REPORT ON

NEW ENGLAND REGIONAL

WASTEWATER INSTITUTE

RELATIONSHIP TO WATER POLLUTION

CONTROL TRAINING NEEDS IN

NEW ENGLAND

United States Environmental Protection Agency

Region I

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INDEX

I. Introduction and Financial Statement

The New England Regional Wastewater Institute(NERWWI)is located at Southern Maine Vocational Technical Institute(SMVTI) in South Portland, Maine. It was established and is operated under the control of the New England Interstate Water Pollution Control Commission(NEIWPCC).

The Institute provides entry-level training for students preparing to enter the wastewater treatment field through its nine-month certificate program in Wastewater Treatment Technology. There are also two additional programs that provide upgrade training for operators currently employed in treatment plants. One is a mobile training facility that travels throughout New England offering 3-5 day courses at treatment plants on topics requested by the operators. Two short courses are offered during the summer for state-agency personnel and operators. The subject matter is ordinarily of an advanced nature and covers such topics as Process Control, Troubleshooting O & M Problems at Municipal Wastewater Treatment Facilities, and Pump Maintenance and Repair.

The Institute is supported from a variety of sources including EPA funds, vocational education funds, and tuition fees. Exhibit 1 is a Financial Statement delineating the revenues and expenses of the Institute for the most recent year.

EXHIBIT 1

Financial Statement

New England Regional Waste Water Institute

Revenue			% of Total
EPA Funds		$83,480	49%
Tuition			
WW Technology Program	$20,650		
Short Courses	4,200	$24,850	14%
Contribution - Southern Maine Vocational Technical Institute		$62,670	37%
Total Revenue		$171,000	100%
Expenses			
Wastewater Technology Program			
Personnel	$44,700		
Social Security	2,680		
Health & Accident	1,340		
Retirement	1,790		
Scholarship	2,700		
Operating Expenses	67,630	$120,840	71%
Mobile Training Facility			
Personnel	27,400		
Social Security	1,640		
Health & Accident	820		
Retirement	1,100		
Operating Expenses	15,000	45,960	27%
Short Courses		4,200	2%
Total Expenses		$171,000	100%

As can be seen from the Financial Report, EPA provides the bulk of the funding for the Institute. The next major source of funds is SMVTI. If SMVTI were to absorb the Wastewater Technology Program into its regular curriculum, it would cost the State of Maine an additional $58,170 per year. An appropriation of this size would have to be approved by the State legislature. We have been advised that this is highly unlikely due to the State's current austerity programs. However, it may be a long range possibility. In the short run, if the Institute is to continue in operation, EPA must continue to provide the funds.

It should be noted that the expenses to present the short courses are completely covered by the students' tuition fees, which usually are $70 per course. This fee includes tuition and room and board, thus making it a very inexpensive training program for the student. Given the sparcity of training funds in State and municipal budgets, the low fee for the short courses allows many individuals to receive training who would otherwise not.

II. Wastewater Technology Program

The Wastewater Technology Program began in October 1969 with funding from the New England Regional Commission. Subsequently, additional funding was obtained for a package treatment plant. This certificate program consists of 1400 hours of instruction, divided among the classroom, laboratory, and operating the package treatment plant. It also includes 160 hours of on-the-job training at a treatment plant in any of the six New England States. This is the only institutionalized wastewater treatment plant operator training program with this structure in New England.

The demand for this type of training is evidenced by the number of applicants seeking to be enrolled in the program. From September 1971 to August 1977, only 56 percent of the people who applied for enrollment could be accommodated due to lack of space. Table 1 lists the States from which the students were enrolled.

TABLE 1

Wastewater Technology Program
Enrollment by State
November 1971 - April 1976

STATE	NUMBER	%	% of Municipal Flow in N. E.	Difference
CT	24	9.3	25.5	(16.2)
ME	138	53.3	7.7	45.6
MA	19	7.3	50.3	(43.0)
NH	39	15.1	5.7	9.4
RI	1	.3	8.3	(8.0)
VT	38	14.7	2.5	12.2
OTHER	2			
TOTAL	261	100.0	100.0	

As can be seen from Table 1, when we compare the percentage of students enrolled from a particular State to the percentage of municipal flow in New England treated in those States, it becomes apparent that too many students come from ME, VT, and NH; and not enough from CT, MA, and RI. This could be explained by the geographical location of the School, which is most accessible to the northern New England States.

