EPA

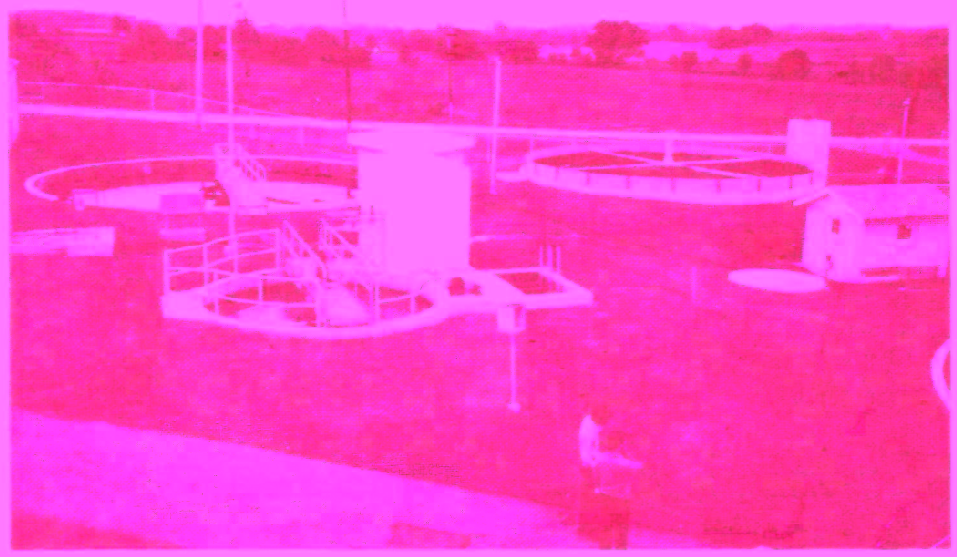
United States
Environmental Protection
Agency

Office of Municipal
Pollution Control
Planning and Analysis Division

August 1988

# The On-Site Operator Training Program

## Success in Every Region!



This brochure was prepared by EPA's Office of Municipal Pollution Control, Planning and Analysis Division. EPA was assisted in the preparation of this brochure by the staff of Roy F. Weston, Inc.

# GRASSROOTS SOLUTIONS TO WATER POLLUTION CONTROL PROBLEMS

A small-scale program rehabilitating small-scale wastewater systems: that's the concept behind EPA's On-Site Operator Training Program. Under Section 104(g)(1) of the Clean Water Act, EPA has provided about $2 million a year to states to improve operations and maintenance at sewage treatment works. Since its inception in 1982, the program has proven to be economical and effective. Highlights from among its hundreds of success stories are presented in the pages that follow.

## OVERLOOKED PLANTS GET OVERSIGHT

Governmental programs have tended to overlook the sewage treatment plants that serve our smaller communities. Environmental problem-solvers are understandably concerned with attacking the biggest problems first and thus achieving dramatic results.

But results also accrue from thinking small. The On-Site Operator Training Program is committed to keeping effluent from such systems clean, and to improving their overall operations, economics, long-term integrity, and protecting the local investment in these facilities.

The Program is fulfilling that mission by delivering technical assistance and training to troubled plants. Its technical assistance experts and trainers build plant staff expertise, make the adjustments and small repairs that often stimulate dramatic water quality improvements, and work with both operators and municipalities to improve administration and communication.

## TABLE OF CONTENTS


| | Page |
|---|---|
| Introduction | 1 |
| Approaches To Success Training | 5 |
| Success Stories - Training | 6 |
| Approaches To Success Facility Correction | 11 |
| Success Stories Facility Correction | 12 |
| Approaches To Success - Facility Management | 17 |
| Success Stories - Facility Management | 18 |
| Success In Every Region | 22 |

This assistance is truly affordable, too: the community need pay nothing but the price of any larger improvements that troubleshooters might recommend.

## A TARGETED SOLUTION AT A PRICE THAT'S RIGHT

The On-Site Operator Training Program is also a bargain for the nation as a whole. The average federal expenditure per facility is about $6,000. The 104(g)(1) program regularly brings failing plants into compliance with their water quality goals. Some are plants whose municipal managers were ready to abandon them and build a new facility. Clearly, a $2 million program that saves just one community per year from major capital costs is well worth its price tag.

How can the program operate so thriftily? One reason is its low administrative costs. EPA makes grants directly to each State. Program managers in the appropriate environmental department either carry out the plant evaluations themselves or contract these tasks out to private local firms or universities. The staff stays small: typically two or three people per State.

## A PEER RELATIONSHIP MAKES TROUBLESHOOTING WORK

The On-Site Operator Training Program has generated a tremendous amount of trust and cooperation at the grassroots level. Prescriptions for plant improvement are never "cook-book" or theoretical. Most *"104"* troubleshooters and Regional coordinators have actually been wastewater treatment plant operators. These expert evaluators know what they're talking about. They bring knowledgeable, hands-on solutions to each plant they visit. Operators and municipal managers are eager to listen to these visitors who speak their language, understand their concerns, and fix their problems.

## THE PROGRAM IS EXTREMELY POPULAR

Although participation in this low-key program is completely voluntary and publicity is limited to small mailings and word-of-mouth advertising, community response has been enthusiastic. Training center staff in each State make annual commitments as to the number of plants they will serve, but demand runs high. Over the past couple of years, trainers have been exceeding annual goals by 150%—often within the original grant budget for the year! More than 2,500 plants have been served to date, and between 500 and 600 are being added every year.

## THE SUCCESS RATE IS OUTSTANDING

The most recent program evaluation showed that of the 2,525 troubled plants getting technical assistance since 1983, 50% achieved compliance with their assigned water quality standards. Twenty-five percent more made dramatic improvements in other areas.

### WHAT DO *"104(g)"* TRAINERS EVALUATE?

1. Existing Facilities, for:
   - Performance Limitations
   - Existing Capacity
2. Process Control, for:
   - Adjustment
   - Physical Correction
3. Laboratory Work, for:
   - Adequate Equipment
   - Correct Sampling Techniques and Analyses
4. Staffing Adequacy, for:
   - Appropriate Size
   - Level of Expertise
5. Financial Systems, for:
   - User Charge Adequacy
   - Replacement Strategies

How does the On-Site Operator Training Program define "success"? Most people first think of a clean effluent from the plant. This is indeed an important measure, and one that is often attained. The program is tapped by many communities with other plant and town management problems as well. And by still others that are ready to write off a failing plant but are willing to try one last-ditch effort to turn it around. What kind of successes can troubleshooters claim for these participants?

***"It costs money to talk to engineers, but we get good free advice from the '104(g)' trainer"***

*Greg Durbin, Crystal Mountain Treatment Plant*
*Crystal Mountain, Washington*

Stories featuring both compliance achievement and other successes appear in this pamphlet. In brief, those "other" successes can be:

- Improved operations, maintenance, and appearance;
- Improved harmony between plant staff and town managers;
- Reduction in operator turnover, a benefit for both the plant and the profession;
- Improved utilization of staff;
- Enhanced expertise in lab and process control;
- Small-scale plant repairs that boost longevity or streamline process control;
- Establishment of better financial systems and sinking funds;
- Cost containment;
- Identification of design and construction problems;
- Stop-gap improvements in poor effluent to at least minimize the problem until permanent measures can be taken;
- Corrective and preventive maintenance systems that extend equipment life.

