THE COMPTRAIN PROJECT

FINAL
REPORT

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Submitted To

U.S. Environmental Protection Agency
Office of Water Program Operations

By

National Demonstration Water Project

July 1985

THE COMPTRAIN PROJECT: FINAL REPORT

Table of Contents

Also included Comptrain Guide and Financial-Management Manual.

THE COMPTRAIN PROJECT: FINAL REPORT

Overview of the Project

In October, 1982 the U.S. Environmental Protection Agency (EPA), through its Office of Water Program Operations (OWPO), made a grant to National Demonstration Water Project (NDWP) to carry out a program of "over-the-shoulder" training for the operators of small wastewater treatment plants. This program was called, by NDWP, the Comptrain (Compliance-Through-Training) Project. Subsequently, a grant for a second program year was provided, and this was extended to allow a period of time for completion of the field work and project wrap-up at the national level, including the preparation of a final report. The project officially ended on June 30, 1985. Thus, in total, the Comptrain Project represented 29 months of program effort and the expenditure of approximately $1.1 million. (Supplementary funding for the project was also provided by the Appalachian Regional Commission, and this allowed the Comptrain Project to do some work in water treatment plants.)

Project Objectives

The funding of Comptrain was one attempt by EPA to address directly the problem of wastewater treatment plant compliance. EPA's basic mission is to clean up, and prevent further pollution of, the nation's water supplies, groundwater and surface water. To accomplish this mission, it has both grant-making and regulatory authority. It provides grants to local communities to build better wastewater treatment plants, thus helping to prevent water pollution through municipal sewage. It also works through the states to insure by regulatory action that local wastewater treatment plants are in compliance with federal standards that Congress has authorized EPA to issue.

The training function at EPA is an adjunct of the compliance mission. If plants are to remain in compliance with federal standards, they must be properly operated and maintained. Historically, local plant operators have not always been properly trained to perform O&M tasks. The OWPO has attempted to help states and localities with this problem by funding a variety of training assistance activities. This includes help in establishing state training centers (the so-called 109(b) centers), financial support for the development of training materials, and the funding of discrete demonstration projects, such as Comptrain.

The objective of the Comptrain Project was to demonstrate that small wastewater plants could be brought into compliance through on-site, plant-specific training of operators. The emphasis was to be on achieving compliance, or at least improving plants toward compliance, rather than conducting formal training. The program brochure explained the difference this way:

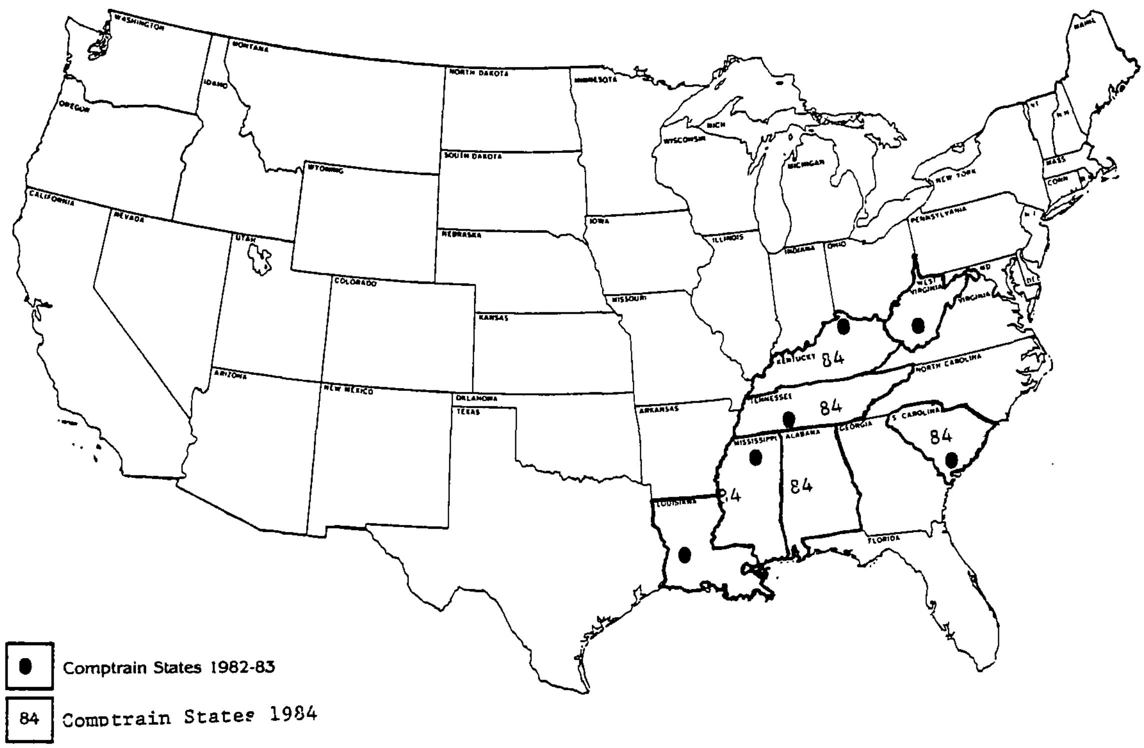
The activity is not purely technical assistance because the intent is to educate the operator, not just improve the plant; but is not entirely training either because the merit of the activity is judged in terms of improved plant performance, not just greater operator competence....To conclude from this that the ideal is a combination of training and technical assistance is to miss the point. The way to bring small water and wastewater systems into compliance is neither through training nor technical assistance. The way to bring them into compliance is to bring them into compliance. In other words, we must work our way backward from the problem, identifying the cause of the problem, and employing whatever corrective measures are necessary to end the non-compliance.

Comptrain Methodology

NDWP's approach in carrying out this work was to target selected states (see Exhibit I) in which to work and then to recruit and hire locally "field operations directors" -- over-the-shoulder training specialists. The field operations directors, working with state and local officials; then identified a manageable number of plants in need of assistance and carried out the training on a circuit-riding

EXHIBIT I

THE COMPTRAIN STATES



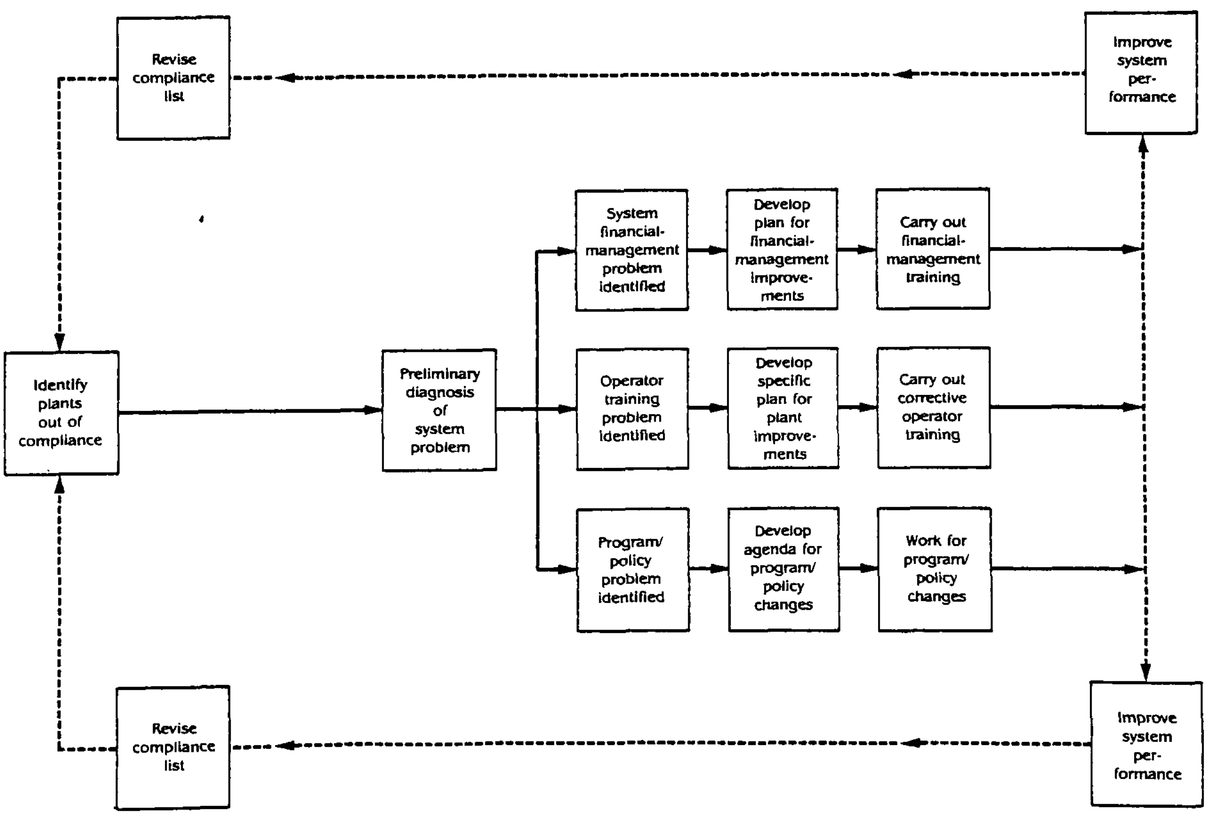
basis. The field work was back-stopped from the national level, either by NDWP staff directly or by other organizations working under contract to NDWP. These organizations included the National Environmental Training Association, the American Clean Water Association, and Great Lakes Rual Network. Their work ranged from the preparation of simplified manuals for plant use to the holding of formal training sessions. NDWP monitored and managed all the field work.

The field operations directors included a microbiologist, a training and operations specialist, and professional engineers with plant experience. NDWP's in-house professional engineer, also a certified operator, provided support and guidance to the field operatives.

A fairly systematic methodology was used in the training effort. (See Exhibit II). The intent was to used a broad approach to preliminary problem diagnosis in an effort to turn up problems which were not solely operator-related.

EXHIBIT II

COMPTRAIN METHODOLOGY



Once the final list of target plants was developed in each state, a series of diagnostic, corrective and reinforcement actions was initiated. NDWP continued to use its own diagnostic instrument for evaluating plant performance. Exhibit III summarizes the kind of data that is generated by this instrument. The computer program developed by EPA Region X for the Apple IIe was also used extensively as a diagnostic tool. (Copies of some of the analyses generated using this program are included as Appendix A.) At the

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EXHIBIT III

COMPTRAIN DIAGNOSTIC INSTRUMENT

Summary

Phase I - Preliminary Investigation

- Make initial contact and request background material
- Review background information, make a preliminary visit to the plant and formulate hypothesis about possible causes of non-compliance

Phase II - Conduct On-Site Functional Evaluation

- Complete functional evaluation questionnaire
- Prepare a report considering management, support and wastewater facility functions and their impact on plant performance

Phase III - Develop Data-Based Profile of Plant Performance

- Complete design information summary form
- Collect energy costs, chemical costs, supplies and maintenance costs
- Develop laboratory test data
  - implement a testing program with tests, frequencies, and types of sample appropriate to the facility being evaluated
  - Test parameters to be considered include: BOD_5, TSS, VSS%, TKN, PH, Alkalinity, Temp, DO, COD, Sodium 13, priority metals, MLSS, 30 minute settlability, RAS, WAS, RAS MLSS, Microscope Evaluation
- Apply computerized diagnostic program
- Apply evaluation checklist
- Prepare plant evaluation report
  - summarize interviews with management and plant personnel
  - evaluate commitment of operating officials to provide continued support to project
  - evaluate need for "over-the-shoulder" training and technical assistance

Phase IV - Revise Tentative Plant List As Required

Phase V - Develop A Service Plan For Each Plant And Obtain Local Approval conclusion of the diagnostic phase, a service plan was developed showing each plant's deficiencies and proposed corrective and remedial actions. Local endorsement was then sought for each service plan. (Sample copies of Service Plans are attached as Appendix B.) Corrective actions addressed plant deficiencies shown in the service plans through intensive, on-site, individualized training and technical assistance activities.

In the first year of operation, the emphasis was on technical training, i.e., work directly with the operators in the problem plants. In the second year, increased attention was paid to financial training, and this necessitated more work with officials other than the operators.

In the first year of Comptrain, there were six target states -- West Virginia, Kentucky, South Carolina, Tennessee, Mississippi, and Louisiana. West Virginia and Louisiana dropped out of the program after one year, and second-year effort was concentrated on the remaining four states. (In addition, some program development work was done in Alabama, although this state was never targeted for site-specific field work.)

In all, the Comptrain project provided direct operator assistance in some degree to over 200 water and wastewater treatment plants. Intensive training was provided in nearly 150 plants as field operations directors logged thousands of miles going from plant to plant. Of course, other plants also received some benefits through the non-site-specific work of the program, such as the major financial training session in Tennessee and the Comptrain Manual. The concept of target plants could not be rigidly defined because once the presence of an assistance project becomes known, many needy communities are likely to ask for help, whether or not they are on the original target list. Comptrain attempted to help everyone who asked, at least to some extent.

Over 80 percent of the plants receiving intensive training were either brought into compliance or "improved significantly toward compliance." The latter category was used as one measure of progress because compliance, in the field, is not a static condition that can readily be pin-pointed. There are commonly lags in reporting and other circumstances that leave plants technically out of compliance even when the quality of the effluent being produced is acceptable. In broad, however, Comptrain did achieve its objective of moving plants into or close to a compliance status in most cases. (See Exhibit IV).

An Example of Change

An example of the kind of change that may be brought about is provided by the plant in Clemson, South Carolina, where numerous repairs and improvements to the facility have been made at the suggestion of the Comptrain field operations director. Two aeration basins have been cleaned and repaired and are ready to be returned to service. A

EXHIBIT IV

IMPROVEMENT SHOWN IN PLANTS RECEIVING COMPTRAIN ASSISTANCE 1982-84

STATE	TOTAL	BROUGHT INTO COMPLIANCE		IMPROVED TOWARD COMPLIANCE		NEEDS MORE ASSISTANCE	
		No.	%*	No.	%	No.	%
South Carolina	34	19	56%	10	29%	5	15%
West Virginia	32	16	50	6	19	10	31
Louisiana	8	2	25	4	50	2	25
Kentucky	22	9	41	12	55	1	4
Mississippi	36	14	39	18	50	4	11
Tennessee	14	10	71	2	15	2	14
TOTALS	146	70	48%	52	36%	24	16%

*Percentages have been rounded off.

clarifier has been rebuilt and is operational. Automatic samplers have been installed at the influent and effluent sampling locations. The effluent flow meter has been replaced with a new unit and the chlorination unit has been repaired. In addition, a pilot study for a belt press has been conducted for the dewatering of sludge, and the Town's engineering firm has been authorized to start on plans and specifications for upgrading the facility.

The laboratory staff has implemented an extensive program of process control testing which includes mixed liquor suspended solids, volatile suspended solids and settleable solids, return sludge flow rates, suspended solids and volatile suspended solids. Food-to-microorganism ratio is being calculated, clarifier sludge blanket depth checked, and microscopic examinations of the activated sludge conducted. The facility now has a full-time properly certified operator and additional laborers are to be hired.

However, this facility still remains extremely sensitive to fluctuations in flow rates and sometimes violates its N.P.D.E.S. permit due to solids washouts. The daily flow varies from a low of 300,000 gpd to 800,000 gpd maximums. The facility, when operating with aeration basin #3, is designed for 350,000 gpd. Once aeration basins #1 and #2 are returned to service, 550,000 gpd can be handled. The sudden loss of solids from the treatment plant creates operational problems as the F:M ratio changes and the MLSS drops. As a result, the plant losses its ability to effectively treat waste.

The main difference in the facility, other than the physical improvements, is that the staff is now aware of the problems at the facility and work is being completed to correct the problems. Once aeration basins #1 and #2 are placed back in service, the belt press installed to handle waste sludge and the mode of operation converted to conventional activated sludge, the facility should consistently achieve permit compliance.

The Comptrain Guide

As much as possible of NDWP's experience from the Comptrain Project was codified in "The Comptrain Guide: A Manual for Evaluating the Performance of Small Water and Wastewater Systems."

The guide is intended for nonprofit organizations, state and local agencies, and others interested in setting up a "Comptrain-Type" project. It is aimed at plants in small, rural communities, i.e., those whose capacity is less than three million gallons per day. This includes about 80 percent of the plants nationwide and a majority of the plants in all states. The manual covers both water and wastewater systems, since these operations are usually combined in small towns and is based on NDWP's field experience. It takes a comprehensive approach to looking at problems rather than focusing exclusively on the technical side of operations. It is not, however, a primer on water and wastewater treatment plants. The assumption of the manual is that the reader has or has access to someone who has some technical capability in water and wastewater treatment.

The manual is divided into four chapters, each chapter discussing one or more steps in the Comptrain methodology: project organizations, target identification, problem diagnosis, corrective action, and project evaluation. Sample forms, guidelines and procedures are included as aids in setting up a Comptrain project.

NDWP has distributed the manual to participants in the Comptrain project and to others by request. (An additional copy is included with this report.)

Financial-Management Training

In 1982-83, Great Lakes Rural Network, an NDWP affiliate, was given a contract to conduct a review of the existing financial-management capabilities in eleven plants located in West Virginia. This small sampling of plants revealed a need for an improved understanding of the operation and management techniques that are needed to run a utility efficiently and effectively. In 1984-85, NDWP increased its emphasis on the training needs of small town employees other than the plant operators involved in the provision water and wastewater services.

Communities to receive financial-management (f-m) training were identified in each of the target states -- Kentucky, Tennessee, South Carolina, Mississippi. The training was carried out through over-the-shoulder training; small group intensive training sessions; or larger training sessions. Some states received a combination of these.

The over-the-shoulder f-m training drew heavily on the over-the-shoulder operator training as a model. The same diagnostic, corrective and reinforcement stages were followed. For many of the communities receiving the over-the-shoulder f-m training it was the first time they had ever participated in a management study of their systems. Each utility was given a detailed report with a summary and recommendations for their operations. This over-the-shoulder approach to providing f-m assistance helped several town clerks in Mississippi to improve record keeping and to make available timely and accurate information to local decision makers. In Rosedale, the town clerk, with the aid of the Comptrain f-m specialist, developed a new accounting system to separate the entries made to the ledger to show water and sewer as distinct accounts. In West, the town clerk was helped to construct a semiannual reporting form to report the status of the wastewater system to local officials in terms of receipts and disbursements. Similar improvements to financial record keeping and management activities were realized in other communities receiving the over-the-shoulder f-m training. (Individual reports on these activities and all other f-m training activities are included as Appendix C.)

Three, small group, intensive financial-management workshops were held during the 1984-85 project. These workshops focused on the financial-management process, planning, financing, budgeting, cost recovery, and record keeping and information systems. In South Carolina, 1.0 hour of Continuing Education Units (CEU) was awarded on completion of the workshop held there. Clerks, recorders, mayors, board/council members and plant operators were represented at the workshops held in South Carolina, Kentucky, and Mississippi. A copy of the manual used at the workshops and the certificate awarded to all participants is enclosed with this report.

One larger training session was held in Tennessee. This session, called "Clean Water Finance 1985: The Tennessee Initiatives," was attended by more than 150 mayors, public work officials, finance officers, health officers, engineers, construction and utility contractors, builders, pollution control managers, county executives, and bookkeepers and financial advisors. Information on topics such as federal programs, contract management/procurement, alternative small scale technology, enforcement, rate structure/depreciation, financial programs, privatization and pre-treatment was presented. (An agenda, list of speakers and exhibitors and attendees are included in Appendix C.) The session was very favorably received. One review, from the Tennessee Municipal League's Town and City, called the seminar "wonderful," and continued:

> Last month's workshop, "Clean Water Finance 1985: The Tennessee Initiatives," at the Sheraton Hotel in Nashville was one of the best attended in TML history.
>
> Areas covered included the governor's clean water initiatives, the revenue bond market, funding trends and enforcement trends and alternative small scale technologies.
>
> "What took us so long to get around to a conference like this?" Larry Eddins exclaimed afterwards.
>
> Eddins, manager of the Fayetteville water and sewer system, is one of the nation's top ten public works leaders.

He said afterwards, "The people who put this conference together, made it one of the best ever, first class all the way.

"I got more information from it than I got from a lot of others all put together," said Eddins, who is chairman of Tennessee's Water and Waste Water Board of Certification which certifies water and waste water operators."

Conclusions and Recommendations

Throughout the project, NDWP has monitored performance in the field with a view to arriving at conclusions that would be useful to EPA-OWPO in establishing training policies and carrying out future programs. Although the work done through Comptrain benefitted hundreds of rural communities (and thousands of rural residents) and could be justified in that sense alone, this target group represented only a small portion of the needy population. Thus the real value of Comptrain was seen in terms of its contribution to EPA's long-run efforts to deal with the problem of system compliance through operator training. With this in mind, NDWP offers the following conclusions and recommendations as being warranted on the basis of Comptrain experience.

Conclusion #1: Over-the-shoulder training works.

It was no surprise to find that operators improve their performance when they receive competent, direct training. Comptrain was not really funded to test the premise -- which is widely accepted already -- that this technique works. Rather, the question was whether a program centered around this technique could be successful. Training cannot work unless the trainee is receptive to being trained. The question of whether they would be receptive was the object of the field demonstration.

At the beginning, there was some fear that system operators and other community officials might not be receptive to outside, site-specific assistance since it might imply that they were not doing their jobs. This fear proved to be unfounded. With minor exceptions, operators welcomed any help they could get and were disappointed when the project ended. Likewise, community leaders were not reluctant to accept financial-management training.

Of course, to gain this kind of acceptance, Comptrain staff had to approach communities with some sensitivity and to stress the fact (and act out the fact) that they were there to help and not to expose violations or be an instrument of punishment. Also, the trainers had to know what they were talking about. But once Comptrain people had established their "bona fides," they had, by and large, good working relations with people in the communities.

In general, there was more suspicion on the part of state agencies than local agencies. In one case, in fact (West Virginia), the project was actually terminated after one year because of a lack of state cooperation. Comptrain made every effort to work with state officials and to keep them informed of activities, and this led to satisfactory relationships in most cases, but probably any federallydirected effort working in an area of state responsibility would have to proceed with caution. Although the federal government (i.e., EPA) should continue to support demonstration projects, it is clear that long-run over-the-shoulder training should be a state responsibility.

Recommendation #1: States should establish over-the-shoulder training programs, with EPA assistance.

Every state that does not have an over-the-shoulder training program (and many states do) should establish one. EPA should assist states in planning these programs and should provide some "seed" financing under its 104(g) and 109(b) authorities. The training to be provided should include both in-plant "technical" training for operators and in-community financial-management training. Thus, at a minimum, the state training team should include two full-time, well-qualified people. These may operate out of the state's regulatory agency, but it is generally a good idea to separate the regulatory and training functions to some extent. Logically, the state 109(b) center (which should be established if it does not exist) would be the locus of the training team, although this should be true only if the center is going to receive solid state support.

The implementation of this recommendation is already well underway. Increasingly, EPA 104(g) funds have been channeled to state agencies, and these agencies have been encouraged to establish field training programs. Grants have been provided to the National Environmental Training Association to survey current state programs and develop standards for future programs.

While these efforts are needed, there is more that should be done. It is not enough to develop standards that states may or may not implement. EPA should use or withhold its training funds as an inducement to states to move more quickly in setting up programs that meet decent standards as far as over-the-shoulder training is concerned. At the same time, EPA should provide program development assistance to states. The fact is that many state agencies do not know how to set up workable programs. Without help, they are likely to set up "paper" systems that are long on administrative detail and short on field performance. In states that have neither 109(b) centers nor effective training programs, a special EPA push will be required.