Of the 261 students who enrolled, 200 students completed the program satisfactorily, 9 failed, and 52 dropped out. Seventy percent of the students who completed were placed by graduation. It is anticipated that 85 percent of the Class of '78 will have jobs by graduation. This signifies an increasing demand for trained treatment plant operators, which coincides with the new plants coming on line. One hundred twenty-seven of the graduates have been traced, and Table II identifies their current occupations.

TABLE 2

Job Titles	#	CT	ME	NH	MA	VT	RI	OTHER
Public Works Dir.	2		2					
Superintendents	25		25					
Operators	81	10	6	29	17	16	1	2
Lab Technicians	2		2					
Sewer Depts.	4		4					
Engineer Co's.	7		7					
Sales	2		2					
Water Depts.	4		4					
	127	10	52	29	17	16	1	2
% of Total	100%	7.9%	40.9%	22.8%	13.4%	12.6%	0.8%	1.6%

This analysis indicates that there is very little outmigration from New England. Yet,there is substantial mobility from state to state especially for those students who choose to be operators. For this reason we can consider the New England area to be a closed labor market and could reasonably expect that students trained in New England will remain in New England to work.

This analysis indicates that the Wastewater Technology Program is rated as a successful program using standard vocational education criteria as a basis for judgement. Twice as many people apply as can be accepted, and the placement rate is acceptable.

III. Mobile Training Facility

The mobile training facility is a specially equipped van that travels throughout New England presenting 3-4 day short courses at Wastewater Treatment facilities. Once the topic and dates have been selected by the treatment facility, arrangements are made to have operators from nearby facilities also attend the training course.

Over a period of years, the Institute has identified those training courses which are most necessary to upgrade the skills of treatment plant operators. The current list is presented in Exhibit 2. These subjects are constantly being reviewed for relevancy, and the list of course offerings is updated continuously.

EXHIBIT 2

MOBILE TRAINING FACILITY
COURSE OFFERINGS

Operational

West Process Control
Activated Sludge
Trickling Filters & Anaerobic Digestion
Stabilization Ponds
Sludge Dewatering
Advanced Wastewater Treatment

Lab

Basic Wastewater Analysis
Bacterial Analysis
Special Wastewater Analysis (Advanced)

Maintenance

Pumps and Pump Maintenance
Electricity & Electrical Maintenance
Preventive Maintenance

Safety

Plant Safety Procedures & Equipment

Applied Basic Education

Introductory Chemistry
Introductory Bacteriology
Industrial Math
Introductory Hydraulics

The mobile training facility is in heavy demand and is scheduled at least six months in advance. It has acquired a very commendable reputation in the wastewater treatment field, as evidenced by the answers to questionnaires completed by supervisors and employees who had received training from the mobile training facility. Excerpts from these questionnaires appear in Exhibit 3.

EXHIBIT 3

MOBILE TRAINING FACILITY EVALUATION BY

SUPERVISORS AND EMPLOYEES

Supervisor Evaluation of Mobile Training Facility

100% felt that the training resulted in dollar savings.

95% felt that the training resulted in more efficient treatment plant operation.

47% felt that the training led to promotions.

Employee Evaluation of Mobile Training Facility

97% felt the training had increased their confidence and ability.

90% felt that the training contributed to a more efficiently operated treatment plant.

89% used the skills acquired during training.

80% felt qualified to train inexperienced operators.

From November 1971 to April 1976 the mobile training facility has trained 1383 people throughout New England. Table 3 shows the students trained from each State compared to the percent of municipal flow in New England treated by the State.

TABLE 3

Mobile Training Facility

Students by State

November 1971 - April 1976

STATE	NUMBER	%	% of Municipal Flow in N.E.	Difference
CT	289	20.9	25.5	(4.6)
ME	202	14.6	7.7	6.9
NH	299	21.6	5.7	15.9
MA	299	21.6	50.3	(28.7)
VT	235	17.0	2.5	14.5
RI	59	4.3	8.3	(4.0)

As indicated in Table 3, the northern New England States received more than their fair share of training, while CT, MA, and RI do not utilize the mobile training facility to the extent that we would logically expect. Again, the geographical location of the van many explain the variance.

