



United States Environmental Protection Agency  
Office of Water  
Office of Wastewater Management  
Municipal Assistance Branch

**Wastewater Treatment Plant Operator  
On-Site Technical Assistance Training Program - 104(g)(1)  
End of Fiscal Year 2007 Accomplishment Report**



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# WASTEWATER OPERATOR TRAINING PROGRAM – 104(g)

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## Introduction

Section 104(g)(1) of the Clean Water Act authorizes funding for the Wastewater Treatment Plant Operator On-Site Technical Assistance Training Program. The program is funded through Congressional earmarks that are specific to section 104(g)(1). The 104(g) program provides on-site technical assistance to small<sup>1</sup> publicly-owned wastewater treatment facilities struggling with compliance and performance issues. By bringing facilities into compliance with applicable permits and improving performance, this program protects human health, improves water quality, and safeguards capital investments and upgrades at these treatment plants. The 2007 Annual Report will outline the results of the 2007 program, describe the program's successes and identify EPA's next steps for the future of the 104(g) training program.

Federal funding is distributed to 46 States through grants, often in cooperation with educational institutions or nonprofit agencies. In many cases, the grants are administered by environmental training centers. In fiscal year 2007, at an average Federal cost of about \$2,000 per facility, the program accomplished the following:

- Assisted 586 facilities nationally;
- Assisted in achieving or maintaining compliance or improved performance at 514 of these the 586 facilities, an 88 percent success rate;
- Completed training at 341 of these facilities; and
- Assisted in achieving or maintaining compliance or improved performance at 318 of the 341 above-mentioned facilities, a 93 percent success rate.

## Program Background

There are over 15,000 municipal wastewater treatment plants in the U.S., of which almost 14,000 of those (>93 percent) discharge less than five million gallons per day (MGD). More than half of these plants have sophisticated activated sludge treatment technologies that require highly-developed operating skills. Permitting authorities have taken about 11,000 enforcement actions against these small facilities. Out of these 11,000 enforcement actions, 10,121 were for facilities that have a capacity of less than one MGD. Small wastewater treatment plants face the additional challenges to compliance because of high operator turnover, low budgets and salaries, and often a lack of community support. Small community wastewater treatment plants that experience noncompliance or technical problems that could result in noncompliance are

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<sup>1</sup> with effluent discharges of less than 5 million gallons per day

candidates for the Wastewater Treatment Plant Operator On-Site Technical Assistance Training Program. This section describes further details about the training program.

The goal of the program is to provide direct on-site assistance to operators at small community wastewater treatment facilities in order to help the facilities achieve and maintain consistent permit compliance. Consistent permit compliance maximizes the community's investment in improved water quality by realizing maximum benefits with fewer dollars. The program is a cooperative effort with EPA Regions, States, State training centers, municipalities, tribes, and operators. The program assistance focuses on issues such as wastewater treatment plant capacity, operation training, maintenance, administrative management, financial management, trouble-shooting, and laboratory operations. The technical assistance is provided at no charge and the focus of the assistance is directed at noncapital intensive solutions. In return, the facility is expected to address factors limiting its performance. For example, if a facility evaluation conducted as part of the program reveals a severe limitation in facility design capacity, trainers advise the utility officials to seek the services of a consultant or a design engineer. The utility benefits from an independent evaluation from the 104(g) trainers, who do not profit from any subsequent construction.

The 104(g) program assists small community wastewater treatment facilities in several ways, such as: identifying repairs or new construction that may be necessary to meet existing or future permit limits, reviewing and evaluating designs submitted by consultants, recommending ways to improve preventive maintenance of equipment and structures, and reducing costs for energy and chemicals through more efficient operation techniques. Most importantly, the 104(g) program gets plant operating staff and local elected officials working together on the problems at the treatment plant, which improves water quality by maximizing treatment equipment efficiency. This is achieved by educating the local officials about the compliance requirements, penalties, and how those requirements can be met with minimum cost and effort. The 104(g) program works with facilities that have completed training as well as those where training still continues. The facilities that have completed training are facilities that have achieved the desired result and assistance is no longer needed. Training is still provided at facilities that have not yet achieved the desired result and require further technical assistance and support to do so. Some facilities (less than four percent) in the 104(g) program choose to opt out and feel that they can pursue compliance through alternative methods.

