



VERMONT

Department of Environmental Conservation

Drinking Water and Groundwater Protection Division

Vermont's Public Drinking Water Systems Capacity Development Program Triennial Report to the Governor 2017



Helping public drinking water systems improve their technical, managerial, and financial capabilities so they can provide safe, affordable drinking water to their customers- now and into the future.

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Executive Summary

The Capacity Development Program's mission is to help public water systems improve their technical, managerial, and financial capabilities so they can serve their customers safe drinking water. The program uses a number of tools to fulfill its mission, including the Drinking Water State Revolving Fund (DWSRF); sanitary surveys; long range plans; source water assessments; operator training and certification; capacity evaluations and consultations; and source, construction, and operating permits. This triennial report provides an overview of the program, the effectiveness of its strategies, and the recent progress made towards improving the capacity of Vermont's public water systems.

The services public drinking water systems provide are vital to the health, safety, and economies of our communities. The people managing these systems face significant challenges as they try to provide their customers a sufficient amount of safe, affordable water. Challenges include managing, repairing, and replacing aging and inadequate infrastructure; achieving financial viability; increasing resiliency to climate related events; recruiting and retaining qualified staff; responding to emergencies; adjusting to changes in demand for services; overcoming resistance to rate increases; adapting to changes in source water quality and quantity; addressing emerging contaminants (e.g., perfluorooctanoic acid (PFOA), blue-green algae, pharmaceuticals, and personal care products), and complying with new and more stringent regulatory requirements.

In the past three years, the Capacity Development Program helped many public water systems improve their capabilities and comply with drinking water regulations. In 2017, 99 percent of the people served by community water systems received water that met all the health-based standards. This is up from 97 percent in 2014. Also, based on compliance scores that consider all federal drinking water rules, fewer systems are now an immediate enforcement concern.

But as drinking water infrastructure continues to age and degrade, systems will struggle to comply with regulations and meet their customers' expectations. Feeling pressure to keep rates low, many public water systems are not making the investments needed to properly maintain, repair, rehabilitate, and replace their assets. The Environmental Protection Agency (EPA) estimates that Vermont needs to invest more than \$510 million in public drinking water infrastructure in the next twenty years to ensure the health, security, economic viability, and well-being of our communities (Drinking Water Infrastructure Needs Surveys and Assessment, Fifth Report to Congress, April 2013).

Meanwhile, the amount of public financing available to systems has declined. The contributions to Vermont's DWSRF declined by 16 percent (excluding the grant from the American Recovery and Reinvestment Act of 2009) in the three-year period reported in 2014 (fiscal years 2012-2014.) The contributions further declined by 6 percent in this last three-year period (fiscal years 2015-2017.) The DWSRF money is used to provide public water systems planning and capital improvements loans and other types of capacity development assistance. The loans allow systems to replace aging infrastructure, upgrade water treatment plants, and develop new water sources.

Money from utility reserves and public financing is not enough to address Vermont's drinking water infrastructure needs. This financial shortfall is the greatest challenge for most public community water systems. In response, the Capacity Development Program is working to revise its strategy to

include new tools and initiatives to help systems meet this challenge. The new strategy, for example, will have several initiatives to encourage systems to create and use an Asset Management Program.

An Asset Management Program uses detailed asset inventories, life cycle cost analyses, risk assessments, and financial planning to set priorities and help meet level of service goals in a cost-effective manner. It can help systems operate more efficiently, prolong asset life, plan and pay for future repairs and replacements, make informed decisions (e.g., when to conduct maintenance activities; whether to repair, rehabilitate, or replace an asset), justify system needs and decisions, set and gain support for appropriate user rates, meet service expectations and regulatory requirements, improve emergency response, make the best of use of limited resources, reduce vulnerability to hazards (e.g., flooding), and become more resilient. An effective program can help Vermont’s public drinking water systems build capacity and make their systems more sustainable.

Most of our drinking water infrastructure is buried, so to many people it’s “out of sight, out of mind”. But we should not take the services it provides for granted. We need to invest more money in the infrastructure. Water systems’ managers need to use better financial and management practices to operate, maintain, repair, rehabilitate, and replace assets. Otherwise, we will not be able to continue to rely on public water systems for disease protection, fire protection, basic sanitation, economic development, and to support our quality of life.



Introduction

Vermont's public drinking water systems face significant challenges as they try to comply with regulations, manage aging infrastructure, and achieve financial viability. To help address these challenges and to meet the requirements of the federal Safe Drinking Water Act's (SDWA) 1996 Amendments, the Drinking Water and Groundwater Protection Division (DWGPD) created a Capacity Development Program. The program's objectives are:

- To ensure that new community (CWSs) and non-transient non-community (NTNCs) systems demonstrate the technical, managerial, and financial capacity to provide a sufficient quantity of safe water in a cost-effective manner now and into the future; and
- To help existing systems become more sustainable by improving their technical, managerial, and financial capabilities.

Technical capacity refers to a system's physical and operational abilities. Examples of strong technical capacity include:

- The system has qualified operators with knowledge and skills to operate the system.
- The system's infrastructure (i.e., source, storage facilities, treatment plant, and distribution systems) can meet current and anticipated demand.
- The system's infrastructure is adequately protected, treated, and sampled.
- The system's infrastructure is in good condition.

Managerial capacity refers to a system's administrative and organizational abilities. Examples of strong managerial capacity include:

- Owners, managers, and operators are accountable and knowledgeable about the water system.
- Owners, managers, and operators receive ongoing training.
- The system plans for current and future needs.
- The system interacts well with customers and regulators.

Financial capacity refers to a system's abilities to generate or obtain enough money to maintain the system and pay for future improvements. Examples of strong financial capacity include:

- The system's revenues pay for the full cost of services.
- The system knows and can measure all costs and revenues.
- Reserves are available for unexpected expenses.
- The system uses good budgeting and accounting practices.
- The system can access capital through public or private sources.

Figure 1. Vermont's public water systems (PWSs):

The 1,391 PWSs in Vermont include 417 community, 248 non-transient non-community, and 726 transient non-community systems.

Community water systems serve 25 or more year-round residents or have 15 or more year-round residential connections;

Non-transient non-community water systems serve 25 or more of the same people at least six months per year. Examples include daycares, schools, and office buildings; and

Transient non-community water systems serve 25 or more people per day at least 60 days per year. The persons served need not be the same people. Examples include delis, hotels, campgrounds, and restaurants.

This triennial report provides an overview of the Capacity Development Program, the effectiveness of its strategies, and the progress made toward improving the technical, managerial, and financial capacity of Vermont’s public water systems during the past three years. The report’s first section focuses on the program’s strategy to ensure that all new CWSs and NTNCs demonstrate the capacity to comply with drinking water regulations. It also lists the compliance status of the systems that began providing water within the past three years. The next section of the report focuses on the Capacity Program’s strategy to help existing systems improve their technical, managerial, and financial capabilities. It describes how the program identifies systems that need assistance and some of the tools used to help build capacity. The last part of the report describes the program’s plans for the near future.

Capacity Development for New Public Water Systems

Section 1420(a) of the Safe Drinking Water Act requires the state to ensure that all new CWSs and NTNCs drinking water systems beginning operations after October 1st, 1999, demonstrate the capacity to comply with regulations. Vermont’s legal authorities to implement this requirement are in statute (10 V.S.A. § 1685) and rule (Environmental Protection Rules, Chapter 21 Water Supply Rule). There were no changes to these legal authorities during the year.

Control Points

The Water Supply Rule (Environmental Protection Rules Chapter 21) prohibits a new CWS or NTNC from operating before demonstrating that it has adequate technical, managerial, and financial capacity. The rule also outlines the criteria to demonstrate capacity, and includes several control points – places where the DWGPD can exercise its authority to ensure a new system will have adequate capacity (see Figure 2). Each control point marks a significant milestone in demonstrating capacity. The DWGPD makes a formal determination as to whether a system has adequate capacity at two points – before issuing the construction and operating permits.

The 2013 changes to the internal procedures related to control points (i.e., for new CWSs and NTNCs, Capacity staff review and approve the Long Range Plan, Operations & Maintenance Manual, conducts initial sanitary survey, and issues the operating permit) have been continued. While these changes have increased workload for the Capacity staff, it has been more efficient than multiple staff familiarizing themselves with the same system. It has also streamlined some of the system’s interactions with the DWGPD. In late 2015, the Capacity Development Program worked with the Water Resources Section to combine the Source Permit Application Received letter

Figure 2. Control points to ensure that new CWSs and NTNCs have adequate capacity.

- ◆ *Source Protection Plan Approval*
- ◆ *Source Permit Issuance*
- ◆ *Long Range Plan Approval*
- ◆ *Construction Permit Issuance*
- ◆ *O&M Manual Approval*
- ◆ *Sampling Plan Approvals*
- ◆ *Operator Certification*
- ◆ *Operating Permit Issuance*

with the Capacity letter for new proposed CWSs and NTNCs. This change has been made in an effort to be more upfront and transparent with the requirements, responsibilities, timeline, and costs associated with operating a public water system.

Capacity Determinations for New Public Water Systems

The table below lists new systems for which a capacity determination was completed during state fiscal year 2017. It also lists proposed systems for which an evaluation is underway, but not yet completed, and a note regarding their status.

Table 1. Capacity evaluation status for new CWSs and NTNCs.