The mobile training facility is vital to the Region as an upgrade training program. It operates on site with full-time instructors knowledgeable in wastewater treatment. It can reach into rural and urban areas. According to thoses employees and supervisors who have received training from the mobile training facility, it has succeeded in its objectives of providing skills training.

IV. Short Courses

During June of each year, the Institute offers two one-week short courses for people currently employed in the wastewater treatment field. The topics for the short courses are based on responses to questionnaires distributed to each of the State operators associations and students from the previous year's short courses. Courses have recently been offered on Process Control and Pump Repair and Maintenance.

The tuition fee ranges from $70-85 per course and includes room, board, coffee breaks, tuition, handout material, and parking. The fee is certainly conducive to attracting students, and covers all of the expenses of presenting the training.

Table 4 shows the number of students who have been trained by State.

TABLE 4

Short Courses

Students by State

STATE	NUMBER	%	% of Municipal Flow in N.E.	Difference
CT	34	18.1	25.5	(7.4)
ME	54	28.7	7.7	21.0
NH	23	12.2	5.7	6.5
MA	30	16.0	50.3	(34.3)
VT	36	19.1	2.5	16.6
RI	11	5.9	8.3	(2.4)
TOTAL	188	100.0	100.0	

As Table 4 shows, a disproportionate number of students come from ME, NH, and VT. MA, CT, and RI are underrepresented.

The Institute sponsors the only short courses available in New England on a recurrent basis. The number of training programs in New England geared to upgrading the skills of operators is very small; yet, there is an immense need for this type of training if we are to have efficiently operated treatment plants.

V. Physical Facilities and Capacity

The Institute's physical facilities include a building, housing a classroom, library, stockroom, equipment room, and administrative offices. The space available is barely adequate. At times equipment is stored outside. There is very little room for the students to actually work on the equipment. The administrative offices are cramped. Under these conditions it would be impossible to increase the student body of the Wastewater Technology Program without a sizeable capital investment.

The mobile training facility is new; and therefore, the roving training program is not in any current danger of being eliminated due to lack of facilities. Three instructors are assigned to the van. One instructor works on the van exclusively, the other two instructors rotate, one week on the van and one week in the classroom. The van is in heavy demand and is scheduled at least six months in advance. The mobile training facility is operating at full capacity. The only way to increase the number of students being reached would be to purchase another van and hire at least two additional instructors. It would double the outlay for the mobile training facility from $46,000 to $92,000. There is no way to increase the effectiveness of the mobile training facility by adding a smaller amount of funds.

The short courses are offered during the month of June because that is the only month of the year when the dormitories on the campus are available. The dorms are closed during July and August for renovation. This is the only program the Institute operates that could be expanded. Two one-week short courses are presented during June. That could probably be expanded to four courses. Other courses could be offered during July and August by accommodating the students at local hotels. Any strain on the teaching staff could be reduced by hiring outside instructors. Since these courses are usually oversubscribed, serious consideration should be given to expanding the number and types of training offered.

Some thought has been given to offering training programs in the evening. This approach does not appear feasible for several reasons. The instructor workload is heavy as is, and there is some doubt that the current staff could absorb an additional teaching burden. Only ME residents could avail themselves of the training; and as we have seen, a disproportionate number of students already are from ME. Therefore, this type of program expansion should probably be abandoned.

The Institute and its programs are operating at full capacity. Any increase in the Wastewater Technology or mobile training facility programs would require a substantial capital investment. The only Institute offering that could be expanded cost effectively are the short courses. Since this type of training is rare in New England, we would recommend that expansion only be considered in this area.

VI. Labor Market Analysis for Wastewater Treatment Plant Operators.

Each of the six New England States has gathered some data that can be incorporated into a manpower forecast of supply and demand for wastewater treatment plant operators within their respective States. The methodology used ranges from best professional estimate to a very sophisticated analysis of the labor market. Following is an analysis of supply and demand for wastewater treatment plant operators based on information the Water Programs Environmental Workforce Unit has compiled from published studies, grant documents, and some of its own data collection activities.