## SUCCESSES FALL INTO THREE CATEGORIES

When Regions were asked to provide information on the "stars" of the *"104(g)"* program, the success stories they provided were rich in diversity and innovation. Solutions to problems seemed to be the most useful and logical way to organize the data, and three categories soon revealed themselves:

1. **Training** —Improving operators' and managers' understanding of their plant and its processes;

2. **Facility Correction**—Making simple, low-cost, physical adjustments and improvements that correct performance; and

3. **Facility Management**—An "other" category that includes the management of such factors as infiltration and inflow, finances, communications, staffing, and industrial loading.

Sample success stories follow. A full spectrum of the preeminent successes contributed by the Regions is displayed in the center of this booklet: virtually every State boasts at least one. Indeed, On-Site Operator Training troubleshooters believe that some measure of success was achieved in every single plant they visited.

# TRAINERS DISCOVER A WIDE RANGE OF PROBLEMS

Training and management approaches account for at least 70% of *"104"* successes. In many cases, the plant design is not faulty: its poor performance usually has a human cause. Still, troubleshooters in the On-Site Operator Training Program deploy their training function for far more than sizing up individual expertise. When these evaluators listen to an operator's concerns, watch his procedures, read his reports, and note his mistakes and omissions, they learn a great deal about the facility's soundness. They take stock of the plant's community support, equipment, staffing, budget and users.

The need for customized training at small treatment plants is intense and has everything to do with community size. Plants in the 0.1 to 1.0 mgd range are the most basic level of sewage treatment. Operator turnover is high. Operators move to the larger plants and often don't stick around to train their replacements. Low budgets mean discouraging salaries. The result: small plants are usually staffed by novices and employee morale is often lacking.

So the On-Site Operator Training Program is a low-budget solution for small communities. Training and technical assistance does make a difference at a fraction of the cost of an enforcement action. As a testament to that claim is the fact that half the communities visited were permit violators brought back into compliance by O&M trainers. This clearly measurable success is tending to drive program activities toward achieving compliance, although it is clear from the stories in this book that many different kinds of successes have been attained.

Experience at hundreds of plants makes it safe to say that:

- Most small-scale wastewater treatment plant problems can be easily fixed;
- Even at plants where effluents aren't bad, performance still can be dramatically improved;
- Training cannot be an afterthought: towns can't spend millions on a plant upgrade and neglect to train the operator;
- Training must not be theoretical or long-distance: effectiveness is directly related to hands-on demonstration; and
- Training is a morale booster: it shows plant operators that their labors are worthy of respect.
- Training must go hand-in-hand with getting local officials involved in the day-to-day operation of the plant.

Training leads very straightforwardly to improvements in plant performance. The success stories that follow focus on training within the walls of the treatment works, training that improves the ability and expertise of plant operators. The equipment repair issues and community-related wastewater management issues that also arise as part of many plant evaluations have their own success stories and are discussed separately.

***"If it would not have been for a dedicated effort by the Technical Assistance Team our town would still be in non-compliance and paying stiff fines. They came in and worked with our wastewater staff and solved many operational problems in a relatively short time. This pleased our town administrator, DHEC personnel, and saved the tax payers many hundreds of dollars"***

***Jody Wilson, Wastewater Superintendent, Manning, South Carolina***

# TRAINING: IMPROVED OPERATOR UNDERSTANDING IS KEY TO PROGRAM SUCCESS

**Bloomfield, New Mexico**
**Plant Size: 0.9 mgd**
**Treatment Type: Activated Sludge**

## FROM MURKY GRAY TO "BEST EFFLUENT EVER"

Bloomfield's conventional activated sludge plant was in a serious state of upset when the *"104(g)"* trainers arrived for an evaluation. A murky dark grey effluent was discharging from the secondary clarifiers and a black sludge had accumulated in the system as far as the chlorine contact chamber. Process performance had been poor for more than a year and had recently become worse due to continued operator error. BOD in effluent samples had fluctuated widely: 69 mg/l at one time; 115 mg/l at another.

The field trainer closely examined process control and showed operators how to correct the situation. They:

- Accelerated the wasting schedule and adjusted the sludge blanket to optimum depth;
- Reduced D.O. in the aeration basins to promote floccing and settling;
- Cleaned the black sludge from the aeration basin and the chlorine contact chamber; and
- Improved laboratory analysis techniques to bring accuracy to effluent quality data.

Within several weeks the Bloomfield plant had attained acceptable effluent quality. Two more months of educating operators and fine tuning the process resulted in the plant turning out its best effluent ever.

| | Before | After | Permit |
|---|---|---|---|
| *BOD mg/l* | 69-115 | 10 | 30 |

**Boone, Iowa**
**Plant Size: 5.5 mgd**
**Treatment Type: Trickling Filter**

## PLANT UPGRADE LEAVES OPERATORS WITH OBSOLETE EXPERTISE

What happens when a plant upgrade leaves operators with obsolete expertise? The *"104(g)"* evaluators discovered this situation in Boone, Iowa where the wastewater plant had been recently upgraded. The upgrade included the use of aerated sludge holding basins.

Operators were unfamiliar with operation and maintenance of various new laboratory items and related procedures, and were experiencing difficulty with EPA audit sample protocols and lab procedures related to plant

*Excellent O&M practices keep the final effluent well within permitted levels at the Atlantic Plant in Virginia Beach, Virginia.*

discharge monitoring. In addition, staff were having problems with the aerated sludge holding basins - - a new technology at the plant.

Trainers from Kirkwood Community College educated Boone staff on:

- Aerated sludge holding tank operation and monitoring (Additional blower capacity was added to improve oxygen transfer and reduce odors);
- BOD and NH3 lab procedures and trouble shooting;
- Standard methods lab procedures; and
- Use of lab equipment (D.O. and pH meters, analytical balance, incubator, water distillation and deionizing equipment).

Fifty-two hours of training over a year and a half considerably improved the performance of the lab and improved overall operations at the plant. Now in compliance, the Boone facility proudly displays the following before and after data:

| | Before | After | Permit |
|---|---|---|---|
| *BOD mg/l* | 70 | 16 | 30 |
| *TSS mg/l* | 54 | 22 | 30 |

**Bridgeport, Washington**
**Plant Size: 0.2 mgd**
**Treatment Type: Oxidation Ditch**

## NO VIOLATOR, WASHINGTON PLANT STILL RECOGNIZED ITS NEED FOR HELP

The local press release said that Bridgeport's new wastewater treatment plant operator had literally turned plant operations around. The new operator had inherited a troubled 20-year-old plant. It was suffering from low maintenance and a lack of problem-solving on the part of his predecessor. As a result the *"104"* evaluator logged numerous problems with laboratory procedures, process control, maintenance, and financial management.