WSID	Water System Name	PWS Type	Date Activated	Capacity Review Status
VT0020964	Alburgh Fire District #2	CWS	7/25/2014	Completed – Operating permit issued
VT0021202	Berlin Municipal Water System	CWS	2/22/2016	Completed – Operating permit issued
VT0021448	Westminster Public Safety Building	NTNC	8/2/2016	Completed – Operating permit issued
VT0021062	MSCVT Water System	NTNC	9/8/2016	Completed – Operating permit issued
VT0021454	Heartbeet Community Center	NTNC	10/11/2016	Completed – Operating permit issued
VT0021272	South Face Village at Okemo	CWS	11/3/2016	Completed – Operating permit issued
VT0021446	The Binding Site VT	NTNC	3/16/2017	Completed – Operating permit in draft
VT0021477	Rovers North	NTNC	Proposed	Source and Construction permit issued
VT0020376	Killington Village Water System	CWS	Proposed	Source and Construction permit issued
VT0021005	Sundance Subdivision	CWS	Proposed	Source and Construction permit issued
VT0021490	KCOS Holdings LLC	NTNC	Proposed	Source and Construction permits issued
VT0021010	Valley Water System	CWS	Proposed	Source and Construction permit reissued
VT0021585	71 Depot Hill	NTNC	Proposed	Source permit issued. Construction application received
VT0021520	Camp Precast	NTNC	Proposed	Source permit issued. Construction application received
VT0021396	Daniels Construction	NTNC	Proposed	Source permit issued and Construction permit application received
VT0021557	Tata Harper Skin Care	NTNC	Proposed	Source permit issued.
VT0021460	Battenkill Valley Health Center	NTNC	Proposed	Source permit issued
VT0021376	Carinthia at Mount Snow	CWS	Proposed	Source permit application received
VT0021429	Smuggler’s Notch Development	CWS	Proposed	Source permit application received
VT0021588	17 Black Walnut LLC	CWS	Proposed	Source permit application received
VT0021590	Quechee Lakes Subdivision – Highland Parcel	CWS	Proposed	Source permit application received
VT0021512	Highgate Methodist Church	NTNC	Inactivated	System became non-public partway through Capacity determination. Inactivated 9/1/2017.

New System Compliance

The best measure of the capacity development strategy's effectiveness for new water systems is whether they are in compliance with drinking water regulations, especially the health-based standards. If a public water system does not comply with a federal or state drinking water regulation, the DWGPD notifies the water system's owner(s) and operator(s) of the violation. The Division's letter notification of violation requests that the system inform the public of the alleged violation, provide corrective action as necessary and return what water system to compliance with safe drinking water standards. If warranted, the DWGPD directs the system to take steps to protect public health (e.g., issuing a boil water notice). The Division also offers the system technical assistance to help them return to compliance. If the system still does not comply, the Division takes appropriate enforcement actions.

All the new systems activated in the past three years are currently in compliance with the drinking water health-based standards. During 2014-2017, however, two of the systems violated health-based standards.

- ◆ Highgate Methodist Church – violated the maximum contaminant level (MCL) for arsenic. As of September 1, 2017, the Water System has been reclassified as a non-public drinking water system. The Water System is working with the Division's Essex Junction Regional Office to address the elevated levels of arsenic in the drinking water in their Wastewater System and Potable Water Supply Permit, WW-6-0004-2.
- ◆ Alburgh Fire District #2 – prior to the implementation of the Revised Total Coliform Rule (RTCR), the Water System violated the MCL for total coliform bacteria. The Water System issued boil water notices and the supplying water system boosted chlorine treatment, while Alburgh Fire District #2 addressed the contamination issue. Following the issue, the Water System monitored residual chlorine and sampled repeatedly for total coliform to demonstrate their ability to comply with this health-based standard.

The systems kept their customers informed during the contamination events. They also worked with DWGPD staff to resolve the issues to make sure the water was safe to drink. E. coli bacteria was not detected at the Alburgh Fire District #2 system and no adverse health effects were reported. Alburgh Fire District #2 has returned to compliance with the health-based standards and Highgate Methodist Church is working with the Division's Essex Junction Regional Office to return to compliance with the Wastewater System and Potable Water Supply Rule.

Another important compliance and capacity measure is the Environmental Protection Agency's (EPA's) Drinking Water Enforcement Tracking Tool (ETT) score. The ETT score measures noncompliance across all federal rules, placing higher weight on the health-based standards. A violation of an acute MCL, for example, carries more weight than that of a reporting violation. A score is calculated for each system based on violations occurring within the past five years and any older open-ended violations. It does not include violations for which the system has returned to compliance, or has been issued an enforceable directive to return to compliance (e.g., a schedule in an operating permit).

The DWGPD uses the ETT to help prioritize enforcement actions and capacity development assistance. Table 2, see below, includes the ETT status of CWSs and NTNCs activated during the past three years. Systems that exceed a score of ten become an immediate enforcement priority. Those with scores of ten or less are tracked closely. No systems activated in the past three years has a score of more than ten.

Table 2. Compliance status of CWSs and NTNCs activated within the last three years that had capacity determinations.

WSID	Water System Name	PWS Type	Date Activated	On ETT list? Score?
VT0021446	The Binding Site VT	NTNC	3/16/2017	No
VT0021272	South Face Village at Okemo	CWS	11/3/2016	No
VT0021454	Heartbeet Community Center	NTNC	10/11/2016	No
VT0021062	MSCVT Water System	NTNC	9/08/2016	No
VT0021448	Westminster Public Safety Building	NTNC	8/02/2016	No
VT0021512	Highgate Methodist Church	NTNC	4/05/2016	Yes – 5
VT0021202	Berlin Municipal Water System	CWS	2/22/2016	No
VT0021493	Pad Print Machinery of VT Inc.	NTNC	4/15/2015	No
VT0020964	Alburgh Fire District #2	CWS	7/25/2014	Yes – 1

Note: Data reflects second quarter 2017.



Capacity Development for Existing Public Water Systems

Section 1420(c) of the SDWA requires the state to develop and implement a strategy to help existing public water systems acquire and maintain technical, managerial, and financial capacity. On July 28th, 2000, the DWGPD published its “Existing Public Water System Capacity Strategy”. The strategy’s five major components are listed in Figure 3, see below. With time, the Capacity Development Program has incorporated other tools. For example, in the last three years, the program has begun to employ a strategic long-term planning strategy which promotes water systems inventorying and performing condition assessments of their assets, and preparing budgets and timelines for infrastructure maintenance and replacement. We believe this strategy will further strengthen and improve systems’ technical, managerial, and financial capacity in the short-term and into the future. The DWGPD started revising the formal Capacity Development Program strategy in 2016 but, due to staff losses, the revisions stalled in 2017. The DWGPD intends to revise the strategy in 2018 to incorporate this additional focus.

As of August 2017, there were 1,391 public water systems in Vermont, including:

- 417 community systems (CWSs),
- 248 non-transient non-community systems (NTNCs), and
- 726 transient non-community systems (TNCs).

About 70 percent of Vermonters are served by CWSs.

Figure 4, below, shows a breakdown of the CWSs in Vermont

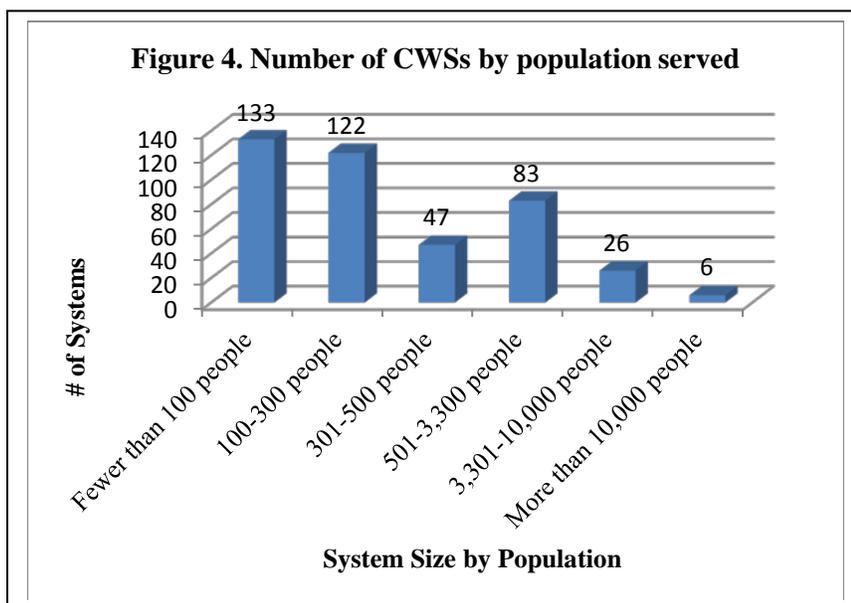


Figure 3. The *Existing Public Water System Capacity Strategy* describes:

- The methods or criteria used to identify and prioritize systems in need of capacity development assistance.
- The factors (e.g., legal, regulatory, or institutional) at the federal, state, or local level that encourage or impair capacity development.
- The ways the state uses its authorities and resources to help systems comply with regulations, encourage the development of partnerships between systems, and train and certify water system operators.
- The methods used to establish a baseline and measure improvements in capacity.
- The ways to involve interested parties in developing and implementing the capacity development strategy.

by population served. Vermont is unique in that 72% of its CWSs are very small (i.e., serve 500 or fewer people). According to the EPA, only about 56% of CWSs nationwide are this small (EPA Document 816-R-10-022, July 2011)

Most small systems in Vermont were created when regulatory standards were less stringent than they are today. For example, most of Vermont's small CWSs were created between 1975 and 1987. The smallest systems are often run by part-time or volunteer staff with limited time and experience. Many do not generate enough revenues to cover the system's full costs because they have a small customer base and inadequate rates. Too often rates have been kept low by relying on volunteers or underpaid staff, and deferring infrastructure maintenance, repairs, and replacement.