These numbers are not to be regarded as infallible since they were derived in many cases from estimates. However, they do give an indication of the scope of the training effort needed by each State. The NH Water Supply & Pollution Control Commission prepared a very sophisticated manpower forecast entitled, "Manpower Study and Training Evaluation for Municipal Wastewater Treatment Systems." In their analysis, they determined that the turnover rate for wastewater treatment plant operators is 17.5% far exceeding the average national manufacturing turnover rate of 4.5%. This means that we need to train nearly four times as many new entry operators than we would need to train if the turnover at treatment plants were not so high.

Table 5 is a five-year projection of the demand for operators in New England. The number of operators currently employed was gathered from various sources. This number only includes operational personnel. Maintenance personnel were excluded because they come from a different segment of the labor market and their skills are transferable among several different industries. The attrition rate was assumed to be 17% except in the case of New Hampshire. The number of operators needed to staff new and upgraded plants was based primarily on State estimates. The number of operators who need upgrade training over the next five years is essentially the same as the workforce of operators in the next five years. The assumption was made that at least 20% of the workforce must upgrade

their skills on a yearly basis. This assumption was based on research conducted by the Department of Labor that indicates the average worker requires retraining every five years to keep pace with technological changes in the field.

TABLE 5

FIVE-YEAR PROJECTION OF

DEMAND FOR TRAINING

		Demand for New Operators Next Five Years			a + c
State	a. Current # of Operators	b. Attrition	c. Construction	d. Total	# of Operators in five years
CT	1300	1100	70	1170	1370
ME	600	500	125	625	725
NH	150	180	120	300	270
MA	1350	1175	325	1500	1675
VT	250	200	40	240	290
RI	220	185	125	310	345
TOTAL	3870	3340	805	4145	4675

The Water Programs Environmental Workforce Unit conducted a Training Survey in Region I to identify the environmental education programs in New England. That survey was subsequently followed up and more detailed information was obtained on curriculum and number of graduates per year. This information was used as a basis for estimating the number of operators who will be supplied by the educational mechanisms in place.

EPA Region I has also funded many training programs and the number of students graduated from these programs was also factored into the supply of trained personnel. As in the case of the demand for operators, all figures are projected over the next five years.

Tables 6 thru 11 identify by State the number of operators who will be trained and identifies the training source.

TABLE 6

CONNECTICUT

FIVE-YEAR PROJECTION OF

TRAINING ACTIVITIES

SOURCE	# OF NEW OPERATORS TRAINED	# OF OPERATORS RECEIVING UPGRADE TRAINING
Northwestern Community College	60	
New England Regional Waste Water Institute*	25	325
Vocational Education System*	80	120
New England Water Pollution Control Association*		200
Connecticut Department of Environmental Protection*		175
Total	165	820

* Partial or complete EPA funding

TABLE 7

MAINE

FIVE-YEAR PROJECTION OF

TRAINING ACTIVITIES

SOURCE	# OF NEW OPERATORS TRAINED	# OF OPERATORS RECEIVING UPGRADE TRAINING
Eastern Maine Vocational Technical Institute	60	
New England Regional Waste Water Institute*	140	260
New England Water Pollution Control Association*		100
State Dept. of Vocational Education*	50	30
TOTAL	250	390

* Partial or complete EPA funding

TABLE 8

NEW HAMPSHIRE

FIVE-YEAR PROJECTION OF

TRAINING ACTIVITIES

SOURCE	# OF NEW OPERATORS TRAINED	# OF OPERATORS RECEIVING UPGRADE TRAINING
New England Regional Waste Water Institute*	40	325
New Hampshire Water Supply & Pollution Control Comm. Training Center*	60	30
New England Water Pollution Control Association*		100
New England College	30	
TOTAL	130	455