NDWP's Comptrain Guide is an aid to establishing programs that can be used by state agencies, but it was really developed more with nonprofit organizations in mind. There is a need for a manual aimed specifically at state action and based on work with states in setting up programs.

Conclusion #2: Training alone will not solve the operation and maintenance problem in wastewater plants.

Plants that have operator training problems tend to have other problems that have little to do with the operator. NDWP's second-year shift to more financial-management training was one response to this problem. Many small communities do not know how to make budgets or even keep books, and this hinders even the most well-trained operator. For example, there is little value in training an operator to handle chlorine feed better if the town neglects to put aside enough money to buy chlorine. This is why financial-management training must nearly always be a companion to technical operator training.

But the problem goes beyond financial-management inadequacies, which can also be handled by training. In case after case, NDWP saw plants that were not designed for the loads they were carrying. In rural America, industrial plants may be added to a municipal wastewater system willy-nilly, as a way of attracting industry, with little thought to the operation and maintenance problems that will be caused. Funding agencies (EPA and state) do not exercise enough care in approving system designs and equipment.

Of course, even the worst plant can probably be improved somewhat by a competent operator, but until plants are designed better, they will continue to have compliance problems.

Recommendation #2: States should coordinate their funding, regulatory, and training problems for wastewater systems.

Ideally, states would have a single "compliance system," preferably based in one agency or a consortium of agencies, that would have funding, regulatory, and training arms. Each function would be performed with due regard for the other functions. At present, the three are often uncoordinated and training takes a back-seat to the others.

NDWP has spelled this idea out in greater detail in a "model" training plan that is included as Appendix D. Obviously, adoption of such a plan would mean some changes in the way most states do business, but until something like this is done, full compliance will not be achieved. Neither the building of new plants, nor the threat of regulatory action, nor improved training can do the job if they continue to act in isolation from each other.

Conclusion #3: Local communities will accept their training responsibilities if they have financial reasons for doing so.

Local communities are well aware that it is their responsibility to bring local wastewater treatment plants into compliance with federal standards. They are also aware that the compliance situation can be improved through more training leading to better operation and maintenance. What they do not know is where they will get the money. If the federal or state government provides training free of charge, they will accept it. If they must take the lead in asking for training help, and in paying for it, they are more reluctant, because they are not convinced that it is cost-effective.

To be sure, they are impressed when minor changes lead to savings, and there are occasions when that occurs. In several instances, the Comptrain project was able to save plants hundreds of dollars in power costs just by recommending that blowers be turned off at certain times. Naturally, trainers tend to stress these examples in promoting the virtues of training.

In the more typical case, however, the local community perceives that training leading to better operation and maintenance costs them money, not just for the training itself but for the demands placed upon them when operation and maintenance improves. Better-trained operators want higher wages; it costs more to repair equipment than to leave it broken; if there are figures to be reported, it costs more to do lab tests than to simply make up numbers.

Small rural communities are existing on the margin in a financial sense. They are under great pressure from hard-pressed residents to keep water and sewer rates, to say nothing of local taxes, low. Thus resources are thin and every expenditure, even a new pH meter, is a major item. Before they become too concerned with training, they have to see, in financial terms, the increased benefits, because the increased costs are all to evident.

Recommendation #3: EPA should provide more information on the financial benefits of training.

At present, we have inadequate information to present to local communities about the financial advantages of improved operation and maintenance through training. Dramatic examples of cost-savings only go so far. We need some indepth studies of long-run cost benefits, studies based in field experience but with hard economic analysis. Until we have this, local communities will continue to accept training, if it is free, but to ignore many of the recommendations of the trainers.

FINANCIAL STATUS REPORT

(Follow instructions on the back)

1. FEDERAL AGENCY AND ORGANIZATIONAL ELEMENT TO WHICH REPORT IS SUBMITTED	Environmental Protection Agency
2. FEDERAL GRANT OR OTHER IDENTIFYING NUMBER	T901424-01-3
OMB Approved No. 80-RO180	
PAGE OF PAGES	1 · 2
3. RECIPIENT ORGANIZATION (Name and complete address, including ZIP code)	National Demonstration Water Project 1725 DeSales Street, N.W., Suite 402 Washington, D.C. 20036
4. EMPLOYER IDENTIFICATION NUMBER	237367533
5. RECIPIENT ACCOUNT NUMBER OR IDENTIFYING NUMBER	
6. FINAL REPORT	[X] YES [ ] NO
7. BASIS	[ ] CASH [X] ACCRUAL
8. PROJECT/GRANT PERIOD (See instructions)	FROM (Month, day, year) 9/1/82 TO (Month, day, year) 6/30/85
9. PERIOD COVERED BY THIS REPORT	FROM (Month, day, year) 9/1/82 TO (Month, day, year) 6/30/85

10. STATUS OF FUNDS

PROGRAMS/FUNCTIONS/ACTIVITIES ▶	(a) DIRECT LABOR	(b) FRINGE	(c) TRAVEL	(d) EQUIPMENT	(e) SUPPLIES	(f) CONTRACTUAL	(g) OTHER DIRECT COSTS
a. Net outlays previously reported	$	$	$	$	$	$	$
b. Total outlays this report period							
c. *Less:* Program income credits							
d. Net outlays this report period *(Line b minus line c)*							
e. Net outlays to date *(Line a plus line d)*	452,247.00	126,321.00	91,897.65	3,392.00*	4,359.25	191,774.88	41,739.22
f. *Less:* Non-Federal share of outlays	22,619.00	1,500.00	4,125.65	-0-	4,121.25	29,244.88	2,611.22
g. Total Federal share of outlays *(Line e minus line f)*	429,628.00	124,821,00	87,772.00	3,392.00*	238.00	162,530.00	39,128.00
h. Total unliquidated obligations							
i. *Less:* Non-Federal share of unliquidated obligations shown on line h							
j. Federal share of unliquidated obligations							
k. Total Federal share of outlays and unliquidated obligations	429,628.00	124,821.00	87,772.00	3,392.00*	238.00	162,530.00	39,128.00
l. Total cumulative amount of Federal funds authorized	472,605.00	107,753.00	100,000.00	4,000.00	1,000.00	162,530.00	29,360.00
m. Unobligated balance of Federal funds	42,977.00	(17,068.00)	12,228.00	608.00	762.00	-0-	(9,768.00)

11. INDIRECT EXPENSE — a. TYPE OF RATE *(Place "X" in appropriate box)*	[X] PROVISIONAL [ ] PREDETERMINED [ ] FINAL [ ] FIXED
b. RATE	32.87%
c. BASE	
d. TOTAL AMOUNT	$225,106.00
e. FEDERAL SHARE	$225,106.00
12. REMARKS: *Attach any explanations deemed necessary or information required by Federal sponsoring agency in compliance with governing legislation.*	
13. CERTIFICATION	I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays and unliquidated obligations are for the purposes set forth in the award documents.
SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	Edwin L Cobb
DATE REPORT SUBMITTED	7/31/85
TYPED OR PRINTED NAME AND TITLE	Edwin L. Cobb, Exec. Dir.
TELEPHONE *(Area code, number and extension)*	(202)659-0661

269 102

STANDARD FORM 269 (7-76)
Prescribed by Office of Management and Budget
Cir. No. A-110

Nonexpendable Equipment Inventory

*These funds were used to purchase an Apple IIe computer as approved in the grant. The computer is in good condition. We need instructions from EPA regarding the disposition

FINANCIAL STATUS REPORT
(Follow instructions on the back)

1. FEDERAL AGENCY AND ORGANIZATIONAL ELEMENT TO WHICH REPORT IS SUBMITTED	Environmental Protection Agency
2. FEDERAL GRANT OR OTHER IDENTIFYING NUMBER	T901424-01-3
OMB Approved No. 80-R0180	
PAGE OF PAGES	2 of 2
3. RECIPIENT ORGANIZATION (Name and complete address, including ZIP code)	National Demonstration Water Project 1725 DeSales Street, N.W., Suite 402 Washington, D.C. 20036
4. EMPLOYER IDENTIFICATION NUMBER	237367533
5. RECIPIENT ACCOUNT NUMBER OR IDENTIFYING NUMBER	
6. FINAL REPORT	[X] YES [ ] NO
7. BASIS	[ ] CASH [X] ACCRUAL
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9. PERIOD COVERED BY THIS REPORT	FROM (Month, day, year) 9/1/82 TO (Month, day, year) 6/30/85

10. STATUS OF FUNDS

PROGRAMS/FUNCTIONS/ACTIVITIES ▶	(a) INDIRECT COST	(b)	(c)	(d)	(e)	(f)	(g) TOTALS
a. Net outlays previously reported	$	$	$	$	$	$	$
b. Total outlays this report period							
c. *Less:* Program income credits							
d. Net outlays this report period *(Line b minus line c)*							
e. Net outlays to date *(Line a plus line d)*	225,106.00						1,136,837.00
f. *Less:* Non-Federal share of outlays	-0-						64,222.00
g. Total Federal share of outlays *(Line e minus line f)*	225,106.00						1,072,615.00
h. Total unliquidated obligations							
i. *Less:* Non Federal share of unliquidated obligations shown on line h							
j. Federal share of unliquidated obligations							
k. Total Federal share of outlays and unliquidated obligations	225,106.00						1,072,615.00
l. Total cumulative amount of Federal funds authorized	197,775.00						1,075,023.00
m. Unobligated balance of Federal funds	(27,331.00)						2,408.00

11. INDIRECT EXPENSE

a. TYPE OF RATE (Place "X" in appropriate box)	[X] PROVISIONAL [ ] PREDETERMINED [ ] FINAL [ ] FIXED
b. RATE	32.87%
c. BASE	
d. TOTAL AMOUNT	225,106.00
e. FEDERAL SHARE	225,106.00

12. REMARKS: *Attach any explanations deemed necessary or information required by Federal sponsoring agency in compliance with governing legislation.*

13. CERTIFICATION
I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays and unliquidated obligations are for the purposes set forth in the award documents.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL: Edwin L Cobb

DATE REPORT SUBMITTED: 7/31/85

TYPED OR PRINTED NAME AND TITLE: Edwin L. Cobb, Exec. Dir.

TELEPHONE (Area code, number and extension): (202) 6590661

269 102

STANDARD FORM 269 (7-76)
Prescribed by Office of Management and Budget
Cir. No. A-110

Appendix A
Computer Generated Plant Analyses

IDEALIZED MATHEMATICAL MODEL OF HAZARD, KY SINGLE STAGE TRICKLING FILTER WASTEWATER TREATMENT SYSTEM

Prepared by ES Environmental Services,
by contract with Boise State
University, Boise, Idaho. Through a grant from the
Environmental Protection Agency. Region X,
Seattle Washington.

RUN#1 5/21/84

DATE:
TIME: :

WASTEWATER CHARACTERIZATION

AVERAGE DRY WEATHER FLOW	MGD:	.8
PEAK DRY WEATHER FLOW	MGD:	2
DESIGN FLOW	MGD:	1.5
INFLUENT BOD	MG/L:	132
INFLUENT TSS	MG/L:	130
INFLUENT VSS	(%):	75
TEMPERATURE	°C:	20
TKN	MG/L:	30
ALKALINITY	MG/L:	100
PH	:	7
PO4-P	MG/L:	8

*
DEFAULT VALUE USED

PLANT CONFIGURATION AND DIMENSIONS

DESIGN AVERAGE DAILY FLOW (MGD): 1.5
DESIGN PEAK WET WEATHER FLOW (MGD): 3

PRIMARY CLARIFICATION

NUMBER OF RECTANGULAR CLARIFIERS: 2

DIMENSIONS	EACH	TOTAL
LENGTH (FT):	85	
WIDTH (FT):	18	
DEPTH (FT):	8.14	
WEIR LTH (FT):	34.08	68.16
SFC AREA (FT2):	1530	3060

TRICKLING FILTER

MEDIA TYPE: ROCK
CONSTANT RECIRCULATION
NUMBER OF TRICKLING FILTERS: 1

DIMENSIONS	EACH
DIAMETER (FT):	100
DEPTH (FT):	4.25
RECIR.RATE(GPM):	1042

DATE:
TIME: :

SECONDARY CLARIFICATION

NUMBER OF RECTANGULAR CLARIFIERS: 2

DIMENSIONS		EACH	TOTAL
LENGTH	(FT):	85	
WIDTH	(FT):	18	
DEPTH	(FT):	8.14	
WEIR LTH	(FT):	34.08	68.16
SFC AREA	(FT2):	1530	3060

SLUDGE HANDLING

TYPE OF DIGESTION: ANAEROBIC

NUMBER OF PRIMARY DIGESTERS: 1

	#1
VOLUME (GAL):	364935
DIGESTER HEATED	Y
DIGESTER MIXED	Y

HAZARD, KY

DATE:
TIME: :
BOD: 132
TSS: 130
TEMP 20

PRIMARY SYSTEM LOADINGS

FLOW MGD	CLAR. LOADINGS SURFACE GPDSF	WEIR GDP/FT	DETN TIME HRS.
.600	196	8802	7.45
.670	219	9829	6.67
.740	242	10856	6.04
.810	265	11883	5.52
.880	288	12910	5.08
.960	314	14084	4.66
1.03	337	15111	4.34
1.10	359	16138	4.07
1.17	382	17165	3.82
1.24	405	18192	3.61
1.31	428	19219	3.41
1.38	451	20246	3.24
1.45	474	21273	3.08
1.52	497	22300	2.94
1.59	520	23327	2.81
1.67	546	24501	2.68
1.74	569	25528	2.57
1.81	592	26555	2.47
1.88	614	27582	2.38
1.95	637	28609	2.29

HAZARD, KY

DATE:
TIME: :
BOD: 132
TSS: 130
TEMP 20

PRIMARY SYSTEM PERFORMANCE

FLOW MGD	% REMOVAL BOD	% REMOVAL TSS	P.C. EFF MG/L BOD	P.C. EFF MG/L TSS	PRIMARY SLUDGE PROD. LBS TSS	LBS VSS	% SOL	GDP
.600	55	65	59	46	423	317	6.20	818
.670	55	65	59	46	472	354	6.20	913
.740	55	65	59	46	522	391	6.20	1009
.810	55	65	59	46	571	428	6.20	1104
.880	55	65	59	46	620	465	6.20	1199
.960	55	65	59	46	677	507	6.20	1308
1.03	55	65	59	46	726	544	6.20	1404
1.10	55	65	60	46	775	581	6.20	1499
1.17	54	65	61	46	825	618	6.20	1595
1.24	52	65	63	46	874	655	6.20	1690
1.31	51	64	65	46	914	685	6.20	1767
1.38	50	63	66	48	945	709	6.20	1827
1.45	49	62	68	49	975	731	6.20	1885
1.52	48	61	69	51	1003	753	6.20	1941
1.59	47	60	70	52	1031	774	6.20	1995
1.67	46	59	72	54	1062	797	6.20	2054
1.74	45	58	73	55	1088	816	6.20	2104
1.81	44	57	74	56	1113	835	6.20	2153
1.88	43	56	75	57	1137	853	6.20	2200
1.95	43	55	76	59	1161	871	6.20	2245

HAZARD, KY

DATE:
TIME: :
BOD: 132
TSS: 130
TEMP 20

SECONDARY SYSTEM LOADINGS

FLOW MGD	FILTER LOADING GPDSF	FILTER LOADING # BOD 1000FT3	RECIR. RATIO %	CLAR. LOADINGS SURFACE GPDSF	CLAR. LOADINGS WEIR GPD/FT	CLARIFIER DETN. TIME HRS.
.600	76	8	250	196	8802	7.45
.670	85	9	223	219	9829	6.67
.740	94	10	202	242	10856	6.04
.810	103	12	185	265	11883	5.52
.880	112	13	170	288	12910	5.08
.960	122	14	156	314	14084	4.66
1.03	131	15	145	337	15111	4.34
1.10	140	16	136	359	16138	4.07
1.17	148	17	128	382	17165	3.82
1.24	157	19	121	405	18192	3.61
1.31	166	21	114	428	19219	3.41
1.38	175	22	108	451	20246	3.24
1.45	184	24	103	474	21273	3.08
1.52	193	26	98	497	22300	2.94
1.59	202	27	94	520	23327	2.81
1.67	212	29	89	546	24501	2.68
1.74	221	31	86	569	25528	2.57
1.81	230	33	82	592	26555	2.47
1.88	239	35	79	614	27582	2.38
1.95	248	36	76	637	28609	2.29

HAZARD, KY

DATE:
TIME: :
BOD: 132
TSS: 130
TEMP 20

SECONDARY SYSTEM PERFORMANCE

FLOW MGD	EFF CONC. MG/L BOD	EFF CONC. MG/L SS	SEC. SLUDGE PROD LBS TSS	SEC. SLUDGE PROD LBS VSS	TOTAL SLUDGE PROD LBS TSS	TOTAL SLUDGE PROD LBS VSS	TOTAL SLUDGE PROD % SOL	GPD
.600	4	3	113	80	631	469	4.50	1681
.670	4	4	136	95	701	519	4.41	1907
.740	5	5	159	111	769	569	4.32	2135
.810	6	5	184	128	837	618	4.24	2365
.880	6	6	209	144	904	665	4.17	2598
.960	7	7	239	164	979	719	4.10	2865
1.03	8	8	267	182	1044	764	4.04	3101
1.10	8	8	294	199	1107	809	3.98	3337
1.17	9	9	323	217	1171	853	3.93	3574
1.24	10	10	351	236	1233	897	3.88	3811
1.31	11	11	381	254	1294	939	3.83	4049
1.38	11	12	410	272	1355	981	3.79	4287
1.45	12	12	440	291	1415	1022	3.75	4525
1.52	13	13	471	310	1474	1062	3.71	4764
1.59	13	14	502	329	1533	1102	3.67	5002
1.67	14	15	537	350	1599	1147	3.64	5274
1.74	15	15	569	369	1657	1185	3.60	5513
1.81	15	16	600	388	1713	1223	3.57	5750
1.88	16	17	632	407	1769	1260	3.54	5988
1.95	17	18	664	426	1825	1296	3.51	6226

HAZARD, KY

DATE:
TIME: :
BOD: 132
TSS: 130
TEMP 20

DIGESTER PERFORMANCE
ANAEROBIC

PRIMARY DIGESTER VOLUME (GAL): 364?

PLANT FLOW MGD	TOTAL SLUDGE FLOW GPD	VSS LOADING LB/FT3/ DAY	MCRT DAYS	% VSS RED.	ALK. MG/L	GAS PRO. FT3/ DAY	% SOL DIG. SLUDGE
.60	1681	.01	217.	75.00	4053	5273	2.04
.67	1906	.01	191.	75.00	3967	5842	2.00
.74	2134	.01	170.	75.00	3889	6400	1.97
.81	2365	.01	154.	75.00	3818	6947	1.94
.88	2597	.01	140.	75.00	3754	7483	1.91
.96	2865	.01	127.	75.00	3686	8084	1.88
1.03	3100	.02	117.	75.00	3632	8599	1.86
1.10	3336	.02	109.	75.00	3581	9104	1.83
1.17	3573	.02	102.	75.00	3534	9601	1.81
1.24	3811	.02	95.8	75.00	3490	10088	1.80
1.31	4049	.02	90.1	75.00	3449	10566	1.78
1.38	4287	.02	85.1	75.00	3410	11036	1.76
1.45	4525	.02	80.6	75.00	3374	11497	1.75
1.52	4763	.02	76.6	75.00	3339	11951	1.74
1.59	5002	.02	73.0	75.00	3307	12398	1.72
1.67	5274	.02	69.2	75.00	3272	12899	1.71
1.74	5512	.02	66.2	75.00	3242	13330	1.70
1.81	5750	.03	63.5	75.00	3215	13754	1.69
1.88	5988	.03	60.9	75.00	3188	14172	1.68
1.95	6225	.03	58.6	74.56	3163	14499	1.68

IDEALIZED MATHEMATICAL MODEL OF DRAKESBORO, KY EXTENDED AERATION OXIDATION DITCH WITHOUT PRIMARY CLARIFICATION WASTEWATER TREATMENT SYSTEM

Prepared by ES Environmental Services,
by contract with Boise State
University, Boise, Idaho. Through a grant from the
Environmental Protection Agency, Region X,
Seattle Washington.

RUN#1 4/24/84

DATE:
TIME: :

WASTEWATER CHARACTERIZATION

AVERAGE DRY WEATHER FLOW	MGD:	.03
PEAK DRY WEATHER FLOW	MGD:	.11
DESIGN FLOW	MGD:	.165
INFLUENT BOD	MG/L:	200
INFLUENT TSS	MG/L:	200
INFLUENT VSS	(%):	75
TEMPERATURE	°C:	20
TKN	MG/L:	35
ALKALINITY	MG/L:	100
PH	:	7
PO4-P	MG/L:	8

*
DEFAULT VALUE USED

PLANT CONFIGURATION AND DIMENSIONS

DESIGN AVERAGE DAILY FLOW (MGD) : .16
DESIGN PEAK WET WEATHER FLOW (MGD): .412

OXIDATION

NUMBER OF OXIDATION DITCHES: 1

DIMENSIONS	EACH	TOTAL
VOLUME (GAL):	135600	135600

DATE:
TIME: :

SECONDARY CLARIFICATION

NUMBER OF ROUND CLARIFIERS: 1

DIMENSIONS	EACH	TOTAL
DIAMETER (FT):	26	
DEPTH (FT):	10.29	
WEIR LTH (FT):	81.7	81.7
SURFACE AREA :	530	530

DRAKESBORO, KY

DATE:
TIME: :
BOD: 200
TSS: 200
TEMP 20

BIOLOGICAL OXIDATION PERFORMANCE

FLOW MGD	MAX MLSS	MLVSS %	F/M	MCRT DAYS	SVI	RAS MGD	RAS MG/L	WAS LBS/DAY
.020	2736	36	.030	209	100	9.96	10000	15
.030	2802	39	.040	141	100	9.96	10000	22
.040	2912	41	.050	108	100	.019	10000	30
.050	2754	43	.060	79	100	.019	10000	39
.060	2910	44	.070	69	100	.029	10000	47
.070	2802	46	.080	55	100	.029	10000	57
.080	2976	47	.090	51	100	.039	10000	65
.090	2893	48	.100	43	100	.039	10000	75
.100	2823	49	.110	37	100	.039	10000	85
.110	2764	50	.120	32	100	.039	10000	96
.120	2950	50	.120	31	100	.049	10000	105
.130	2899	51	.130	28	100	.049	10000	115
.140	2854	52	.140	25	100	.059	10000	126
.150	2814	53	.150	23	100	.059	10000	137
.160	2779	53	.160	21	100	.059	10000	149
.170	2967	53	.160	21	100	.069	10000	158
.180	2934	54	.170	19	100	.079	10000	169
.190	2904	55	.180	18	100	.079	10000	180
.200	2877	55	.190	16	100	.079	10000	192
.210	2852	56	.200	15	100	.089	10000	204

DRAKESBORO, KY

DATE:
TIME: :
BOD: 200
TSS: 200
TEMP 20

FINAL CLARIFIER PERFORMANCE AND EFFLUENT CHARACTERISTICS

FLOW MGD	OUR MG/L /HR	DOB FT	EFF BOD	EFF TSS MG/L	EFF NH3 MG/L	EFF NO3 MG/L	EFF PO4-P MG/L
.020	1	7.5	<5	<5	<1.0	30.7	5
.030	2	7.4	<5	<5	<1.0	30.5	5
.040	3	7.3	<5	<5	<1.0	30.3	5
.050	3	7.5	<5	<5	<1.0	30.1	5
.060	4	7.3	<5	<5	<1.0	30.0	5
.070	5	7.4	<5	<5	<1.0	29.9	5
.080	5	7.2	<5	<5	<1.0	29.8	5
.090	6	7.3	<5	<5	<1.0	29.7	4
.100	7	7.4	<5	<5	<1.0	29.5	4
.110	7	7.4	<5	5	<1.0	29.4	4
.120	8	7.3	<5	5	<1.0	29.4	4
.130	9	7.3	<5	6	<1.0	29.3	4
.140	9	7.4	<5	7	<1.0	29.2	4
.150	10	7.4	<5	8	<1.0	29.1	4
.160	11	7.4	<5	9	<1.0	29.0	4
.170	11	7.2	<5	9	<1.0	29.0	4
.180	12	7.3	<5	11	<1.0	29.0	4
.190	13	7.3	5	12	<1.0	28.9	4
.200	13	7.3	5	14	<1.0	28.8	4
.210	14	7.4	6	16	<1.0	28.7	4

DRAKESBORO, KY

DATE:
TIME: :
BOD: 200
TSS: 200
TEMP 20

SECONDARY SYSTEM PERFORMANCE

FLOW MGD	CLARIFIER LOAD SFC GPSFD	CLARIFIER LOAD WEIR GPLFD	SEC. SLUDGE PROD LBS TSS	SEC. SLUDGE PROD LBS VSS	TOTAL SLUDGE PROD LBS TSS	TOTAL SLUDGE PROD LBS VSS	% SOL	GPD
.020	42	275	15	5	15	5	2.45	72
.030	57	367	20	8	20	8	2.40	101
.040	75	489	28	11	28	11	2.35	143
.050	94	611	37	16	37	16	2.28	192
.060	113	734	45	20	45	20	2.24	239
.070	132	856	54	25	54	25	2.19	295
.080	151	979	64	30	64	30	2.15	355
.090	170	1101	72	35	72	35	2.12	408
.100	188	1223	82	40	82	40	2.08	473
.110	207	1346	92	46	92	46	2.05	540
.120	226	1468	101	51	101	51	2.03	598
.130	245	1591	112	57	112	57	2.00	670
.140	264	1713	122	64	122	64	1.97	744
.150	283	1835	133	71	133	71	1.94	821
.160	301	1958	144	77	144	77	1.92	901
.170	320	2080	153	82	153	82	1.91	963
.180	339	2203	164	89	164	89	1.88	1045
.190	358	2325	176	96	176	96	1.86	1130
.200	377	2447	187	104	187	104	1.84	1217
.210	396	2570	199	111	199	111	1.82	1305

IDEALIZED MATHEMATICAL MODEL OF
MURRAY, KY
EXTENDED AERATION OXIDATION DITCH
WITHOUT PRIMARY CLARIFICATION
WASTEWATER TREATMENT SYSTEM

Prepared by ES Environmental Services,
by contract with Boise State
University, Boise, Idaho. Through a grant from the
Environmental Protection Agency, Region X,
Seattle Washington.