Lacking strong capacity, specifically managerial and financial capacity, these systems need the tools and training to help them operate in a more sustainable manner. Water systems need assistance to identify their infrastructure needs and the resources available to assist them in completing necessary and required improvements. While the Capacity Development Program provides its assistance to all community and non-transient and non-community water systems, extra focus is on the smallest, and frequently the most non-compliant, community systems.

“I have been the sole caretaker of this system for nearly 20 years, with little help or no help from the water customers. I am 67 and want to retire but how? My wife takes care of the finances and does a great job. She has no experience with computers or financial records keeping. We do everything by paper and filing...I try to have at least annual meetings but no one shows up. I send letters and financial updates, apart from that, I am a one man operation.” – A statement from a response to the capacity questionnaire (sent out in 2014) describing the challenges facing a very small water system.

Identifying Systems that Need Assistance

The Capacity Program uses compliance data and sanitary survey findings to help identify systems in greatest need of technical assistance. DWGPD staff conducts a sanitary survey at each system every three to five years, depending on the system's type (i.e., CWS or NTNC), treatment, and water source.

During each survey, division staff reviews the system's compliance with regulatory standards and provides the water system with guidance on how to improve operations and management. If the system is identified as needing technical, managerial, and/or financial capacity assistance, the surveyor refers them to the Capacity Development Program. More information regarding sanitary surveys is included in the section below.

Information from capacity determinations for systems applying for Drinking Water State Revolving Fund (DWSRF) loans is also used to direct technical assistance to the Program. The DWSRF Program Development Specialist completes a majority of the capacity determinations for loan applicants. Capacity Development Program staff also completes the eligibility determinations related to

loans that involve a change in ownership of a water system. During the capacity assessment, staff ensure that the improvements project that is being proposed for DWSRF loan funding is designed to address technical deficiencies that have been identified by the Division. For systems lacking managerial and/or financial capacity, staff prepares a list of tasks that, if completed, will improve the water system’s compliance capabilities. These tasks are either provided as recommendations to the system, included as a compliance improvements schedule activity within an operating permit, or as a requirement for loan approval or forgiveness. The DWSRF Development Specialist and/or the Capacity Development Program staff work with systems that request help completing the tasks. The state does not award DWSRF monies to systems that lack adequate capacity unless the funds will improve the system’s capabilities and address chronic non-compliance issues.

Providing Assistance to Improve Capacity

During the past three years, the state continued to use tools identified in the capacity development strategy to help systems improve their technical, managerial, and financial capabilities. These tools include: source, construction, and operating permits; sanitary surveys; operator certification; financial assistance programs, including low interest and negative interest loans; capacity assistance consultations; technical assistance consultations; and source water assessments. The Division continues to develop new capacity development initiatives using set-aside funds from the DWSRF, while continuing to emphasize Asset Management and Water Loss Control Programs. Some of the tools and the new initiatives designed to help improve system capacity are described below.

Sanitary Surveys

A sanitary survey is an on-site inspection of a system’s water source, facilities, equipment, operation, and maintenance. The surveys are conducted by DWGPD staff. During a survey, the surveyor identifies sanitary deficiencies and assesses a system’s capability to supply safe drinking water. A compliance schedule to address any deficiencies is then incorporated into the system’s operating permit. Table 3 lists the number of sanitary surveys conducted during the past three years.

Table 3. Number of sanitary surveys conducted during the past three state fiscal years

PWS Type	State Fiscal Year 2015	State Fiscal Year 2016	State Fiscal Year 2017
CWSs	187	164	125
NTNCs	79	88	127
TNCs	79	73	94
<i>Total</i>	<i>345</i>	<i>325</i>	<i>346</i>

Operator Certification

All public water systems are required to have a certified operator. The operators are responsible for protecting public health by operating and maintaining drinking water infrastructure in a safe, optimal, and reliable manner. Systems without a qualified, accountable operator lack the capacity to provide safe drinking water. As of September 14, 2017, 5 community, 8 non-transient non-community, and 36 transient non-community drinking water systems did not have a certified operator. The Division

Section sends the water systems lacking a certified operator a notification letter. If they do not obtain a certified operator in a timely fashion, normally within 30-days, they will be issued a notice of alleged violation and subject to enforcement activities.

The DWGPD’s Operator Certification Program helps ensure that operators receive the training necessary to fulfill their duties. Currently, there are 1,200 certified operators and 36 operators-in-training. The DWGPD has an active contract with the Vermont Rural Water to conduct trainings. In addition, the DWGPD had a training grant agreement, with Green Mountain Water Environment Association (GMWEA); however, that agreement ended in December 31, 2015. In 2015 and 2016, The Capacity Development Program also offered four Asset Management workshop series (two series each year.) A total of 4,556 training credit hours were awarded in 2015 and 6,700 were awarded in 2016. The number of credit hours for 2017 will be compiled and included in the next Operator Certification Program Annual Report, which will be available on July 1st, 2018.

Drinking Water State Revolving Fund

The 1996 Amendments to the SDWA created the DWSRF. The fund establishes a financial mechanism to help states achieve the SDWA’s public health protection goals. Each year the EPA gives Vermont a grant to capitalize the fund. The State must match at least 20 percent of the federal grant. The money is used to provide public water systems planning and capital improvements loans and other types of assistance. Table 4, see below, lists the federal grant monies and state match added to the fund for the past three years. The federal grant amount for federal fiscal year (FFY) 2018 is expected to be \$8,312,000, the same amount awarded in FFY 2017. This would require a state match of \$1,662,400 and result in a \$9,974,400 addition to the fund.

Table 4. Federal grant monies and state match added to the Drinking Water State Revolving Fund the last three years.

Federal Fiscal Year	Federal Capitalization Grant Amount	State Match (20% of Federal Grant)	Total Capital Added to the Fund
2015	\$8,845,000	\$1,769,000	\$10,614,000
2016	\$8,312,000	\$1,662,400	\$9,974,400
2017	\$8,312,000	\$1,662,400	\$9,974,400
Three Year Total	\$25,469,000	\$5,093,800	\$30,562,800

Monies from Vermont’s DWSRF are critical to helping public drinking water systems achieve and maintain technical, managerial, and financial capacity. The SDWA requires the state to prepare an Intended Use Plan each year that describes how the DWSRF monies will be spent. Most of the monies are used to fund loans to public water systems for capital improvement projects. Systems serving disadvantaged communities are often eligible for some principal forgiveness and more favorable loan conditions (e.g., negative interest rates.)

To date, loans of more than \$210 million have been awarded through the DWSRF, including about \$18 million from the American Recovery and Reinvestment Act of 2009. The table below lists the number of executed loans and the amounts for each of the past three state fiscal years.

Table 5. Loans from the Drinking Water State Revolving Fund executed in the last three years.

State Fiscal Year	Number of Loans Executed	Dollar Amount of Loans*
2015	15	\$11,923,010
2016	10	\$16,596,594
2017	10	\$11,536,685
Three Year Total	35	\$40,056,289

* The loans executed in a given year may include funds from the current year’s federal grant and state match, as well as monies from interest earnings, loan repayments, and uncommitted funds from previous years.

While the vast majority of the DWSRF monies are used for planning and construction loans, a small percentage is earmarked for other types of assistance. These other types of assistance are referred to as “set-aside” activities. Some of the more recent set-aside activities are described below.

Asset Management Programs - Grants, Workshops, and Other Assistance

In a 2014 capacity questionnaire, Vermont’s community water systems identified “creating or updating an Asset Management Program...or other tool to help manage the water system” as a top priority. So to help community water systems develop an Asset Management Program, the Capacity Program hosted two workshop series in 2015 and followed up by offering grants to select CWSs in the spring of 2016. In response to the popularity of these efforts, the Capacity Program responded by hosting another two workshop series in late 2016, followed with another round of grants in the beginning of 2017.

Each workshop series consisted of four full-day workshops spread over a three-month period. During the workshops, participants learned how to develop the components of an Asset Management Program to help solve a problem with their drinking water utility. Between each of the four workshops, the participants applied what they learned by working on portions of an Asset Management Program for their system. By the end of the training series each water system had developed a program for part of their system, and gained the knowledge and confidence to grow their water system’s Asset Management Program over time. Representatives from 35 community water systems participated in the 2015 and 2016 workshop series.

An Asset Management Program uses level of service goals, a detailed asset registry, risk assessments, risk and cost reduction strategies, and financial planning to help set priorities and meet customers’ expectations in a cost-effective manner. It can help systems:

- ◆ *Operate more efficiently,*
- ◆ *Prolong the life of assets,*
- ◆ *Make informed decisions,*
- ◆ *Justify needs and decisions,*
- ◆ *Plan and pay for future repairs and replacements, and*
- ◆ *Become more resilient and sustainable.*

An up-to-date map and asset registry are the backbone of a successful Asset Management Program. Public water systems often have limited staff time available and creating a detailed inventory can take a number of years. Water systems can benefit from the development of an Asset Management

Program before the asset registry is complete; however, the time and effort needed to create an inventory often prevents a water system from starting an Asset Management Program. Therefore, in 2016 and 2017, the Division’s Capacity Development Program offered systems grants of up to \$20,000 to assist with the development and implementation of an Asset Management Program.

In 2016, 27 systems were awarded an Asset Management grant; 19 of which either completed the Asset Management workshops in 2015 or 2016. In 2017, 21 systems were awarded an Asset Management grant; 6 of the 21 grantees received grants in 2016 for other components of an Asset Management Program. Systems use the funding to develop level of service goals and performance measures; create an asset inventory and assess the condition of assets; map assets; analyze asset life cycle costs; conduct a risk assessment to identify priority assets; develop risk and life cycle cost reduction measures; and create funding strategies (see Table 6).

Table 6. Number of systems with grant funding to complete each component of an Asset Management Program.