* Partial or complete EPA funding

TABLE 9

MASSACHUSETTS

FIVE-YEAR PROJECTION OF

TRAINING ACTIVITIES

SOURCE	# OF NEW OPERATORS TRAINED	# OF OPERATORS RECEIVING UPGRADE TRAINING
Berkshire Community College	60	
University of Lowell	75	
Springfield Technical Community College	75	
Northern Essex Community College	50	
New England Regional Waste Water Institute*	20	330
State Dept. of Environmental Protection	175	90
New England Water Pollution Control Association*		200
Operators Association		200
TOTAL	455	820

* Partial or complete EPA funding

TABLE 10

VERMONT

FIVE-YEAR PROJECTION OF

TRAINING ACTIVITIES

SOURCE	# OF NEW OPERATORS TRAINED	# OF OPERATORS RECEIVING UPGRADE TRAINING
Vermont Technical College		
Bureau of Apprenticeship & Training	120	
State thru Vermont Technical College*		60
New England Regional Waste Water Institute*	40	270
New England Water Pollution Control Association*		100
TOTAL	160	430

* Partial or complete EPA funding

TABLE 11

RHODE ISLAND

FIVE-YEAR PROJECTION OF

TRAINING ACTIVITIES

SOURCE	# OF NEW OPERATORS TRAINED	# OF OPERATORS RECEIVING UPGRADE TRAINING
Davies Voc. Tech.	75	
New England Regional Waste Water Institute*	5	75
New England Water Pollution Control Association*		100
TOTAL	80	175

* Partial or complete EPA funding

TABLE 12

FIVE-YEAR PROJECTION OF
DEMAND AND SUPPLY
OF WASTEWATER
TREATMENT PLANT
OPERATORS

STATE	DEMAND		SUPPLY		DEFICIT	
	New Operators Next 5 Years	Operators Needing Upgrade Training	New Operators Generated in Next 5 Years	Operators Receiving Upgrade Trng.	New Operators Next 5 Years	Upgrade Trng. Existing Operators
CT	1170	1370	165	820	1005	550
ME	625	725	250	390	375	335
NH	300	270	130	455	170	(185)
MA	1500	1675	455	820	1045	855
VT	240	290	160	430	80	(140)
RI	310	345	80	175	230	170
TOTAL	4145	4675	1240	3090	2905	1585

Table 12 consolidates all the data collected relative to demand and supply of operators and allows us to analyze the training picture in New England. Over the next five years, there will be 2905 people employed who have not received entry-level training. Emphasis should be given to the fact that these people will be hired and will receive some haphazard on-the-job training. The result will be that five years from now 62 percent of the operators working at treatment plants will not have received basic training and another 1585 operators will not have received any upgrade training.

One question remains unanswered. Why doesn't the supply of operator training expand to meet the demand? The answer may very well be that the supply is not elastic and cannot change in the time period necessary to meet the demand. Vocational education systems should be the prime deliverers of entry-level training. State budgets for vocational education are fairly fixed. Introduction of a new operator training program means that you must eliminate an ongoing program as well as allow 3 to 5 years lead time for planning and obtaining funds. With this inflexible mechanism, it is very difficult to respond to demand for training. The NERWWI, operators' associations, and EPA grants are flexible and can respond almost instantaneously to demand increases until their resources are exhausted.

The majority of the training done over the next five years will be financed by EPA program grants, operator training funds, construction grants training center funds, and Interagency Agreement funds. The NERWWI will train 21% of the new entry operators and will provide 45% of all the upgrade training in New England. This is a substantial contribution to operator training needs in the Region.

The analysis also indicates that CT and MA will have the largest problems to contend with in all of New England. MA has discussed the feasibility of operating a training center and tripling their current training effort. This will help but will not address all of the State's needs. CT has not yet begun to recognize or address the problem.

NH and VT have no problems with upgrade training due to the mobile van run by the Institute; however, they still have a need to train more entry-level operators.

In terms of priority of need for entry-level and upgrade training, priority should be given to those states with the higher magnitude of need. Below is the order in which resources should be allocated:

1. MA
2. CT
3. ME
4. RI
5. NH
6. VT

VII. Conclusions & Recommendation

Conclusions

The NERWWI operates three successful programs. The nine month Wastewater Technology program graduates 21 percent of all the new entry operators in New England. Twice as many students apply for the program as can be accepted. Seventy percent of the graduates are placed by the time of graduation. Follow-up indicates that the Institute's graduates occupy responsible positions in the water pollution control field.