The 104(g) program provides a variety of other benefits to the facility including better effluent levels, lower energy and chemical usage, more efficient use of staff time, laboratory monitoring and sampling assistance, and a more appropriate financial support system. The success stories presented later in this report demonstrate the benefits realized due to efforts of the 104(g) trainers.

The program funding level for fiscal year 2006 and 2007 was set at \$1.182 million, which is distributed in grants to the states to fund the training programs. No additional funding for this program was provided in EPA's FY 2008 appropriations. In some cases, Federal funds act as "seed money" for the program training centers to access additional funds to provide assistance. However, in other instances, the only addition to the 104(g) allotment is the recommended 25 percent match from the grantee.

## 2007 Program Achievements

The Wastewater Treatment Operator Training Program, through the EPA regional offices and State partners, assisted 586 facilities in fiscal year 2007. Compliance was achieved or maintained or performance was improved, at 514 (88 percent) of these facilities. This section outlines the accomplishments of the 2007 training program.

Table -1 indicates that the majority of the work conducted in the program for fiscal year 2007 resulted in achieving or maintaining compliance and improving performance at the facility. Many facilities that completed training activities in 2007, needed assistance to achieve or maintain compliance at the treatment plant site. The facilities that are continuing training activities from 2007 into 2008 still need assistance to improve performance or achieve and maintain compliance at the treatment plant location.