Asset Management Program Components	2016 Number of Systems with Grant Funding for Component	2017 Number of Systems with Grant Funding for Component
Level of Service Agreement (Goals and Performance Measures)	19	16
Asset Inventory and Condition Assessment	27	21
Maps	19	18
Life Cycle Cost Analyses	12	17
Risk Assessments	23	16
Risk and Cost Reduction Strategies	21	17
Funding Strategies	19	16

Drinking Water Lead Reduction Strategies Grants

In early 2017, the Capacity Development Program offered grants to help public CWSs reduce the risks of exposure to lead in drinking water. The purpose of the grants is to help community systems create an inventory of publicly and privately-owned lead service lines and/or other lead-containing infrastructure; develop strategies for removing the lead infrastructure and reducing exposure users; and communicate with system users. The total amount available for the grants was \$125,000; maximum grant award \$80,000, and the minimum grant \$20,000.

Two systems community water systems were awarded grants, totaling \$125,000. Grant funding will be used to: find, map, and inventory water distribution and customer service lines and other lead-containing infrastructure; establish a proactive, full lead service line replacement program; educate the public about the risks of exposure to lead in drinking water and how to reduce risks; develop a Capital Needs Study, Capital Improvement Plan, and funding strategies to replace publicly and privately-owned lead lines and other lead-containing infrastructure. The work under the grants is expected to be completed by October 26, 2018. We expect these grantees to develop and implement risk reduction strategies that other communities can use as a model, with an emphasis on finding and removing lead service lines.

Leak Detection Surveys

Finding and repairing leaks in a timely fashion can minimize wasteful water withdrawals, reduce treatment costs, capture lost revenue, prevent disruptions to the water system, and protect public health. For the fourth consecutive year, the Capacity Development Program has offered free leak detection services to CWSs.

To be considered for the leak detection services, systems had to submit a project request including the results from a basic water audit, the miles of pipe they want to be surveyed, the pipe's age and material type, and any additional information demonstrating why the system would benefit from the project (e.g., water pipe break history, or examples of system water shortages or low-pressure events thought to be caused by leaks). The system also had to agree to assist with the survey (i.e., preparing maps, locating listening points, exercising valves, etc.), and fix any leaks found.

In fiscal year 2016, thirty-two public community drinking water systems received leak detection services. About 257 miles of pipe were surveyed and 117 leaks were identified. An estimated 669 gallons per minute (963,720 gallons per day) of drinking water was being lost through these leaks. Capacity Development Program staff followed up with the systems to ensure that they fixed the leaks or had a plan to do so. Because leak detection is not an exact science, some leaks were likely not found. Table 7, see below, provides a summary of the leak detection surveys conducted in fiscal years 2014, 2015, and 2016.

Table 7. Summary of leak detection surveys completed in fiscal years 2014, 2015, and 2016.

Fiscal Year	Number of Systems	Miles of Pipe Surveyed	Number of Leaks Identified	Estimated Losses from Leaks Identified (gallons per day)
2014	25	155	51	519,840
2015	24	359	89	1,731,960
2016	32	257	117	936,720

This year, sixteen systems were awarded a leak detection survey. The surveys are being conducted in accordance with the American Water Works Association's "Water Audits and Loss Control Programs" manual (Manual of Water Supply Practices M36, 3rd Edition, 2009). They are scheduled to be completed by the end of May 2018. A final project report will be prepared once the surveys are done.

The Capacity Development Program plans to offer leak detection services again next year, calendar year 2018. And we also plan to help systems develop more comprehensive water loss programs by offering trainings and technical assistance on conducting and validating water audits. Comprehensive water loss programs will likely be required for some systems in the future.

Revised Total Coliform Rule – Level 2 Assessments

To meet the goals of the Revised Total Coliform Rule, the Drinking Water and Groundwater Protection Division's Compliance and Support Section offers free Level 2 Site Assessments to CWSs and NTNCs following the triggers identified in the Rule, including an *E. coli* maximum contaminant level violation, or certain repeated total coliform or compliance issues. The goal of the assessments is to

help identify sanitary defects or issues that triggered the assessment or led to the compliance issues, and recommend corrective actions to resolve the issue. This will lead to a better understanding of the water system by the operator, increased compliance with drinking water regulations, and greater protection of public health.

Flood Vulnerability Assessments

Many of Vermont's communities are susceptible to flooding because of our landscape (e.g., steep slopes) and development patterns. Floods are already one of the most common hazards in Vermont. And as the intensity and frequency of storms increase due to climate change, so do the risks of significant flood damage.

In 2014, the Facilities Engineering Division (FED) in consultation with the DWGPD started a flood resilience project. Using funds from the DWSRF set-asides, FED hired a temporary employee to help community water systems assess the vulnerability of their infrastructure to natural disasters, focusing primarily on floods; and identify mitigation measures that will improve systems' resiliency to natural disasters.

As of June 30th, 2017, the FED temporary employee had visited and prepared brief assessment summaries for 52 public water systems. Some of the identified vulnerabilities require mitigation measures which will require significant financial investment. To encourage system to make these investments, FED awards additional DWSRF construction loan priority points to projects that will improve resiliency.



The table below describes some other on-going capacity development initiatives. Appendix A includes a list of capacity development projects completed in previous years.

Table 8. Some on-going capacity development initiatives for existing systems.

Initiative	Target Audience	Description
Drinking Water State Revolving Fund (DWSRF) Program Changes	Potential DWSRF loan recipients	Changes were made to the Priority List ranking criteria in December 2016. These changes attempt to streamline the deficiency point categories, preserving award of the highest points to the most serious public health risks, elevating projects that will address lead and copper issues, and refining how aged infrastructure is addressed. For the aged infrastructure issue, three new categories were created to better reflect what the funding and regulating programs are witnessing: inadequacy of critical components, system vulnerability to contamination, and improvements to/redundancy of system components.
Training and Assistance	Public water system (PWS) owners and operators	Contract with Vermont Rural Water Association to provide technical assistance and conduct group and one-on-one trainings. The Capacity Development Program also hosted two intensive Asset Management workshop series in 2015 and 2016.
Legal Assistance	Community (CWSs) and non-transient non-community (NTNCs) DWSRF loan recipients	Pays for legal services associated with DWSRF loan closings. Also pays for legal reviews for systems using DWSRF monies to purchase land or to acquire, merge with, or purchase another system.
User Rate Reviews and Budgeting/Assisting in the Development of Financial Capacity	CWSs	Systems have contacted the Capacity Development Program for assistance in establishing an equitable user rate structure.
By-laws and Ordinance Development and Updates	CWSs	Several water systems requested help with creating or updating by-laws and ordinances. Developing a checklist of items to include in a municipal ordinance.
Ownership restructuring	CWSs	Providing guidance while undergoing restructuring (e.g., forming a Fire District to acquire a privately owned system, assisting with a merger between two municipal entities)
Technical Assistance, RTCR Assessments, and Contamination Investigations for transient non-community (TNCs) water systems.	TNCs	The DWGPD has contractors available to provide technical assistance, conduct contamination investigations and RTCR assessments at TNCs. Assistance includes determining the possible causes of contamination, identifying sanitary defects, making recommendations on how to improve the system and comply with regulations. This service has helped educate owners and operators at TNCs on drinking water regulations, protect public health and assist systems with staying in compliance or returning to compliance more quickly.
Flood Vulnerability Assessments	CWSs	FED hired a temporary employee to help CWSs 1) assess the vulnerability of their infrastructure to natural disasters (focus mainly on flood and erosion hazards); and 2) identify ways to reduce risks and improve resiliency to natural disasters.

Effectiveness of the Capacity Development Strategy for Existing Public Water Systems

As with new systems, the best measure single measure of the effectiveness of the capacity development strategy for existing water systems is whether they are in compliance with federal and state drinking water regulations, especially the health-based standards. The percentage of systems in compliance with the health-based standards has increased over the past three years (see Table 9, below). For example, during 2017 99 percent of the people served by CWSs were provided water that met all the health-based standards. This number was up from 97 percent in 2015. A contributing factor to these trends is the implementation of the Revised Total Coliform Rule (RTCR). The RTCR went into effect April 1, 2016 and the Total coliform MCL was replaced with performance assessments – the find and fix it approach. These trends indicate that the capacity development strategy, and Division’s efforts for a smooth roll-out of the RTCR, are effective.

Table 9. Percentage of systems and population served by systems in compliance with the health-based standards in the past three state fiscal years.

PWS Type	% of Systems in Compliance			% of Population Served by Systems in Compliance		
	2015	2016	2017	2015	2016	2017
CWSs	88	90	96	97	98	99
NTNCs	95	92	98	93	93	99
TNCs	94	93	99	97	95	99

Note: Vermont state fiscal years were used as the time periods.

The ETT scores are another compliance measure used to gauge capacity development efforts. An ETT score is calculated for each public water system as a measure of noncompliance across all federal rules. Systems that exceed a score of ten lack the capacity to comply with regulations and become an immediate enforcement priority. Those with scores of ten or less are tracked closely.

The number of systems with an ETT score of more than ten has decreased in last three years (see Table 10, below). Due to multiple Division initiatives (e.g., outreach conducted for RTCR, enforcement actions, etc.), it is expected that the number of PWSs with an ETT score of more than ten to continue to decrease in the next three years.

Table 10. Number of systems with a Drinking Water Enforcement Targeting Tool score of more than ten.

PWS Type	ETT Report Date Jan 2015	ETT Report Date Jan 2016	ETT Report Date Jan 2017
CWSs	10	10	6
NTNCs	2	2	0
TNCs	15	10	10

Table 11. Systems with a Drinking Water Enforcement Targeting Tool score of more than ten as of July 2017.