The mobile training facility is the principal source of upgrade training in New England. The three northern New England States have received proportionally more training than the three southern New England States.

The two short courses per year offered by the Institute are another major source of training in the Region. Together the mobile training facility and the short courses provide 45 percent of all the upgrade training in New England.

The three programs offered by the Institute have catered to the northern New England States; Maine, New Hampshire, and Vermont. More emphasis must be given to training in the Massachusetts, Connecticut, and Rhode Island.

The physical facilities of the Institute are being utilized to their maximum capacity. Additional students in the Wastewater Technology program could only be accommodated by a huge capital outlay to construct a new building. The mobile training facility is now scheduled six months in advance. To do more training would

require purchase of an additional van and hiring at least two additional instructors. The number of short courses presented by the Institute is currently determined by the availability of dormitory space. The Institute must deliver all short courses during the month of June. Expansion could occur if the courses were offered at other locations in New England or if the students were housed at local motels.

An analysis of the supply and demand for treatment plant operators indicates that in the next five years 2905 operators will be employed who will not have received entry-level training. An additional 1585 will not have received upgrade training. The situation is most severe in Massachusetts and Connecticut. Maine and Rhode Island have substantial new entry and upgrade training needs. New Hampshire and Vermont will receive enough operator upgrade training, but will still need to develop a system for generating more entry-level training.

The majority of all the training conducted in the Region is funded in whole or in part by EPA. We have utilized operator training funds, construction grants training center funds, 106 program grants, and Interagency agreements. These funds are flexible and can respond to the demand for training almost immediately. Conversely, the vocational education system requires a three to five year time period to institute a new training program. State budgets for vocational education are limited.

Recommendations

The Institute should purchase one additional mobile training facility and hire three additional instructors. One mobile training facility could operate in northern New England and one in southern New England.

The Institute should greatly expand the number of short courses offered and expand the subject matter covered. The capability vested in the Institute staff would make it possible for them to present courses similar to those offered at EPA's National Training and Operational Technology Center in Cinicinnati, Ohio. The three instructors hired for the mobile training facility could be assigned responsibility for logistical arrangements and short course presentation on a rotational basis.

These two recommendations if implemented could satisfy the majority of upgrade training needs in New England.

A major benefit of this type of centralization is the generation of an instructor cadre with a great deal of expertise in pollution control training. The efforts of the Institute could be supplemented by training activities of the New England Water Pollution Control Association and State agencies.

The expansion of entry-level training at the Institute would require a large capital investment. The municipality responsible for staffing a federally funded wastewater treatment plant usually hires from within its own geographical boundaries. The person hired may not have any operational training or expertise. Convincing a municipality to send a person away for nine months of training

is extremely difficult. A better approach is to establish training delivery mechanisms within each State that are in close proximity to the newly hired operator. There are several innovative programs within New England that could be emulated successfully. In Vermont, the Bureau of Apprenticeship and Training has established Wastewater Treatment Plant Operator as an apprenticeable occupation. The Bureau and the State jointly fund and deliver training to a majority of new operators.

The State of Massachusetts conducts an operator training program offering 12 academic credits over a one-year period. Four courses are offered: Basic and Advanced Treatment Plant Operations and Basic and Advanced Laboratory Analysis. Each one of these courses is offered one day a week making it relatively easy for operators to attend. There is the potential to triple the size of this program by utilizing training center construction grants funds.

These are just two examples of approaches to deliver new entry operator training. The Institute with assistance from EPA's Water Programs Environmental Workforce Unit could assist the States to develop and implement various types of delivery systems. It would require the addition of another staff position, but would certainly cost less than the capital expenditure necessary to expand the facilities in South Portland. This approach also has the added benefit of graduating more students per year.

These three recommendations could be implemented with an initial capital investment of $15,000 and yearly operating expenses of $70,000. Over the next five years, it would only cost $80 for each student trained. Certainly a modest figure,compared to the monetary losses incurred by having untrained personnel operating and maintaining wastewater treatment plants.