RUN#1 4/26/84

DATE:
TIME: :

WASTEWATER CHARACTERIZATION

AVERAGE DRY WEATHER FLOW	MGD:	1.95
PEAK DRY WEATHER FLOW	MGD:	2.25
DESIGN FLOW	MGD:	3.5
INFLUENT BOD	MG/L:	175
INFLUENT TSS	MG/L:	197
INFLUENT VSS	(%):	75
TEMPERATURE	°C:	20
TKN	MG/L:	30
ALKALINITY	MG/L:	100
PH	:	7
PO4-P	MG/L:	8

*
DEFAULT VALUE USED

PLANT CONFIGURATION AND DIMENSIONS

DESIGN AVERAGE DAILY FLOW (MGD) : 3.5
DESIGN PEAK WET WEATHER FLOW (MGD): 12.1

OXIDATION

NUMBER OF OXIDATION DITCHES: 2

DIMENSIONS	EACH	TOTAL
VOLUME (GAL):	2100000	4200000

1,750,000

7/13

BOB,
CALLED WITH CHANGE IN DITCH VOLUME

DATE:
TIME: :

SECONDARY CLARIFICATION

NUMBER OF ROUND CLARIFIERS: 4

DIMENSIONS	EACH	TOTAL
DIAMETER (FT):	55	
DEPTH (FT):	12	
WEIR LTH (FT):	160	640
SURFACE AREA :	2375	9500

MURRAY, KY

DATE:
TIME: :
BOD: 175
TSS: 197
TEMP 20

BIOLOGICAL OXIDATION PERFORMANCE

LOW MGD	MAX MLSS	MLVSS %	F/M	MCRT DAYS	SVI	RAS MGD	RAS MG/L	WAS LBS/DAY
.46	2824	38	.060	100	100	.577	10000	984
.63	2743	40	.060	86	100	.606	10000	1114
.79	2986	40	.060	85	100	.756	10000	1228
.95	2915	41	.070	75	100	.796	10000	1361
.11	2852	42	.070	66	100	.835	10000	1498
.28	2796	42	.080	59	100	.875	10000	1637
.44	2745	43	.080	54	100	.915	10000	1779
.60	2986	43	.080	55	100	1.10	10000	1891
.76	2939	44	.090	50	100	1.14	10000	2035
.93	2895	44	.090	46	100	1.18	10000	2181
.09	2855	45	.100	42	100	1.22	10000	2328
.25	2819	46	.100	39	100	1.27	10000	2478
.41	2785	46	.110	37	100	1.31	10000	2629
.58	2753	47	.110	34	100	1.35	10000	2782
.74	2987	46	.110	36	100	1.58	10000	2890
.90	2956	47	.120	34	100	1.63	10000	3043
.06	2927	47	.120	32	100	1.67	10000	3199
.23	2900	48	.130	30	100	1.72	10000	3355
.39	2875	48	.130	28	100	1.76	10000	3513
.55	2851	49	.140	27	100	1.80	10000	3673

MURRAY, KY

DATE:
TIME: :
BOD: 175
TSS: 197
TEMP 20

FINAL CLARIFIER PERFORMANCE AND EFFLUENT CHARACTERISTICS

FLOW MGD	OUR MG/L /HR	DOB FT	EFF BOD	EFF TSS MG/L	EFF NH3 MG/L	EFF NO3 MG/L	EFF PO4-P MG/L
1.46	3	8.6	<5	<5	<1.0	25.6	5
1.63	3	8.7	<5	<5	<1.0	25.5	5
1.79	3	8.4	<5	<5	<1.0	25.5	5
1.95	4	8.5	<5	<5	<1.0	25.4	5
2.11	4	8.6	<5	<5	<1.0	25.3	5
2.28	4	8.6	<5	<5	<1.0	25.3	5
2.44	4	8.7	<5	<5	<1.0	25.2	5
2.60	5	8.4	<5	<5	<1.0	25.2	5
2.76	5	8.5	<5	<5	<1.0	25.1	5
2.93	5	8.5	<5	<5	<1.0	25.1	5
3.09	6	8.6	<5	<5	<1.0	25.0	5
3.25	6	8.6	<5	<5	<1.0	25.0	5
3.41	6	8.7	<5	<5	<1.0	24.9	5
3.58	7	8.7	<5	<5	<1.0	24.9	5
3.74	7	8.4	<5	<5	<1.0	24.9	5
3.90	7	8.5	<5	<5	<1.0	24.9	5
4.06	8	8.5	<5	5	<1.0	24.8	5
4.23	8	8.5	<5	5	<1.0	24.8	5
4.39	8	8.6	<5	5	<1.0	24.7	4
4.55	9	8.6	<5	6	<1.0	24.7	4

MURRAY, KY

DATE:
TIME: :
BOD: 175
TSS: 197
TEMP 20

SECONDARY SYSTEM PERFORMANCE

'LOW 1GD	CLARIFIER LOAD SFC GPSFD	WEIR GPLFD	SEC. SLUDGE PROD LBS TSS	LBS VSS	TOTAL SLUDGE PROD LBS TSS	LBS VSS	% SOL	GPD
.46	154	2285	984	383	984	383	2.28	5164
.63	172	2546	1118	449	1118	449	2.25	5967
.79	188	2796	1230	494	1230	494	2.23	6613
.95	205	3046	1361	560	1361	560	2.20	7425
:.11	222	3296	1496	629	1496	629	2.17	8270
:.28	240	3562	1641	705	1641	705	2.14	9202
:.44	257	3812	1781	779	1781	779	2.11	10110
:.60	274	4062	1891	824	1891	824	2.10	10794
:.76	290	4312	2033	899	2033	899	2.08	11735
.93	308	4578	2185	982	2185	982	2.05	12766
.09	325	4828	2330	1061	2330	1061	2.03	13764
.25	342	5078	2478	1143	2478	1143	2.01	14788
.41	359	5328	2627	1226	2627	1226	1.99	15837
.58	377	5593	2787	1316	2787	1316	1.97	16980
.74	394	5843	2892	1356	2892	1356	1.96	17678
.90	410	6093	3043	1442	3043	1442	1.94	18776
.06	427	6343	3196	1529	3196	1529	1.93	19897
.23	445	6609	3360	1623	3360	1623	1.91	21112
.39	462	6859	3516	1712	3516	1712	1.89	22278
.55	479	7109	3673	1804	3673	1804	1.88	23466

IDEALIZED MATHEMATICAL MODEL OF

ASHLAND, KY

EXTENDED AERATION OXIDATION DITCH

WITHOUT PRIMARY CLARIFICATION

WASTEWATER TREATMENT SYSTEM

Prepared by ES Environmental Services,
by contract with Boise State
University, Boise, Idaho. Through a grant from the
Environmental Protection Agency, Region X,
Seattle Washington.

RUN#1 7/23/84

DATE:
TIME: :

WASTEWATER CHARACTERIZATION

AVERAGE DRY WEATHER FLOW	MGD:	9
PEAK DRY WEATHER FLOW	MGD:	18
DESIGN FLOW	MGD:	12
INFLUENT BOD	MG/L:	200
INFLUENT TSS	MG/L:	200
INFLUENT VSS	(%):	75
TEMPERATURE	°C:	20
TKN	MG/L:	30
ALKALINITY	MG/L:	100
PH	:	7
PO4-P	MG/L:	8

*
DEFAULT VALUE USED

PLANT CONFIGURATION AND DIMENSIONS

DESIGN AVERAGE DAILY FLOW (MGD) : 12
DESIGN PEAK WET WEATHER FLOW (MGD): 18

OXIDATION

NUMBER OF OXIDATION DITCHES: 2

DIMENSIONS	EACH	TOTAL
VOLUME (GAL):	6050000	12100000

DATE:
TIME: :

SECONDARY CLARIFICATION

NUMBER OF RECTANGULAR CLARIFIERS: 2

DIMENSIONS	EACH	TOTAL
LENGTH (FT):	164	
WIDTH (FT):	41	
DEPTH (FT):	15	
WEIR LTH (FT):	276	552
SURFACE AREA :	6724	13448

ASHLAND, KY

DATE:
TIME: :
BOD: 200
TSS: 200
TEMP 20

BIOLOGICAL OXIDATION PERFORMANCE

FLOW MGD	MAX MLSS	MLVSS %	F/M	MCRT DAYS	SVI	RAS MGD	RAS MG/L	WAS LBS/DAY
6.75	2777	46	.090	52	100	2.58	10000	5292
7.22	2996	46	.090	53	100	3.07	10000	5648
7.68	2950	47	.090	48	100	3.19	10000	6096
8.15	2908	48	.100	44	100	3.32	10000	6552
8.61	2869	48	.100	41	100	3.45	10000	7014
9.08	2834	49	.110	38	100	3.57	10000	7483
9.54	2801	49	.110	35	100	3.69	10000	7958
10.0	2771	50	.120	33	100	3.82	10000	8438
10.4	2984	50	.120	34	100	4.43	10000	8783
10.9	2955	50	.120	32	100	4.56	10000	9266
11.4	2928	51	.130	30	100	4.69	10000	9755
11.8	2902	51	.130	28	100	4.82	10000	10248
12.3	2878	52	.140	27	100	4.96	10000	10746
12.8	2856	52	.140	25	100	5.09	10000	11249
13.2	2834	52	.150	24	100	5.22	10000	11755
13.7	2814	53	.150	23	100	5.35	10000	12266
14.2	2795	53	.160	22	100	5.48	10000	12781
14.6	2777	54	.160	21	100	5.61	10000	13300
15.1	2982	53	.160	22	100	6.39	10000	13616
15.6	2964	53	.160	21	100	6.53	10000	14135

ASHLAND, KY

DATE:
TIME: :
BOD: 200
TSS: 200
TEMP 20

FINAL CLARIFIER PERFORMANCE AND EFFLUENT CHARACTERISTICS

FLOW MGD	OUR MG/L /HR	DOB FT	EFF BOD	EFF TSS MG/L	EFF NH3 MG/L	EFF NO3 MG/L	EFF PO4-P MG/L
6.75	5	10.	<5	<5	<1.0	24.8	5
7.22	5	10.	<5	<5	<1.0	24.8	5
7.68	6	10.	<5	5	<1.0	24.8	5
8.15	6	10.	<5	6	<1.0	24.7	4
8.61	6	10.	<5	7	<1.0	24.6	4
9.08	7	10.	<5	8	<1.0	24.6	4
9.54	7	10.	<5	9	<1.0	24.5	4
10.0	7	10.	<5	10	<1.0	24.4	4
10.4	8	10.	<5	11	<1.0	24.5	4
10.9	8	10.	<5	12	<1.0	24.4	4
11.4	8	10.	5	14	<1.0	24.4	4
11.8	9	10.	5	15	<1.0	24.3	4
12.3	9	10.	6	17	<1.0	24.3	4
12.8	10	10.	7	19	<1.0	24.2	4
13.2	10	10.	8	22	<1.0	24.2	4
13.7	10	10.	9	24	<1.0	24.1	4
14.2	11	10.	10	27	<1.0	24.1	4
14.6	11	10.	11	30	<1.0	24.0	4
15.1	11	10.	11	30	<1.0	24.1	4
15.6	12	10.	12	34	<1.0	24.0	4

ASHLAND, KY

DATE:
TIME: :
BOD: 200
TSS: 200
TEMP 20

SECONDARY SYSTEM PERFORMANCE

FLOW MGD	CLARIFIER LOAD SFC GPSFD	CLARIFIER LOAD WEIR GPLFD	SEC. SLUDGE PROD LBS TSS	SEC. SLUDGE PROD LBS VSS	TOTAL SLUDGE PROD LBS TSS	TOTAL SLUDGE PROD LBS VSS	TOTAL SLUDGE PROD % SOL	TOTAL SLUDGE PROD GPD
.75	502	12228	5292	2477	5292	2477	1.90	33473
.22	537	13079	5652	2642	5652	2642	1.88	36103
.68	571	13913	6095	2892	6095	2892	1.85	39522
.15	606	14764	6554	3156	6554	3156	1.82	43131
.61	640	15597	7011	3421	7011	3421	1.80	46775
.08	675	16449	7484	3697	7484	3697	1.77	50607
.54	709	17282	7953	3975	7953	3975	1.75	54461
0.0	744	18134	8438	4264	8438	4264	1.73	58501
0.4	779	18985	8787	4417	8787	4417	1.72	61294
0.9	814	19818	9264	4702	9264	4702	1.70	65350
1.4	848	20670	9757	4999	9757	4999	1.68	69587
1.8	883	21503	10244	5294	10244	5294	1.66	73820
2.3	918	22355	10747	5601	10747	5601	1.65	78232
2.8	953	23206	11254	5912	11254	5912	1.63	82728
3.2	987	24039	11754	6221	11754	6221	1.62	87207
3.7	1022	24891	12270	6540	12270	6540	1.60	91862
4.2	1056	25724	12778	6857	12778	6857	1.59	96492
4.6	1091	26576	13302	7184	13302	7184	1.57	01296
5.1	1125	27409	13612	7303	13612	7303	1.57	03983
5.6	1160	28260	14135	7630	14135	7630	1.56	08840

APPENDIX C

TREATMENT PLANT CONFIGURATION
DATA SHEETS

Treatment Plant Name Ashland Wastewater Treatment

State of Kentucky

Type of Treatment Plant (check appropriate box)

( ) 1. Primary treatment

( ) 2. Conventional activated sludge, with or without primary sedimentation

( ) 3. Single stage activated sludge for nitrification, with or without primary sedimentation

( ) 4. Extended aeration with or without primary sedimentation

(X) 5. Extended aeration oxidation ditch with or without primary sedimentation

( ) 6. Contact stabilization, with or without primary sedimentation

( ) 7. Single stage trickling filter with primary sedimentation

( ) 8. Two stage trickling filter with primary sedimentation

( ) 9. Activated Bio-Filter Process, with or without primary sedimentation

( ) 10. Rotating biological contactors with primary sedimentation

1. Primary Clarification Input Data:

Circular Clarifiers

Clarifier Number	#1	#2	#3	#4	#5
Diameter of ea. clarifier (ft)					
Avg. depth of ea. clarifier (ft)					
Weir length of ea. clarifier (ft)					

Rectangular Clarifiers

Clarifier Number	#1	#2	#3	#4	#5
Length of ea. clarifier (ft)					
Width of ea. clarifier (ft)					
Avg. depth of ea. clarifier (ft)					
Weir length of ea. clarifier (ft)					

Fine Screen

Are fine screens being used (yes or no): ____________

If yes, answer the following questions:

Type of screen: ____________

Number of screens: ____________

Width (ft): ____________

Height (ft) ____________

Screening opening: (in): ____________

Capacity ea. (MGD): 12 MG

2. Secondary Clarification Input Data:

Circular Clarifiers

Clarifier Number	#1	#2	#3	#4	#5
Diameter of each clarifier (ft)					
Avg. depth of ea. clarifier (ft)					
Weir length of ea. clarifier (ft)					

Rectangular Clarifiers

Clarifier Number	#1	#2	#3	#4	#5
Length of ea. clarifier (ft)	164	164			
Width of ea. clarifier (ft)	41	41			
Avg. depth of ea. clarifier (ft)	15	15			
Weir length of ea. clarifier (ft)	276	276			

3. Reactor(s) Input Data:

Type of Reactor: circle the type of reactor shown below and indicate the dimensions for each of the reactors

Activated Sludge/Extended Aeration

Circular Reactors (Aeration Basins)

Reactor Number	#1	#2	#3	#4	#5
Diameter (ft)					
Water depth (ft)					

Rectangular Reactors (Aeration Basins)

Reactor Number	#1	#2	#3	#4	#5
Length of ea. basin (ft)					
Width of ea. basin (ft)					
Avg. depth of ea. basin (ft)					

Extended Aeration Carrosell Ditch

Ditch Number	#1	#2	#3	#4	#5
Volume of ea. ditch (gal)	6.05 MG	6.05 MG			

Contact Stabilization

Round Reaeration Tanks

Tank Number	#1	#2	#3	#4	#5
Volume of ea. tank (MG)					

Rectangular Reaeration Tanks

Tank Number	#1	#2	#3	#4	#5
Length of ea. tank (ft)					
Width of ea. tank (ft)					
Avg. depth of ea. tank (ft)					

Round Contact Tanks

Tank Number	#1	#2	#3	#4	#5
Volume of ea. tank (MG)					

Rectangular Contact Tanks

Tank Number	#1	#2	#3	#4	#5
Length of ea. tank (ft)					
Width of ea. tank (ft)					
Avg. depth of ea. tank (ft)					

Activated Bio-Filter (ABF)

Bio-tower media (circle one): Redwood, stacked plastic, packed plastic

Are bio-towers constant flow or constant recirculation:

Circular Bio-Filters	#1	#2	#3	#4	#5
Diameter of ea. bio-filter (ft)					
Depth of ea. bio-filter (ft)					
Flow rate (GPM)					

Rectangular Bio-Filters	#1	#2	#3	#4	#5
Length of ea. bio-filter (ft)					
Width of ea. bio-filter (ft)					
Depth of ea. bio-filter (ft)					
Flow rate (GPM)					

Circular Aeration Basins

Reactor Number	#1	#2	#3	#4	#5
Diameter (ft)					
Avg. depth (ft)					

Rectangular Aeration Basins

Reactor Number	#1	#2	#3	#4	#5
Length of ea. basin (ft)					
Width of ea. basin (ft)					
Avg. depth of ea. basin (ft)					

Activated Sludge/Extended Aeration/Contact Stabilization/ABF

Type of aeration (circle one): diffused air, mechanical aeration

Tank Number	#1	#2	#3	#4	#5
diffused: scfm/reactor mechanical: hp/reactor	150	150	150		

Single Stage Trickling Filter

Filter media (circle one): rock, stacked plastic, packed plastic

Are filters constant flow or constant recirculation:

Filter number	#1	#2	#3	#4	#5
Diameter of ea. filter (ft)					
Depth of ea. filter (ft)					
Flow rate (GPM)					

Two Stage Trickling Filter

Primary Filter media (circle one): rock, stacked plastic, packed plastic

Are filters constant flow or constant recirculation:

Primary Filter Number	#1	#2	#3	#4	#5
Diameter of ea. filter (ft)					
Depth of ea. filter (ft)					
Flow rate (GPM)					

Secondary Filter Media (circle one): rock, stacked plastic, packed plastic

Are filters constant flow or constant recirculation:

Secondary Filter Number	#1	#2	#3	#4	#5
Diameter of ea. filter (ft)					
Depth of ea. filter (ft)					
Flow rate (GPM)					

Rotating Biological Contactor (RBC)

Manufacturer of RBC units ______________________________

Type of drive unit (air or mechanical) ______________________

No. of process trains ___________

No. of stages per train __________

Stage No. 1 surface area/per stage _______ ft^2

Stage No. 2 " " " " _______ ft^2

Stage No. 3 " " " " _______ ft^2

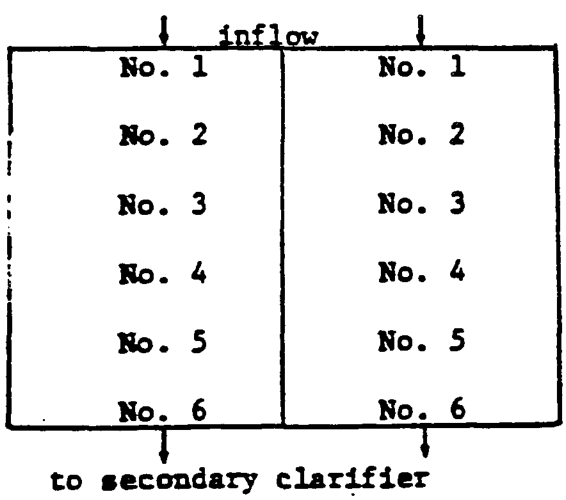
Stage No. 4 " " " " _______ ft^2

Stage No. 4 " " " " _______ ft^2

Stage No. 5 " " " " _______ ft^2

Stage No. 6 " " " " _______ ft^2

Example:



In example there are two trains with six stages in series. Stage Nos. 1,2,3 in each train have 100,000 ft^2 of surface area each or a total of 600,000 square feet. Stages Nos. 4,5,6 have a surface area of 150,000 ft^2 each or a total of 900,000 ft^2.

4. Sludge Digestion Input Data:

<u>Anaerobic Digestion</u>

Primary Digesters ____________________

Tank Number	#1	#2	#3	#4

Volume of each primary digester ____________________ gallons

Are the digesters heated ____________________ (yes or no)

Are the digesters mixed ____________________ (yes or no)

Is there any type of thickening prior to digestion? If so what kind

____

Secondary Digesters ____________________

Tank Number	#1	#2	#3	#4

Volume of each digester ____________________ gallons

Can the digesters be heated ____________________ (yes or no)

Can the digesters be mixed ____________________ (yes or no)

<u>Aerobic Digestion</u>

Tank Number	#1	#2	#3	#4

Volume of each digester ____________________ gallons

Is there any type thickening prior to digestion? If so what type

____

HARDEEVILLE, SC

Review of Contract Operations and Maintenance Proposal
Wastewater Treatment Facility

A proposal for contract operations and maintenance of the wastewater treatment plant by PSC Water Services, Inc. was reviewed. As with any complex issue, a direct answer to the proposal is not straight forward without looking at many facets and options of the current situation.