WSID	Water System Name	PWS Type	ETT Compliance Score
VT0005240	Hemlock Ridge Condominium	CWS	52
VT0005324	Okemo Village Condominiums	CWS	33
VT0020941	Grey Fox Inn	TNC	25
VT0021415	Kampersville Snack Bar	TNC	21
VT0020760	East Mountain MHP	CWS	21
VT0020680	St Onges Hidden Country	TNC	19
VT0001045	Mount Snow Academy	TNC	18
VT0021207	Killington Gateway I Condo Association Inc.	CWS	17
VT0021076	Burdick MHP	CWS	15
VT0020523	Derby Boys LLC	NTNC	14
VT0005603	Wintergreen at Killington	CWS	13
VT0020607	Newport Country Club	TNC	13
VT0001706	Mike & Tammy's Main Street Market	TNC	12
VT0021455	Mach's General Store and Pizza	TNC	11
VT0000779	Trailside Inn	TNC	11
VT0021188	Dream Camp	TNC	11
VT0021292	Amee Farm	TNC	11
VT0005482	Rutland Town Fire District 10	CWS	11
VT0005007	Lazy Brook MHP	CWS	11
VT0005571	Telemark Village	CWS	11
VT0021265	Duxbury Campground	TNC	11

While compliance with the drinking water standards is a useful measure of capacity, it does not indicate whether a system will have adequate capacity in the future. Any system could quickly fall out of compliance due to a number of factors, including changing water quality, degrading infrastructure, increasing regulations, or changes in staff. The revised capacity development strategy will include new ways to evaluate and enhance a system's technical, managerial, and financial capabilities.

Capacity Development – Looking Forward

The Capacity Development Program's goal is to help ensure that Vermont's public water systems are sustainable. Sustainable drinking water systems have the technical, managerial, and financial capabilities to provide their customers a sufficient quantity of clean, safe water in a cost-effective manner - now and into the future.

“You cannot have a first-rate community...with third-rate infrastructure”– Source unknown

Feeling pressure to keep user rates low, many communities have not been making the investments needed to properly maintain, repair, rehabilitate, and replace their drinking water infrastructure. Consequently, more pipes, pumps, storage tanks, and water treatment plants continue to exceed their engineer's assessment for remaining useful life. The Environmental Protection Agency

estimates that Vermont needs to invest more than \$510 million in public drinking water infrastructure in the next twenty years to ensure the health, security, and economic well-being of our communities (Drinking Water Infrastructure Needs Surveys and Assessment, Fifth Report to Congress, April 2013).

As drinking water infrastructure continues to age and degrade, public water systems will continue to struggle to be sustainable and remain in compliance with safe drinking water standards and regulations. Funding from utility reserves and public financing will likely not be enough to address Vermont's drinking water infrastructure needs into the future. This financial shortfall presents the greatest challenge for most public community water systems.

It is for this reason that Vermont's Capacity Development Program is encouraging systems to develop and implement Asset Management Programs to help address this funding shortfall, and to plan to meet these and other challenges they likely face (e.g., emerging contaminants, retaining the knowledge of retiring staff, adjusting to changes in demand for services, and complying with new and more stringent regulations). Building on momentum from the Asset Management Workshops and Grants, the Capacity Development Program will continue to help systems by offering more training and technical assistance. The Capacity Development Program is encouraging the development of asset management plans, so we can target the most critical projects first and better manage the limited resources available.

Vermont's systems need to invest more money in drinking water infrastructure and use better financial and management practices to operate, maintain, repair, rehabilitate, and replace assets. The state and federal governments need to invest more too. In 2016, the federal capitalization grant and state match that fund Vermont's Drinking Water State Revolving Loan Program decreased by six percent to \$8,312,000. Funding stayed level at this decreased amount for 2017. But funding needs for infrastructure and operations and maintenance continue to grow. Without proper funding, we will not be able to continue to rely on our drinking water infrastructure for disease protection, fire protection, basic sanitation, economic development, and to support our quality of life.

Appendix A. Capacity Development Initiatives Completed in Previous Years

Capacity Initiative	Target Audience	Notes
Transient Non-Community (TNC) Water Quality Monitoring Project	TNCs	In 2002, the program developed a cost estimate for conducting quarterly compliance monitoring for all TNCs in the state. At the time, TNCs were only taking annual coliform samples. The goal of the project was to help TNCs transition to quarterly monitoring. Using the cost estimate, the TNC Program hired contractors to collect quarterly samples during 2004 and 2005, prepare a sampling plan for each system, and teach staff how to take samples properly. The samples were analyzed at the Department of Environmental Conservation's laboratory.
Board Member Owner Manual	CWSs	The manual outlines the responsibilities and liabilities for PWS board members and includes information on relevant laws, regulations, and policies, and a list of resources. A draft has been prepared.
Engineering Technical Assistance	CWS, NTNC	DWGPD had several engineering firms under contract to provide operational troubleshooting assistance to small public water systems.
Small System Templates and Self-Assessment	CWS, NTNC	Templates for O&M manual and long range plan, and a capacity assessment form was developed. These documents form the basis for some of the individual on-site and group-training sessions provided. Capacity assessments are completed for all loan applicants and are a prerequisite for both planning and construction loan eligibility. Additionally, a customer complaint policy form and <i>How to Form a Fire District</i> guidance document were developed.
Public Service Board (PSB) Technical Assistance	Private, for-profit CWS (regulated utilities)	Beginning in early summer of 2009, DWGPD met with representatives from the PSB and DPS to discuss better coordination between the three entities. The aim is to help the very smallest of regulated public water systems with rate review, tariffs, and reporting. A guidance manual was developed to assist small systems in the rate approval process.
Consolidation Study	CWS	Consolidation Study was replaced with a Facilitation and Mediation contract beginning in June 2008.
Communication Workgroup	All PWSs	A workgroup was formed to evaluate and develop recommendations on mass mailing procedures, newsletters, use of the Electronic Bulletin Board, electronic communication with water systems, and general publicity issues. A number of those recommendations were implemented.
Reservoir Water Quality Study	Surface water CWS	The study collected and analyzed data on changes in source water characterization during the year for two small surface water bodies used by public community water systems in Vermont. Field data collection occurred between April 2002 and May 2003 for the Town of Brattleboro and City of St. Albans Water Systems. Data was analyzed and results evaluated and communicated to the participating water systems.
Comprehensive Performance Evaluation Program	CWS	Comprehensive performance evaluations were conducted on three surface water systems.

Small System Engineering Evaluations	CWS, NTNC	An extremely successful initiative and may resume in the future for those systems that did not already receive an evaluation.
Regulation of Consecutive Water Systems and New Water Line Extensions	CWS	Successful passage of H806 to Act 156 <i>An Act Relating to Public Water Systems.</i>
Asset Management Pilot	CWS	The DWGPD and Village of Waterbury, a small drinking water system, collaborated on an asset management pilot project that ended in Spring 2013. The goal of the pilot was to populate CUPSS, the EPA-developed asset management program, using ArcGIS for a more efficient way to enter many hundreds to thousands of assets. The use of GIS to spatially locate and attribute assets for use in CUPSS had never been done successfully. The Village now has the frame work for an Asset Management Program. A report describing the project is available on our website at http://dec.vermont.gov/water/drinking-water/capacity-dev/publications-and-resources/archived-documents
Determination of non-profit status	Loan Applicants	The DWGPD was given the authority to determine if a water system was not-for-profit without being a tax-exempt (through the IRS) entity. This distinction is beneficial in it reduces a potentially significant time and money delay in the DWSRF loan process
WaterSense Pilot	NTNC	The Orange Center School has a history of seasonal water outages. It appeared that the problem might be solved through water conservation efforts. So the school was awarded a grant in 2012 to purchase and install new WaterSense labeled toilets and faucet aerators, and a new dishwasher. The fixtures helped significantly reduce water use and the school was able to stop hauling water temporarily.
Drinking Water & Groundwater Protection Division Newsletter- <i>Waterline</i>	All PWSs, Consultants, interested organizations	This is an effective means for communicating to a broad audience interested in hearing from the state on issues affecting public water systems. We have received feedback from readers that is highly supportive of the newsletter.

Appendix B. Operator Certification Program Annual Report for 2016

Vermont Drinking Water and Groundwater Protection Division Public Water Operator Certification Program Annual Report for Calendar Year 2016

May 15, 2017

This 2016 Public Water Operator Annual Report documents Vermont's program compliance with the EPA Public Water Operator Certification Guidelines for the calendar year ending December 31, 2016. The US Environmental Protection Agency published guidelines for the "Certification and Recertification of the Operators of Community and Non-Transient Non-Community Public Water Systems" in February 5, 1999. Vermont adopted revised rules in the Vermont Water Supply Rule on December 29, 2000 to comply with the EPA guidelines. EPA approved the State of Vermont Operator Certification Program on February 14, 2001 and awarded the Operator Certification Expense Reimbursement Grant (ERG) which was fully utilized by 12/31/2009.

This 2016 Annual Report provides information for the 9 baseline standards described in the 1999 EPA guidelines. The Vermont Public Water Operator Certification Program continues to be implemented at the same level as previous years. No statutory or regulatory changes were made to the Program in 2016.

Operator Certification Program Overview and Enforcement Efforts

Public water systems in Vermont are classified based on indicators of potential health risk which include complexity, size, source water for treatment facilities and size for distribution systems. Specific operator certification and renewal requirements have been developed for each level of water system classification. System Classification and Operator Certification requirements are addressed in Subchapter 21-12 of the Vermont Water Supply Rule. This Subchapter includes the method for five classes (Class 1, 2, 3, 4 & D) of public water systems and drinking water facilities, requirements for operator certification and operator certification renewal. Details of Subchapter 21-12 are provided in Appendix B of this report.