Discharge Monitoring Report (DMR) data, required by the plant's permit, were based on improper laboratory procedures; therefore, it was not surprising that the Bridgeport plant had never reported or been cited for effluent violations. Even though no enforcement sword hung over their heads, town managers were enthusiastic about improving plant performance and getting their new operator trained right from the start. The *"104"* troubleshooter helped update lab equipment and protocols, develop a sludge disposal program, and bring equipment maintenance up to date.

Unlike most troubled plants, Bridgeport never seemed to be in violation because of questionable monitoring data. Genuine improvements in plant operations have now been made bringing with them valid DMRs of which the town can be proud.

*The attention paid to maintenance is evident at this Ohio wastewater treatment plant.*

**Buchanan Village, New York**
**Plant Size: 0.55 mgd**
**Type Treatment: Activated Sludge**

## OPERATOR TRAINING FOSTERS CONTINUING SUCCESS

Excessive suspended solids were the chronic problem that brought *"104(g)"* evaluators to Buchanan Village's wastewater treatment plant. The facility had been in violation of New York's Pollution Discharge Elimination System limits for eight consecutive months. Would education on improved process control turn the tide? Plant managers and operators were enthusiastic about the possibility.

O&M troubleshooters found an old plant in fairly good shape, but process control was shaky. The final clarifiers were septic and very turbid. The operator was collecting few samples and analyzing little data, and was controlling sludge wasting via settleability. The result was poor settling and a turbid effluent. Furthermore, sludge had not been hauled from the plant in over two years. Periodic industrial "slug" loading and infiltration/inflow (I/I) problems aggravated the situation.

*Pumps and other essential equipment should be installed in pairs whenever possible to minimize the amount of time which the plant must be shut down for repairs.*

While they made recommendations for controlling factors outside the plant, O & M evaluators decided to focus attention on quick-payback parameters like training and process control. Together with plant personnel, they:

- Developed a comprehensive testing program that covered MLSS, D.O., blanket depth, settleability, flow data, and microscopic and physical observations;
- Designed a strategy for controlling return and wasting rates;
- Instituted the collection of 6-hr. composite samples of influent and effluent;
- Put the second clarifier on line; and
- Initiated a complete preventive maintenance program.

The program's recommendations and actions resulted in cleaner effluent for Buchanan Village, well within permit limitations. Plant personnel now fully understand their facility's characteristics and needs, and success is expected to continue.

**Clarks Summit, Pennsylvania**
**Plant Size: 1.2 mgd**
**Treatment Type: Extended Aeration**

## CLASSIC TRAINING OF EAGER STAFF WINS COMPLIANCE

A diagnostic evaluation targeted Clarks Summit early as a likely candidate for improvement through training. Readily identifiable problems, an interested plant staff, and the sudden availability of new lab equipment all conspired to make this Pennsylvania plant a priority candidate for assistance.

Operations at Clarks Summit suffered due to inadequate laboratory procedures, unsatisfactory process control strategies (particularly sludge wasting), and limited flexibility in plant processes and sludge handling capabili-

ties. The approach took three main avenues: in-plant technical assistance, laboratory training, and classroom training.

The results? The activated sludge process has been considerably improved, and lab procedures and quality control are now exceptional. The plant is well in compliance, with effluent data as follows:

| | Before | After | Permit |
|---|---|---|---|
| *BOD5 mg/l* | 71 | 10 | 22 |
| *TSS mg/l* | 46 | 16 | 25 |
| *NH3 mg/l* | 0.4 | 1.0 | 1.5 |

**Green River, Utah**
**Plant Size: 0.3 mgd**
**Treatment Type: Lagoon**

## FAST, CONCENTRATED TRAINING PROTECTS LOCAL ECONOMY

The operator of the treatment plant contacted the Utah Valley Community College Operator Training Center seeking assistance to problems affecting his plant. He was under intense pressure because the plant process had been upset and the resulting severe odors had nearly ruined the tourist trade. This was a particularly severe problem as the town's economy was dependent almost entirely upon the tourist trade.

Arrangements were made for the outreach trainer and the operator to meet at the plant. During the evaluation the trainer observed that the four lagoons had low pH and dissolved oxygen levels. It was found that a lack of understanding of the plant's processes had caused the upset. The primary cell was overloaded and the storage cell had developed a serious filamentous algae condition, which had caused the odor problem.

Training was provided in pH and D.O. testing and their relation to process control was also presented to the operator. Strategies for assisting the operator in running the plant such as the use of irrigation return flows were developed.

Offensive odors have now been eliminated and the community is no longer angry over the situation at the treatment plant. The plant has been operating without incident since the on-site assistance was provided. Green River is an example of the ability of the *"104"* program to respond on short notice to operators who find themselves in difficulties or situations with which they have had little or no experience.

**Waverly, Illinois**
**Plant Size: 0.4 mgd**
**Treatment Type: Activated Sludge (Walker Process Package Plant)**

## IMPROVED UNDERSTANDING OF PROCESS CONTROL GETS OUTSTANDING RESULTS

Why do package plants frequently get mixed reviews on performance and cost effectiveness? One answer might be the one found at Waverly, Illinois: process control was out of control. State *"104"* investigators determined that the facility should be capable of meeting interim permit limits by a wide margin, yet BOD5 was in violation and the City's data showed frequent violations of fecal coliform bacterial limits.

Recommendations from the *"104"* trainer focused on plant-wide monitoring and process improvements. The City of Waverly:

- Improved chlorination techniques to provide adequate disinfection;
- Upgraded laboratory equipment, sampling procedures, and reporting methodologies to achieve valid lab results;
- Increased solids wasting, optimized drying beds and kept the sludge blanket under control;

- Changed the existing complete mix aeration system to an extended aeration system, eliminating short circuiting and reducing solids loading; and

- Eliminated use of a polishing pond that was actually degrading effluent quality.

Improving process control and educating staff on how to monitor and maintain it led to dramatic improvements at the Waverly plant. All problem parameters achieved not just interim, but final permit limit compliance within a year of the initial evaluation.

**West Rutland, Vermont**
**Plant Size: 0.325 mgd**
**Treatment Type: Extended Aeration**

## STARVING A SYSTEM TO DEATH

When West Rutland's major industry closed its doors, the town suffered a severe economic setback. One of the first victims of the municipal belt tightening was the sewage treatment plant. Within a few years the effects of an inadequate budget began to take their toll. The facilities began to decline and operators came and went with increasing frequency. By the time *"104"* help was accepted, the plant was run by a single, part-time operator. Pump stations and mechanical systems were poised on the brink of disaster. The treatment process was in disarray and permit violations were routine.

Suddenly, things changed. The town elected new managers who, while still frugal, began system improvements. Notable among them were infiltration/inflow repairs to the sewer system and a decision to ask for help from the *"104"* program.

The troubleshooter got a receptive welcome. West Rutland hired two plant operators who were new, green, and anxious to learn. Municipal officials, too, were enthusiastic about the training sessions, and several participated with good effect.

