as either the WDS does not project out onto the beach far enough to obstruct emergency vehicles, or emergency access points are available on the adjacent shorelines on either side of the WDS.

The WDS may obstruct beach walkers during high tide conditions. The degree to which the WDS is an obstruction depends on the location of the WDS on the beach and the lowest elevation of the beach at the WDS relative to the tidal conditions at each site. At Harbor Island, beach walkers cannot pass the WDS on dry beach more than 35 percent of the time. However, wave heights are typically small at this location, and beach walkers can walk through shallow water seaward of the WDS much of the time that there is no dry beach. Given that the WDS is in close proximity to the houses and sandbags on the

landward side of the WDS (at the narrowest part of the Harbor Island beach the WDS is within 5 feet of sandbags placed at lot 52 and within 13 feet of sandbags at lot 49), the WDS is only a minor obstruction to beach walkers as compared to the beach that would exist without the WDS.

Beach walkers at BE may not be able to pass seaward of the WDS more than 50 percent of the time. However, they can walk along the beach on the landward side of the WDS nearly all of the time. As a result, the BE WDS causes minimal restrictions to beach walkers.

In April, beach walkers at SV may not be have been able to pass seaward of the WDS more than 34 percent of the time, although this decreased to one percent by July due to accretion. Beach walkers can walk on the landward side of the WDS at SV, and therefore, the WDS causes minimal restrictions to beach walkers at SV.

At OC, beach walkers at may not be able to pass seaward of the WDS more than 58 percent of the time. Furthermore, there is no alternative route on the landward side of the WDS to allow access to the beach on the opposite side of the structure. Therefore, the WDS at OC obstructs beach walkers and public access along the beach a majority of the time unless the property owners provide an alternate upland route.

The "health of the beach dune system" was not defined in the RFP. We interpret this to mean the ability of the beach dune system to provide the desired level of ecological habitat, storm protection to structures, and public recreational opportunities.

From storm damage protection perspective, a sufficiently wide berm and a dune to avoid erosion-related damage to upland structures during an extreme storm event are considered part of a healthy beach in South Carolina. The WDS does not adversely affect the beach berm width or dune, with the exception of possible minor erosion of the upper beach that may take place on adjacent shorelines. If this adverse effect occurs, it could be offset by placement of compatible beach sand in these areas.

From an ecological habitat perspective, the WDS was not observed to have a significant adverse effect on any fauna at the monitored sites. The primary concerns related to impacts to fauna are the potential effects of the WDS on nesting sea turtles and hatchlings, which is addressed in detail below.

14. Can the horizontal panels be deployed within 120 hours or less and removed within 120 hours or less?

Generally speaking, yes. GEL did not directly observe horizontal panels deployed or removed, although GEL did observe trenching in preparation for panel installation. During the monitoring period, segments of the WDS at Ocean Club and the WDS at Beachwood East were lowered 2 feet in response to decreasing beach elevations. This involved removal of the horizontal panels, lowering the piles, trenching the beach and reinstalling the horizontal panels. This process required about one work week (about 5 days) to lower the landward tier of the OC installation. Given that horizontal panel removal, vertical pile lowering, trenching and horizontal panel redeployment of 13 horizontal panel segments required about one week of on-site work, then certainly some horizontal panels can be deployed or removed within 120 hours or less, assuming a contractor can be mobilized to the site within this time frame and assuming the vertical piles are already in place. The exact number of horizontal panels that

can be installed in this time frame is unknown. The time required to deploy or remove horizontal panels for an entire WDS is dependent on the total length of the system.

15. Can the WDS be adjusted after initial deployment in response to fluctuations in beach elevations?

Yes. As mentioned above, the WDS was adjusted during the monitoring period in response to fluctuations in beach elevations. Segments of the WDS at Ocean Club and the WDS at Beachwood East were lowered 2 feet in response to decreasing beach elevations. This involved removal of the horizontal panels, lowering the piles, trenching the beach and reinstalling the horizontal panels.

16. If any major storms occurred during the study period, does the WDS remain intact?

Major storms did not occur during the study period. However, prior to this monitoring program, Hurricane Joaquin dislodged pipes from at least 11 horizontal panels. Also, a few pipes were observed beneath the WDS at OC in April 2016 and are assumed to have been from storm wave action in the March to April 2016 time period. Given these observations, it is likely that at least some portions of WDS systems would be dislodged during moderate to large storm events. The first version of the WDS installed at SV was damaged by a Nor'Easter on March 1, 2014, and removed from the beach. However, it is noted that this was an initial design that was different from that monitored for this study.