Vermont has a fixed three-year cycle of renewals for Operator Classifications 2, 3, 4 and D. The current renewal cycle for Class 2 and 4 operators is July 1, 2014 through June 31, 2017. The current renewal cycle for Class 3 and D operators is July 1, 2016 through June 31, 2019. Operator Classification 1 also have a three-year renewal cycle which, unlike the other classification, is on a rolling basis with the certification period beginning the date issued and expiring ending on June 30th of the third year.

The total number of certified operators for Community, Non-Transient Non-Community, and Transient Non-Community systems is 1220. Vermont has not grand parented operators since 1992 when we adopted the initial operator certification rules. The goal was to assist those operators already operating public water systems to become certified. All grand parented operators are required to maintain their renewal credits for their class each renewal cycle. We currently have 51 grand parented operators in our certification database (SWOCS).

Vermont offers Operator-in-Training and Provisional Certification to help new water systems and operators become fully certified. Our database currently lists 36 individuals with Operator-in-Training Certification and 1 operator with Provisional Certification.

The number of systems without certified operators is listed in the table below:

System type	Number of systems	Number of systems with no certified operator as of 12/31/16
Community	418	7
Non-Transient Non-Community	250	4
Transient Non-Community*	721	77

* TNC certification is not mandated by EPA.

The Division Operator Certification Officer continues to work closely with new and delinquent community and non-transient non-community water systems to help them obtain a certified operator. The Operator Certification Officer runs a report monthly to identify community and non-transient non-community systems without a certified operator. The Operator Certification Officer will contact these systems and follow up with an initial warning letter, if necessary. The water system has thirty days to notify the Drinking Water and Groundwater Protection Division in writing of their certified operator. If the system does not obtain a certified operator, we will issue a Notice of Alleged Violation (NOAV) shortly after the thirty-day period. At this stage, most water systems comply with the NOAV. For the few remaining, a Department attorney may contact the water system and warn the system of a potential enforcement action. If the system still does not obtain a certified operator, we will refer the system to the Agency of Natural Resources Office of General Council, Enforcement and Litigation Section for further action.

Most community and non-transient non-community water systems without certified operators have this status because their operator(s) fail to renew their certification on time or an operator leaves the system, they are working to obtain a new operator, or the system is making changes and will be inactivated as a public water system. In calendar year 2016, five NOAV's were issued by the Division to water systems for failure to have a certified operator of which four have retained a certified operator. Three Administrative Orders and two Assurance of Discontinuance issued in 2016 remain unresolved, as of the end of 2016.

The Agency of Natural Resources has the authority to revoke or suspend an operator's certificate. Failure to comply with the regulations may require revocation or suspension. In calendar year 2016 no operator's certification was revoked or suspended.

Training and exams

The Vermont operator training program is coordinated through a contract with the Vermont Rural Water Association (VRWA). Communication between the VRWA Coordinator and Drinking Water and Groundwater Protection Division Operator Certification staff occurred frequently throughout the year. Through this contract courses were held in various locations throughout the state to reach small water systems. The attendance for each class ranged from 10-20 participants (depending on location).

Additional courses were provided at locations in Vermont by other training providers including Earth Water Specialists, Green Mountain Water Environment Association (GMWEA), New England Water Works Association (NEWWA), and the Vermont Department of Environmental Conservation.

The state continued to contract with VRWA for the duration of 2016 first with a new contract running from May 1, 2015 through April 30, 2016. This contract had the provision to be amended twice which has been done, first to extend the contract from May 1, 2016 through April 30, 2017 and then to extend the contract a second and final time from May 1 2017 through April 30, 2018. The state plans to issue a request for

proposals during the winter of 2018 for a new operator training contract to commence May 1, 2018. A copy of the current contract with VRWA and two contract amendments is attached.

Courses for Vermont Water Operators are publicized on our web, <http://dec.vermont.gov/water/drinking-water/pwso/operator-training> . This includes both in-class and online training courses. In calendar year 2016, approximately 6700 training contact hours were awarded to water professionals through classes provided throughout the state and through online training courses. Approximately 69% of these training contract hours were awarded by VRWA to 1038 Water Professionals. Details of the training provided by Vermont Rural Water Association in 2016 are listed in Appendix A.

Review and approval of training courses occurred throughout the year except for VRWA, GMWEA, NEWWA, Earth Water Specialists, and NEIWPC which have “blanket approval” for in-class courses they provide.

On-line training courses by the following training providers have been approved for water system operator TCHs. Note that only up to 50% of water system operator renewal credits may be earned from on-line courses.

- [AYPO Tech, LLC](#)
- [CEUplan.com](#)
- [Michigan State University Water Management Courses](#)
- [Vermont Leagues of Cities and Towns, PACIF Online University](#)

All other courses by training organizations and providers, including any distance learning training, must be pre-approved using a pre-approval form taking into account our pre-approval guidelines. Courses must be relevant to operations or management of water systems. We accept a wide spectrum of topic areas from basics to advanced topics. Training topic areas include a range of technical training including safety, capacity, equipment mechanics, and drinking water rules. We also provide training classes for new operators of small systems, systems with advanced treatment and system with distribution only.

Class 2, 3, 4 and D exams were again administered in the spring and fall (May 6, 2016 and November 4, 2016) at two different locations (Berlin and Rutland, VT) on the same day. There were 64 individuals who took an exam in May and there were 41 individuals who took an exam in November.

Stakeholder Involvement and Program Review

During 2016, the Vermont Operator Certification Advisory Committee met on January 8, April 15, July 15, and October 21. Topics addressed by this committee in 2016 included:

- Water Supply Rule revisions to Subchapter 21-12 – Water System Classification and Operator Certification. The committee identified issues to be addressed in rule revisions. The Division is drafting revisions to this Subchapter and other parts of the Rule in 2017
- Public water operator certification program evaluation. The Division completed an evaluation in response to a legislative review of licensing programs under consideration moving the administrative functions of the certification program to the Vermont Secretary of State Office of Professional Regulation. The Division recommended postponing consideration of such a move for a few years to allow for further evaluation of the coordination necessary between the 2 Agencies, considering that the regulatory requirements for certified operators working at public water systems would still reside with the DEC DW&GWPD in accordance with EPA requirements. Also under consideration was the need

to assess dataflow needs between the two agencies which, once established would likely change upon implementation of the new SDWIS Prime in the future.

- Class 2 exam review. A review was completed and edits were made to the Class 2 exam. Use of the updated Class 2 exam began in May 2016.
- Computer based testing. The committee discussed offering computer base testing for the ABC exams that we currently administer (Class 2, 3,4 & D) and whether to use the standardized ABC exams rather than one customized by ABC for Vermont. The committee is continuing this evaluation and anticipates any changes will be made after ABC releases new test forms.
- Operator in Training. The committee has discussed providing clearer requirements/guidance for the types of training and experience time and how it is documented for persons who are certified as an “operator in training”. Recommendations were identified and will be developed further in 2017.
- Continuing Education for Certification Renewal. The committee has discussed ways to enhance the professional development of operators. One way is to require continuing education/training hours in various training categories. Recommendations were identified and will be developed further during 2017 along with an implementation plan.

Committee review, discussions and providing recommendations to the Division will continue at future meetings as evaluations of these topics continues or others come up. Any changes to the operator certification program will be discussed in advance with EPA Region 1 Operator Certification Contact to ensure that our program continues to meet the baseline standards and implement EPA’s Final Guidelines for the Certification and Recertification of Operators of Community and Non-Transient Non-Community Public Water Systems.

Over the years, it has been our goal is to complete an internal review of the customized exam for each operator classification on a 5-year cycle. A review of the Class 2 exam occurred in the winter of 2016. A review of the 3, 4 and D exam will occur as part of an evaluation of whether to use the standardized ABC exams. The advantage of using the standardized ABC exams is that ABC completes a review and updates the exams on a more frequent routine basis than the Division has been able to accomplish for the Vermont Customized 3, 4 & D exams. The current schedule for review of the exams for the 2, 3, 4 & D Operator Class is listed below.

Operator Class	Last reviewed and updated	Schedule for Review and Updating
Class 2	2016	Review completed during the Winter of 2016. Revisions were made to some exam questions and revised exam was first used at the May 2016 exam. Consider changing to an ABC standardized exam.
Class 3	Prior to 2007	2017 – Evaluate whether to change to ABC standardized 3, 4 & D exams. Review updated ABC standardized exams when available in 2017 before making change. In the interim review the questions in the VT 3, 4 and D customized exams and make replace any questions as needed.
Class 4	Prior to 2007	
Class D	2009	

Expenditures

The Division continues to use DWSRF money to fund operator training provided by the Vermont Rural Water Association. The VRWA contract is funded by Technical Assistance Set-Aside Funds.