A change in attitude, mutual cooperation, and delivery at a most receptive moment: these all spelled success in West Rutland. The system was transformed from a failure to an award winner: it received 2nd place in 1987's Green Mountain Water Pollution Control Association (GMWPCA) competition and an EPA Region I Operation and Maintenance Excellence award in 1988. The results were outstanding:

- Fully certified operators;
- Excellent maintenance system-wide;
- Good quality effluent;
- A sufficient O&M budget; and
- A new sinking fund for costly replacement and repair.

*Adequate, well maintained solid handling equipment is essential to successful plant operation.*

# TAILORED EQUIPMENT MODIFICATION GETS PLANTS TO RUN CORRECTLY

When people aren't the problem behind poor plant performance, equipment often is. The On-Site Operator Training Program clearly doesn't have the budget to provide assistance concerning large-scale facility corrections. Traditionally, though *"104"* troubleshooters have helped fix small deficiencies, sometimes with startling success. Bigger problems have been turned over to the community, often urging their recommendations through to completion.

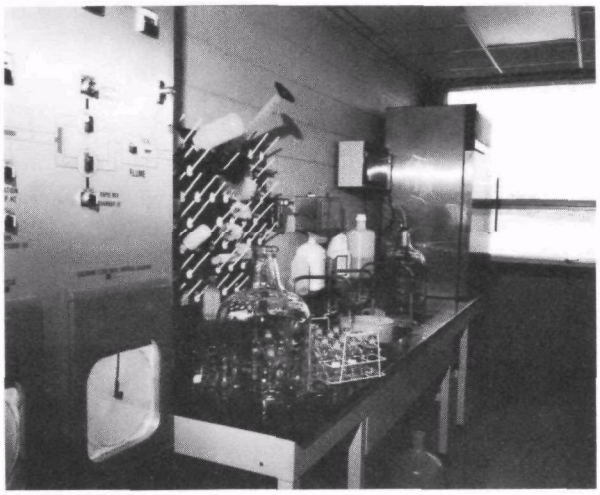
Many of the hardware problems evaluators discover can be traced back to basic omissions at the design stage that ultimately come home to roost with a community that had blind faith in its plant design. It occurs to neither operator nor town manager that the hardware could be the problem.

But plant operators may simply not be getting what they need for wastewater success from the outset. Unfortunately, many design firms don't give enough attention to designing an effective system for small towns. They often prescribe off-the-shelf technology and methods or try to scale back a design intended for a much bigger city without tailoring it.

***"Success means being able to quantify the value of training by moving a treatment facility from non-compliance, through on-site diagnosis and training"***

*Jack Samson, EPA Program Director, Wastewater Training Grants*

One of the major problems that result is lack of system flexibility. When large designs are rescaled for small towns, a ten-clarifier system can become a large one-clarifier system, with no room built in for equipment failure. Furthermore, small systems are often patched together with "mix and match" equipment, often oversized for their needs.



*A well maintained state certified lab has helped make the Somerset-Baker treatment plant in New York an O&M award winner.*

What *"104"* troubleshooters bring to each small system is a creative ability to tailor the plant's equipment to on-site needs. Most of them have been in numerous small towns and facilities and really understand their needs and capabilities. They reposition a pipe here, change the function of a clarifier there, take a problem aerator off line, rearrange the system to make it more efficient. They install baffles, level weirs, identify leaking tanks. And these O&M evaluators are often amazed and impressed at the initiative operators have themselves shown in jerry-rigging and repairing problem equipment.

In many cases, troubleshooters and operators have tinkered with the physical plant until they get it to run right, often circumventing really major problems with effluent quality and facility design. The success stories that follow reflect the creativity and, in some cases, humor that arise from their interactions.

**Barnesville, Georgia**
**Plant Size: 0.75**
**Treatment Type: Activated Sludge**

## CHEMICAL ADJUSTMENT FORESTALLS EQUIPMENT INSTALLATION

Sometimes physical plant correction can be forestalled by corrective chemical treatment. This turned out to be the case in Barnesville, where frequent high flows aggravated solids billowing in the final clarifier. These escaping solids were degrading effluent quality. The *"104"* facilitator determined that the key problem was poor baffling in the clarifier, and considered installing baffles. First, however, chemical treatment was attempted.

Chemical dosage requirements were analyzed, and liquid alum was metered into the clarifier. Billowing ceased almost immediately as the process was locked into proper equilibrium. As settling rates began to capture solids efficiently, the dosage to the clarifier was reduced. Within two months, sludge quality was restored and the sludge mass control program had "kicked in."

Improvements were more dramatic than recorded data might indicate, since it is very likely that operators didn't take their samples when the clarifiers were billowing.

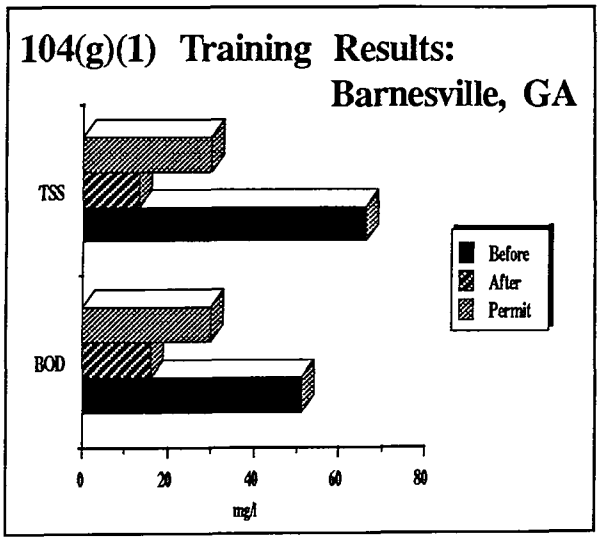
**Clayton Village, New York**
**Plant Size: 0.30 mgd**
**Treatment Type: Activated Sludge**

## A BREATH OF FRESH AIR

When a smelly sewage treatment plant offends the summer tourists, it's time to call for help. New York's Clayton Village had experienced the olfactory results of low plant D.O. levels for years. In addition, the plant had violated BOD5 and TSS limits on several occasions.

Attempts to fix the problem had failed until the *"104"* troubleshooter showed up. He installed a new blower and more diffusers to improve oxygen transfer. He also recommended operational improvements, a preventive maintenance scheme, and a public relations campaign.

The result? The odors are gone, BOD5 and TSS levels have plummeted, and everyone got to tour the treatment plant. Clayton Village is savoring the sweet smell of success.




**Estherwood, Louisiana**
**Plant Size: 0.08**
**Treatment Type: Overland Flow**

## REPAIRS CURTAIL INUNDATION AND CLEAN EFFLUENT

This tiny system, which had neither a certified operator nor a discharge permit, was plagued with excessive wet weather flows. The system was designed at 0.08 mgd, but at times was inundated at from 0.25 to 0.4 mgd. When troubleshooting began, drainage ditches were severely eroded, untamed grass and weeds were crowding out purifying vegetation, and the chlorination system was inoperable.