The following comments are offered as guidelines for aiding in reaching your final decision:

A. General

The operation of the Hardeeville WWTP has been difficult for the town for the last few years. Although the facility is only about four years old, there has been some difficulty in obtaining compliance with the NPDES permit. During the past year, the National Demonstration Water Project has included Hardeeville in its Comptrain Project in South Carolina. Frequent visits and training by the NDWP Field Operations Director has produced many positive results and improvements. This project has now been terminated, however, leaving the operators to be on their own for operating the facility. There still needs to be some continuous assistance from outside sources to provide for permit compliance.

B. Contract O & M Proposal

A proposal has been made by PSC Water Services, Inc., a subsidary of the Philadelphia Suburban Corporation. This proposal offers to take over complete charge of the operation and management of the WWTP for an annual fee of $154,550. The contract proposal guarantees meeting all requirements of the NPDES permit under PSC/WS management. This would releive the Mayor, Council, and Administrator of day-to-day concern over the treatment operation and its problems, allowing more time to be devoted to other matters such as community development and improvements.

C. Contract O & M Benefits and Concerns

Contract operations would certainly solve the present situation of meeting permit limits and its associated O & M problems, since the total resources of PSC/WS would be available. It would have the disadvantage of the town losing control over the wastewater utility and its personnel. There is also no assurance in the long term that present employees would retain their jobs, although initially they will be hired and given benefit of their capability and performance.

The major concern for any contract O & M plan is the cost of such a venture to the community. When the town manages its facility they have complete control over all expenditures. If money is short they can delay obligations and suffer the consequences. When someone else guarantees performance they can not delay any actions, in fact, they may have to go a little further to make sure they will always meet the standards. The contract operators may have, however, experience and knowledge that can save energy costs and certain other expenditures that may not be necessary because of better preventive maintenance.

It is therefore very important that the contract fee be carefully reviewed since some other costs that the town may be responsible for could surface later. A review of the current budget reveals the following:

a. 1985 Budget	\$188,446
b. Contract O & M	-154,550
	========
c.	\$+33,896
d. Other obligations	-35,152
(Bonds, loans, etc.)	========
e.	\$ -1,256

However, the major difference as the budget appears to be established, is that the current sewer budget includes some part of the salaries for the Mayor, Council, Administrator, and clerks. These cost are included in the \$154,550 portion of the money that would be paid to the contractor, so where would money be available to pay the town's administration? It appears that some portion of the following sewer budget items would still be required:

No.	Item
1	Salaries
2	F.I.C.A.
3	Health Ins.
4	Worker's Comp.
6	Telephone
11	Audit
12	Postage
13	Dues
14	Subscription
15	Tort Liability
16	Miscellaneous
17	Employee bonds
19	Office supplies

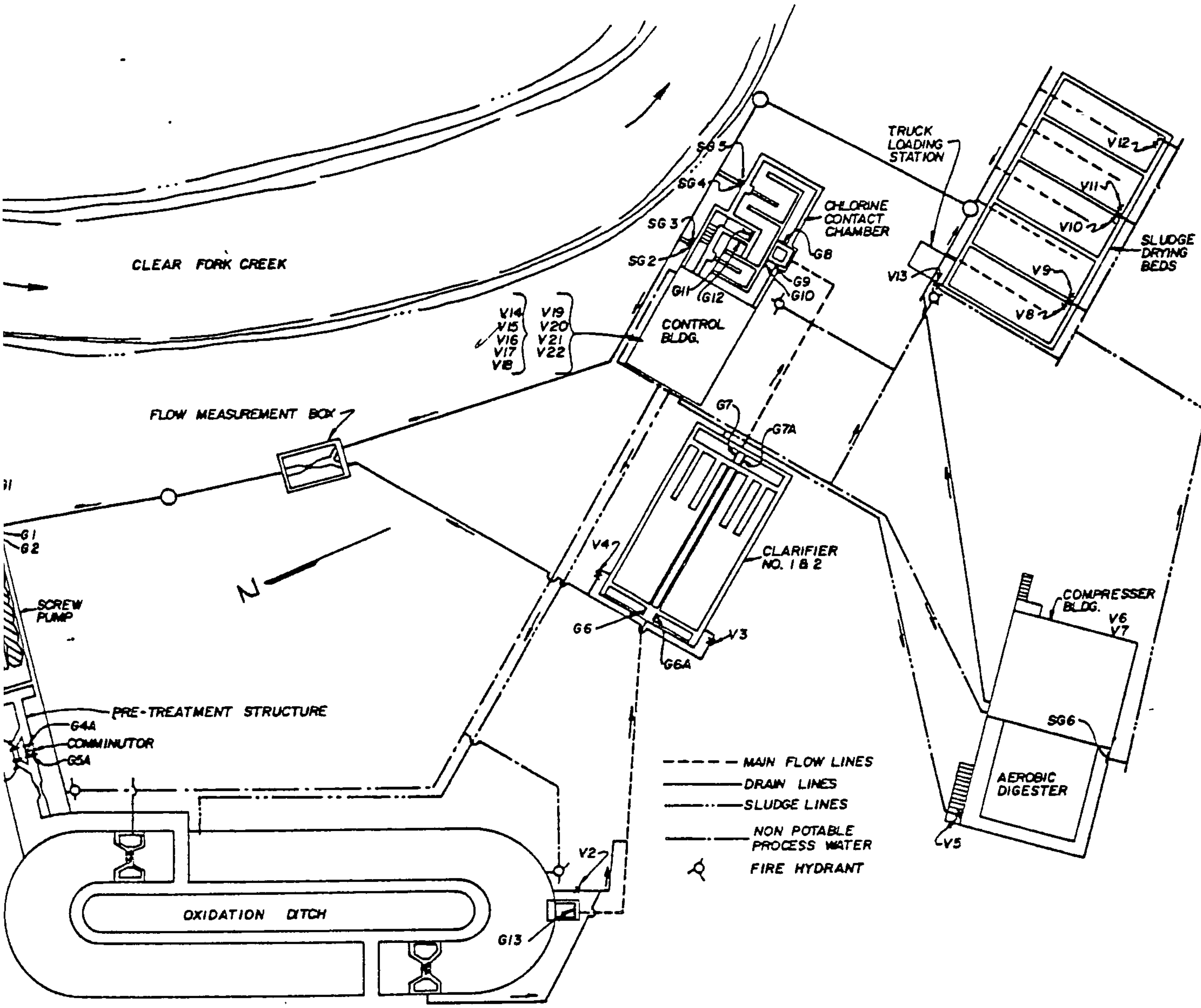
If none of the money in the above line items is required for the town administration, then the \$188,446 budget minus \$154,550 would be realistic.

D. General Opinions

1. The contract proposal would certainly be an answer to the current permit compliance problem.
2. The proposal cost is realistic provided no additional funds are required from the line items discussed above.
3. PSC/WS certainly has the resources to provide adequate O & M for the WWTP.
4. It appears that PSC/WS is very generous in guaranteeing permit compliance and any fines up to $100,000.
5. It would be well to have PSC/WS to include laboratory certification, since this is one of the current programs being established by DHEC.

Larry A. Parker, P.E.
January 25, 1985

Alabany Wastewater Plant



ALBANY

WASTEWATER CHARACTERIZATION

AVERAGE DRY WEATHER FLOW	MGD:	0.146
PEAK DRY WEATHER FLOW	MGD:	0.200
DESIGN FLOW	MGD:	0.493
INFLUENT BOD	MG/L:	226
INFLUENT TSS	MG/L:	240
INFLUENT VSS	(%):	75
TEMPERATURE	^{o}C:	20
TKN	MG/L:	30*
ALKALINITY	MG/L:	100*
PH	:	7
PO4-P	MG/L:	8*

* DEFAULT VALUE USED

PLANT CONFIGURATION AND DIMENSIONS

DESIGN AVERAGE DAILY FLOW (MGD)	:	0.432
DESIGN PEAK WET WEATHER FLOW (MGD)	:	0.752

APPENDIX C

TREATMENT PLANT CONFIGURATION
DATA SHEETS

Treatment Plant Name Albany

State of Kentucky

Type of Treatment Plant (check appropriate box)

( ) 1. Primary treatment

( ) 2. Conventional activated sludge, with or without primary sedimentation

( ) 3. Single stage activated sludge for nitrification, with or without primary sedimentation

( ) 4. Extended aeration with or without primary sedimentation

(X) 5. Extended aeration oxidation ditch without primary sedimentation

( ) 6. Contact stabilization, with or without primary sedimentation

( ) 7. Single stage trickling filter with primary sedimentation

( ) 8. Two stage trickling filter with primary sedimentation

( ) 9. Activated Bio-Filter Process, with or without primary sedimentation

( ) 10. Rotating biological contactors with primary sedimentation

1. Primary Clarification Input Data:

Circular Clarifiers

Clarifier Number	#1	#2	#3	#4	#5
Diameter of ea. clarifier (ft)					
Avg. depth of ea. clarifier (ft)					
Weir length of ea. clarifier (ft)					

Rectangular Clarifiers

Clarifier Number	#1	#2	#3	#4	#5
Length of ea. clarifier (ft)					
Width of ea. clarifier (ft)					
Avg. depth of ea. clarifier (ft)					
Weir length of ea. clarifier (ft)					

Fine Screen

Are fine screens being used (yes or no): No

If yes, answer the following questions:

Type of screen: ______

Number of screens: ______

Width (ft): ______

Height (ft) ______

Screening opening: (in): ______

Capacity ea. (MGD): ______

2. Secondary Clarification Input Data:

Circular Clarifiers

Clarifier Number	#1	#2	#3	#4	#5
Diameter of each clarifier (ft)					
Avg. depth of ea. clarifier (ft)					
Weir length of ea. clarifier (ft)					

Rectangular Clarifiers

Clarifier Number	#1	#2	#3	#4	#5
Length of ea. clarifier (ft)	52	52			
Width of ea. clarifier (ft)	13	13			
Avg. depth of ea. clarifier (ft)	12	12			
Weir length of ea. clarifier (ft)	24	24			

3. Reactor(s) Input Data:

Type of Reactor: circle the type of reactor shown below and indicate the dimensions for each of the reactors

Activated Sludge/Extended Aeration

Circular Reactors (Aeration Basins)

Reactor Number	#1	#2	#3	#4	#5
Diameter (ft)					
Water depth (ft)					

Rectangular Reactors (Aeration Basins)

Reactor Number	#1	#2	#3	#4	#5
Length of ea. basin (ft)					
Width of ea. basin (ft)					
Avg. depth of ea. basin (ft)					

Extended Aeration Oxidation Ditch

Ditch Number	#1	#2	#3	#4	#5
Volume of ea. ditch (gal)	642,083				

Contact Stabilization

Round Reaeration Tanks

Tank Number	#1	#2	#3	#4	#5
Volume of ea. tank (MG)					

Rectangular Reaeration Tanks

Tank Number	#1	#2	#3	#4	#5
Length of ea. tank (ft)					
Width of ea. tank (ft)					
Avg. depth of ea. tank (ft)					

Round Contact Tanks

Tank Number	#1	#2	#3	#4	#5
Volume of ea. tank (MG)					

Rectangular Contact Tanks

Tank Number	#1	#2	#3	#4	#5
Length of ea. tank (ft)					
Width of ea. tank (ft)					
Avg. depth of ea. tank (ft)					

Activated Bio-Filter (ABF)

Bio-tower media (circle one): Redwood, stacked plastic, packed plastic

Are bio-towers constant flow or constant recirculation:

Circular Bio-Filters	#1	#2	#3	#4	#5
Diameter of ea. bio-filter (ft)					
Depth of ea. bio-filter (ft)					
Flow rate (GPM)					

Rectangular Bio-Filters	#1	#2	#3	#4	#5
Length of ea. bio-filter (ft)					
Width of ea. bio-filter (ft)					
Depth of ea. bio-filter (ft)					
Flow rate (GPM)					

Circular Aeration Basins

Reactor Number	#1	#2	#3	#4	#5
Diameter (ft)					
Avg. depth (ft)					

Rectangular Aeration Basins

Reactor Number	#1	#2	#3	#4	#5
Length of ea. basin (ft)					
Width of ea. basin (ft)					
Avg. depth of ea. basin (ft)					

Activated Sludge/Extended Aeration/Contact Stabilization/ABF

Type of aeration (circle one): diffused air, mechanical aeration

Tank Number	#1	#2	#3	#4	#5
diffused: scfm/reactor mechanical: hp/reactor	30	30			

Single Stage Trickling Filter

Filter media (circle one): rock, stacked plastic, packed plastic

Are filters constant flow or constant recirculation:

Filter number	#1	#2	#3	#4	#5
Diameter of ea. filter (ft)					
Depth of ea. filter (ft)					
Flow rate (GPM)					

Two Stage Trickling Filter

Primary Filter media (circle one): rock, stacked plastic, packed plastic

Are filters constant flow or constant recirculation:

Primary Filter Number	#1	#2	#3	#4	#5
Diameter of ea. filter (ft)					
Depth of ea. filter (ft)					
Flow rate (GPM)					

Secondary Filter Media (circle one): rock, stacked plastic, packed plastic

Are filters constant flow or constant recirculation:

Secondary Filter Number	#1	#2	#3	#4	#5
Diameter of ea. filter (ft)					
Depth of ea. filter (ft)					
Flow rate (GPM)					

Rotating Biological Contactor (RBC)

Manufacturer of RBC units ______________________________

Type of drive unit (air or mechanical) ______________________

No. of process trains ____________

No. of stages per train ____________

Stage No. 1 surface area/per stage ________ ft^2

Stage No. 2 " " " " ________ ft^2

Stage No. 3 " " " " ________ ft^2

Stage No. 4 " " " " ________ ft^2

Stage No. 4 " " " " ________ ft^2

Stage No. 5 " " " " ________ ft^2

Stage No. 6 " " " " ________ ft^2

Example:

↓ inflow ↓

No. 1	No. 1
No. 2	No. 2
No. 3	No. 3
No. 4	No. 4
No. 5	No. 5
No. 6	No. 6

↓ ↓

to secondary clarifier

In example there are two trains with six stages in series. Stage Nos. 1,2,3 in each train have 100,000 ft^2 of surface area each or a total of 600,000 square feet. Stages Nos. 4,5,6 have a surface area of 150,000 ft^2 each or a total of 900,000 ft^2.

4. Sludge Digestion Input Data:

Anaerobic Digestion

Primary Digesters ____________________

Tank Number	#1	#2	#3	#4

Volume of each primary digester ____________________ gallons

Are the digesters heated ____________________ (yes or no)

Are the digesters mixed ____________________ (yes or no)

Is there any type of thickening prior to digestion? If so what kind

____

Secondary Digesters ____________________

Tank Number	#1	#2	#3	#4

Volume of each digester ____________________ gallons

Can the digesters be heated ____________________ (yes or no)

Can the digesters be mixed ____________________ (yes or no)

Aerobic Digestion

Tank Number	#1	#2	#3	#4

Volume of each digester 92,820 gallons

Is there any type thickening prior to digestion? If so what type

No prior thickening.

Winnsboro: Facility Operations

The operational staff is inexperienced in the operation of a facility of this type. Two of the five operators are certified (1-C, 1-D), however, all staff personnel are working to become certified or upgrade their certification. The staff appears capable of learning how to operate the facility. Overall moral of the facility personnel is good.

At the time of evaluation, no process control scheme was being followed. The lead operator had been at the facility less than three months and had not instituted any process control testing to date. The same holds true for the anaerobic sludge digestors. Conversations with sate regulatory personnel indicate that the lead operator has made many improvements in the organization of the facilities laboratory, offices, and shops. The plant grounds were very well kept. Major equipment problems at the time of inspection centered around the sand filters. The available information concerning the sand filters is inconsistent with the units as they are installed.

Winnsboro: Laboratory Evaluation

1) Laboratory facilities:

- Lacks a convenient location for muffle furnace
- Lacks proper 220 volt power plug for muffle furnace
- Need file cabinets for lab records
- Table and chair would be useful

2) Sample collection records should have each sample point designated in the log books and type of sample and parameter to be collected at each point.

3) Laboratory equipment:

- Should be keeping A.M. and P.M. temperature records on incubators and ovens when in use
- A spare pH electrode should be kept
- The date electrodes are received and placed into service should be kept
- Winkler reagents for D.O. measurement are not dated. Sodium thiosalfate is not standardized. This should be done monthly in triplicate and records maintained.
- Another case of BOD bottles is needed
- Need to begin dechlorinating and reseeding BOD samples
- The analytical balance should be serviced and calibrated once per year. Laboratory weights can be used to check performance of balance between servicing.
- Desiccating material inside weighing chamber should be open to the atmosphere. The desiccant should be routinely replaced and recharged by drying in a 103° oven. Might want to use a color indicating desiccant.
- Need a thermometer graduated in 0.1°C increments for the fecal coliform water bath
- Need an incubator, warm air for verification of fecal coliforms
- Need a wide field binocular microscope (10-30X) with fluorescent light for counting fecal coliform plates.
- Need bacterialogical media for fecal coliform verification (Lauryl tryptase and E.C. media)

- Need glassware for F.C. verification (culture tubes, fermentation tubes and cups)
- Need small (100-200 ml) wick mouth bottles, sterilized with dechlorinating agent added, for fecal coliform sample collection
- Need to institute a quality control program for fecal coliform test: to include sterility control checks, positive control test and verification test

1984 COMPTRAIN PROGRAM OBJECTIVES
CITY OF DAYTON WATER TREATMENT PLANT

I. TECHNICAL ASSISTANCE
   A. Turbidity Compliance Problems
      1. Prefilter turbidity
         a. Cleaning sedimentation tanks
         b. Cleaning backwash basin
         c. In-line turbidimeters
         d. Cost of frequent backwashing
         e. Chemical dosages and possible change in coagulent aids
      2. Jar Tests
   B. Maintenance and Repair of Equipment
      1. Preventive maintenance system
      2. Maintaining chemical dosage equipment
         a. Lime and alum
         b. Fluoridation
         c. Calgon
      3. Pumps
         a. Raw water pumps
         b. Backwash water basin return water pumps
   C. Review Consulting Engineers' Feasibility Plan for Distribution System

II. TRAINING
   A. Chemical Dosages
      1. Jar testing
      2. Calibrating chemical feeders

TENNESSEE COMPTRAIN 1984

WATER TREATMENT SYSTEM ASSESSMENT

A. General

Facility Name Dayton WTP Design Population 6,000

Type of Plant Filtration Facility

Year Built (& Major Renovations) 1964

Town/County Dayton/Rhea

Operating Agency: Name City of Dayton - City Manager

Official Jim Smith Telephone No. (615) 775-1817

Regulatory Agency Tennessee Department of Public Health

Permit No. PWS ID 000174

Major Pre-identified Non-compliance Areas 1. Occassional final water turbidity violations. 2. $CaCO_3$ equilibrium. 3. Failure to analyze for sodium and corrosivity. 4. Maintenance problems.

B. Water Treatment System

Water Supply

Source Description Tennessee River

Typical Characteristics on Records:

	Raw	Finished
Turbidity (NTU)	(4-17) avg. = 7	0.45
Alkalinity (mg/l)	50	41 (phenolphthalein)
Hardness (mg/l)	56	64
Organics		Less than MCL
Total THM's		Not applicable
Sodium (mg/l)		Not sampled

Problems with Source Raw water turbidity is extremely variable and quite high.

Reporting Requirements

State Report (Attach copy) See State Reports (January-April, 1984)

Parameters Reported Water treated, turbidity, alkalinity, pH, hardness, fluoride, chemicals used, filter operation data, microbiological examination (total coliform), chlorine residual.

Sampling Methods Desciption: Type (grab or composite) Grab

Frequency and Location Raw, finished and pre-filter (turbidity only) once per shift.

Analyses Techniques Turbidity - Hach Turbimeter 2100A, pH - pH meter, hardness and alkalinity - titration, chlorine residual - amperometric, total coliform - constant temp. bath

Laboratory Capabilities State certified for turbidity analysis. Analysis of all reported parameters.

Records sent in on time? Yes

Water Treatment Plant

Storage Reservoir: Capacity None Type

Controls Manual operation Intake Structure Description 2 Influent pumps with bar screen.

Pumping to Plant: No. Available 2 No. Operating 1

Capacity and Comments One high capacity (1400 gpm) and one low capacity pump due to condition of second pump.

Design Conditions: Average Daily Flow 2.0 MGD

Actual Water Usage 1.5 MGD Metering Description Finished water meter - Badger

Metering Calibration, Balance or Checks Not known

Gallons per customer per month: Design ______

Actual 16,600 gals/month

Chemical Addition: Type(s) of chemical & Purpose Alum - coagulant aid, lime - pH adjustment, flouride - dental hygiene and calgon - corrosivity control.

Dosages Lime - 12 mg/l; Alum - 30 mg/l; Flouride - 0.6 mg/l

Chemical Feeder Type Dry Feeders

Chemical Storage Capacity Dry bags of chemical

Rapid Mix Tank: Size & Volume 8'x 8' X 11'- 4' deep, 5,400 gals.

Mixer & Type Mechanical mixer - 5HP

Average Detention Time 5 minutes

Condition of Equipment & Comments Rapid mix equipment is old.

Flocculation Basins: Size & Volume 76' x 15' x 11'- 4' deep, 100,000 gals.

Mixing, Baffling Arrangement Flocculator paddle with 1 1/2 HP drive.

Detention Time 1.6 hrs.

Condition of Equipment & Comments Paddles have been replaced this past month. Alum being fed intermittently on manual basis, and a good floc was not forming.

Sedimentation Basins: Size & Volume 2 basins - (76'x 70' area) 437,700 gals.

Average Dentention time 7 hrs.

Overflow Rate (gpd/sf) 282 gpd/sq ft

Sludge Collection Drain valve to backwash water basin.

Condition of Equipment & Comments Sedimentation basin has 4 ft. of mud on the bottom, but cannot be removed because the backwash water storage tank is also full of mud. This effects water turbidity.

Filtration: Size & Surface Area 12'- 6" x 14' = 175 sq ft each

Number of Tanks: Available 4

On-line 4

Type of Media Sand and anthraite.

Typical filtration rate = 1.5 gpm/sq ft

Backwash Procedure Once daily (2nd shift)

Loss of Head Gauge Gauges are not functional

Control System(s) When raw water pump capacity is reduced, filters are backwashed.

Frequency of Backwashing Two filters, once per 24 hrs. at about 36 gpm/sq ft (20,000 gals/day)

Backwash Water Quality Very muddy, but not sampled.

Backwash Discharge To storage tanks. Supernatent pumped back to influent.

Condition of Equipment & Comments Loss of head gauges not functional. Finished water turbidity is occasionally in violation of State standards.

Disinfection: Type Gas chlorinators

Number of Chlorinators 2 - Pre & Post chlorination

Type & Size of Injector 2" throat

Feed Rate 70 lbs/day - raw water, 45 lbs/day - clearwell.

Dosage(s) Pre chlorination = 5.6 mg/l

Post chlorination

Mixing Turbulence in pipes

Alarms None

Size of Cylinders One ton cylinders.

Cylinder Storage In chlorinator building.