Appendix A – Water Operator Training provided January 1, 2016 – December 31, 2016

Month	Course Title Training January 1, 2016 – December 31, 2016	TCH	# of attendees	TCHs Awarded
Vermont Rural Water Association Training Sessions:				
Jan	Water Line Defrosting - Rutland	3	15	45
	Water Line Defrosting - Montpelier	3	21	63
	Revised Total Coliform Rule - Milton	3	24	72
	Lock Out/Tag Out	3	22	66
	Excavation Safety	4	35	140
	Metering in the 21st Century	3	16	48
	Level 1 Site Assessment and Coliform Sampling Plan	3	19	57
	Revised Total Coliform Rule - Rutland	3	21	63
Feb	RTCR Course - Hyde Park	3	18	54
	Effective Utility Management	6	8	48
	Level 1 Site Assessments and Coliform Sampling Plan	3	27	81
	How to Respond to Sanitary Surveys	3	17	51
	Corrosion Control	3	11	33
	Polymers - an Owner's Manual	3	21	63
Mar	Revised Total Coliform Rule - Newport	3	16	48
	Asset Management Course - Rutland	3	11	33
	Asset Management Course -Swanton	3	9	27
	Advanced Course*	35	14	450
	Distribution Course**	30	13	350
	Level 1 Site Assessments - Bennington	4	24	96
	Leak Detection - Bennington	4	22	88
	Leak Detection - Essex Jct	4	15	60
Apr	Advanced Course*	10	14	120
	Effective Utility Management	6	11	66
	Small Systems Class 2 - Putney	18	7	126
	Small Systems Class 2 - Essex Jct	18	7	126
	Revised Total Coliform Rule - Bennington	3	4	12
	VT Warn	1	4	4
	Basic Water System Math	3	14	42
	Exam Review - Essex Jct	4	13	52
	Exam Review - Putney	4	3	12
May	VRWA Annual Conference Training			
	Utility O&M: An Asset Management Perspective	1	47	47
	Funding Options for Capital Improvements	1.5	52	78
	Revised Total Coliform Rule (Short Course)	1.5	46	69
	Regulatory Updates	1.5	36	54
	Level 1 Site Assessments	1.5	35	52.5
	Optimizing Your Water/Wastewater Pump Stations	3	12	36

	Revised Total Coliform Rule (Montpelier)	3	11	33
	Cyanobacteria Course (South Burlington)	2	12	24
	TNC Operations (Rutland)	3	23	69
	Understanding your Control Panel	5	16	80
June	TNC Operations - Enosburg	3	12	36
	Chemical Feed Pumps - Rutland	3	8	24
	Chemical Feed Pumps - Essex Jct	3	11	33
	Managing your Water and Wastewater Assets	6	7	42
	Revised Total Coliform Rule (White River Jct)	3	6	18
	Cyanobacteria Course (Grand Isle)	2	12	24
	Surface Water Treatment Technology *	10	28	260
	Understanding your Motor Control Panel	5	18	90
July	Basic Water/Wastewater Math	3	3	9
	Water System O&M Manuals	3	11	33
	Water and Wastewater System Ethics	3	12	36
August	Revised Total Coliform Rule	3	3	9
	Hydrants, Valves and Meters (Rutland)	3	20	60
	Understanding Your Motor Control Panels	5	13	65
	Effective Utility Management	6	5	30
September	Advanced Water Treatment Course (Class 3 & 4)	30	4	100
	Distribution Course	30	2	40
October	Advanced Water Treatment Course (Class 3 & 4)*	15	4	40
	Line Thawing, Distribution Maintenance and Hydrants - White River Jct	3	14	42
	Line Thawing, Distribution Maintenance and Hydrants - Milton	3	20	60
	Small Systems Course - Rutland	18	7	126
	Small Systems Course - White River Jct	18	5	90
	Water and Wastewater Math	3	6	18
November	Exam Preparation	4	4	16
December	O&M Manuals	3	8	24
	Affordable Control/Telemetry System	3	17	51
	Effective Utility Management	6	5	30
	O&M Manuals	3	7	21
	VRWA 2016 Total:	422	1038	4565.5

Appendix B

AGENCY OF NATURAL RESOURCES DEPARTMENT OF ENVIRONMENTAL CONSERVATION

ENVIRONMENTAL PROTECTION RULES CHAPTER 21 WATER SUPPLY RULE REVISION DATE: December 1, 2010

Subchapter 21-12 WATER SYSTEM CLASSIFICATION AND OPERATOR CERTIFICATION

Introduction

This subchapter applies to the following **Public** water systems:

- (a) **Public Community** water systems;
- (b) **Public Non-Transient Non-Community** (NTNC) water systems;
- (c) **Public Transient Non-Community** (TNC) water systems; and
- (d) Domestic **Bottled** water systems.

12.1 General

All **Public** water systems shall be operated by a certified operator of the appropriate class as defined in this subchapter. A certified operator is one who has met the requirements of this subchapter and has a current, valid certification from the Secretary.

All **Public Community**, **Domestic Bottled**, and **Public Non-Transient Non-Community** water systems must have a designated certified operator in responsible charge available at all times. "Available" means based on system size, complexity, and source water quality, a certified operator must be on site or able to be contacted as needed to initiate the appropriate action in a timely manner.

For purposes of certifying **Public** water system operators, each **Public** water system shall be classified according to degree of treatment, and in the case of Class 4, according to size of population served. The class of operator certification required is dependent upon the classification of such facility.

There are five classes of water systems. Classes 1, 2, 3, and 4 apply to water systems with their own source(s) of supply, and Class D applies to systems which distribute water.

12.2 Responsibilities and Duties

12.2.1 Owner's Responsibilities

12.2.1.1 The owner shall be responsible for compliance with the federal Safe Drinking Water Act, Vermont statutes, and the regulations developed pursuant to both.

12.2.1.2 The owner shall be a certified operator or shall designate a certified operator(s) to carry on the daily operations of the system. Such designation shall be in writing and shall be signed by both the certified operator and the owner. A copy of the written designation shall be made available to the

Secretary upon request.

12.2.1.3 The owner of any **Public Community** or **Non-Transient Non-Community** water system shall place the direct supervision of the water system under the responsible charge of the designated certified operator(s) (see Subsection 12.2.1.2). The owner shall place the certified operator(s) in responsible charge of all quality, quantity, process control, and system integrity decisions involving public health, treatment, storage, distribution, and standards compliance. The certified operator shall hold a valid certification equal to or greater than the classification of the treatment facility and distribution system.

12.2.2 Certified Operator's Responsibilities

The certified operator shall comply with the following requirements as a condition of his or her certification:

- (a) The certified operator(s) in responsible charge must hold a valid certification equal to or greater than the classification of his or her water system, including each treatment facility and distribution system, as determined by the Secretary.
- (b) The operator in responsible charge shall perform the following duties:
 1. Conduct visual inspections of the system's source, source water protection area, storage facilities, and chemical addition systems at an appropriate frequency giving consideration to the system's design, location, vulnerability, Operations and Maintenance Manual (see Appendix D), and other relevant factors.
 2. Be familiar with all aspects of the treatment and distribution system operation of the water system.
 3. Oversee all bacterial monitoring, chemical monitoring, and other monitoring required under this Rule.
 4. Review the sample monitoring schedule and locations quarterly.
 5. Ensure that all samples are delivered to a certified laboratory in a timely manner.
 6. Inspect system within 24 hours of any positive fecal coliform result, positive Total Coliform repeat sample result, or other water system failures that threaten public health.
 7. Notify owner of any violation(s) of this Rule.
 8. Ensure the accuracy of water meters and other flow measuring devices.
 9. Be responsible for measuring, and recording chemical additions.
 10. Operate and maintain chemical feed and all treatment systems.
 11. Keep abreast of changes in the drinking water regulations and safety regulations.
 12. Fulfill certification and certification renewal requirements.
 13. Operate and maintain system in accord with the Operation & Maintenance Manual.
 14. Attend all inspections as requested by state personnel.
 15. Oversee source water protection, watershed protection, and other activities associated with chemical waivers or otherwise required by this Rule.
 16. Keep complete and accurate water system records.
 17. Carry out all required reporting requirements including submitting a complete monthly report to the Secretary by the 10th day of the following month.
 18. Develop and maintain an accurate site plan showing the water source and distribution system.
 19. Respond to consumer complaints promptly.
 20. Comply with all applicable state and federal statutes, rules and orders governing water system regulation.
 21. Conduct all duties with reasonable care and judgment for the protection of public health, public safety, and the environment.

12.3 Operator Certification

- 12.3.1 To be eligible for operator certification, each applicant must:
- (a) Submit an application on a form provided by the Secretary;
 - (b) Meet the educational and experience requirements set forth in Section 12.9;
 - (c) Classes 2, 3, 4 and D shall obtain a passing grade on the certification examination approved by the Secretary (Class 1 operators need registration only);
 - (d) Pay any required fee; and
 - (e) Satisfy all other state mandated requirements for professional licensing and certification.
- 12.3.2 When replacing an operator, the water system owner shall notify the Secretary in writing within ten (10) days following the date an operator ceases operation of a plant or system, and within ten (10) days after a new operator commences operation of a **Public** water system.
- 12.3.3 Whenever a new **Public** water system is constructed, the water supplier shall employ or contract with an operator certified in the corresponding class for the new facilities.
- 12.3.4 When significant modifications are made to an existing **Public** water system which change the system's classification, the operator(s) shall obtain a new certificate as required by the improvements.
- 12.3.5 An operator holding a certification in any class is permitted to operate all facilities in that class and any lower class. Class 4C is the highest Vermont water operator class. This paragraph does not apply to Class D (distribution only).
- 12.3.6 A certified operator may move from any **Public** water system class to the next higher one if he or she satisfies all of the following:
- (a) the operator has obtained a passing grade on the examination of the higher class; and
 - (b) he or she has worked as an operator-in-training for six months in the next higher class. One year as an operator-in-training shall be required before advancing two or more classes.
- 12.3.7 Applicants who did not obtain a passing grade on a written certification examination for a class may be retested at any scheduled examination for the particular class.
- 12.3.8 In the event an operator's certification is denied, the Secretary will provide the applicant with written notification of the reasons for such denial. Applicants may appeal the denial in accordance with the provisions of 10 V.S.A., §1680.
- 12.3.9 The operator's certification shall be displayed in the office or plant of the system, and provided for inspection upon reasonable request.