The *"104"* trainers immediately initiated routine grass cutting, repaired erosion damage, and began alternating usage of the two overland flow plots. They rehabilitated the chlorination system and tackled the leaky collection system. Fifty-nine major sources of inflow were discovered. Repairs reduced wet weather flows by up to 80%.

Results:
- Infiltration/inflow reduced by an average of 55%;
- Power consumption at lift stations was cut 40%; and
- Estherwood's system is now very clean: BOD5 ranges from 6-14 mg/l; TSS from 4-20 mg/l, and fecal coliform is always < 10/100 ml.

**Garberville, California**
**Plant Size: 0.06 mgd**
**Treatment Type: Unaerated ponds with percolation ponds**

## SEEKING THE RIGHT LEVEL FOR SUCCESS

Sometimes facility correction can be brilliantly simple. The Regional Water Quality Control Board had issued "cease and desist" orders to the Garberville plant because of frequent bacterial violations. This was serious business: effluent from gravelly percolation ponds was entering a source of downstream water supply.

***"Those two fellows, from Chicago, came down and did a fine piece of work. They solved the problem and saved us money."***

***Jimmy Wright, Mayor***
***Linton, Indiana***

Why was chlorine demand so high, so widely variable, and so often ineffective? The trainers discovered that effluent was being drawn off near the bottom of the third-stage pond. The result: high levels of suspended organic solids in the stream to be chlorinated!

The two troubleshooters recommended that the drawoff pipe be modified to allow control of the depth at which effluent could be removed. After several months, the final effluent flowing to the Eel River was well within permit limitations.

**Heppner, OR**
**Plant Size: 0.250 mgd**
**Treatment Type: Trickling Filter**

## THE 59¢ SOLUTION

The old trickling filter plant at Heppner, Oregon was consistently violating fecal coliform limits. The plant has no recycle, and its overworked operator was removing sludge from the clarifier only once a day.

The troubleshooting team helped the operator work on the chlorine system. They removed the chlorine solution line from the clarifier and rerouted it to the trickling filter discharge line, rigging its end with a 59¢ garden sprayer nozzle.

In addition, the operator began removing sludge twice daily.

The Heppner plant came into compliance within three site visits. And there wasn't a single complaint about the cost.

**Julesburg, Colorado**
**Plant Size: 0.25 mgd**
**Plant Type: Trickling Filter**

## TIMELY ACTION AVERTS PROBLEM

When the *"104"* troubleshooter arrived in Julesburg, he found an odd design "glitch" in the system. Sewage-filled influent and final effluent passed through the same manhole in two open channels. The clean and dirty streams were separated by a wall just 8" high! A blockage or power outage would back up the influent and allow it to spill into the clean-water channel in a very short time.

The program evaluator recommended that a cement wall be built, and the town administrators grudgingly agreed. Because the facility wasn't staffed at night, the wall was designed to hold back 12 hours of average nighttime flow.

There the new wall sat. And sat. And sat... until one summer night there was a major power outage at the plant. Next morning, the surprised operator found 13 hours of influent flow backed up in the system: two inches from the top of the wall!

The result: A contamination disaster headed off by timely corrective action.

**Kennebunkport, Maine**
**Plant Size: 0.7 mgd**
**Treatment Type: Extended Aeration**

## BETTER COMPOST IN JUST 14 DAYS!

Composting sludge is supposed to reduce odors, but Kennebunkport, Maine received more than 100 complaints a year about its smelly treatment works. This 0.7 mgd extended aeration plant used wood chips to provide bulk to composting sludge, but odor-control techniques were keeping the compost wet.

The *"104"* troubleshooter suggested replacing wood chips with wood ash from a nearby biomass boiler and changing the air flow to the piles. Success was dramatic and improved further when operators began using a special strategy for controlling compost temperature. Kennebunkport is now producing dry sludge compost in only 14 days.

**Sand Creek, Wisconsin**
**Plant Size: 0.0075 mgd**
**Treatment Type: Two Cell Stabilization Pond**

## A LOW-PRESSURE APPROACH

The tiny two-cell stabilization pond system in Sand Creek, Wisconsin was designed simply for a very small flow: 0.0075 MGD. But the system had not had a discharge from its primary to its secondary treatment cell since it was started up in 1978! Sand Creek couldn't get a new discharge permit because its plant wasn't operating as designed: It never achieved secondary treatment.

About 7,500 gallons was leaking from the bottom and sides of the primary tank every day. Proposals to reline or modify the cell were rejected as being too costly. The O & M troubleshooter suggested dropping the water level in the primary cell by one foot to relieve hydraulic pressure on the seal. Success was startling: a continuous discharge of between 3,000 and 19,000 gallons a day began immediately! Effluent BOD5 dropped to below 30 mg/l. The pressure was off Sand Creek.

**Sandy Hook, Kentucky**
**Plant Size: 0.07 mgd**
**Treatment Type: Extended Aeration**

## PLANT CORRECTIONS MEET WATER QUALITY STANDARDS AND CUT COSTS

The Sandy Hook treatment plant was out of compliance. Operations were in a slump: the surge tank did nothing more than "slug load" the treatment process, and effluent from a nonfunctional sand filter was bypassing the chlorine contact tank. Low dissolved oxygen prevailed plant-wide. Effluent quality was poor and operating costs were very high.

The on-site evaluators determined that physical correction of the plant could improve its performance and efficiency considerably. They:

- Converted the surge tank into an extension of the aeration tank, thus eliminating the surge pumps;
- Retired the useless sand filter, converting it to a post aeration basin;
- Restored use of the chlorination basin;
- Rehabilitated the aeration system; and
- Recycled supernatant from the aerobic digester.

These improvements cut electricity and in-plant water costs dramatically. The much-improved effluent was used for washdown and chlorine feed. During these adjustments, the operator quickly learned the concepts of process control, solids management and sludge disposal that further improved effluent quality.

Results:

- 50% reduction of electricity costs;
- 100% reduction of water costs for washdown and chlorine feed; and
- BOD5 and TSS concentrations of less than 10 mg/l and an ammonia-nitrogen concentration of less than 0.05 mg/l.

***"My community has benefited in three areas from technical assistance and the State Training Action Plan : certification upgrade, more effective personnel scheduling, and certification in backflow prevention."***

*Laura Thomas, Mayor*
*Ridgeway, South Carolina*

**Tionesta, Pennsylvania**
**Plant Size: 0.25 mgd**
**Treatment Type: Rotating Biological Contactor (RBC)**

## COMPLIANCE ACHIEVED WITH A FLICK OF THE SWITCH

In Tionesta, the *"104"* trainer showed plant staff that a simple solution can often be the answer to a big problem. Tionesta's sewage treatment plant experienced hydraulic overloads almost daily, even in dry weather. These high flows frequently flooded the RBC units and also resulted in the plant being bypassed.

While the old combined sewer system contributed some inflow and infiltration, the on-site troubleshooter discovered that most of the "real" infiltration/inflow problem was caused by the improper setting of a pump station float switch. It caused the station to pump only when full, and the resulting periodic surge overflowed the plant. This situation was exacerbated by the improper setting of the overflow weir, which allowed surges to flood the RBCs.