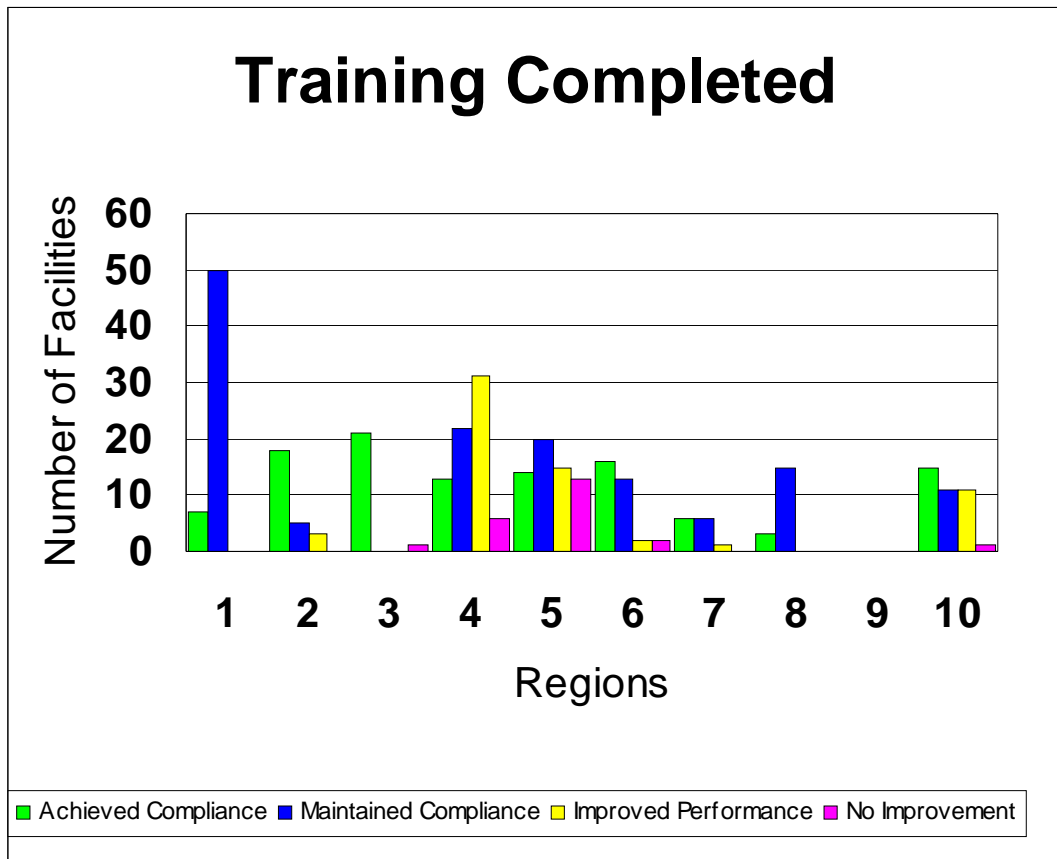
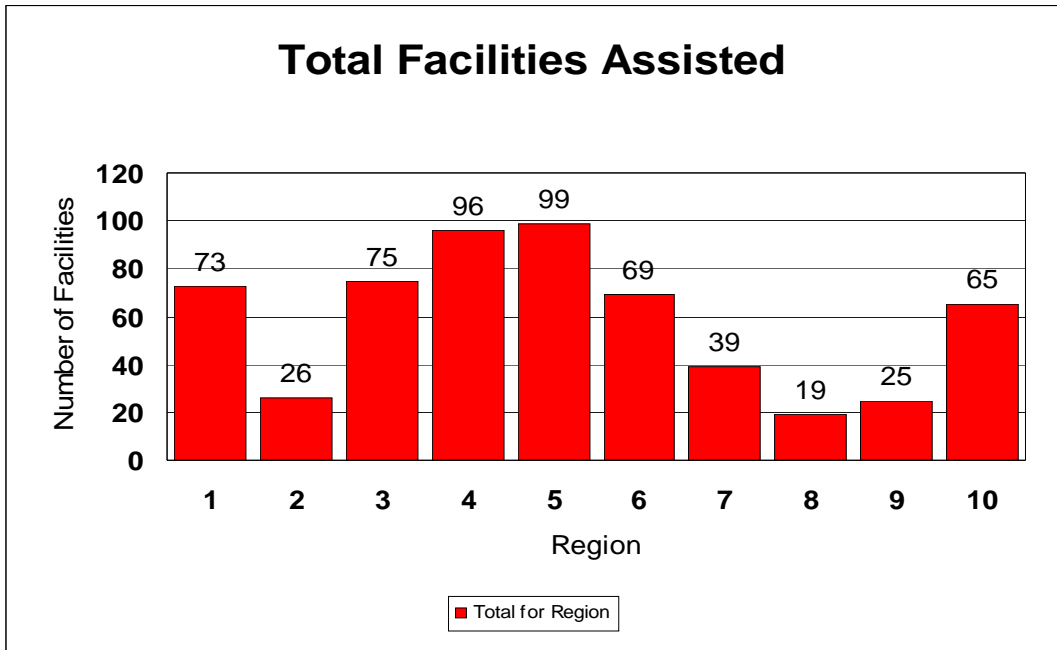
Out of the total of 341 facilities that completed training in fiscal year 2007, 318 (or 93 percent) achieved or maintained compliance, or improved performance. Compliance was achieved by 113 facilities, 142 maintained compliance, and 63 of these facilities improved plant performance (including compliance maintenance and preventing noncompliance). Twenty-three facilities had no improvement and decided to pursue compliance through alternative methods.