17. Does the WDS negatively impact or inhibit sea turtle nesting or other fauna?

The WDS does not appear to significantly affect sea turtle nesting or other fauna. The condition of the shoreline in the absence of the WDS must be considered when evaluating potential impacts to nesting habitat. Most of the shorelines evaluated in this study were poor habitat for nesting (i.e., either armored with sandbags, obstructed by debris, or having little to no dry beach), although the WDS did preclude nesting in some small areas with suitable habitat. No nesting was observed along the shorelines protected by the WDS for at least one nesting season prior to the installation of the WDS, indicating that these areas are likely less attractive to nesting turtles than other areas along the islands. Overall, the WDS installations caused very small reductions of access (if any) to suitable nesting habitat, as compared to the available habitat on the islands.

It is conceivable that a nesting adult or a hatchling could become trapped behind the WDS if there is no lateral wing wall above the existing grade or sand bags that tie back to the dune or scarp line. All four WDS installations include some type of tie back to the dune or scarp. Mays and Watson (2016) state that the WDS at BE was modified to extend the wing wall on the north end due to concerns that a sea turtle might otherwise get trapped behind the system. The maintenance of lateral wing walls above the existing grade should be effective at preventing nesting adults from crawling behind the WDS at the ends of the structures, and similarly, wing walls should also be effective at blocking hatchlings from these areas. There is no evidence to-date that the WDS is a significant risk of adult turtle or hatchling mortality due to entrapment.

Some emergences from the sea by adult females do not result in nesting. These non-nesting emergences are commonly referred to as false crawls. In South Carolina, about 48% of emergences were false crawls in 2016. Reasons for false crawls likely have to do with some sort of distasteful characteristic

being found on the potential nesting site by the turtle, such as light, debris, compacted sand, signs of predators, presence of human observers, or other factors related to nest site selection listed above.

There have been false crawls caused by sea turtles encountering the WDS. Evaluation of false crawl data along Harbor Island and IOP indicates that there was a higher rate of false crawls along the segments of shoreline with the WDS than the remainder of the island. However, given the conditions of the shoreline on the landward side of the WDSs, there is no evidence that the WDSs caused a significant increase in the incidence of false crawls as compared to what may have occurred in the absence of the WDSs.

The adverse effect on turtles associated with a false crawl at a WDS is uncertain. After returning to the water from an aborted attempt, the turtle typically returns to the same beach or area where they first emerged on the same or the following night (Miller 1997). Therefore, if a sea turtle makes a non-nesting emergence at a WDS location, it will most likely nest nearby on the same or following night. We found no evidence that the false crawls at the WDS locations result in a decrease in the total number of nests on Harbor Island or IOP.

The WDS was not observed to adversely interact with other fauna.

18. Does the WDS meet the regulatory definition of a seawall, found in the SC Code of Regulations, R.30-1(D)(22)(a)?

No. A seawall is a traditional coastal armoring structure that is typically a massive, concrete structure with its weight providing stability. The primary purpose of a seawall is to prevent inland flooding from major storm events with large waves, and the seawall crest elevation is typically designed to minimize overtopping from storm surge and wave runup (USACE 2002). The South Carolina Code of Regulations [R. 30-1(D)(22)(a)] defines a seawall as a special type of retaining wall that is specifically designed to withstand wave forces. The WDS does not meet the South Carolina Code of Regulations definition of a seawall because it is not a retaining wall. A retaining wall has an increase in ground elevation from the front side to the back side of the structure, and it is designed to resist the lateral pressure from the backfilled soils.

References

Bouchard, S., Moran, K, Tiwari, M., Wood, D., Bolten, Al, Eliazar, P.J., and Bjorndal, K. 1998 Effects of exposed pilings on sea turtle nesting activity at Melbourne Beach, Florida. Journal of Coastal Research, 14(4):1343-1347.

City of Isle of Palms. 2008. Local Comprehensive Beach Management Plan. City of Isle of Palms, South Carolina. April 7, 2008.

CSE. 2007. Shoreline assessment and long-range plan for beach restoration along the northeast erosion zone, Isle of Palms, South Carolina. Feasibility Report for Wild Dunes Community Association, Isle of Palms, SC. Prepared by Coastal Science & Engineering, Columbia, SC.

CSE. 2012. Final Report, Shoal Management Project, Isle of Palms (SC). Prepared for the City of Isle of Palms. Prepared by Coastal Science & Engineering. Columbia, SC.

CSE. 2015. 2008 Beach Restoration Project, Isle of Palms South Carolina, Monitoring Report No 6. Prepared for the City of Isle of Palms. Prepared by Coastal Science & Engineering. Columbia, SC. April 2015.

CSE. 2016. 2008 Beach Restoration Project, Isle of Palms South Carolina, Monitoring Report No 7. Prepared for the City of Isle of Palms. Prepared by Coastal Science & Engineering. Columbia, SC. June 2016.