The evaluator also scheduled sludge pumping to the drying beds before wasting from the final clarifiers, and arranged more frequent sludge withdrawal. This ended the problem of overflowing digester contents reentering the influent and organically overloading the RBC.

The results? Correction allowed the plant to operate as designed. Furthermore, effluent quality improved. After adjustment, the plant consistently stayed in compliance.

# FACILITY MANAGEMENT: LOOKING OUTWARD FROM THE PLANT

Facility management covers a wide spectrum of concerns. Most of them relate to problems outside the plant itself. O&M evaluators can quickly size up the level of expertise of the staff and the adequacy of system design. If plant performance is notably poor, and in-plant equipment and staffing aren't major problems, it's time to look elsewhere for the solution.

Facility management problems from outside the plant can include:

**Poor Administration**—Inadequate budget, sharing of plant personnel with other departments, lack of attention to and care of plant, no financial strategies for replacement and repairs, inadequate user charges.

**High Flows**—Bad infiltration and inflow problems in the collection system.

**Lack of Control Over Users**—High or toxic loads, shocks from "slug" loading by industry.

**Poor Communication**—Poor morale of staff, unexpressed or unmet needs.

Inadequate maintenance is an in-plant problem, but it usually relates back to inadequate staffing or budget.

The success stories that follow reflect this wide diversity of "other" problems that are neither purely equipment- or purely staff-related.

## CLUES ON EXISTENCE OF FACILITY MANAGEMENT PROBLEMS

Rundown, unkempt plant and poor morale - - Poor support from local officials.

Severe fluctuations in effluent quality  Slug loading from industry.

General poor performance without staff and equipment problems  Inadequate maintenance.

Frequent washouts, overpowering of system  Infiltration/Inflow problems.

**Abbeville, South Carolina**
**Plant Size: 1.0 mgd**
**Treatment Type: Trickling Filter**

## AUTOMOTIVATION IN SOUTH CAROLINA

This 1.0 mgd trickling filter plant has the most unusual looking primary clarifier drive in the entire state of South Carolina. As one enters the gate, the piece of equipment stands out proudly on one axle jutting out almost two feet above the clarifier access walkway. Connected to an electric motor with gear reducer by a standard V-belt and defying all the rules of normal wastewater treatment plant equipment is a 1958 Pontiac Bonneville rear end. A true case of "doing your best with what you have available" has become the talk of the entire South Carolina Technical Assistance Team. Investigation has revealed that the operator-in-charge of this plant had run out of funding in a recent year and resorted to the Town's account at a local junk yard. The staff at the South Carolina Environmental Training Center are still debating the pros and cons of this type of repair but agree that the idea of this rear end serving another useful purpose was pleasing to everyone.

**Booneville, NC**
**Plant Size: 0.10 mgd**
**Treatment Type: Extended Aeration**

## TOWN CLERK ATTENDS WASTEWATER SCHOOL

Encouraged by the *"104"* trainer, Booneville, North Carolina's Town Clerk decided to sign up for wastewater school. The Clerk supervises the wastewater operator and the plant budget. She acknowledges that Booneville has had trouble keeping a certified operator on board, so she is going for certification herself. In the meantime, she's backing up the capable operator now serving this small extended aeration plant.

**Caruthers, California**
**Plant Size: 0.1 mgd**
**Treatment Type: aerated lagoons/stabilization ponds**

## INTEREST AND ATTENTION MOTIVATE DEMORALIZED PLANT

The Caruthers treatment plant was proclaimed a virtual disaster upon initial evaluation. The *"104"* trainer found 20 years of accumulated solids and debris that nearly filled the weed-choked lagoons. Odors were rampant, access to the treatment area was wide open, and the operator complained that no one had offered any concern or advice about the facility for many years.

Caruthers is an almost classic example of the impact of concerned interest and attention. The operator didn't know what he was expected to do and felt that no one cared anyway.

Advice and attention from the *"104"* troubleshooter motivated the operator's activity. Within 5 months he had cleaned out one lagoon and was operating it properly while the other awaited solids removal. Odor problems were considerably improved and the plant looked much better.

The operator continued to upgrade the Caruthers system over the next year. While the plant isn't a showplace yet, it is vastly improved in terms of both performance and aesthetics.

***" I doubt very much whether we could have been an award winning plant without the On-Site Operator Training Program."***

*Jack Young, Division Manager,*
*Cheyenne Dry Creek Plant*
*Cheyenne, Wyoming*

**Hardwick, Vermont**
**Plant Size: 0.37 mgd**
**Treatment Type: Aerated Lagoon**

## MANAGEMENT "UPGRADE" EXTENDS PLANT'S LONGEVITY

Hardwick, Vermont almost slipped through the cracks of the *"104"* program because its technical violations were minor. But Hardwick persisted in its requests and a troubleshooter was detailed to the small village. Organization of the wastewater "department" was in disarray. No wastewater budget existed, nor were there any maintenance or replacement programs. The operator reported to the street department and often worked there.

The evaluator got right to work on financial and management problems. The operator and the municipal managers were all trained. They accepted a sinking fund plan for capital expenditures over the next ten years and earmarked revenues for replacement and repair. A wastewater budget now exists. The village increased the operator's hours and limited them to wastewater work. Good maintenance techniques and schedules are in place.

The success here is not technical, but perennial, Hardwick's wastewater treatment plant is going to last!

**Narrowsburg, New York**
**Plant Size: 0.1 mgd**
**Treatment Type: Sand Filtration of Septic Tank Effluent**

## POOR MAINTENANCE "UPSTREAM" CAUSES DIRTY INFLUENT

Narrowsburg runs an innovative/alternative facility that processes influent that comes directly from about 250 septic tanks through sand filters before discharging to the Delaware River. Designed for 100,000 gpd, the plant started experiencing ponding problems in its sand beds at only 43,000 gpd. Fortunately, before effluent quality had suffered, the facility called for technical assistance.

The O&M troubleshooter identified two major problems. First, the two on-line sand filter beds were being overloaded while the other two were being cleaned. Understaffing at the plant meant the out-of-service beds could not be cleaned quickly; the result was ponding under a heavy hydraulic load. Second, dirty influent was clogging the sand filters. The existing septic tanks were to serve as primary treatment, but as sludge built up in them, solids were overflowing to the plant. The septic tanks had never been pumped out as was required to keep the system operating as designed. Money had never been budgeted for septic tank pumping.

The evaluator's recommendations were simple and highly effective:

- Staff up and mount an intensive cleaning effort on the sand bed filters. Keep cleaning regularly; and
- Pump out overloaded septic tanks.

Once all four beds were clean and on-line and two heavily loaded septic tanks were pumped, the facility handled an average of 61,000 gpd without ponding problems. Effluent quality remained good: BOD was 11.5 mg/l and TSS was 3 mg/l. The *"104"* facilitator recommended that identified infiltration/inflow problems be eliminated to keep hydraulic loads down to manageable levels during wet weather.