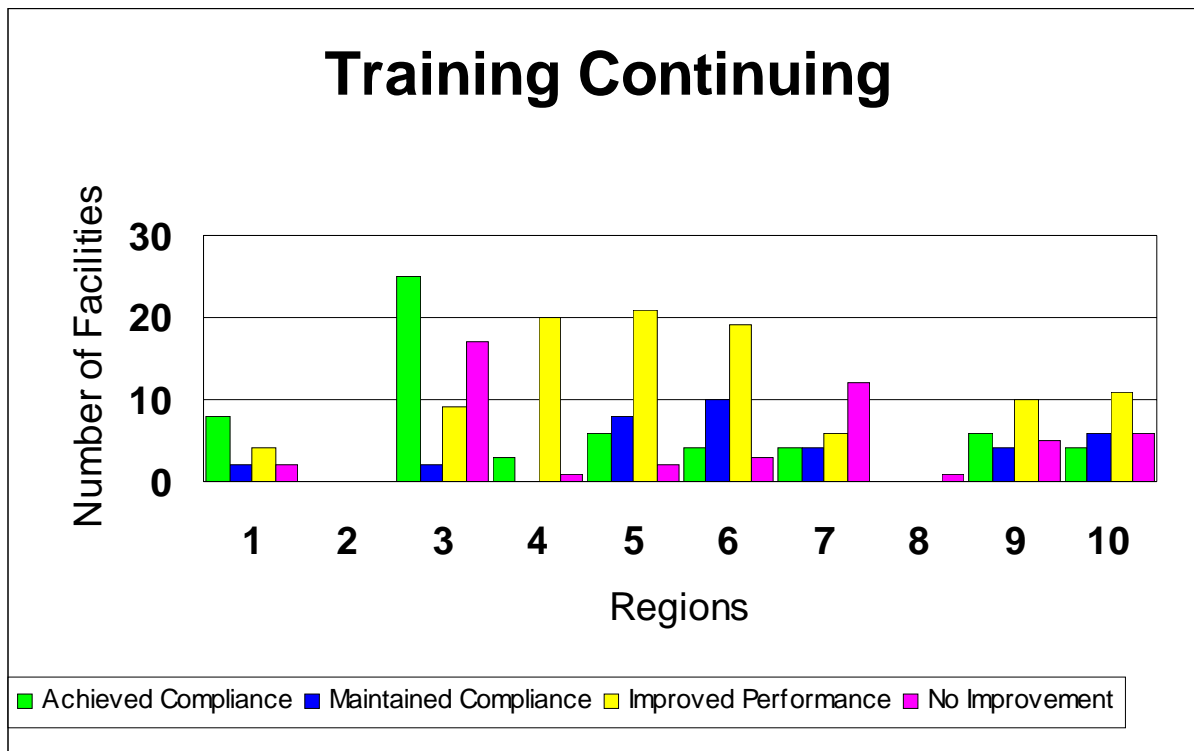
A total of 245 facilities will continue to receive training assistance into fiscal year 2008. These facilities are still in need of assistance in order to improve performance and maintain long-term compliance. Sixty (60) of these facilities have achieved compliance, 36 maintained compliance, and 100 of these facilities improved performance. Forty-nine of these facilities had no improved performance but continue to pursue compliance through the 104(g) program. Table 1 summarizes the achievements of each EPA Region with the 104(g) program.

**TABLE -1**

REGION	Total	1	2	3	4	5	6	7	8	9	10
<b>TRAINING COMPLETED:</b>											
<b>ACHIEVED COMPLIANCE</b>	<b>113</b>	7	18	21	13	14	16	6	3	0	15
<b>MAINTAINED COMPLIANCE</b>	<b>142</b>	50	5	0	22	20	13	6	15	0	11
<b>IMPROVED PERFORMANCE</b>	<b>63</b>	0	3	0	31	15	2	1	0	0	11
<b>NO IMPROVEMENT</b>	<b>23</b>	0	0	1	6	13	2	0	0	0	1
<b>TRAINING CONTINUING:</b>											
<b>ACHIEVED COMPLIANCE</b>	<b>60</b>	8	0	25	3	6	4	4	0	6	4
<b>MAINTAINED COMPLIANCE</b>	<b>36</b>	2	0	2	0	8	10	4	0	4	6
<b>IMPROVED PERFORMANCE</b>	<b>100</b>	4	0	9	20	21	19	6	0	10	11
<b>NO IMPROVEMENT</b>	<b>49</b>	2	0	17	1	2	3	12	1	5	6
<b>TOTAL</b>	<b>586</b>	<b>73</b>	<b>26</b>	<b>75</b>	<b>96</b>	<b>99</b>	<b>69</b>	<b>39</b>	<b>19</b>	<b>25</b>	<b>65</b>

Details of number of facilities assisted, where training was completed or is continuing by Region is shown on the charts below.