Cylinder Replacement Technique Two cyclinders manifolded together.

Separate Chlorine Room Yes

Safety ("A" or "B" Kit) No

Type of Contact Chamber Clear Well

Contact Time 8 hrs.

Residual Readings 1.4 mg/l on top of filters and 2.9 mg/l to distribution system.

Loss of Weight Measurement Fairbanks Morse dual cylinder scale.

Condition of Equipment & Comments In fair condition.

Fluoridation: Type Dry feeder

Number One

Mixing Procedures In-line injection to the clearwell.

Dosage Rate About 0.5 - 1.0 mg/l, but equipment is out of service since February, 1984

Residual Readings 1.1 mg/l finished water

Storage None on site

Condition of Equipment & Comments Equipment has been out of service since February.

Distribution System (Attach Schematic):

Pumping: Number & Type Two high service pumps - vertical turbine pumps from clearwell.

Capacity (Attach Pump Curve) 2 @ 1600 gpm each.

Number of Pumps in Service One

Pumping Schedule & Sequence Pumps are operated 24 hours per day unless storage tanks are full and begin to run over.

Power (HP) 200 HP each.

Condition of Pumps & Comments Pumps are in fair condition.

Piping & Transmission: System Map Available? Yes at City Hall

Date(s) Installed Prior to plant construction in 1964.

Sizes and Types of Piping Mains are asbestos cement and are 10 inches in diameter.

Minimum Pressure in System Minimum pressure is on the other side of town, downstream of pressure relief valve.

Maximum Pressure 140 psig

Pressure Regulators Two on water loop in town.

Individual Homes Newer homes are installing them.

Individual Metering Yes

Hydrant Description No information

Pressure Gauges None in system.

Leak Survey No survey has been conducted on water loss in the system.

Equipment Available for Repairs? Normally

Inventory Available Meters, valves and standard size piping.

Pressure Problems in System Yes, maintaining pressure at furthest point above 15 psig.

Highest Elevation No information

Lowest Elevation No information

Head Loss Conditions No information

Free Cl_2 Residual Maintained 1.5 - 1.6 mg/l in distribution system.

Storage Tanks: Number Two

Capacity of Each 500,000 gallons each.

Types Standpipe storage floating off the system.

Year(s) Constructed 1964

Elevations 1075 feet (both at same elevations across town.)

Altitude (PRV) Values Two adjustable PRV'S in town to regulate pressure at furthest point in system.

Describe Pumping Practices to Storage Trys to keep storage tanks full to keep up with demand.

Changes in Elevation in Tank(s) Usually full.

Records None

Day & Night Levels

Days of Storage 16 hours in system.

Condition of Tanks One tank needs to be painted.

Can tanks provide water when service pumps are off? Yes

Operation and Staffing: Hours Staffed per Day 24 hours/day.

Certification Superintendent is certified.

Certification Training of Operator(s) Operators have not received formal training.

Total Treatment Costs No information.

Personnel Costs No information.

Describe Over-all Operator Duties Operator performs laboratory tests, backwashes filters, fills chemical feeders, starts and stops raw and distribution water pumps, cleans plant and checks elevations in storage tank. (See attached monitoring program.)

Work Order System (Attach Copy) None

Maintenance Procedures

Preventive Maintenance No formal system is used.

Restoring Equipment back in Service The floridator and alum chemical feeder have been out of service for several months.

Tools & Inventory Appears to be adequate.

Manuals

Plant O&M Manual None

Equipment Catalogs None at the plant.

Training No information on formal school training.

Housekeeping Practices Plant is kept fairly clean.

Report Keeping

Log Sheets (attach copy) Each shift has a duty log. (See attachment)

Supervisory Skills Superintendent could give more direction to operators.

Operating Knowledge & Capabilities

(Troubleshooting Techniques) Needs to improve maintenance of equipment and cleaning out backwash storage tank. This causes excessive backwashing and turbidity problems. Turbidity control needs to be improved.

Dayton, Tennessee

SECOND SHIFT 3:30 p.m. - 12:00 Midnight

NAME ____________________

DATE ____________________

PHYSICAL CHARACTERISTICS

Gallons Raw Water Pumped	Gallons Finished Water Pumped	Raw Water Temp. C°	Turbidity
________	________	________	RAW ______ SETTLED ______ FINISHED ______

CHEMICAL CHARACTERISTICS

CHLORINE RESIDUAL

ON TOP OF FILTER ________ p.p.m. PLANT EFFLVENT ________ p.p.m.

ALKALINITY

RAW ________ p.p.m. FINISHED ________ p.p.m.

pH

RAW ________ FINISHED ________

HARDNESS

RAW ________ p.p.m. FINISHED ________ p.p.m.

FREE CO2

RAW ________ p.p.m. FINISHED ________ p.p.m.

IRON

RAW ________ p.p.m. FINISHED ________ p.p.m.

MANGANESE

RAW ________ p.p.m. FINISHED ________ p.p.m.

FLOURIDE

RAW ________ p.p.m. FINISHED ________ p.p.m.

BACTERIOLOGICAL EXAMINATION

MONDAY - FRIDAY

COLIFORM / 100ML

RAW ________ PLANT EFFLVENT ________ DIST. SYSTEM ________

DAILY DUTIES

(INITIAL WHEN COMPLETED)

1. Wash 2 Filters .... ________
2. Clean Building (Dust, Sweep, Mop) .... ________
3. Equipment Check .... ________
4. Reclaim Wash Water .... ________
5. Fill Chemical Feeders (Alum, Lime) .... ________

COMMENTS

HERALD PRINT—DAYTON

DAYTON WATER TREATMENT PLANT
Dayton, Tennessee

FIRST SHIFT 6:00 a.m. - 2:30 p.m.

NAME ____________________

DATE ____________________

PHYSICAL CHARACTERISTICS

Gallons Raw Water Pumped	Gallons Finished Water Pumped	Raw Water Temp. C°	Turbidity
____________	____________	____________	RAW ______ SETTLED ______ FINISHED ______

CHEMICAL CHARACTERISTICS

CHLORINE RESIDUAL

ON TOP OF FILTER ________ p.p.m. PLANT EFFLVENT ________ p.p.m.

ALKALINITY

RAW ____________ p.p.m. FINISHED ____________ p.p.m.

pH

RAW ____________ FINISHED ____________

HARDNESS

RAW ____________ p.p.m. FINISHED ____________ p.p.m.

FREE CO2

RAW ____________ p.p.m. FINISHED ____________ p.p.m.

IRON

RAW ____________ p.p.m. FINISHED ____________ p.p.m.

MANGANESE

RAW ____________ p.p.m. FINISHED ____________ p.p.m.

FLOURIDE

RAW ____________ p.p.m. FINISHED ____________ p.p.m.

BACTERIOLOGICAL EXAMINATION

MONDAY - FRIDAY

COLIFORM/100ML

RAW ____________ PLANT EFFLVENT ____________ DIST. SYSTEM ____________

DAILY DUTIES

(INITIAL WHEN COMPLETED)

1. Chart Change . . . . ________
2. Clean Building (Dust, Sweep, Mop) . . . . ________
3. Equipment Check . . . . ________
4. Reclaim Wash Water . . . . ________
5. Fill Chemical Feeders (Alum, Lime, Flouride and Calgon When Needed) . . . . ________

COMMENTS

____

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HERALD PRINT—DAYTON

PUBLIC WATER SYSTEM RATING FORM — DIVISION OF WATER QUALITY CONTROL

Tennessee Department of Public Health

NAME OF SYSTEM Dayton Water System DATE 11-20-83

WATER QUALITY (58)

DEFICIENCY POINTS | SCORE

1. PHYSICAL CHARACTERISTICS — Turbidity more than 2 units ( ) Color More than 15 units ( ) — Taste and Odor ( ) ________ ( ) ( )
2. CHEMICAL CHARACTERISTICS — Iron ( ) — Manganese ( ) Chloride ( ) Sulfate ( ) — Calcium Carbonate Equilibrium ( ) — Hardness ( ) — Total dissolved solids ( ) — Other ( ) Chemical Analysis ( ) — Other ( ) (-)
3. BACTERIOLOGICAL QUALITY — Samples submitted on monthly basis ( ) Check Samples ( ) Mean Density and positive sample ( ) ( )
4. SOURCE OF SUPPLY — Adequacy ( ) Standby ( ) — Pollution Hazards ( ) Supply protection ( ) — Raw water quality ________ ( ) ( )
5. CROSS CONNECTIONS — Ordinance or policy filed with department ( ) Signed statement to department ( ) — On-going cross connection program ( )
6. DISTRIBUTION SYSTEM, RESERVOIRS & TANKS — Free chlorine residual in system ( ) Adequate storage ( ) — Disinfection of new works or existing works subject to contamination ( ) — Maintenance of Reservoirs or tanks ( ) — Routine flushing ( ) — 20 psi residual pressure in systems ________ ( ) (1)
7. OPERATION & LABORATORY CONTROL OF TREATMENT WORKS — Systematic operation of all treatment facilities (x) — Laboratory control of treatment (x) — ________ (5) 52

PHYSICAL EQUIPMENT (21)

8. EQUIPMENT, BUILDINGS & GROUNDS — Master meter ( ) — Pumping equipment ( ) All water works buildings and grounds ( ) — Other equipment or structures ________ ( ) ( )
9. TREATMENT FACILITIES — Aerators ( ) — Chemical feeders ( ) Coagulation basin ( ) — Sedimentation basin ( ) Filter units & Appurtenances ( ) — Disinfection equipment ( ) — Contact time ( ) ________ ( ) — Sludge & Wastewater Facilities ( ) — Turbidimeters ( ) ( )
10. LABORATORY FACILITIES — Chemical and physical ( ) — Bacteriological ( ) Space adequate for work ( ) ________ ( ) ( )
11. DISTRIBUTION SYSTEM PIPING — Kind, size, and location of mains ( ) — Valves, hydrants, and blow-offs ( ) Extent of service ( ) Map of system ( ) ________ ( ) ( ) 21

OPERATION (21)

12. CERTIFIED OPERATOR — Plant Operator ( ) — Distribution ( ) ________ ( ) ________ ( ) ( )
13. MAINTENANCE OF EQUIPMENT, BUILDINGS AND GROUNDS — All buildings and grounds or other structures ( ) — Cleanliness ( ) Maintenance of treatment units (x) ________ ( ) (2)
14. COOPERATION WITH DEPARTMENT — Submission of operation reports ( ) — Submission of plans and specifications for approval ( ) — General attitude of cooperation ( ) ________ ( ) ( ) 19

NOTE: Defects marked with a Cross (x)

TOTAL SCORE 92

Signed Larry Burriss

Revised Jan. 1976

TDPH B-020

PUBLIC WATER SYSTEM DATA

Key Identification Number: 0000174

Name of Water System: Dayton Water System
Mailing Address: P.O. Box 226, W. First Avenue
City: Dayton, Tennessee County: Rhea
Zip Code: 37321 Office Phone: 775-1817 Plant Phone: 775-2752

Title of Person	Time	Certification	Interviewed	Correspondence
Mayor	Wendell Brown			X
City Manager	Jim Smith			X
Superintendent	Agnew Jewell Filt.	III Di	st. X	X
Operators	Arnold Wilkey, Charles Robinson,			
	Sherman Shnyder			

No.		Source Name	INTAKE LOCATION (USGS Map, Latitude, Longitude, River Mile) DEG		MIN		SEC		SURFACE	GROUND	PURCHASED	AERATION	PRECHLORINATION	COAGULATION	SEDIMENTATION	FILTRATION	CORRISION CONTROL	SOFTENING	TASTE AND ODOR CONTROL	IRON REMOVAL	FLUORIDE ADJUSTMENT	DISINFECTION
1	R	Tennessee River	3	5	2	8	1	8	X				X	X	X	X					X	X
	A																					
2	R																					
	A																					
3	R																					
	A																					
4	R																					
	A																					

MARK (ONE ONLY): Surface, Ground, Purchased. TREATMENT: Aeration through Disinfection.

Name of Systems served by this System	Other Systems Connected to this System
Evensville Utility District	

Plant Classificaiton: III
Distribution Classification: I Date Laboratory Certified: 11-29-83 Turbidity
Design Capacity: 1425 (gpm) Filter Area: 4 @ 14 X 12.5 (sq. ft.) Filter Rate: 2.0 (gpm/ft.²)
Raw Water Pump Capacity: 2 @ 1400 (gpm) Finished Water Pump Capacity: 2 @ 1600 (gpm)
Distribution Storage, Gravity Flow: 2½ million, 1 3/4 million (million gallons) Emergency Power Only: None (gal/day)
Clearwell Capacity: 500,000 (million gallons) Date Cross Connection Control Program Approved: Ordinance Only
Date of Last Inorganic Chemical Analysis: 5-16-83 Date of Last Organic Chemical Analysis: 5-16-83
Date of Last Radionuclide Analysis: 5-27-80 Date Emergency Plan Approved: Last Rating: 92
Number of Wholesale Customers: One Number of Meters: 2709 Date of Last Survey: 4-8-82
Ramarks: Check for maintenance frequently

Date of Survey	Number of Connections	Household Factor	Population Served	Average Daily Pumpage (million gallons)	Maximum Day Pumpage (million gallons)	Engineer	Rating	Year
								1988
								1987
								1986
								1985
								1984
11-29-83	2709	2.99	8100	1.379	1.765	GKB	92	1983

PH-0355 WOC-(12/76)

WATER FIELD SHEET

SYSTEM Dayton Water Department DATE 11-29-83

COUNTY Rhea

SAMPLES REQUIRED PER MONTH 9 REPORTS SUBMITTED 12/12

	1982			1983								
MONTH	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT
SAMPLES RUN	9	8	9	9	9	11	9	10	10	9	9	9
ORGANISM/100 ML												

REMARKS
1. Violates $CaCO_2$ equilibrium.
2. Rapid mix broken
3. Oster Tank needs paint
4. Centennial Hights, Hatch bent on tank.
5. Pipe Gallery leaks
6. Air Relief Valve leaks on clearwell.

RECOMMENDATIONS

DATE LETTER SENT Dec. 2, 1983

WQS

Gary Burriss

STATE OF TENNESSEE
DEPARTMENT OF PUBLIC HEALTH
SOUTHEAST REGIONAL OFFICE
2501 MILNE STREET
CHATTANOOGA, TENNESSEE 37406

JRM
RBM 12/8
SKB 12/
GKB 12/12
JMM 12/
PLS 12/2
FILE
DAYTON - WATER
RHEA

December 7, 1983

Honorable Wendell Brown, Mayor
City of Dayton
P.O. Box 226, W. First Avenue
Dayton, Tennessee 37321

Re: Dayton Water System
Sanitary Survey of Water System
Rhea County, Tennessee
P.W.S.I.D. # 0000174

Dear Mayor Brown:

Pursuant to the Tennessee Safe Drinking Water Act of 1983, a sanitary survey was conducted on the public water system referenced above on November 30, 1983. In accordance with the published Procedures for Rating Public Water Supply Systems in Connection with Investigations, your system was awarded a numerical score of 92, placing it among the State's APPROVED public water supplies.

During the survey the filter plant laboratory was recertified to run turbidity analysis.

The following are deficiencies observed during the survey:

1. Maintenance of the storage tanks needs to be improved. The tank at the Oster Plant needs to be painted as soon as possible to prevent rust from totally destroying it. The Centennial Hights tank needs a new and stronger hatch in order to prevent unwanted entry into the tank.

2. The filter plant should be operated systematicly and not allowed to fall into a state of disrepare as it has in the past.

3. Jar tests should be conducted frequently to determine proper chemical dosage.

4. The chemical feeders should be calibrated frequently and maintenance of all treatment units should be improved.

If you have any questions or need information on requirements please contact Gary Burriss, Robert Moore, or me. Our telephone number is 624-9921 in Chattanooga.

Sincerely,

Philip L. Stewart

Philip L. Stewart
Assistant Manager
Chattanooga Basin Office
Division of Water Management

PLS/GKB/agk

cc: Rhea County Health Department
cc: Agnew Jewell, Superintendent

bc: Southeast Regional Health Office
bc: W. David Draughon, Division of Water Management, Nashville

1984 COMPTRAIN PROGRAM OBJECTIVES
CITY OF DAYTON WASTEWATER TREATMENT PLANT

I. TECHNICAL ASSISTANCE
   A. Compliance Sampling Program
      1. Technique and procedures
      2. Schedule and record keeping
   B. Assess Laboratory Analysis Needed
      1. Analysis for process control
      2. Staffing for performance of sampling and lab work
      3. Assess adequacy of laboratory equipment
   C. Process Control
      1. Measuring sludge blankets in clarifiers and controlling return activated sludge (RAS) flow
      2. Wasting sludge by solids retention time (SRT)
         a. Measure WAS flow by fill and draw
         b. Wasting more continuously
      3. Settleability of mixed liquor suspended solids (MLSS)
      4. Grit removal
      5. Sand drying bed operation
   D. Odor Control
      1. Review consulting engineers' report(s) on odor control
      2. Prepare comments on source of odor and proposed control methods
   E. Solids Disposal
      1. Alternatives for disposal of sand drying bed sludge and/or liquid stabilized sludge
      2. Assist in preparation of permit application
   F. Evaluate Treatment Plant Capacity
      1. Use "Idealized Computer Model"
      2. Liquid handling capacity
      3. Solids handling capacity
   G. Energy Conservation Opportunities (ECO)
      1. Energy Audit
         a. Review power bills
         b. Identify major energy comsumers
      2. Assess ECO's - cost savings and payback periods
   H. Long Term Planning
      1. Equipment replacement and recommended capital improvements program
      2. Define alternatives for I/I problem
      3. Review color discharge problem

II. TRAINING
   A. Laboratory Training
      1. BOD analysis
      2. Suspended solids and volatile suspended solids
      3. Maintenance of lab equipment
   B. Process Control Techniques
      1. Sludge blanket levels
      2. Sludge wasting, settleability and DO measurements

FW
environmental consultants

FW CONSULTANTS, INC.

310 W. Liberty Street
Morrissey Building - Suite 714
Louisville, Kentucky 40202
502-589-3272

July 25, 1984

Mr. James M. Smith, Jr.
City Manager
City of Dayton
P.O. Box 226
Dayton, Tennessee 37321

Re: Comptrain Sampling Compliance Program

Dear Mr. Smith:

Based on my visit to the Dayton Wastewater Treatment Plant, I feel that your highest priority should be to establish a representative, consistent compliance sampling program. The elements of this recommended program consist of sampling on the same day each week (regardless of the conditions prevailing on that day), of sampling according to EPA recommended procedures and of maintaining records as required in your NPDES permit.

This recommended procedure should result in data representative of plant conditons and will provide you with an established program, so that the Tennessee Department of Public Health should be confident that the data actually represents plant performance. It is also to your advantage to initiate a program like this to verify self-monitoring compliance.

I will be in touch directly with the Chief Operator to assist in setting up this routine practice. It should be noted that sampling on this routine basis should have a high priority at the plant, and that only an emergency should interupt the schedule.

Attached is a copy of the EPA manual, "NPDES Compliance Sampling Manual", for Mr. Snyder's use.

Sincerely,

Neil A. Webster

Neil A. Webster, P.E.
COMPTRAIN TENNESSEE
Field Director

cc: Mr. Agnew Jewell - Superintendent
Mr. Marvin Snyder - Chief Operator

Compliance Sampling Schedule
City of Dayton, Tennessee

Sample	Location	Type of Sample	Frequency and Amount	Handling and Preserving	Analysis	Record Keeping
1. Raw Sewage	Inlet box at top of screw pump.	Composite (1)	Monday Wednesday Friday (3 days) sample every 2 hours for 16 hours/day 200 mls per sample.	Refrigerate composite	TSS BOD5 Ammonia	Time, Date Amount, Location, Individual (See Part B Monitoring Procedures Pg. 4 of 17 Dayton NPDES Permit.) Maintain records for 3 years.
2. Final Effluent	Collection chamber at clarifier effluent.	Composite (1)	Monday Wednesday Friday (3 days) Sample every 2 hours for 16 hours/day 200 mls per sample.	Refrigerate composite	TSS BOD5 Ammonia	Time, Date Amount, Location, Individual (See Part B Monitoring Procedures Pg. 4 of 17 Dayton NPDES permit.) Maintain records for 3 years.

Compliance Sampling Schedule (con't.)

3. Final Effluent	At the discharge point to the stream.	Grab	Monday - Friday (5 days) Once per day grab sample - 2 liters.	Refrigerate Perform fecal coliform within 6 hrs of sampling.	Fecal coliform, D.O., chlorine residual, settleable solids, pH	Time, Date, Amount, Location, Individual (See Part B Monitoring Procedures Pg. 4 of 17 Dayton NPDES permit.) Maintain records for 3 years.

---

(1) The raw sewage sample pump should be repaired in order to use the automatic sampler. The final effluent sampler can be used if construction does not affect the sample.

COMPOSITE SAMPLE LOG

DATE: ______________________

SAMPLE LOCATION (Influent or Effluent)	TIME SAMPLED	SAMPLE VOLUME COMPOSITED	OPERATOR	COMMENTS

TENNESSEE COMPTRAIN 1984

WASTEWATER TREATMENT SYSTEM ASSESSMENT

A. General

Facility Name Dayton WWTP Design Population 6,000

Type of Plant Complete mix extended aeration activated sludge.

Year Built (& Major Renovations) Start-up - January 1974

Town/County Dayton/Rhea

Operating Agency: Name City of Dayton - City Manager

Official Jim Smith Telephone No. (615) 775-1817

Regulatory Agency Tennessee Department of Health

Permit No. TN 0020478

Major Pre-identified Non-compliance Areas (ref. State letter May 21, 1984) 1. Not running ammonia analysis. 2. Color in effluent. 3. Chlorine residual analyzer not in service. 4. sampling deficiencies. 5. Excessive I/I.

B. Wastewater Treatment System

Permit Conditions: Discharge Requirements

BOD_5 (mg/l) 10 (avg.) 20 (daily max.)

TSS (mg/l) 30 (avg.) 45 (daily max.)

NH_3 (mg/l) 10 (avg.) 15 (daily max.)

D.O. (mg/l) 5.0 Minimum

Fecal Coliform (count/100 mls) 200/100 mls

Receiving Stream Richland Creek Embayment @ Mile 2.3
(Attach NPDES Permit)

Description of Treatment Plant & Equipment

Hydraulics

Average Daily Flow (Design) 2.0 MGD (in 18 hrs.)

(Current) 1.88 MGD (Jan.- June 1984)

Maximum Daily Flow (Design) 2.67 MGD

(Current) 2.4 MGD

Minimum Daily Flow (Design) ______

(Current) 1.6 MGD

Peak Hourly Flow (Design) ______

(Current) 3.2 MGD

Collection System (Combined, Separate): ______

Combined sewer system

Seasonal Variation (explain) None except during wet and dry season.

Average Influent Characteristics

BOD_5: Design (mg/l) 220

Current (mg/l) 167 mg/l (Jan.- June 1984)

TSS: Design (mg/l) 220

Current (mg/l) 178 mg/l (Jan.- June 1984)

Types of Waste

% Domestic 60%

% Infiltration/Inflow Very high during rain

% Industrial Waste 40%

Types of Industrial Waste Dye manufacturer, hoisery mill, sink manufacturing

Connected Population Greater than 6,300

Processes Description (attach schematic diagram of all unit processes)

Preliminary Treatment

Bar Screens

* Number One
* Dimensions 36" across the channel.
* Openings 1 1/4"
* Flow-through Velocity About 1.5 fps
* Method of Cleaning (Manual/Mechanical) Manual
* Cleaning Frequency Three times per shift.
* Daily Volume of Screenings Trash can full.
* Disposal Hauls to local landfill.
* Comments The raw sewage influent flow is split between the bar screen and comminutor. There is an excessive amount of rags and debris in the plant.