**Sandwich, Illinois**
**Plant Size: 0.95 mgd**
**Treatment Type: Activated Sludge**

## INDUSTRIAL "SLUG" DISCHARGES SHOCK SMALL SYSTEM

It's a common story in wastewater management: the "mystery" polluter who shocks the local treatment plant regularly with slug discharges. The offender is usually an industry on which the town relies economically.

In Sandwich, Illinois, the 0.95 mgd activated sludge plant was out of compliance due to poor process control, sludge wasting, and shock discharges to the system. The *"104"* troubleshooter helped operators improve those areas within their control, but it took an enforcement meeting, set up by the *"104"* trainer, to get town administrators to find and control the offending polluters.

**Socorro, New Mexico**
**Plant Size: 1.0 mgd**
**Treatment Type: Activated Sludge**

## PLANT REHABILITATION SAVES MILLION$

A steadily growing population and a deteriorating plant effluent had convinced Socorro city managers that they needed a completely new treatment plant. They believed that the old plant could no longer meet permit limits. When the *"104"* troubleshooter arrived to see what could be done to improve performance, he found an uninterested city administration. Socorro was already on the priority list for a construction grant!

The on-site evaluator found plenty of other problems too: disorganized plant operation, poor process control, low operator morale, offensive plant odors, and erratic effluent quality. Although he pushed for improvements, measurable results didn't occur until several months later. That's when operating Socorro's existing facility to its real capacity became a precondition of the desired grant. Plant performance and condition improved dramatically as the city acted upon the trainer's recommendations.

Socorro:

- Promoted a capable operator to a position of responsibility for the plant;
- Hired a new lab technician who began to generate credible data;
- Increased user charges by 25%;
- Enacted a sewer use ordinance;
- Established an O&M program for the collection system; and
- Improved process control and added 25% aeration capacity.

The old plant is doing its job again. Effluent BOD and TSS, which had been ranging over 30 mg/l during the previous year, were controlled to 9 mg/l BOD and 16 mg/l TSS. Plant odors have been much reduced and staff morale is up.

**Spring Green, Wisconsin**
**Plant Size: 0.260**
**Treatment Type: Oxidation Ditch.**

## OIL IN TROUBLED WATERS

Heavy thick foaming in the aeration basin and floating solids in the clarifier greeted the *"104"* troubleshooter when he arrived at the Spring Green facility. By the time the plant called for help, solids settling was out of control and getting worse: 600-700 ml/l one month, 800-900 ml/l the next. Sludge was being wasted only once or twice a month.

The on-site evaluator saw immediately that high grease loads were entering the plant. Seventeen food service businesses were inspected for grease control violations and ordered to use grease traps correctly. At the same time, plant operators sprayed foam with a dilute chlorine solution 2-3 times a day.

Meanwhile, the troubleshooter experimented with chlorinating the return activated sludge to attack turbidity and filamentous bacteria. After several unsuccessful tries, he hit upon an unorthodox chemical addition point: the mixed liquor overflow to the final clarifier. Success was achieved within 24 hours.

These solutions, combined with a long-term program of regular sludge wasting, cleaned up Spring Green's problems. Within a couple of weeks, technical assistance had brought a troublesome plant well within 30/30 permit limits: BOD5 was 15 mg/l and TSS stood at 10 mg/l.

**Superior, Arizona**
**Plant Size: 3.0 mgd**
**Treatment Type: Contact Stabilization**

## OPERATIONS HAMPERED BY UNEXPRESSED NEEDS

Superior, Arizona wanted to bring its plant into compliance. If only their wastewater operator could tell them how! The *"104"* trainer discovered an unschooled plant operator running a "seat of the pants" system. Lacking operational training and unaware of the required testing equipment, he was unable to express plant needs to the people able to supply them. The trainer worked closely with both the operational and budgeting needs and improved expertise and hardware within the plant.

**Thurmont, Maryland**
**Plant Size: 1.0 mgd**
**Treatment Type: Oxidation Ditch**

## ONCE BYPASSED PLANT NOW SQUEAKY CLEAN

When high flows fouled the sand filters with solids at the Thurmont's wastewater treatment plant, the result was "a truly nasty mess." So the operator bypassed the plant whenever flows exceeded 75% of capacity.

The *"104"* trainer found the Thurmont plant seriously understaffed. No one was doing mechanical or electrical maintenance. The chief operator was torn between doing lab work and plant operations. The spiragester could not be made to work, no matter what wasting schedule was tried, and septic sludge was flowing uncontrolled into the downstream works. Solids washed out to the sand filters at only 60% of design capacity.

Thurmont staff were trying, but were overwhelmed. The troubleshooter:

- Implemented a data collection program that began to reveal the true capability of each unit process;
- Taught the operators the relationship between data trends and process stability;
- Retired troublesome equipment from service;
- Suggested hiring a part-time lab assistant; and
- Devised a high-flows strategy and helped solve infiltration/inflow problems.

No sludge washouts occurred after the trainer began improvements, and the plant works at flows up to 1.2 mgd. The lab assistant has substantially relieved staffing pressures, and all participants have the time and understanding to run a successful plant. Thurmont is in compliance and its effluent is five times cleaner than required!

## SUCCESS IN EVERY REGION

The treatment plants listed in this table are those which were identified as "success stories" by EPA Regional Offices and submitted to assist in the development of this brochure. They represent only a fraction of the "success stories" of the 104(g)(1) program.

| Region | Plant | | Success | | |
|---|---|---|---|---|---|
| | | | Training | Facility Correction | Mgmt. |
| I | Seymour, CT | Activated Sludge | x | | |
| | Thomaston, CT | Activated Sludge | | | x |
| | Mass. Maritime Academy, MA | Activated Sludge | | x | |
| | Huntington, MA | Activated Sludge | x | | |
| | Kennebunkport, ME | Activated Sludge | | x | |
| | Zambarno Memorial Hosp., RI | Extended Aeration | | | x |
| | Hardwick, VT | Aerated Lagoon | | | x |
| | West Rutland, VT | Extended Aeration | x | | |
| II | Arcade, NY | Trickling Filter | x | x | |
| | Blooming Grove, NY | Activated Sludge | x | | |
| | Buchanan, NY | Activated Sludge | x | | |
| | Camden, NY | Oxidation Ditch | | x | |
| | Clayton, NY | Activated Sludge | | x | |
| | Fulton, NY | Trickling Filter | | | x |
| | Kings Acres, NY | Biotower | x | x | |
| | Montgomery, NY | Oxidation Ditch | x | | |
| | Narrowsburg, NY | I/A | | | x |
| | Walton, NY | Trickling Filter | | | x |
| III | George's Creek, MD | Oxidation Ditch | x | | x |
| | Hagerstown, MD | Activated Sludge | | | x |
| | Indian Head, MD | Activated Sludge | | x | |
| | Sharptown, MD | Extended Aeration | x | | x |
| | Thurmont, MD | Oxidation Ditch | | | x |
| | Westminster, MD | Activated Sludge | x | | |
| | Alexandria, PA | Activated Sludge | x | | x |
| | Clarks Summit, PA | Extended Aeration | x | | |
| | Mt. Pocono, PA | Activated Sludge | | x | |
| | Saxonburg, PA | Extended Aeration | | x | |
| | Tionesta, PA | RBC | | x | |
| | Towanda, PA | Contact Stab. | x | | |
| | Boydton, VA | Activated Sludge | x | | x |
| | Cape Charles, VA | Contact Stab. | x | | x |