In response to the incorporation of environmental outcomes into grant requirements, the 104(g) program has developed a pollutant reduction tracking database. The pollutant reduction is calculated from the difference in the concentrations of nitrogen, total suspended solids, and Biochemical Oxygen Demand (BOD) existing in the wastewater treatment plant effluent prior to assistance, and the concentrations of those pollutants in the effluent after assistance had concluded. Although all the States and training centers are requested to report the pollutant reductions, many facilities do not. These facilities may not report pollutant load information because they do not have access to process data or equipment to monitor process conditions. The EPA continues to encourage the training centers to provide the information on pollutant load reductions, and the number of facilities reporting pollutant load reductions has increased steadily. For the facilities where assistance was completed in 2007 and results reported, the 104(g) program helped facilities prevent the discharge of over four million pounds of pollutants into the waters of the United States.

Table 2 summarizes the pounds of pollutants prevented from being discharged into surface water by each EPA Region under the 104(g) program. The pollutant pound load calculation is based on the available information for the flow and the concentration of pollutants before and after assistance is provided to the facility. In absence of the flow and concentration data, some of the loads are estimated based on the information available.

**TABLE - 2**

	Pounds of TSS Removed	Pounds of BOD Removed	Pounds of Nitrogen Removed	Total Pounds of Pollutants Removed
Region 1	470,673	392,408	186,761	1,049,842
Region 2	152,773	194,551	89,995	437,319
Region 3	112,408	53,039	24,591	190,038
Region 4	350,189	273,373	119,335	742,897
Region 5	369,912	140,300	33,485	543,697
Region 6	72,563	137,667	9,048	219,278
Region 7	59,079	72,140	57,670	188,888
Region 8	6,904	11,945	329	19,178
Region 9	127,687	77,852	20,285	225,824
Region 10	333,515	131,450	27,397	492,362
<b>TOTAL</b>	<b>2,055,703</b>	<b>1,484,724</b>	<b>568,896</b>	<b>4,109,323</b>

## **Success Stories**

### **The City of Carbondale, KS**

The city had a history of effluent Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) violations and did not have a certified operator. The city's latest permit issued May 1, 2006, included a Schedule of Compliance, which stated that if the city could not consistently meet permit effluent limits by October 1, 2007, it must hire a consulting engineer and upgrade the facility. Further, by November 1, 2006, the facility should have a Kansas Department of Health and Environment (KDHE) certified operator. The new permit required monthly monitoring until there was a satisfactory resolution of the problem and established limits for BOD, TSS, and fecal coliform.

Plans and specifications for the facility were missing. The flow pattern was determined during a 104(g) appraisal. It was found that Cell (concrete tank) #4 was being bypassed due to an obstruction in a splitter box, which can direct flow to either Cell #4 or Cell #5. The water rose an extra foot to enter Cell #5, which resulted in water levels one foot higher in the first three cells. When the obstruction was removed, flow entered Cell #4 and the water levels in the first three cells dropped a foot.

Cell #2 was also being bypassed as the control structure for parallel operation of the first two cells had been left open when series operation was resumed a few years ago. The effect was that water from Cell #1 bypassed Cell #2 and entered Cell #3. Water from Cell #3 backed up into Cell #2 through the control structure between Cell #2 and Cell #3. This backing up of the water was remedied and the water now flows in proper sequence through all the cells. The operator created a piping diagram for future use.

Some problems of excessive Infiltration & Inflow (I/I) and sludge levels in Cells 4, 5, and 6 still remain.

At the conclusion of training, the effluent met permit limits for nine consecutive months where it had only met permit limits for a few months before the 104(g) assistance. About nine months ago, it was discovered that the commercial laboratory that collects the samples had collected the samples from the wrong point. The city staff now accompanies the sample collector. The city staff has petitioned KDHE for relief from the monthly sampling and from the requirement to upgrade the facility.