Dean, R. G. 1987. Coastal Armoring: Effects, Principles, and Mitigation. Pages 1843-1857 in Billy L. Edge, editor. Proceedings, 20th International Conference on Coastal Engineering. New York, NY: American Society of Civil Engineers.

Dean, R.G. and R.A. Dalrymple. 1991. Water Wave Mechanics for Engineers and Scientists. World Scientific.

Dean, R.G. and R.A. Dalrymple. 2002. Coastal Processes with Engineering Applications. Cambridge, United Kingdom: Cambridge University Press.

ERDC. 2016. Wave Information Studies. Available: http://wis.usace.army.mil/hindcasts.html (May 5, 2016).

Gaudiano, D.J., and T.W. Kana. 2001. Shoal bypassing in South Carolina tidal inlets: geomorphic variables and empirical predictions for nine mesotidal inlets. Journal of Coastal Research. Vol 17. pp 280-291.

Hayes. M. O. and J. Michel 2008. A Coast for All Seasons: A Naturalist's Guide to the Coast of South Carolina. Columbia, South Carolina: Pandion Books.

Kana, T.W., Traynum, S.B., Gaudiano, D., Kaczkowski, H.L., and Hair, T. 2013. The physical condition of South Carolina beaches 1980–2010. *In*: Kana, T.; Michel, J., and Voulgaris, G. (eds.). Proceedings, Symposium in Applied Coastal Geomorphology to Honor Miles O. Hayes. Journal of Coastal Research. Special Issue No. 69, 61–82. Coconut Creek, Florida. ISSN 0749-0208.

Kana, T.W. and M.L. Williams. 1985. Shoreline Changes Along Wild Dunes, Isle of Palms, South Carolina, June 1984 to June 1985. Prepared for Wild Dunes Beach and Racquet Club Co. Prepared by Research Planning Institute, Inc., Columbia, SC.

Kraus, N. C. 1988. The Effects of Seawalls on the Beach: An Extended Literature Review. Journal of Coastal Research. Special Issue No.4. pp 1-29.

Kraus, N. C., and W. G. McDougal. 1996. The effects of seawalls on the beach; Part I: An updated literature review. Journal of Coastal Research 12(3), 691-701.

Lamont, M.A., and C. Houser. 2014. Spatial distribution of loggerhead turtle (*Caretta caretta*) emergences along a highly dynamic beach in the northern Gulf of Mexico. Journal of Experimental Marine Biology and Ecology. 453:98-107.

Mays, T. and M. Watson. 2016. Wave Dissipation System Report. Prepared by The Citadel Department of Civil and Environmental Engineering. Prepared for SI Seawall and Fencing Systems, LLC. August 28, 2016.

Miller, J.D., 1997. Reproduction in sea turtles. *In*: Lutz, P.L., Musick, J.A. (Eds.), The Biology of Sea Turtles. CRC Press, Boca Raton, FL, pp. 51–81.

Mosier, A.E. 1998. The impact of coastal armoring structures on sea turtle nesting behavior at three beaches on the East Coast of Florida. Masters thesis, Department of Marine Science, University of South Florida, 112 pp.

NOAA. 2016. Ten Dangers at the Beach. Available: http://oceanservice.noaa.gov/news/jul14/beachdangers.html (October 4, 2016).

SCDHEC-OCRM. 2009. South Carolina Annual State of the Beaches Report. South Carolina Department of Health and Environmental Control, Office of Ocean and Coastal Resource Management. Columbia, SC.

Traynum, S. 2015. Isle of Palms Post-Storm Survey Results. Letter report to Linda Tucker, City Administrator, City of Isle of Palms. October 30, 2015.

Traynum, S.B., Kana, T.W., and Simms, D.R., 2010. Construction and performance of six template groins at Hunting Island, South Carolina. Shore & Beach, 78(3), 21–32.

USACE. 2002. Coastal Engineering Manual. Engineering Manual EM-1110-2-1100. U.S. Army Corps of Engineers, Washington, D.C. (in 6 volumes).

Weishampel, J.F., Bagley, D.A., Ehrhart, L.M., and B.L. Rodenbeck. 2003. Spatiotemporal patterns of annual sea turtle nesting behaviors along an East Central Florida Beach. Biological Conservation 110:295-303.

Witherington, B. 2003. The biological conservation of loggerheads: challenges and opportunities. *In* Bolten, A., and Witherington, B. Loggerhead Sea Turtles. Washington D.C. Smithsonian Institution Press, pp. 295-311.

Witherington, B., Hirama, S., and A. Mosier. 2011a. Responses of sea turtles to barriers on their nesting beach. Journal of Experimental Marine Biology and Ecology, 401:1-6.

Witherington, B., Hirama, S., and A. Mosier. 2011b. Barriers to sea turtle nesting on Florida (United States) beaches: linear extent and changes following storms. Journal of Coastal Research v. 27(3):450-458.