Comminutors

* Type Worthington
* Dimensions 35" across and 57" high.
* Hydraulic Capacity of Each Unit 0.5 MGD to 11 MGD
* Comments Comminutor is maintained in service.

Grit Removal

* Type of System Aerated grit channel.
* Hydraulic Capacity 2.67 MDG (7 min. - 24 secs. detention time.)
* Dimensions 12ft x 12ft 10ft deep
* Volume of Grit Pumps with air eductor.
* Velocity (Average) 0.04 fps
* Disposal To landfill

* Comments Only removes grit once every three months and maybe scouring grit off the bottom.

Flow Measurement Influent

* Type of Device Parshall flume
* Recordings Local indicator and remote circular chart recorder.

Primary Treatment

Clarifiers

* Number None
* Surface Area
* Depth
* Volume
* Weir Overflow Rate
* Surface Settling Rate
* Scum Collection Method
* Comments

Sludge Pumping

* Number
* Method of Control
* Capacity & HP
* Comments

Secondary Treatment

Activated Sludge

* Number of Basins Two
* Volume 1.08 MG
* Hydraulic Detention Time 13 hrs @ 2.0 MGD.
* F/M Ratio 1.19 lbs BOD5/lb MLSS/day
* Mixed Liquor (MLSS) and Volatiles (MLVSS)

  Avg. MLSS = 1670 mg/l (No volatiles)
* Sludge Residence Time Approximately 4-5 days
* Describe Operating Control Procedure Measures DO twice daily, wastes according to MLSS concentration (about 1 hr/day), checks settleability and pumps RAS according to solids carryover in clarifier
* Type of Aeration Diffused air

  (Mechanical)

  * Number
  * HP
  * Rated Capacity
  * Dissolved Oxygen Levels

  (Diffused Air)

  * Type of Diffusers Chicago pump (discfusers)
  * Number of Compressors Two
  * Type of Compressor Hoffman centrifugal
  * Capacity 3500 scfm @ 7 psig
  * HP 200 HP each (one on line)
  * Estimated Oxygen Transfer Efficiency About 5%
  * Dissolved Oxygen Levels 5.0 mg/l

* Air Limitation Problems Cannot throttle blowers any lower to save energy.
* Control of Air System Inlet air butterfly valve.
* Condition of Equipment & Comments Diffused air equipment seems to be in over-all good condition.

Trickling Filter Process

* Media Type Not applicable.
* Surface Area
* Media Depth
* Hydraulic Loading
* Organic Loading
* Recirculation Ratio
* Recirculation Pump Capacity
* Troubleshooting (Ponding, etc.)

Secondary Clarifiers

* Number Two
* Type (Rectangular or Circular) Rectangular
* Weir Loading Rate 7250 gpd/ft
* Surface Area 440 sq ft/day
* Solids Loading Rate 7 lbs/sq ft/day
* Hydraulic Loading 450 gpd/sq ft
* Detention Time 4.7 hrs.
* Sludge Collection System Chain and flight collector to hopper at influent end.
* Return Sludge Pump(s) Capacity Three pumps - 500 gpm each.

* Pump Control Three pumps used between 2 tanks.
  * Waste Sludge Pump Capacity Wastes off RAS line.
  * Wasting Schedule Wastes sludge for about 1 hour each day to control MLSS concentration.
  * Waste Sludge Problems Metering on wasting rate may not be accurate. Wastes entire amount in one hour.
  * Comments (Short circuiting or bulking problems) Good settleability for MLSS, however there is a problem in pumping RAS evenly from each clarifier. Without a sludge judge to measure sludge blankets, operator observes solids carryover from one clarifier before changing pumping rate.

Disinfection

Contact Basins

* Number None (under construction)
* Volume
* Detention Time

Chlorinator

* Chlorinator Capactiy (0 - 500 lbs/day)
* Ejector Type Process water pressure eductor.
* Feed Control Based on chlorine residual in effluent.
* Dosage Rate 3 mg/l
* Chlorine Residual 0 - 1 mg/l at discharge point.
* Cylinder Size & Storage 1 ton cylinders
* Alarms Low chlorine pressure from ton cylinder.
* Loss of Weight Control Reads scale daily.
* Separate Building Yes

* Safety ("A" or "B" Kit) No "B" kit available, but there is a self-contained breathing apparatus.
* Cylinder Replacement Electric hoist used to replace cylinders. Two cylinders can be manifolded together.
* Fecal Coliform Count Usually 100/100 mls
* Comments Chlorine contact basin, currently under construction, will assist in controlling dosage.

Solids Handling

Sludge Generation

Primary None

Secondary 90,000 gals/day or 4,000 lbs/day

Describe Solids Handling Processes and Design

1. Two aerobic digesters - DO maintained at 7.0 mg/l and is supernated daily by pumping to influrent (700 gpm pump). Digested sludge is pumped to drying beds with 250 gpm pump. TS and TVS are monitored once per week. Data on TS and TVS is questionable (i.e. TS = 7.0% VS = 80-90%). Capacity = 0.2 MG, Detention Time = 8 days, Volatile Solids Loading 0 = .11 lbs VS/cu ft.
2. Sand dry beds - Five beds for a total surface area of 10,000 sq ft. Dewatered sludge is hauled by City of Dayton Street Department.

Ultimate Disposal of Sludge

Contract Hauling No

Location of Disposal Site Farmland or sites in the City of Dayton.

Description of Disposal Practice Dried or liquid sludge is disposed of on land.

Permit for Land Spreading? In the process of applying for permit from the State of Tennessee.

Alternative Future Sludge Disposal Methods Not known

By-Passing Capability: For Preliminary or Primary (Frequency, Duration, % of Flow) No

For Secondary (Frequency, Duration, % of Flow) No

By-Pass Reporting Sent in monthly to State report (See attached)

System By-Passing At the lift station during the heavy rain.

Reporting to EPA Yes

Average Effluent Characteristics (Attach past 6 months of State Report)

Characteristics: BOD_5 (mg/l) 6

TSS (mg/l) 6

Ammonia (mg/l) Not measured

Dissolved Oxygen 5.1 mg/l

Sampling Methods (Daily, Weekly, Monthly, Grab or Composite) Raw sewage sampler pump for automatic sampler is out of service. Grab samples taken once/hour, three days/week by Chief Operator. Final effluent sampler is usable when effluent pumps are in service, but due to construction, it is not used.

State Inspection Reports (Attach latest report) (January 18, 1984) Compliance Sampling Inspection

1. Infiltration/Inflow excessive 2. Color discharge 3. Capacity problem 4. Sampling problems 5. Plant is understaffed.

Laboratory Capability

Describe Equipment and Testing Apparatus Chief Operator performs laboratory analysis. BOD5 analysis, TSS, TS, TVS, pH, DO and fecal coliform. Problems experienced with anaytical balances.

Quality Assurance Program Description Marginal. The State requires the Plant to do 10% spikes and duplicates for each sample are done. Operator should check seeded vs. unseeded on effluent.

Process Control (Attach Control Practices)

Activated Sludge Process Control Description (i.e., settleablility, SRT, F/M, D.O., O.U.R.'s, Bulking Sludge Measures settleability and DO'S. Does not control process according to SRT or F/M.

Process Knowledge Chief Operator is a self trained Class III operator and has never had formal training. A definite need exists for specific on-site training in sampling, analytical procedures and process control.

Record Keeping (Attach Copies) Refer to attached sheets which outline daily analysis and duties to be performed.

Process Control Problems 1. Proper control of wasting rate, RAS rate, DO, sludge blankets and sampling are needed.

Administrative Support Appears to be okay, except for training and possible additional staffing needs.

Operation and Staffing

Hours Staffed Per Day 16 hrs/day - 7 days/week

Number of Operators 1 Chief Operator, 3 Operators

Organizational Structure City Manager - Superintendent of water and wastewater and Chief Operator.

Certification(s) Chief Operator - Class III and one Class I operator.

Certification Training No formal training at Murfreesboro training center by any operators.

Describe Over-all Operator Duties Chief Operator does sampling and all laboratory work. Determines process control decisions and supervises operators. Operators remove rags from pumps, bar rack, and gates, wastes sludge, records chlorine levels, skims tanks, cleans areas and checks lift stations.

Work Order System (Attach Copy) None in existence - Chief Operator informs superintendent of needed repairs.

Maintenance: Preventive Maintenance Fills oilers, lubricates bottom bearing in influent screw lift pump, and checks equipment.

Restoring Equipment Back in Service Most critical equipment is kept in service.

Tools & Inventory Appears to be adequate.

Planning & Schedule There is no established priority system.

Manuals: Plant O&M Manual Yes, a complete two volume set.

Equipment Catalogs Manufacturers' information is in the O & M Manuals.

Housekeeping Kept up routinely.

Safety Practices No formal program exists and no formal training has been received.

Budget Preparation - Who helps prepare annual budget? Superintendent and City Manager (see attached budget).

Preliminary List of Compliance Problems

1. Sampling - technique and record keeping.
2. Analytical procedures.
3. Dye discharge to stream.
4. Infiltration/Inflow.

Collection System

Pumping Stations: Controls Level control - wet well.

Alarms None

By-passing Yes during heavy rains - reported to State.

Location North drainage basin.

Numbers One lift station.

Condition & Documents Pumps are old and are being replaced this year along with new station.

Piping Sizes 8"

Gravity of Force Mains Mostly gravity fed to plant.

Possible H2S Problem(s) Yes, a severe odor problem exists at the plant and has been documented as H2S problem.

Type of Pipes Concrete, clay

Manhole Entry Procedures No established procedures and rare entry into manhole.

Emergency Planning A section in the O & M Manual addresses this situation for standby -power generator (170 kw) and natural disasters.

Planning: Capacity The City faces many problems with the plant right now in terms of capacity, infiltration/inflow, pretreatment, staffing and compliance with discharge regulations.

Future Standards No anticipated change.

Regulations on Hand

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning the effective date of this permit and lasting through the expiration date of this permit, the permittee is authorized to discharge from all point sources associated with this operation.

Discharge 001, consisting of treated municipal wastewater from a facility with a design capacity of 2.54 mgd, discharges to mile 2.3 of Richland Creek. Discharge 001 shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Effluent Limitations						Monitoring Requirements		
	Monthly Avg. Conc. mg/l	Monthly Avg. Amount lb.(kg)	Weekly Avg. Conc. mg/l	Weekly Avg. Amount lb.(kg)	Daily Max. Conc. mg/l	Daily Max. Amount lb.(kg)	Measurement Frequency	Sample Type	Sampling Point
BOD_5	10	210(95)	15	320(145)	20	420(190)	3/week	composite	influent effluent
Ammonia as Nitrogen	10	210(95)	12.5	260(118)	15	320(145)	3/week	composite	influent effluent
Suspended Solids	30	635(288)	40	847(384)	45	953(432)	3/week	composite	influent effluent
Fecal Coliform	See below						3/week	grab	effluent
D.O.	5.0 minimum						5/week	grab	effluent
Chlorine Residual					0.5		5/week	grab	effluent
Settleable Solids					0.1 ml/l		5/week	grab	effluent
pH	6.0 - 9.0 standard units						5/week	grab	effluent
Flow, mgd (m^3/day)							7/week	continuous	effluent
Conservative Parameters	See Part III, REPOENER CLAUSE								

J-21-

STATE OF TENNESSEE
DEPARTMENT OF HEALTH AND ENVIRONMENT
SOUTHEAST REGIONAL OFFICE
2501 MILNE STREET
CHATTANOOGA, TENNESSEE 37406

January 27, 1984

Certified Mail

Mr. James M. Smith, Jr.
City Manager
City of Dayton
P. O. Box 226
Dayton, Tennessee 37321

Re: City of Dayton's WWTP,
Operation and Maintenance Inspection
NPDES Permit No. TN0020478
C. O. No. 80-009
Rhea County, Tennessee

Dear Mr. Smith:

In our letter dated January 18, 1984, the following information was inadvertantly omitted from deficiency number 2.

> This Division has received several complaints from private citizens concerning color in the Richland Creek embayment. The source of these complaints is the Dayton Wastewater Treatment Plant's outfall. The culprit appears to be the Pentafab Corp. discharging dye wastes directly into the City sewerage system without pretreatment. If this is the case, the City of Dayton needs to require that Pentafab Corp. install pretreatment facilities capable of handling all dye wastes before they're discharged into the City's sewerage system.

Please include comments for this in your response letter to us. If you have any questions or comments, please contact Mr. Pilkin at this office. The telephone number here is 615/624-9921.

Sincerely,

Philip L. Stewart

Philip L. Stewart, Assistant Manager
Chattanooga Basin Office
Division of Water Management

PLS/JFP/tdm/dfp

cc: Rhea County Health Department
cc: City of Dayton, c/o Mr. Marvin Snyder
cc: Environmental Protection Agency, Atlanta, Georgia, c/o Mr. Gil Wallace
(through Garland Wiggins, Nashville)
bc: Division of Water Management, Nashville, c/o Garland Wiggins and Paul Davis
bc: Division of Construction Grants and Loans, Nashville, c/o Roger Lemasters
bc: Southeast Regional Health Office
bc: Jack R. McCormick

STATE OF TENNESSEE
DEPARTMENT OF HEALTH AND ENVIRONMENT
SOUTHEAST REGIONAL OFFICE
2501 MILNE STREET
CHATTANOOGA, TENNESSEE 37406

May 21, 1984

Certified Mail

Mr. James M. Smith, Jr.
City Manager
City of Dayton
P. O. Box 226
Dayton, Tennessee 37321

Re: City of Dayton's WWTP
Compliance Sampling Inspection
NPDES Permit No. TN0020478
Commissioner's Order No. 80-009
Rhea County, Tennessee
NOTICE OF NON-COMPLIANCE
NOTICE OF COMPLIANCE REVIEW MEETING

Dear Mr. Smith:

A routine, on-site compliance sampling inspection (CSI) of the City of Dayton's WWTP was conducted on January 16, and 17, 1984 by Eugene O. Scrudder and Terrence P. Whalen of the Division of Water Management's Chattanooga Basin Office. They were accompanied by Mr. Marvin Snyder, Chief Operator at the facility. The findings of the inspection were reported on U.S.-EPA Form 3560-3. A copy of the completed form, a summary of effluent analytical results and a copy of the Reports of Analysis of samples collected during the inspection are attached. Please note that a copy of this report has been forwarded to the U.S.-EPA Region IV, Atlanta.

The following problems were noted during the inspection:

1. The plant is currently operating under both a NPDES Permit and a Commissioner's Order. The Permit limits are in effect for those parameters listed in the Permit but not in the Order. Therefore, the City is found to be in non-compliance with NPDES Permit No. TN0020478 in two respects since ammonia is not being run or reported. Also, the effluent being discharged to the Richland Creek Embayment caused an objectionable color contrast at the time of the inspection.

2. The effluent was in non-compliance with Commissioner's Order No. 80-009 for BOD_5 and fecal coliform.

3. The effluent flow totalizer reading was substantially less than the influent flow reading and could not be used. The influent flow was checked and found to be approximately thirteen percent high. It is imperative that all flow measurement devices be placed in correct working order as soon as possible.

4. The influent composite sampler should be restored to service. It was necessary to hand composite an influent composite sample from hourly grab samples taken in volumes proportional to flow.

5. As explained to the City on several earlier occasions the recommended staffing for this facility is 7.5 persons (equivalent) of which one is a Grade 3 operator and three are Grade 1 operators. Currently, Mr. Snyder (Grade 3) is the only certified operator. An increase in staffing is necessary to insure that adequate manpower, properly trained, is available to perform all operation and maintenance functions.

6. All laboratory equipment was in working order except for the amperometric titrator. It should be repaired or replaced as soon as possible since it is the only practical device available for measuring total residual chlorine in samples containing color bodies which interfere with other procedures.

7. It appears that analyses are being performed according to approved procedures and are correctly calculated. The laboratory exceeds the U.S.-EPA recommendations of 10% duplicate samples. However, to insure accuracy of the results, the laboratory should spike approximately 10% of the applicable samples. In this instance, BOD and ammonia are the only parameters amenable to spiking.

8. Our laboratory personnel have reviewed the May 23 and 24, 1983, U.S.-EPA Compliance Sampling Inspection report. It is believed that references to 0.99 normal N and 0.375 N sodium thiosulfate are the result of misunderstanding and typographical error. When used for dissolved oxygen determinations (either perse or in the BOD procedure), a stock solution of 0.1 N sodium thiosulfate is diluted to a working strength of approximately 0.025 N and standardized. For convenience in calculations, the strength of the working solution is expressed as a factor, which is a ratio of actual strength to the ideal strength of 0.025 N. The above lead our personnel to believe that the factor of 0.99 is referred to instead of 0.99 N. The reference to 0.375 N is believed to be a typographical error based on an EPA procedure which we understand uses 0.0375 N.

9. On February 8, 1982, Messrs. Anwar H. Mujahid and Eugene O. Scrudder of this office performed a Performance Audit Inspection (PAI) of the Dayton WWTP. Results were reported in a letter dated February 23, 1982. That letter contained a request that a written response be submitted within thirty (30) days; as of May 14, 1984, no response has been received in this office.

10. This Division sent the City of Dayton a letter dated February 29, 1984, requesting further information on four of the deficiencies noted during our January 16, 1984 Operation and Maintenance (O&M) inspection. It also contained a request that a written response be submitted within thirty (30) days and no response to that request has been received in this office either.

11. The Chattanooga Basin Office has continued to receive and investigate complaints of objectionable color in the Richland Creek Embayment. The investigations have found the source of this color to be the dye waste in the effluent being discharged from the City of Dayton's WWTP's outfall line. Also, during the course of these investigations, evidence of very poor preventive maintenance on the wastewater collection system was found. A A map with notes describing some of the problem areas found is attached. Preventive maintenance is required to limit infiltration/inflow (I/I) and so reduce the periodic hydraulic overloading of the treatment units at thn WWTP.

Based upon the items noted above, this Division is issuing this formal Notice of Non-Compliance to the City of Dayton. It is requested that the City prepare a written response to this Notice for submittal to this office. The response should outline what steps have been taken or are being proposed to correct the recurrence of various problems and violations. The response must be submitted to this office within thirty (30) days of receipt of this letter.

This letter also serves as a Notice of Compliace Review Meeting. It is requested that you or your designated representative meet with us in this office on June 28, 1984 at 1:00 p.m. Please bring any information or documentation which may be relevant to this matter. Our offices are located on the third floor of the Southeast Regional Health Office at 2501 Milne Street, Chattanooga.

We appreciate the cooperation shown our personnel by Mr. Snyder and his staff during the inspection. If you have any questions, please contact Mr. Scrudder, Mr. Whalen or me at 615/624-9921.

Sincerely,

Philip L. Stewart

Philip L. Stewart, Assistant Manager
Chattanooga Basin Office
Division of Water Management

PLS/JFP/EOS/tdm/dfp

Enclosures

cc: Division of Water Management, Nashville, c/o Bob Slayden
cc: Mr. Marvin Snyder, Dayton WWTP
cc: Environmental Protection Agency, Atlanta, Georgia, c/o Gil Wallace (through Garland Wiggins, Nashville)
cc: Division of Water Management, Nashville, c/o Garland Wiggins and Bill Duffel through Paul Davis
cc: Rhea County Health Department
cc: Southeast Regional Health Office

o Slayden

rgia, c/o Gil Wallace

o Garland Wiggins and

OMB No. 158-R...

NPDES COMPLIANCE INSPECTION REPORT (Coding Instruction on back of last page)

TRANSACTION CODE		NPDES	YR	MO	DA	TYPE	INSPECTOR	FAC TYPE	TIME
N	5	TN0020478	84	01	16	S	S	1	10:00 a.m.

REMARKS

COMMISSIONERS ORDER 80009

ADDITIONAL

SECTION A - Permit Summary

NAME AND ADDRESS OF FACILITY *(Include County, State and ZIP code)*		EXPIRATION DATE / ISSUANCE DATE
Dayton Wastewater Treatment Plant Highway 27 South Dayton, Rhea County, Tennessee 37321		EXPIRATION DATE: May 1, 1985 ISSUANCE DATE: April 24, 1980
RESPONSIBLE OFFICIAL: James M. Smith, Jr.	TITLE: City Manager	PHONE: (615)775-1817
FACILITY REPRESENTATIVE: Marvin Snyder	TITLE: Chief Operator	PHONE: (615)775-0780

SECTION B - Effluent Characteristics *(Additional sheets attached ______)*

PARAMETER/ OUTFALL		MINIMUM	AVERAGE	MAXIMUM	ADDITIONAL
	SAMPLE MEASUREMENT				(see table 1)
	PERMIT REQUIREMENT				
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				

SECTION C - Facility Evaluation *(S = Satisfactory, U = Unsatisfactory, N/A = Not applicable)*

U	EFFLUENT WITHIN PERMIT REQUIREMENTS	U	OPERATION AND MAINTENANCE	U	SAMPLING PROCEDURES
S	RECORDS AND REPORTS	N/A	COMPLIANCE SCHEDULE	S	LABORATORY PRACTICES
S	PERMIT VERIFICATION	U	FLOW MEASUREMENTS		OTHER:

SECTION D - Comments

SECTION E - Inspection/Review

SIGNATURES	AGENCY	DATE	ENFORCEMENT DIVISION USE ONLY
INSPECTED BY Eugene O. Scrudder	TN-DWM	84-01-16	COMPLIANCE STATUS
INSPECTED BY [illegible] P. Whelan	TN-DWM	84-01-16	☐ COMPLIANCE
REVIEWED BY Philip L. Stewart	TN-DWM	84-05-21	☐ NONCOMPLIANCE

EPA FORM 3560-3 (9-77) REPLACES EPA FORM T-51 (9-76) WHICH IS OBSOLETE.