The operator attended the training and obtained the necessary KDHE certification as required by the permit.

### **The City of Horton, KS**

The City of Horton had a history of non-compliance and two brand new operators. The plant has grit removal and screening, comminution, primary settling, a covered trickling filter, a Rotating Biological Contactor (RBC) for polishing and ammonia reduction, secondary clarification, ultraviolet disinfection and separate two-stage sludge digestion with drying beds. An extraneous flow basin is provided for peak flows (I/I).

The city's discharge permit, issued in September 2005, established limits for BOD, TSS, pH, ammonia and fecal coliform. The permit also required monitoring of various nutrient parameters. A schedule of compliance stated that a KDHE review would decide by May of 2007 if operational changes could alleviate the violations. If not, a formal schedule of compliance would come into effect with the ultimate result of full compliance by December 31, 2009. Another schedule of compliance gave the city until March 1, 2007, to have a KDHE certified operator of the proper class.

The operators, Dan Isabel and Mitchell Noll, enrolled in a long-term wastewater class and received on-site training through the 104(g) program. Both of the operators passed the Kansas certification exams and still remain employed at the facility. The operators now have a very good understanding of the plant and collection system operation.

The last violation occurred in March of 2006 and the plant record was good for a few months prior to that. The KDHE did not implement the schedule of compliance. The wastewater treatment collection and treatment system has received favorable reviews in the local press.

The plant was initially constructed in 1957 and had many of the original components, which had deteriorated to the point of failure. The city made an internal decision to spend the money needed to bring the plant into good repair in an effort to try to get another 10 years of service out of it while saving money for an upgrade. The following is a partial list of the repairs and replacements:

- Repair of the grit pump and conveyor.
- Repair of the comminutor.

- Replacement of the worn out piston pumps and valves in the sludge piping.
- Replacement of the trickling filter center column and distributor arms.
- Replacement of the worn out raw sewage pumps. Only two of the original three remained.
- Repair of the spalled areas of the primary and secondary clarifiers.
- Installation of a new ‘Multitrode’ control system with dialer to replace the old original float system.
- Replacement of a vacuum primed lift station on the east side of town with a submersible pump system.
- Extensive repainting of various plant components.

The operators established a maintenance schedule and will soon have a computer on-site for maintenance and compliance tracking. The operators credit the training they received through 104(g) as instrumental in their success in becoming certified operators and in learning to better operate their plant.

### **The City of Natoma, KS**

The plant had a long history of failure to meet BOD limitations and consequently was issued a schedule to comply with effluent limits in their discharge permit. The primary cell had been on the edge of overloading for a long time and would frequently go septic for long periods, creating odors in the community and causing noncompliance with permit effluent limits. The plant operator with assistance from the local 104(g) trainer brought the facility back into compliance and the schedule of compliance was cancelled by KDHE.

One probable source of overloading was the custom meat-packing plant in the city. The operators brought the septic first and second cells back to an aerobic condition by means of aeration, addition of sodium nitrate, and operating the primary cells in parallel. The city staff also warned the owner of the meat-packing company that further violations of the city’s sewer ordinance regarding waste strength would not be tolerated.

Because of the city’s efforts, the plant won the national second-place O&M award in the “Most Improved” category. EPA Region VII presented an award to the city staff.

### **The City of Sedgwick, KS**

The city was added to the 104(g) assistance list due to its very high total nitrogen and high nitrate values in their effluent. At times, the effluent nitrate levels were above 50 mg/l.

The 104(g) program first focused attention on the source of the high organic wastes. A local truck wash routinely washed cream, milk, chocolate, honey etc. into the sewer, which caused slug loads at the treatment plant. The city implemented a new sewer ordinance in July 2007, with enforceable provisions. The company has since reduced its contribution of strong wastes to the point where an anoxic zone could be created in part of the oxidation ditch to reduce effluent nitrogen. While this anoxic zone has only recently been started, initial results are promising.