12.4 Revocation or Suspension of Operator Certification

- (a) The Secretary may suspend or revoke a certificate granted under this section, after notice and opportunity to be heard, if the Secretary finds that the certificate holder has:
 - (1) submitted or contributed to the submission of materially false or inaccurate information; or
 - (2) violated any material requirement, restriction, or condition of the certificate including:
 - (i) the violation of any applicable statute, rule, or order governing water system regulation; and
 - (ii) the failure to use reasonable care and judgment in the performance of the operator's duties.

The Secretary shall set forth what steps, if any, may be taken by the certificate holder to reapply for certification if a previous certificate has been revoked.

- (b) The applicant may appeal a revocation or suspension as provided in 10 V.S.A., §1680.

12.5 Recertification of Expired Certificates

Any operator who fails to renew his or her certificate within sixty days following the expiration date of the certificate may not receive a new certificate until he or she successfully passes the qualifying examination and meets the requirements set forth in Section 12.3.1.

12.6 Operator-in-Training (OIT)

12.6.1 An Operator-in-Training (OIT) certification is required to operate a **Public** water system under the direct supervision of a certified operator and may be granted by the Secretary. Application must be made on a form supplied by the Secretary.

12.6.2 Upon written notification by the OIT's supervisor that the OIT has completed the minimum required operational experience for full certification in the appropriate water system, the Secretary may issue the appropriate operator certificate provided the OIT has satisfied all operator certification requirements of this part.

12.7 Provisional Certification

12.7.1 A Provisional Certificate may be issued by the Secretary to an applicant for the operation of a specific water system when the applicant has not met the full certification requirements for experience in that water system class. A Provisional Certificate may be issued provided the specific water system has exhausted all reasonable efforts in recruiting a fully certified operator, and the applicant has obtained a passing grade on the operator examination for the particular water system class.

12.7.2 The Provisional Certificate Application shall be co-signed by the applicant and the owner for the water system which will be served by the provisionally certified operator. The owner of the water system shall certify that the applicant has had operator training by the manufacturer, consultant, or other certified operator and is capable of operating the specified water system. The Provisional Certificate has the following restrictions:

- (a) It shall be issued for operation of a single, specific water system;
- (b) It shall be valid only for a time period equal to the minimum operating experience requirements identified in Table 12-1 of Section 12.9; and
- (c) It shall be non-transferable.

12.7.3 To convert from a Provisional to a Full Certificate, applicants must:

- (a) present evidence of having been employed in a particular water system for a specific amount of time, to include all time in training with equipment manufacturers, consultants, or other certified trainers/operators (see Table 12-1, of Subsection 12.9; and
- (b) present evidence of having obtained a passing grade on an examination for the particular classification being sought and evidence that all other certification requirements have been met (see Subsection 12.2.1).

12.8 Classification of Public Water Systems and Drinking Water Facilities

Each **Public** water system is to be classified by the Secretary as set forth in this rule. There will be five classes, 1 through 4 and D.

12.8.1 Class 1A

This class of **Public** water system includes **Transient Non-Community** water systems with distribution and using any of the following technologies

- (a) No treatment;
- (b) Ion exchange for water softening; or
- (c) Limestone contactors.

12.8.1.1 Class 1B

This class of **Public** water system includes **Transient Non-Community** water systems with distribution and using any of the following technologies:

- (a) Disinfection with chlorine or UV, including standby capability.

12.8.2 Class 2

This class of **Public** water system includes **Public Community, Bottled, and Public Non-Transient Non-Community** water systems with distribution and any of the following technologies:

- (a) No treatment;
- (b) Disinfection with chlorine or UV; includes systems with standby chlorination;
- (c) Ion exchange for softening; or
- (d) Limestone contactors.

12.8.3 Class 3

This class of **Public** water system includes **Public Community, Bottled, Public Non-Transient Non-Community, and Public Transient Non-Community** water systems with distribution and any of the following technologies:

- (a) Disinfection by other than chlorine or UV;
- (b) Sequestering or filtration of manganese or iron;
- (c) Fluoridation;
- (d) Corrosion control;
- (e) pH control;
- (f) Air stripping;
- (g) Granular activated adsorption;
- (h) Ion exchange; or
- (i) Aeration

This class also includes all **Public** water systems using groundwater determined to be under the direct influence of surface water and which *have* a filtration waiver.

12.8.4 Class 4

This class of **Public** water system includes all **Public Community, Bottled, Public Non-Transient Non-Community, and Public Transient Non-Community** water systems which use surface water, or which have

groundwater determined to be under the direct influence of surface water with respect to which a filtration waiver has not been issued.

12.8.4.1 Class 4A1

This class includes distribution plus any of the following treatment technologies:

- (a) Bag filtration;
- (b) Cartridge filtration;
- (c) Membrane filtration;
- (d) Slow sand filtration; or
- (e) Other similar technologies, as approved by the Secretary, which do not use coagulants.

This class serves all water system populations of 25 or greater.

12.8.4.2 Class 4A, 4B, and 4C

This class includes distribution plus rapid sand filtration technology and is further differentiated by population served by the system:

4A, for served populations between 25 and 500;

4B, for served populations between 501 and 3,300; and

4C, for served populations greater than 3,300

12.8.5 Class D

This class of **Public** water system includes **Public Community** water systems serving 3,300 people or more and that have only a distribution system. A Class D system purchases its water and does not have any source or treatment associated with it.

12.9 Experience and Education

12.9.1 In determining whether an applicant has the operating experience required for certification in a particular water system class, the Secretary may consider the following:

- 1) the period of satisfactory experience as a system operator or OIT; and
- 2) operating experience accrued in another jurisdiction.

All satisfactory experience as noted above shall be credited toward the total experience required for certification in the particular class for which application is made. Operating experience is defined as time spent at a facility, plant, or system in satisfactory performance of operational duties.

12.9.2 All applicants shall have a high school diploma or a general equivalency diploma (GED). The Secretary may allow experience and relevant training to be substituted for a high school diploma or GED.

12.9.3 Table 12-1, below, contains the minimum experience requirements for certification.

Table 12-1 - OPERATOR CLASSIFICATION REQUIREMENTS

Public Water System Class(s)	Class of Operator	Operating Experience Required (Yrs)
ALL	Operator-in-Training(OIT)	NONE
ALL	Provisional	NONE
1A	Operator Class 1A	NONE
1B	Operator Class 1B	NONE
2	Operator Class 2	1.5
3	Operator Class 3	1.5
4A1	Operator Class 4A1	2
4A	Operator Class 4A	2
4B	Operator Class 4B	2.5
4C	Operator Class 4C	3
D	Operator Class D	1.5

12.9.4 Substitutions for Experience Requirements

- (a) Substitutions with related schooling or courses may be made for required experience for Classes 2, 3, 4A1, 4A, 4B, 4C, and D but with the limitation that 50 percent of any stated experience requirement must be met by actual on-site operating experience in a plant, system or facility.
- (b) Formal Education
 - (1) High School education cannot be substituted for any experience requirement.
 - (2) Approved relevant formal academic education at the post high school or college level may be substituted for experience requirement on a year for year basis, subject to the 50 percent limitation described in Subsection 12.9.4(a) above. Thirty (30) semester hours or equivalent educational hours of credit are considered to represent 1 year of formal education.
- (c) Operator Training
 - (1) Specialized operator training courses, seminars, workshops or approved technical conferences may be substituted for experience requirements subject to the 50 percent limitation previously described. Continuing Education Units (CEUs) totaling 30 are considered equal to 1 year.
- (d) Partial credit toward operating experience may be given for experience in plant or system maintenance, in a laboratory, in a different certification category than that which is being applied for, and in related (allied) trades, as determined or approved by the Secretary.

12.10 Certification Renewal

12.10.1 A certified water system operator shall submit to the Secretary, at least 30 days before the expiration date of the certificate, a completed application on the form approved by the Secretary, including any fee due. The Secretary shall review the application and shall promptly notify the applicant of any deficiencies. If the application is complete, the continuing education requirements of Section 12.11 have been fulfilled, and the Secretary finds no cause under Section 12.3 to deny the application, a renewed certificate shall be issued.

The Secretary intends to provide written notice to operators of their certification renewal date approximately 6 months prior to that date. However, the burden of certification renewal is assumed by the applicant and failure of the Secretary to provide notice shall not constitute a basis for contesting the expiration of an operator certificate.

12.10.2 Certification renewal shall occur on a schedule as shown below and shall be based on various methods of recertification depending on water system class.

Class of Certificate	Duration of Certificate, Years	Method of Certification
1A	3	Registration
1B, 2	3	Continuing Education or Retesting
3	3	Continuing Education or Retesting
4A1,4(A,B,C)	3	Continuing Education or Retesting
D	3	Continuing Education or Retesting

12.10.3 Certifications issued under the rule may be for fewer years than shown above, in order to stagger the renewal dates for more efficient administration of the program.

12.11 Continuing Education

12.11.1 Continuing education requirements for certification renewal are as follows.

- (a) Water System Class 1A operators are encouraged to attend at least 3 hours of state approved seminar or other approved instruction each 3 year renewal period.

Water System Class 1B operators shall attend at least 3 hours of a state sponsored seminar or other approved instruction each 3 year renewal period.

- (b) Water System Class 2 operators shall attend at least 10 hours of a state sponsored seminar or other approved instruction each 3 year renewal period.
- (c) Water System Class 3, 4, and D operators shall attend 20 hours of state sponsored seminars or other approved instruction each 3 year renewal period.

12.11.2 Documentation of continuing education shall be reviewed by the Secretary to determine compliance with the continuing education requirements. Documentation will be provided by the applicant for renewal or by the Secretary. Acceptable documentation shall consist of individual course completion certificates (pre-approval of course required) or formal course sign-in sheets for pre-approved courses containing the signature of the applicant confirming attendance.