## SUCCESS IN EVERY REGION

| Region | Plant | | Success | | |
|---|---|---|---|---|---|
| | | | Training | Facility Correction | Mgmt. |
| | Clifton Forge, VA | Trickling Filter | | | x |
| | McKenny, VA | Extended Aeration | | | x |
| | Elizabeth, WV | Aerated Pond | x | | |
| | Follansbee, WV | Extended Aeration | x | | |
| | Friendly, WV | Oxidation Ditch | | | x |
| | Glen Rogers, WV | Oxidation Ditch | | | x |
| | Hepzibah, WV | Oxidation Ditch | x | | x |
| | Harpers Ferry, WV | Extended Aeration | | | x |
| | Shepherdstown, WV | Extended Aeration | x | | x |
| IV | Atlantic Beach, FL | Contact Stab. | x | x | |
| | Lake Alfred, FL | Contact Stab. | | x | x |
| | Barnesville, GA | Activated Sludge | x | x | |
| | Fairburn, GA | Activated Sludge | x | | |
| | Campbellsburg, KY | Extended Aeration | x | | |
| | Sandy Hook, KY | Extended Aeration | | x | |
| | Booneville, NC | Extended Aeration | | | x |
| | Kershaw, SC | Oxidation Ditch | x | | |
| | Manning, SC | Activated Sludge | x | | |
| | Ridgeway, SC | Extended Aeration | x | | x |
| V | Riverton, IL | Contact Stab. | | | x |
| | Minooka, IL | Oxidation Ditch | x | | x |
| | Pekin, IL | Contact Stab. | x | | |
| | Somonauk, IL | Extended Aeration | x | | |
| | Villa Grove, IL | Extended Aeration | x | | |
| | Goreville, IL | Contact Stab. | | | x |
| | Aurthur, IL | Contact Stab. | | | x |
| | Sandwich, IL | Activated Sludge | | | x |
| | Waverly, IL | Activated Sludge | x | | |
| | Centralia, IL | Contact Stab. | | | x |
| | Carlisle, IN | Extended Aeration | | x | x |
| | Barrett, MN | Extended Aeration | x | | |
| | Morgan, MN | Trickling Filter | x | | |
| | Spring Green, WI | Oxidation Ditch | | | x |
| | Sand Creek, WI | Stab. Pond | | x | |

## SUCCESS IN EVERY REGION

| Region | Plant | | Success | | |
|---|---|---|---|---|---|
| | | | Training | Facility Correction | Mgmt. |
| VI | Garland City, AR | Lagoon | | x | |
| | Mountain Pine, AR | Lagoon | | x | |
| | Calico Rock, AR | Extended Aeration | | x | |
| | Basile, LA | Extended Aeration | x | | |
| | Elton, LA | Oxidation Ditch | x | | |
| | Port Barre, LA | Extended Aeration | | | x |
| | Folsom, LA | Extended Aeration | x | | |
| | Estherwood, LA | Overland Flow | x | | x |
| | Blanchard, LA | Oxidation Ditch | | | x |
| | Bloomfield, NM | Activated Sludge | x | | |
| | Aztec, NM | Extended Aeration | x | | |
| | Reserve, NM | Activated Sludge | x | | |
| | Socorro, NM | Activated Sludge | | | x |
| | Broken Bow, OK | Activated Sludge | x | | x |
| | Coweta, OK | Extended Aeration | x | | x |
| | Checotah, OK | Oxidation Ditch | x | | |
| | Whitehouse , TX | Extended Aeration | x | | |
| | Waller, TX | Oxidation Ditch | x | | |
| | Cottonwood, TX | Lagoon | x | x | |
| VII | Boone, IA | Trickling Filter | x | | |
| | Stuart, IA | Trickling Filter | | x | |
| | Hartford, IA | Aerated Lagoon | x | | |
| | Baldwin City, KS | Oxidation Ditch | x | | x |
| | Exeter, MO | Oxidation Ditch | x | | x |
| | Walthill, NE | Activated Sludge | | x | |
| | Osmond, NE | Activated Sludge | x | | |
| | Burwell, NE | Trickling Filter | x | | |
| VIII | Clark, SD | Oxidation Ditch | x | | x |
| | Keystone, SD | Stab. Pond | | x | |
| | Julesburg, CO | Trickling Filter | | x | |
| | Elizabeth, CO | Aerated Lagoon | | | x |
| | Green River, UT | Lagoon | x | | |
| | Hurricane, UT | Lagoon | x | x | |

## SUCCESS IN EVERY REGION

| Region | Plant | | Success | | |
|---|---|---|---|---|---|
| | | | Training | Facility Correction | Mgmt. |
| IX | Superior, AZ | Contact Stab. | | | x |
| | Patagonia, AZ | Extended Aeration | | | x |
| | East Yolo, CA | Activated Sludge | x | | |
| | Dos Palos, CA | Aerated Ponds | x | | |
| | Fort Bragg, CA | Trickling Filter | | x | |
| | Garberville, CA | Unaerated Ponds | | x | |
| | Caruthers, CA | Aer./Stab. Ponds | | | x |
| | Riverdale, CA | Aerated Ponds | | | x |
| | Sanger, CA | Activated Sludge | | | |
| | Nanakai, HI | Activated Sludge | x | | |
| | Wahiawa, HI | Activated Sludge | x | | |
| | Ahuimanu, HI | Activated Sludge | x | | |
| X | Juliaetta, ID | Extended Aeration | | x | |
| | Harrison, ID | Activated Sludge | x | | |
| | Arlington, OR | Activated Sludge | x | | |
| | Tillamook, OR | RBC | x | | |
| | Heppner, OR | Trickling Filter | | x | |
| | East Sound, WA | Activated Sludge | x | | |
| | Morton, WA | Oxidation Ditch | x | | x |
| | College Place, WA | Activated Sludge | x | | x |
| | Zillah, WA | Oxidation Ditch | x | | |
| | Bridgeport, WA | Activated Sludge | x | | |

# THE ON-SITE OPERATOR TRAINING PROGRAM: A GRASS-ROOTS SUCCESS

The On-Site Operator Training Program is:

- Meeting the wastewater O&M needs of often overlooked communities;
- Supporting the water-quality mandates of the Clean Water Act;
- Applying creativity and the personal touch to technical assistance outreach;
- Helping to build a professional community of capable wastewater operators;
- Helping local officials;
- Establishing State training programs; and
- Protecting State and Federal investment in infrastructure.

Program staff are looking forward to many more success stories over the coming years. For more information on the program, write:

Office of Municipal Pollution Control
Planning and Analysis Division (WH-546)
Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460
(202) 382-5810