If it were not for the technical support from the EPA's 104(g)(1) program that which provided the on-site assistance training, this wastewater treatment plant would still be in major noncompliance.

## **Indianapolis, IN**

The wastewater treatment plant at the town of Laurel in Southeastern Indiana had extensive problems that had been left unattended for quite sometime. The town was facing legal action by IDEM for the deficient operation of the plant. The 104(g) trainers helped the operator to identify the problems and helped create an action plan to assist in managing and renovating the treatment facility, thus allowing it to operate more efficiently.

The trainer introduced the operator to other experts to learn technical training, laboratory work, and waste removal. The plant saved significant amount of funds by conducting laboratory work in house rather than contracting it out. At the suggestion of the trainers, the blowers have been repaired, new wasting facilities installed, and a laboratory has been commissioned. One side of the plant, that was previously holding years of waste, is being transformed into an equalization basin so that the plant will have a consistent equal flow instead of sudden flow increases that are sent to the plant at busy times causing severe operational problems during treatment.

The Town Commissioner was very appreciative of the assistance provided by the 104(g) trainers and wrote a letter to the Indiana Department of Environmental Management thanking them for the technical assistance provided by the trainers. A copy of the letter was also sent to the Indiana Governor.

## **Plans for the Future**

The EPA will continue to work through its Regional offices and with State partners to improve water quality through the Wastewater Operator Training Program's assistance efforts. This section outlines ways EPA will continue to support the program in the future.

The EPA has reduced the burden of reporting by simplifying the pollutant reduction tracking database so that trainers only have to enter appropriate minimal data. In addition, the Regional data is now in a spreadsheet format to minimize the data reporting time. The streamlining of these processes improves the 104(g) program's image by helping EPA Regional offices and States to obtain timely and accurate reporting of pollutant reduction loads and the number of facilities assisted. Additionally, the trainers are also requested to provide specific accomplishments in reducing costs to the facility by saving energy, chemicals, or reducing other expenses for reporting purposes.

The EPA provided financial assistance for organizing the 25th National Operator Trainers Conference in Salt Lake City, UT, scheduled for June 9-12, 2008. This national conference improves the performance of the program by allowing the training center and State trainers to learn about new equipment, methods, technologies, and processes that have recently been developed for the operation and maintenance of small wastewater treatment facilities. The trainers also get the opportunity to share their real-life experiences and solutions with one

another and exchange information about the low-cost treatment methods that individual trainers have employed.

States and tribes also use the 104(g) funding to manage training programs to increase the overall number of trained wastewater treatment plant operators. As noted by the American Water Works Association and Water Environment Federation, the job market for water and wastewater treatment operators is a “buyers’ market.” The qualified operators are in short supply, and the small rural facilities often can not afford to hire highly trained operators to run their plants smoothly and efficiently. The Water Environment Federation is also very concerned with the shortage of trained personnel for small wastewater treatment facilities. The EPA has formed a work group to discuss how to resolve operator workforce issues. The group has held several workshops and meetings to come up with ideas on how to promote professionalism, retention, recruitment, succession planning, infrastructure costs, and operator certification for the small water and wastewater treatment operators. The importance of educating utility decision makers is also an issue for the workgroup. The workgroup has come up with a preliminary workforce problem map with remedies that can reduce this burden for small water and wastewater facilities. The EPA plans to gather additional information and research what States are already doing in this area and further develop guidance on how to recruit, train, and retain the workforce for the small water and wastewater treatment facilities. This information can help the small facilities access to trained operators so that they can better achieve and maintain compliance with the rules and regulations required by the States and EPA.

When asked if the States would continue the program without federal funding, only one state said yes. A handful of States reported they would continue to provide technical assistance to small facilities but at a much reduced level. The rest of the States responded that they would not be able provide any free on-site technical assistance to the small communities if Federal funding was cut. However, EPA is exploring opportunities to support the program in the future, including potentially sponsoring the annual national operator trainers’ conference to be held in fiscal year 2009.

If you have any questions, comments, or require more information on this subject matter, please contact Gajindar Singh at (202) 564-0634. You may also access the program's internet website at [www.epa.gov/owm/mab/smcomm/104g/](http://www.epa.gov/owm/mab/smcomm/104g/).

## U.S. EPA Regional Program Coordinators

### **David Chin**

REGION I {CT, ME, MA, NH, RI, and VT}  
1 Congress Street  
Boston, MA 02114  
Office of Ecosystem Protection / Municipal Assistance  
Unit  
Telephone: 617-918-1764  
Fax: 617-918-2064  
E-mail: [chin.david@epa.gov](mailto:chin.david@epa.gov)

### **Ray Kvalheim**

REGION II {NJ, NY, PR, AND VI}  
290 Broadway  
New York, NY 10007-1866  
Division of Environmental Planning & Protection  
Telephone: 212-637-3782  
Fax: 212-637-3891  
E-mail: [kvalheim.ray@epa.gov](mailto:kvalheim.ray@epa.gov)

### **James Kern**

REGION III {DE, DC, MD, PA, VA, and WV}  
1650 Arch Street (3WP23)  
Philadelphia, PA 19106  
Water Management Division  
Telephone: 215-814-5788  
Fax: 215-814-2318  
E-mail: [kern.jim@epa.gov](mailto:kern.jim@epa.gov)

### **Sam Sampath**

REGION IV {AL, FL, GA, KY, MS, NC, SC, and TN}  
61 Forsyth Street  
Atlanta, GA 30303  
Municipal Facilities Branch  
Telephone: 404-562-9335  
Fax: 404-562-9229  
E-mail: [sampath.sam@epa.gov](mailto:sampath.sam@epa.gov)

### **Russell Martin**

REGION V {IL, IN, MI, MN, OH, and WI}  
77 West Jackson Boulevard (WN-16J)  
Chicago, IL 60604-3590  
NPDES Support/Technical Assistance Branch  
Telephone: 312-886-0268  
Fax: 312-886-0168  
E-mail: [martin.russell@epa.gov](mailto:martin.russell@epa.gov)

### **Margaret Osbourne**

REGION VI {AR, LA, NM, OK, and TX}  
Fountain Place 12th Floor, Suite 1200  
1445 Ross Avenue  
Dallas, TX 75202-2733  
Water Management Division  
Telephone: 214-665-6508  
Fax: 214-665-6490  
E-mail: [osbourne.margaret@epa.gov](mailto:osbourne.margaret@epa.gov)

### **Kelly Beard-Tittone**

REGION VII {IA, KS, MO, and NE}  
901 North 5th Street  
Kansas City, KS 66101  
Wastewater Management Division  
Telephone: 913-551-7217  
Fax: 913-551-7765  
E-mail: [beard-tittone.kelly@epa.gov](mailto:beard-tittone.kelly@epa.gov)

### **Bruce Cooper**

REGION VIII {CO, MT, ND, SD, UT, and WY}  
999 18th Street, Suite 500  
Denver, CO 80202-2466  
Office of Partnerships and Reg. Assistance  
Telephone: 303-312-6028  
Fax: 303-312-6131  
E-mail: [cooper.bruce@epa.gov](mailto:cooper.bruce@epa.gov)

### **Joann Cola**

REGION IX {AZ, CA, HI, NV, AS, GU}  
75 Hawthorne Street  
San Francisco, CA 94105  
Water Management Division  
Telephone: 415-972-3578  
Fax: 415-947-3549  
E-mail: [cola.joann@epa.gov](mailto:cola.joann@epa.gov)

### **Bryan Yim**

REGION X {AK and WA}  
1200 Sixth Avenue  
Seattle, Washington 98101  
Telephone: 206-553-8575  
Fax: 206-553-0165  
E-mail: [yim.bryan@epa.gov](mailto:yim.bryan@epa.gov)