Sections F thru L: Complete on all inspections, as appropriate. N/A = Not Applicable

PERMIT NO. TN0020478

SECTION F - Facility and Permit Background

ADDRESS OF PERMITTEE IF DIFFERENT FROM FACILITY *(Including City, County and ZIP code)*	DATE OF LAST PREVIOUS INVESTIGATION BY EPA/STATE
City of Dayton P.O. Box 226 Dayton, Tennessee 37321	May 23-24, 1983, CSI by EPA FINDINGS S--3 categories U--4 categories N/A--1 categories

SECTION G - Records and Reports

RECORDS AND REPORTS MAINTAINED AS REQUIRED BY PERMIT. [X] YES [ ] NO [ ] N/A *(Further explanation attached ______)*

DETAILS:

	YES	NO	N/A
(a) ADEQUATE RECORDS MAINTAINED OF:			
(i) SAMPLING DATE, TIME, EXACT LOCATION	[X]	[ ]	[ ]
(ii) ANALYSES DATES, TIMES	[X]	[ ]	[ ]
(iii) INDIVIDUAL PERFORMING ANALYSIS	[ ]	[ ]	[ ]
(iv) ANALYTICAL METHODS/TECHNIQUES USED	[X]	[ ]	[ ]
(v) ANALYTICAL RESULTS *(e.g., consistent with self-monitoring report data)*	[X]	[ ]	[ ]
(b) MONITORING RECORDS *(e.g., flow, pH, D.O., etc.)* MAINTAINED FOR A MINIMUM OF THREE YEARS INCLUDING ALL ORIGINAL STRIP CHART RECORDINGS *(e.g. continuous monitoring instrumentation, calibration and maintenance records).*	[X]	[ ]	[ ]
(c) LAB EQUIPMENT CALIBRATION AND MAINTENANCE RECORDS KEPT.	[X]	[ ]	[ ]
(d) FACILITY OPERATING RECORDS KEPT INCLUDING OPERATING LOGS FOR EACH TREATMENT UNIT.	[X]	[ ]	[ ]
(e) QUALITY ASSURANCE RECORDS KEPT.	[X]	[ ]	[ ]
(f) RECORDS MAINTAINED OF MAJOR CONTRIBUTING INDUSTRIES *(and their compliance status)* USING PUBLICLY OWNED TREATMENT WORKS.	[X]	[ ]	[ ]

SECTION H - Permit Verification

INSPECTION OBSERVATIONS VERIFY THE PERMIT. [X] YES [ ] NO [ ] N/A *(Further explanation attached ________)*

DETAILS:

	YES	NO	N/A
(a) CORRECT NAME AND MAILING ADDRESS OF PERMITTEE.	[X]	[ ]	[ ]
(b) FACILITY IS AS DESCRIBED IN PERMIT.	[X]	[ ]	[ ]
(c) PRINCIPAL PRODUCT(S) AND PRODUCTION RATES CONFORM WITH THOSE SET FORTH IN PERMIT APPLICATION.	[X]	[ ]	[ ]
(d) TREATMENT PROCESSES ARE AS DESCRIBED IN PERMIT APPLICATION.	[X]	[ ]	[ ]
(e) NOTIFICATION GIVEN TO EPA/STATE OF NEW, DIFFERENT OR INCREASED DISCHARGES.	[X]	[ ]	[ ]
(f) ACCURATE RECORDS OF RAW WATER VOLUME MAINTAINED.	[ ]	[ ]	[X]
(g) NUMBER AND LOCATION OF DISCHARGE POINTS ARE AS DESCRIBED IN PERMIT.	[X]	[ ]	[ ]
(h) CORRECT NAME AND LOCATION OF RECEIVING WATERS.	[X]	[ ]	[ ]
(i) ALL DISCHARGES ARE PERMITTED.	[X]	[ ]	[ ]

SECTION I - Operation and Maintenance

TREATMENT FACILITY PROPERLY OPERATED AND MAINTAINED. [ ] YES [X] NO [ ] N/A *(Further explanation attached ______)*

DETAILS:

	YES	NO	N/A
(a) STANDBY POWER OR OTHER EQUIVALENT PROVISIONS PROVIDED.	[X]	[ ]	[ ]
(b) ADEQUATE ALARM SYSTEM FOR POWER OR EQUIPMENT FAILURES AVAILABLE.	[X]	[ ]	[ ]
(c) REPORTS ON ALTERNATE SOURCE OF POWER SENT TO EPA/STATE AS REQUIRED BY PERMIT.	[X]	[ ]	[ ]
(d) SLUDGES AND SOLIDS ADEQUATELY DISPOSED.	[X]	[ ]	[ ]
(e) ALL TREATMENT UNITS IN SERVICE. Micro Screens.	[ ]	[X]	[ ]
(f) CONSULTING ENGINEER RETAINED OR AVAILABLE FOR CONSULTATION ON OPERATION AND MAINTENANCE PROBLEMS.	[X]	[ ]	[ ]
(g) QUALIFIED OPERATING STAFF PROVIDED. No Class I Operators. See Letter.	[ ]	[X]	[ ]
(h) ESTABLISHED PROCEDURES AVAILABLE FOR TRAINING NEW OPERATORS.	[X]	[ ]	[ ]
(i) FILES MAINTAINED ON SPARE PARTS INVENTORY, MAJOR EQUIPMENT SPECIFICATIONS, AND PARTS AND EQUIPMENT SUPPLIERS.	[X]	[ ]	[ ]
(j) INSTRUCTIONS FILES KEPT FOR OPERATION AND MAINTENANCE OF EACH ITEM OF MAJOR EQUIPMENT.	[X]	[ ]	[ ]
(k) OPERATION AND MAINTENANCE MANUAL MAINTAINED.	[X]	[ ]	[ ]
(l) SPCC PLAN AVAILABLE.	[ ]	[ ]	[X]
(m) REGULATORY AGENCY NOTIFIED OF BY PASSING. *(Dates ____________ ____________)*	[X]	[ ]	[ ]
(n) ANY BY-PASSING SINCE LAST INSPECTION.	[X]		[ ]
(o) ANY HYDRAULIC AND/OR ORGANIC OVERLOADS EXPERIENCED.	[X]	[ ]	[ ]

PERMIT NO.
TN0020478

SECTION J - Compliance Schedules

PERMITTEE IS MEETING COMPLIANCE SCHEDULE. ☐ YES ☐ NO ☒ N/A *(Further explanation attached ______)*

CHECK APPROPRIATE PHASE(S):

- ☐ (a) THE PERMITTEE HAS OBTAINED THE NECESSARY APPROVALS FROM THE APPROPRIATE AUTHORITIES TO BEGIN CONSTRUCTION.
- ☐ (b) PROPER ARRANGEMENT HAS BEEN MADE FOR FINANCING *(mortgage commitments, grants, etc.)*.
- ☐ (c) CONTRACTS FOR ENGINEERING SERVICES HAVE BEEN EXECUTED.
- ☐ (d) DESIGN PLANS AND SPECIFICATIONS HAVE BEEN COMPLETED.
- ☐ (e) CONSTRUCTION HAS COMMENCED.
- ☐ (f) CONSTRUCTION AND/OR EQUIPMENT ACQUISITION IS ON SCHEDULE.
- ☐ (g) CONSTRUCTION HAS BEEN COMPLETED.
- ☐ (h) START-UP HAS COMMENCED.
- ☐ (i) THE PERMITTEE HAS REQUESTED AN EXTENSION OF TIME.

SECTION K - Self-Monitoring Program

Part 1 – Flow measurement *(Further explanation attached ______)*

PERMITTEE FLOW MEASUREMENT MEETS THE REQUIREMENTS AND INTENT OF THE PERMIT. DETAILS: *	☐ YES	☒ NO	☐ N/A
(a) PRIMARY MEASURING DEVICE PROPERLY INSTALLED. *	☐ YES	☐ NO	☐ N/A
TYPE OF DEVICE: ☐ WEIR ☐ PARSHALL FLUME ☐ MAGMETER ☐ VENTURI METER ☐ OTHER *(Specify* see letter *)*			
(b) CALIBRATION FREQUENCY ADEQUATE. *(Date of last calibration* Nov. 12, 1983 *)*	☒ YES	☐ NO	☐ N/A
(c) PRIMARY FLOW MEASURING DEVICE PROPERLY OPERATED AND MAINTAINED. *	☐ YES	☒ NO	☐ N/A
(d) SECONDARY INSTRUMENTS *(totalizers, recorders, etc.)* PROPERLY OPERATED AND MAINTAINED. *	☐ YES	☒ NO	☐ N/A
(e) FLOW MEASUREMENT EQUIPMENT ADEQUATE TO HANDLE EXPECTED RANGES OF FLOW RATES.	☒ YES	☐ NO	☐ N/A

Part 2 – Sampling *(Further explanation attached* X *)*

PERMITTEE SAMPLING MEETS THE REQUIREMENTS AND INTENT OF THE PERMIT. DETAILS: *	☐ YES	☒ NO	☐ N/A
(a) LOCATIONS ADEQUATE FOR REPRESENTATIVE SAMPLES.	☒ YES	☐ NO	☐ N/A
(b) PARAMETERS AND SAMPLING FREQUENCY AGREE WITH PERMIT.	☒ YES	☐ NO	☐ N/A
(c) PERMITTEE IS USING METHOD OF SAMPLE COLLECTION REQUIRED BY PERMIT. IF NO, ☐ GRAB ☐ MANUAL COMPOSITE ☐ AUTOMATIC COMPOSITE FREQUENCY ______	☒ YES	☐ NO	☐ N/A
(d) SAMPLE COLLECTION PROCEDURES ARE ADEQUATE. *	☐ YES	☒ NO	☐ N/A
(i) SAMPLES REFRIGERATED DURING COMPOSITING	☒ YES	☐ NO	☐ N/A
(ii) PROPER PRESERVATION TECHNIQUES USED	☒ YES	☐ NO	☐ N/A
(iii) FLOW PROPORTIONED SAMPLES OBTAINED WHERE REQUIRED BY PERMIT *	☐ YES	☒ NO	☐ N/A
(iv) SAMPLE HOLDING TIMES PRIOR TO ANALYSES IN CONFORMANCE WITH 40 CFR 136.3	☐ YES	☐ NO	☐ N/A
(e) MONITORING AND ANALYSES BEING PERFORMED MORE FREQUENTLY THAN REQUIRED BY PERMIT.	☒ YES	☐ NO	☐ N/A
(f) IF (e) IS YES, RESULTS ARE REPORTED IN PERMITTEE'S SELF-MONITORING REPORT.	☐ YES	☒ NO	☐ N/A

Part 3 – Laboratory *(Further explanation attached ______)*

PERMITTEE LABORATORY PROCEDURES MEET THE REQUIREMENTS AND INTENT OF THE PERMIT. DETAILS: *	☒ YES	☐ NO	☐ N/A
(a) EPA APPROVED ANALYTICAL TESTING PROCEDURES USED. *(40 CFR 136.3)*	☒ YES	☐ NO	☐ N/A
(b) IF ALTERNATE ANALYTICAL PROCEDURES ARE USED, PROPER APPROVAL HAS BEEN OBTAINED.	☐ YES	☐ NO	☒ N/A
(c) PARAMETERS OTHER THAN THOSE REQUIRED BY THE PERMIT ARE ANALYZED.	☐ YES	☒ NO	☐ N/A
(d) SATISFACTORY CALIBRATION AND MAINTENANCE OF INSTRUMENTS AND EQUIPMENT. *	☐ YES	☒ NO	☐ N/A
(e) QUALITY CONTROL PROCEDURES USED.	☒ YES	☐ NO	☐ N/A
(f) DUPLICATE SAMPLES ARE ANALYZED. 20 % OF TIME.	☒ YES	☐ NO	☐ N/A
(g) SPIKED SAMPLES ARE USED. ______ % OF TIME.	☐ YES	☒ NO	☐ N/A
(h) COMMERCIAL LABORATORY USED.	☐ YES	☒ NO	☐ N/A
(i) COMMERCIAL LABORATORY STATE CERTIFIED.	☐ YES	☐ NO	☒ N/A

* See Letter

LAB NAME ______

LAB ADDRESS ______

OMB No. ...

PERMIT NO.
TN0020478

SECTION L - Effluent/Receiving Water Observations (Further explanation attached

OUTFALL NO.	OIL SHEEN	GREASE	TURBIDITY	VISIBLE FOAM	VISIBLE FLOAT SOL	COLOR	OTHER
001	No	No	Some	No	No	Red to Blue	

(Sections M and N: Complete as appropriate for sampling inspections)

SECTION M - Sampling Inspection Procedures and Observations (Further explanation attached .. *)

☒ GRAB SAMPLES OBTAINED
☒ COMPOSITE OBTAINED
☒ FLOW PROPORTIONED SAMPLE
☒ AUTOMATIC SAMPLER USED
☒ SAMPLE SPLIT WITH PERMITTEE
☒ CHAIN OF CUSTODY EMPLOYED
☒ SAMPLE OBTAINED FROM FACILITY SAMPLING DEVICE

COMPOSITING FREQUENCY Influent-1/Hour PRESERVATION Refrigeration

SAMPLE REFRIGERATED DURING COMPOSITING: ☒ YES ☐ NO

SAMPLE REPRESENTATIVE OF VOLUME AND NATURE OF DISCHARGE Yes

SECTION N - Analytical Results (Attach report if necessary)

See Attached Sheets and Table I

REPORT OF ANALYSES

Division of Water Quality Control — Tennessee Department of Public Hea

SOURCE: DAYTON STP — Mile

IDENTIFICATION: INFLUENT - COMPOSITE

Field Number ______ Collected By TPW EOS Primary Station Number ______ Date Collected 840116-17

Time Collected 1030-1030 Sample Depth (ft.) ______ Laboratory No. CS-7

10-Temperature °C		2	340-C.O.D. mg/L (High Level)		
300-D.O. mg/L		3	335 C.O.D. mg/L (Low Level)		
310-5-day B.O.D. 20 °C mg/L ✓	84	4	70508 Acidity Total - Hot mg/L		
403-pH, Lab.		5	412 Alkalinity (Net) mg/L		1
400-pH, Field		6	38260-MBAS mg/L		1
81-App. Color Pt - Co units		7	95-Conductivity Micromho 25 °C		1
80-True Color Pt - Co units		8	1105-Aluminum as Al ug/L		1
70-Turbidity NTU		9	1007-Barium as Ba ug/L		1
410-Total Alk. as $CaCO_3$ mg/L		10	1032-Chromium-Hex. as Cr. ug/L		2
415-Phth. Alk. As $CaCO_3$ mg/L		11	1033-Chromium-Tri. as Cr. ug/L		2
437-Acidity as $CaCO_3$ mg/L		12	1034-Chromium-total as Cr. ug/L		2
900-Total Hardness as $CaCO_3$ mg/L		13	1037-Cobalt as Co ug/L		2
910-Calcium as $CaCO_3$ mg/L		14	1147-Selenium-total as Se ug/L		2
927-Magnesium as Mg mg/L		15	1145-Selenium (Diss.) as Se ug/L		2
929-Sodium as Na mg/L		16	1077-Silver as Ag ug/L		2
937-Potassium as K mg/L		17	32730-Phenols ug/L		2
500-Total Residue mg/L		18	1022-Boron-Total as B ug/L		2
530-Sus. Residue mg/L	88	19	615-Nitrite Nitrogen as N mg/L		2
515-Diss. Residue mg/L		20	620-Nitrate Nitrogen as N mg/L		3
31501-Coliform No./100 ml		21	405-Free CO_2 mg/L		1
31616-Fecal Coliform No./100 ml.		22	505-Total Vol. Residue mg/L		2
31679-Fecal Strep. No./100ml.		23	535-Vol. Sus. Residue mg/L		3
635-Total Kjl. Nitrogen as N mg/L		24	545-Settleable Residue ml/L		4
630-NO_3 & NO_2 as N mg/L		25	666-Diss. Phosphate as P mg/L		5
1097-Antimony as Sb ug/L		26	745-Sulfide, total as S mg/L		6
1045-Iron as Fe ug/L		27	746-Sulfide, Dissolved as S mg/L		7
1055-Manganese as Mn ug/L		28	369-Cl_2 Demand, 30 min. mg/L		8
940-Chloride as Cl mg/L		29	50064-Cl_2, Free Res. mg/L		9
950-Fluoride as F mg/L		30	50060-Cl_2, Combined Res. mg/L		10
665-Total Phosphate as P mg/L		1	690-Total Carbon mg/L		11
945-Sulfate as SO_4 mg/L		2	550-Oil and Grease mg/L		12
680-Total Organic Carbon mg/L		3	720-Cyanide as CN mg/L		13
1067-Nickel as Ni ug/L		4	32240-Tannin and Lignin mg/L		14
71900-Mercury-Total as Hg ug/L		5	610-Ammonia Nitrogen as N mg/L ✓	6.8	15
1051-Lead as Pb ug/L		6	605-Organic Nitrogen as N mg/L		16
1042-Copper as Cu ug/L		7	58-Flow Rate CFM		17
1002-Arsenic as As ug/L		8	61-Flow Rate CFS, Instantaneous		18
1027-Cadmium as Cd ug/L		9	60-Flow Rate CFS, Mean Daily		19
1092-Zinc as Zn ug/L		10			
955-Silica as SiO_2 mg/L		11			

Remarks: ______

C. PH-054

REPORT OF ANALYSES

Division of Water Quality Control — Tennessee Department of Public Heal

SOURCE : DAYTON STP — Mile

IDENTIFICATION : EFFLUENT - COMPOSITE EOS

Field Number ______ Collected By TPW Primary Station Number ______ Date Collected 840116

Time Collected 1045 - 1045 Sample Depth (ft.) ______ Laboratory No. CS-8

10-Temperature °C			2	340-C.O.D. mg/L (High Level)		1
300-D.O. mg/L			3	335 C.O.D. mg/L (Low Level)		1
310-5-day B.O.D. 20 °C mg/L	✓	41	4	70508 Acidity Total - Hot mg/L		1
403-pH, Lab.			5	412 Alkalinity (Net) mg/L		1
400-pH, Field			6	38260-MBAS mg/L		1
81-App. Color Pt - Co units			7	95-Conductivity Micromho 25 °C		1
80-True Color Pt - Co units			8	1105-Aluminum as Al ug/L		1
70-Turbidity NTU			9	1007-Barium as Ba ug/L		1
410-Total Alk. as $CaCO_3$ mg/L			10	1032-Chromium-Hex. as Cr. ug/L		2
415-Phth. Alk. As $CaCO_3$ mg/L			11	1033-Chromium-Tri. as Cr. ug/L		2
437-Acidity as $CaCO_3$ mg/L			12	1034-Chromium-total as Cr. ug/L		2
900-Total Hardness as $CaCO_3$ mg/L			13	1037-Cobalt as Co ug/L		2
910-Calcium as $CaCO_3$ mg/L			14	1147-Selenium-total as Se ug/L		2
927-Magnesium as Mg mg/L			15	1145-Selenium (Diss.) as Se ug/L		2
929-Sodium as Na mg/L			16	1077-Silver as Ag ug/L		2
937-Potassium as K mg/L			17	32730-Phenols ug/L		2
500-Total Residue mg/L			18	1022-Boron-Total as B ug/L		2
530-Sus. Residue mg/L	✓	34	19	615-Nitrite Nitrogen as N mg/L		2
515-Diss. Residue mg/L			20	620-Nitrate Nitrogen as N mg/L		3
31501-Coliform No./100 ml			21	405-Free CO_2 mg/L		1
31616-Fecal Coliform No./100 ml.			22	505-Total Vol. Residue mg/L		2
31679-Fecal Strep. No./100ml.			23	535-Vol. Sus. Residue mg/L		3
625-Total Kjl. Nitrogen as N mg/L			24	545-Settleable Residue ml/L		4
630-NO_3 & NO_2 as N mg/L			25	666-Diss. Phosphate as P mg/L		5
1097-Antimony as Sb ug/L			26	745-Sulfide, total as S mg/L		6
1045-Iron as Fe ug/L			27	746-Sulfide, Dissolved as S mg/L		7
1055-Manganese as Mn ug/L			28	369-Cl_2 Demand, 30 min. mg/L		8
940-Chloride as Cl mg/L			29	50064-Cl_2, Free Res. mg/L		9
950-Fluoride as F mg/L			30	50060-Cl_2, Combined Res. mg/L		10
665-Total Phosphate as P mg/L			1	690-Total Carbon mg/L		11
945-Sulfate as SO_4 mg/L			2	550-Oil and Grease mg/L		12
680-Total Organic Carbon mg/L			3	720-Cyanide as CN mg/L		13
1067-Nickel as Ni ug/L			4	32240-Tannin and Lignin mg/L		14
71900-Mercury-Total as Hg ug/L			5	610-Ammonia Nitrogen as N mg/L ✓	4.4	15
1051-Lead as Pb ug/L			6	605-Organic Nitrogen as N mg/L		16
1042-Copper as Cu ug/L			7	58-Flow Rate CFM		17
1002-Arsenic as As ug/L			8	61-Flow Rate CFS, Instantaneous		18
1027-Cadmium as Cd ug/L			9	60-Flow Rate CFS, Mean Daily		19
1092-Zinc as Zn ug/L			10			
955-Silica as SiO_2 mg/L			11			

Remarks : ______

PH-054

REPORT OF ANALYSES

Division of Water Quality Control — Tennessee Department of Public Heal

SOURCE: DAYTON STP — Mile

IDENTIFICATION: INFLUENT - GRAB

Field Number ______ Collected By EUS TPW Primary Station Number ______ Date Collected 840117

Time Collected 1250 Sample Depth (ft.) ______ Laboratory No. CS-9

10-Temperature °C	18°	2	340-C.O.D. mg/L (High Level)		1
300-D.O. mg/L		3	335 C.O.D. mg/L (Low Level)		1
310-5-day B.O.D. 20 °C mg/L		4	70508 Acidity Total - Hot mg/L		1
403-pH, Lab.		5	412 Alkalinity (Net) mg/L		1
400-pH, Field	8.5	6	38260-MBAS mg/L		1
81-App. Color Pt - Co units		7	95-Conductivity Micromho 25 °C		1
80-True Color Pt - Co units		8	1105-Aluminum as Al ug/L		1
70-Turbidity NTU		9	1007-Barium as Ba ug/L		1
410-Total Alk. as $CaCO_3$ mg/L		10	1032-Chromium-Hex. as Cr. ug/L		20
415-Phth. Alk. As $CaCO_3$ mg/L		11	1033-Chromium-Tri. as Cr. ug/L		2
437-Acidity as $CaCO_3$ mg/L		12	1034-Chromium-total as Cr. ug/L		2
900-Total Hardness as $CaCO_3$ mg/L		13	1037-Cobalt as Co ug/L		2
910-Calcium as $CaCO_3$ mg/L		14	1147-Selenium-total as Se ug/L		24
927-Magnesium as Mg mg/L		15	1145-Selenium (Diss.) as Se ug/L		2
929-Sodium as Na mg/L		16	1077-Silver as Ag ug/L		26
937-Potassium as K mg/L		17	32730-Phenols ug/L		27
500-Total Residue mg/L		18	1022-Boron-Total as B ug/L		28
530-Sus. Residue mg/L		19	615-Nitrite Nitrogen as N mg/L		29
515-Diss. Residue mg/L		20	620-Nitrate Nitrogen as N mg/L		30
31501-Coliform No./100 ml		21	405-Free CO_2 mg/L		1
31616-Fecal Coliform No./100 ml.		22	505-Total Vol. Residue mg/L		2
31679-Fecal Strep. No./100ml.		23	535-Vol. Sus. Residue mg/L		3
625-Total Kjl. Nitrogen as N mg/L		24	545-Settleable Residue ml/L		4
630-NO_3 & NO_2 as N mg/L		25	666-Diss. Phosphate as P mg/L		5
1097-Antimony as Sb ug/L		26	745-Sulfide, total as S mg/L		6
1045-Iron as Fe ug/L		27	746-Sulfide, Dissolved as S mg/L		7
1055-Manganese as Mn ug/L		28	369-Cl_2 Demand, 30 min. mg/L		8
940-Chloride as Cl mg/L		29	50064-Cl_2, Free Res. mg/L		9
950-Fluoride as F mg/L		30	50060-Cl_2, Combined Res. mg/L		10
665-Total Phosphate as P mg/L		1	690-Total Carbon mg/L		11
945-Sulfate as SO_4 mg/L		2	550-Oil and Grease mg/L		12
680-Total Organic Carbon mg/L		3	720-Cyanide as CN mg/L		13
1067-Nickel as Ni ug/L		4	32240-Tannin and Lignin mg/L		14
71900-Mercury-Total as Hg ug/L		5	610-Ammonia Nitrogen as N mg/L		15
1051-Lead as Pb ug/L		6	605-Organic Nitrogen as N mg/L		16
1042-Copper as Cu ug/L		7	58-Flow Rate CFM		17
1002-Arsenic as As ug/L		8	61-Flow Rate CFS, Instantaneous		18
1027-Cadmium as Cd ug/L		9	60-Flow Rate CFS, Mean Daily		19
1092-Zinc as Zn ug/L		10			
955-Silica as SiO_2 mg/L		11			

Remarks:

PH-054
WQC-6/7

REPORT OF ANALYSES

ivision of Water Quality Control — Tennessee Department of Public Heal

SOURCE : DAYTON STP — Mile

DENTIFICATION : EFFLUENT - GRAB

ield Number ______ Collected By EOS TPJ Primary Station Number ______ Date Collected 840117

ime Collected 1310 Sample Depth (ft.) ______ Laboratory No. CS-10

10-Temperature °C	14	2	340-C.O.D. mg/L (High Level)		
300-D.O. mg/L	*	3	335 C.O.D. mg/L (Low Level)		
310-5-day B.O.D. 20 °C mg/L		4	70508 Acidity Total - Hot mg/L		1
403-pH, Lab.		5	412 Alkalinity (Net) mg/L		1
400-pH, Field	7.0	6	38260-MBAS mg/L		1
81-App. Color Pt - Co units		7	95-Conductivity Micromho 25 °C		1
80-True Color Pt - Co units		8	1105-Aluminum as Al ug/L		1
70-Turbidity NTU		9	1007-Barium as Ba ug/L		1
410-Total Alk. as $CaCO_3$ mg/L		10	1032-Chromium-Hex. as Cr. ug/L		2
415-Phth. Alk. As $CaCO_3$ mg/L		11	1033-Chromium-Tri. as Cr. ug/L		2
437-Acidity as $CaCO_3$ mg/L		12	1034-Chromium-total as Cr. ug/L		2
900-Total Hardness as $CaCO_3$ mg/L		13	1037-Cobalt as Co ug/L		2
910-Calcium as $CaCO_3$ mg/L		14	1147-Selenium-total as Se ug/L		2
927-Magnesium as Mg mg/L		15	1145-Selenium (Diss.) as Se ug/L		2
929-Sodium as Na mg/L		16	1077-Silver as Ag ug/L		2
937-Potassium as K mg/L		17	32730-Phenols ug/L		2
500-Total Residue mg/L		18	1022-Boron-Total as B ug/L		2
530-Sus. Residue mg/L		19	615-Nitrite Nitrogen as N mg/L		2
515-Diss. Residue mg/L		20	620-Nitrate Nitrogen as N mg/L		3
31501-Coliform No./100 ml	XXX	21	405-Free CO_2 mg/L		1
31616-Fecal Coliform No./100 ml. ✓	>12,000	22	505-Total Vol. Residue mg/L		2
31679-Fecal Strep. No./100ml.		23	535-Vol. Sus. Residue mg/L		3
635-Total Kjl. Nitrogen as N mg/L		24	545-Settleable Residue ml/L ✓	0.6 XX	4
630-NO_3 & NO_2 as N mg/L		25	666-Diss. Phosphate as P mg/L		5
1097-Antimony as Sb ug/L		26	745-Sulfide, total as S mg/L		6
1045-Iron as Fe ug/L		27	746-Sulfide, Dissolved as S mg/L		7
1055-Manganese as Mn ug/L		28	369-Cl_2 Demand, 30 min. mg/L		8
940-Chloride as Cl mg/L		29	50064-Cl_2, Free Res. mg/L		9
950-Fluoride as F mg/L		30	50060-Cl_2, Combined Res. mg/L ✓	0.1	10
665-Total Phosphate as P mg/L		1	690-Total Carbon mg/L		11
945-Sulfate as SO_4 mg/L		2	550-Oil and Grease mg/L		12
680-Total Organic Carbon mg/L		3	720-Cyanide as CN mg/L		13
1067-Nickel as Ni ug/L		4	32240-Tannin and Lignin mg/L		14
71900-Mercury-Total as Hg ug/L		5	610-Ammonia Nitrogen as N mg/L		15
1051-Lead as Pb ug/L		6	605-Organic Nitrogen as N mg/L		16
1042-Copper as Cu ug/L		7	58-Flow Rate CFM		17
1002-Arsenic as As ug/L		8	61-Flow Rate CFS, Instantaneous		18
1027-Cadmium as Cd ug/L		9	60-Flow Rate CFS, Mean Daily		19
1092-Zinc as Zn ug/L		10			
955-Silica as SiO_2 mg/L		11			

Remarks : Light pink color. * Probe - 5.2 Winkler - 4.4 (doubtful)
XX [illegible]

C PH-054

Table 1

Summary of Effluent Analytical Results *
City of Dayton's WWTP
NPDES Permit # TN0020478
C.O. # 80-009

arameter	Found	Limitations, (Daily Maximum) C.O.	Permit
low, gpd	1,714,800		
OD5 mg/L	41	25	20
lbs/day	519	584	420
uspended Solids, mg/L	34	45	45
lbs/day	430	843	843
mmonia as N, mg/L	4.9		15
lbs/day	62		320
issolved Oxygen mg/L	5.2	3.0 min.	3.0 min.
H	7.0	6.0-9.0	6.0-9.0
otal Residual Cl_2, mg/L	0.1	0.5	0.5
ettleable Solids, ml/L	0.1	0.1	0.1
ecal Coliform, col/100 ml	>12,000	1,000	1,000

* Results from samples collected January 16 through 17, 1984.

City of Dayton

A. Location of Sewer Line Crossing

On the west bank there is an opening in the pipe which spills sewage into Little Richland Creek.

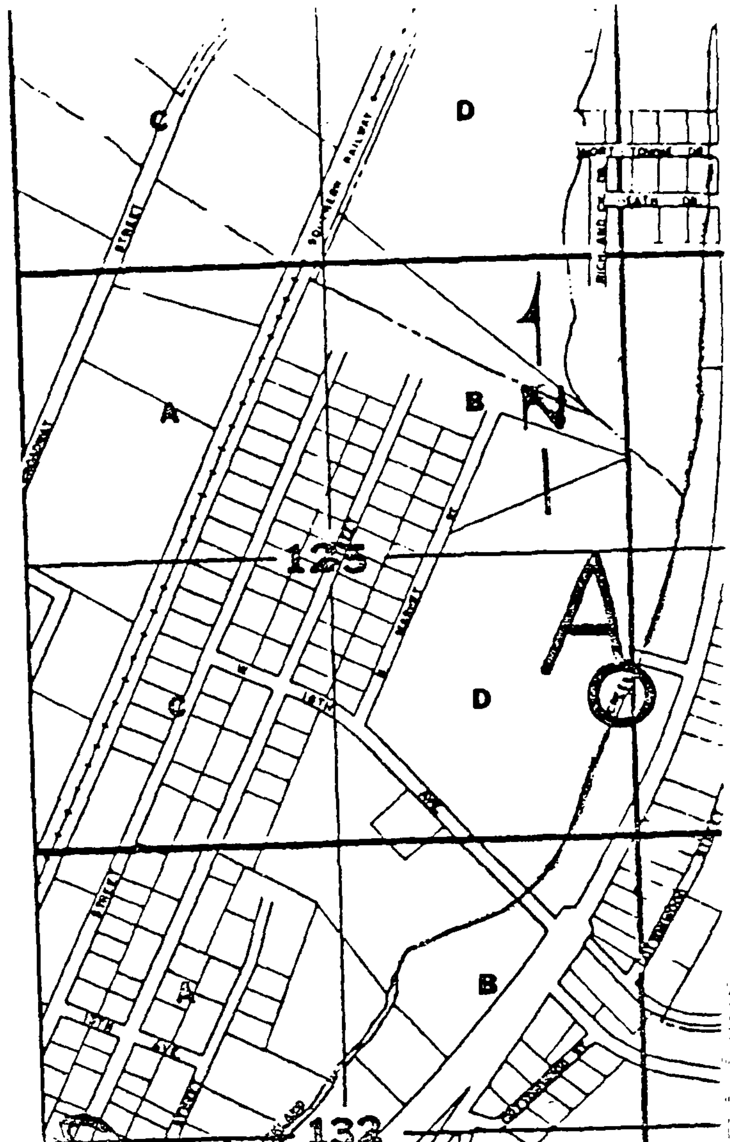
B. Manhole on Market Street

This manhole has overflowed. This indicates that the sewer line may be clogged.

C. Location of Sewer Line Crossing

Sewage was seen seeping from the west bank. This indicates a broken line.

On the east bank there is a broken manhole which has sewage flowing from it into Little Richland Creek.



JF(-)

STATE OF TENNESSEE
DEPARTMENT OF HEALTH AND ENVIRONMENT
SOUTHEAST REGIONAL OFFICE
2501 MILNE STREET
CHATTANOOGA, TENNESSEE 37406

January 18, 1984

Certified Mail

Mr. James M. Smith, Jr.
City Manager
City of Dayton
P.O. Box 226
Dayton, Tennessee 37321

Re: City of Dayton's WWTP
Operation and Maintenance
Inspection, NPDES
Permit No. TN0020478
C.O. # 80-009
Rhea County, Tennessee

Dear Mr. Smith:

On January 16, 1984, a routine, on-site Operation and Maintenance (O&M) Inspection of the City of Dayton's Wastewater Treatment Plant (WWTP) was performed by Mr. James F. Pilkin, Jr., of this office. A Compliance Sampling Inspection (CSI) was performed at the same time and will be reported in a separate letter. Mr. Pilkin was assisted by Mr. Marvin Snyder, Chief Plant Operator, during the O&M Inspection. The overall evaluation of the inspection was reported on EPA Form 7500-5, of which a copy is attached.

At the time of the inspection, the effluent was of an unsatisfactory visual quality, being dark brown in color and extremely turbid with solids. The following deficiencies were noted during the inspection:

1. Infiltration/inflow into the collection system is one of the major problems at the plant. The plant is designed to treat 2.000 million gallons per day (MGD). The average daily flow was less than 2.000 MGD for only 5 of the past 12 months. Overall, the average daily flow for the past year was 2.069 MGD. The peak day for the past year was 3.690 MGD flow. This figure does not include the amount that was periodically bypassed at the North Drainage Basin Pumping Station.

Due to the infiltration/inflow, the treatment units at the plant suffer periodically a severe hydraulic overload. This condition causes a reduced treatment efficiency, shorter life of equipment, and an increased cost for operation.

Infiltration/inflow needs to be [illegible] amount. A routine maintenance schedule for [illegible] system is necessary to prevent additional inf[illegible] existing.

2. Industrial waste appears to be a ma[illegible] plant. The City of Dayton needs to determine the am[illegible], [illegible] and [illegible]

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constitution of the industrial waste discharged into the sewerage system. During the inspection, Mr. Snyder was unable to provide this information.

Dye wastes entering the plant cause the effluent to be highly colored. This color can be offensive and leads to difficulties in analyzing the final effluent for total residual chlorine which are compounded by the amperometric titrator being unserviceable. It should be either repaired or replaced as soon as possible.

3. Our records show that the plant is designed to treat the sewage equivalent to that produced by 6000 persons. Information provided by the City diring the inspection showed that the population served was over 6300. If this figure includes the population equivalents (P.E.) of the industrial waste, then the plant is mildly overloaded organically. If the p.e. of the industrial waste are not included in that figure, then the plant is operating above its design capacity and no additional connections should be allowed to the collection system.

4. The publication "Estimating Manpower Requirements for Conventional Wastewater Treatment Facilities", printed for the Tennessee Department of Public Health in January, 1974, recommends that at least 7.5 persons staff a 2.0 MGD plant such as Dayton's. The recommended staffing is listed on Page 4, Section E. of the attached 7500-5 form. These recommendations have been made in past inspection reports as well.

5. It is suggested that the City of Dayton purchase a copy of the 15th edition of Standard Methods for the Analysis of Water and Wastewater. This reference is very important to insure that the required analyses are performed properly. The book can be ordered from:

American Public Health Association
1015 Fifteenth Street NW
Washington, D.C. 20005

6. There appears to be a rather large discrepancy between the flow readings of the influent and effluent totalizers. The effluent only showed 58% of the reading of the influent. Mr. Snyder stated that the effluent has worked erratically for some time. The source of the discrepancy should be located and resolved.

7. The refrigeration unit on the influent sampler was out. This should be repaired as the NPDES Permit requires composite samples on the influent and effluent. If this is a common problem, it may be more economical if the sampler is replaced rather than repaired.

8. The weirs of clarifier #2 look to be unlevel. Also this clarifier was loosing solids at the time of the inspection. The weirs need to be checked to determine if they are infact unlevel and if they are, then they need to be leveled.

9. The froth spray on one of the aeration basins had frozen during the recent cold weather. Mr. Snyder said that replacement pipe had been ordered and would be installed as soon as possible.

10. The chainlink fence surrounding the plant is in need of repair at the back of the plant where a tree collapsed onto it.

11. Mr. Snyder stated that the water line feeding the chlorinator frequently becomes clogged and needs to be flushed. Would it be feasible to use potable water for this purpose to alleviate the problem?

Due to the above noted deficiencies, the City of Dayton's WWTP is awarded a rating of "Conditional Acceptance" for 1984.

It is respectfully requested that the City of Dayton provide a written response to the above noted deficiencies within thirty (30) days of the receipt of this letter. Please address this response to Mr. James F. Pilkin, Jr. at this office.

We would like to thank Mr. Snyder for his assistance during our inspection. If you have any questions or comments regarding our inspection, please do not hesitate to contact Mr. Pilkin. The telephone number here is 615/624-9921.

Sincerely,

Philip E. Stewart

Philip E. Stewart, Assistant Manager
Chattanooga Basin Office
Division of Water Management

PLS/JFP/tdm

cc: Rhea County Health Department
cc: City of Dayton, c/o Mr. Marvin Snyder
cc: Environmental Protection Agency, Atlanta, Georgia c/o Mr. Gill Wallace (through Garland Wiggins)
bc: Division of Water Management, Nashville c/o Garland Wiggins and Paul Davis
bc: Division of Construction Grants and Loans, Nashville c/o Roger Lemasters
bc: Southeast Regional Health Office

ENVIRONMENTAL PROTECTION AGENCY

REPORT ON OPERATION AND MAINTENANCE OF WASTEWATER TREATMENT PLANT

DATE OF INSPECTION: 840116

Form Approved
OMB No. 158-R0035

A. GENERAL INFORMATION

1. PLANT
(a.) NAME: [illegible] WWTP
(b.) OWNER: City of [illegible]
(c.) LOCATION: [illegible]

2. TYPE OF PLANT: [illegible]
3. PROJECT NO.: C-170291
4. AVG. DESIGN FLOW (mgd): [illegible].0
5. DESIGN POPULATION EQUIVALENT: 6000

6. COLLECTION SYSTEM

COMBINED	X	SEPARATE		BOTH

7. DATE PRESENT PLANT BEGAN OPERATING: [illegible]
8. STATE PERMIT NO.: TN [illegible]

9. IN THE SPACE PROVIDED BELOW, FURNISH A SIMPLIFIED FLOW DIAGRAM OR A WRITTEN DESCRIPTION OF THE PLANT UNITS IN FLOW SEQUENCE.

See Attached Diagram

10. IDENTIFY RECEIVING WATERS
[illegible] Creek Embayment @ Mile 2.3

11. IDENTIFY PERTINENT STREAM STANDARDS AND/OR USES OF THE RECEIVING WATERS
[illegible]

12. GIVE THE EFFLUENT STANDARDS AND/OR REQUIREMENTS FOR STATE OPERATING PERMIT
[illegible] = 15 mg/L; TSS = 30 mg/L; [illegible] = [illegible] mg/L; [illegible] 3.0 mg/L; [illegible]

B. CURRENT PLANT LOADING

1. ANNUAL AVG DAILY FLOW RATE (mgd): [illegible]

2. PEAK FLOW RATE (mgd)

DRY WEATHER	WET WEATHER
[illegible].51	[illegible]

3. POPULATION SERVED: 6,354+

4. ANNUAL AVG BOD_5 OF RAW SEWAGE (mg/l): 182

5. ANNUAL AVG SUSPENDED SOLID OF RAW SEWAGE (mg/l): [illegible]10

6. PRINCIPAL TYPES OF INDUSTRIAL WASTE DISCHARGED TO MUNICIPAL SYSTEM: [illegible]

7. POPULATION EQUIVALENT (BOD) OF INDUSTRIAL WASTES: Unknown

8. POPULATION EQUIVALENT (SS) OF INDUSTRIAL WASTES: Unknown

9. VOLUME OF INDUSTRIAL WASTES (mgd): Unknown

10. INFILTRATION PROBLEMS
[illegible]

EPA Form 7500-5 (4-72) REPLACES FORM FWPCA-12 WHICH IS OBSOLETE.

C. PLANT PERFORMANCE

1. LABORATORY ANALYSIS (*Total Plant*)

(a) REPORTING PERIOD

FROM (*Month, year*)	TO (*Month, year*)
1 1983	December 1983

	MONTHLY ITEMS (b)	ACTUAL PLANT PERFORMANCE DATA (c)	PLANT DESIGN DATA (d)	NPDES PERMIT REQUIREMENTS (e)	PLANT ACHIEVES DESIGN EFFICIENCY (f) YES	(f) NO	PLANT COMPLIES WITH PERMIT REQUIREMENTS (g) YES	(g) NO
(1)	FLOW (*mgd*) (*monthly average*)	2.069	2.0			X		
(2)	PEAK FLOW (*mgd*) (*maximum day*)	3.670	2.0			X		
(3)	SETTLEABLE SOLIDS (*monthly average*) INFLUENT (*ml/1*)	0.1						
	EFFLUENT (*ml/1*)	<0.1		0.1			X	
	% REMOVAL							
(4)	SUSPENDED SOLIDS (*monthly average*) INFLUENT (*mg/1*)	10						
	EFFLUENT (*mg/1*)	7.1		[illegible]			X	
	% REMOVAL	[illegible]						
(5)	BOD$_5$ (*monthly average*) INFLUENT (*mg/1*)	[illegible]						
	EFFLUENT (*mg/1*)	[illegible]		[illegible]5			X	
	% REMOVAL	[illegible]						
(6)	DISSOLVED OXYGEN (*monthly average*) EFFLUENT (*mg/1*)	5.2		Z3.0			X	
(7)	CHLORINE RESIDUAL (*monthly average*) EFFLUENT (*mg/1*)	0.33		[illegible].5			X	
(8)	COLIFORM (*per 100 ml*) (*monthly average*) TOTAL							
	FECAL	7.3		[illegible]			X	
(9)	pH RANGE EFFLUENT MINIMUM	7.0		6.0			X	
	MAXIMUM	7.7		9.0			X	
(10)	TOTAL PHOSPHORUS (*as P*) (*monthly average*) INFLUENT (*mg/1*)							
	EFFLUENT (*mg/1*)							
	% REMOVAL							
(11)	TOTAL NITROGEN (*as N*) (*monthly average*) INFLUENT (*mg/1*)							
	EFFLUENT (*mg/1*)							
	% REMOVAL							

2. PLANT RECORDS

ARE MONTHLY OPERATING RECORDS FILED WITH STATE AGENCY? ☒ YES ☐ NO

Form Approved
OMB No. 158-R0035

3. DOES PLANT HAVE ALTERNATE ELECTRIC POWER SOURCE?
☐ DUAL FEED ☒ GENERATOR ☐ NONE

4. ADEQUATE ALARM SYSTEM FOR POWER OR EQUIPMENT FAILURES?
☒ YES ☐ NO

5. EQUIPMENT PROGRAM	ADEQUATE	INADEQUATE
(a.) ROUTINE MAINTENANCE SCHEDULES	X	
(b.) RECORDS OF MAINTENANCE,REPAIRS & REPLCMT	X	
(c.) SPARE PARTS INVENTORY	X	

6. IS PLANT EFFLUENT BEING CHLORINATED?
☒ YES ☐ NO

7. DOES SEWAGE BY-PASS PLANT IN WET WEATHER?
☐ YES ☒ NO

8. DOES SEWAGE BY-PASS PLANT IN DRY WEATHER?
☐ YES ☒ NO

9. AGENCIES NOTIFIED OF EACH BYPASS
TN. D.W.P.
[illegible]

10. BYPASS FREQUENCY *(Monthly)* ~1

11. AVG DURATION OF BYPASS *(Hrs)* 1

12. REASON FOR BYPASSING
[illegible]

13. CAN BYPASS SEWAGE BE CHLORINATED? ☐ YES ☒ NO

14. DO SEWER OVERFLOWS OCCUR UPSTREAM OF PLANT?
☒ YES ☐ NO

15. ANY ODOR COMPLAINTS BEYOND PLANT PROPERTY? *(If yes, explain)*
Yes, During the summer

16. OBSERVED APPEARANCE OF EFFLUENT, RECEIVING STREAM OR DRAINAGE WAY
Dark [illegible] with solids.

17. IS A CONSULTING ENGINEER RETAINED OR AVAILABLE FOR CONSULTATION ON OPERATING AND MAINTENANCE PROBLEMS?
☒ YES ☐ NO *(If yes, check one of the following)* ☒ CONTINUING BASES ☐ REQUEST BASES [illegible]

18. DO OPERATORS AND OTHER PERSONNEL ROUTINELY ATTEND SHORT COURSES, SCHOOL OR OTHER TRAINING? ☒ YES ☐ NO

(a.) If yes, cite course sponsor, and date of last course.
TN. D.W.P. 1972

(b.) If no, are there any courses available in this area?

(c.) Is there an established procedure for training new operators?

19. IS LAB TESTING ADEQUATE FOR THE CONTROL REQUIRED FOR THIS SIZE AND TYPE OF PLANT AND USES OF RECEIVING WATERS?
☒ YES ☐ NO *(If No, explain)*
[illegible] Cl_2 [illegible]

20. EXPLAIN MAIN DIFFICULTY EXPERIENCED WITH INDUSTRIAL WASTES
Color + low pH
D.O. sag during dry weather (in [illegible] infiltration)

21. PERMANENT RECORD FILE
(a.) PLANT OPERATION AND MAINTENANCE MANUAL? ☒ YES ☐ NO (b.) AS BUILT PLANS AND SPECIFICATIONS? ☒ YES ☐ NO
(c.) MANUFACTURERS OPERATION & MAINTENANCE SPECIFICATIONS? ☒ YES ☐ NO (d.) FLOW CHARTS? ☒ YES ☐ NO

22. ESTIMATED WEEKLY MAN-HOURS FOR LAB WORK INCLUDING MAINTENANCE OF RECORDS AND PREPARATION OF REPORTS
~32

23. ANNUAL BUDGET FOR MAINTAINING AND OPERATING PLANT

SALARIES & WAGES	ELECTRICITY	CHEMICALS	MAINTENANCE	STAFFING & TRAINING	OTHER	TOTAL
	[illegible]	[illegible]	[illegible]			

24. STABILIZATION PONDS

(a.) WEEDS CUT AND VEGETATION GROWTH IN PONDS REMOVED? ☐ YES ☐ NO N/A
(b.) BANKS AND DIKES MAINTAINED? *(Erosion, etc.)* ☐ YES ☐ NO N/A
(c.) ANY REPORTS OF GROUND WATER CONTAMINATION FROM POND? *(If yes, give details)* ☐ YES ☐ NO
N/A
(d.) SEEPAGE REPORTED? ☐ YES ☐ NO N/A
(e.) ADEQUATE DEPTH CONTROL? ☐ YES ☐ NO N/A
(f.) EFFLUENT RELEASE IS N/A ☐ CONTINUOUS ☐ INTERMITTENT ☐ SEASONAL

Form Approved
OMB No. 158-R0035

D. LABORATORY CONTROL

CODING INSTRUCTION

Enter test codes opposite appropriate items. If any of the below tests are used to monitor industrial wastes, place an "X" in addition to the test code.

1 - 7 or more per week	3 - 1, 2 or 3 per week	5 - 2 or 3 per month	7 - Quarterly	9 - Annually
2 - 4, 5 or 6 per week	4 - as required	6 - 1 per month	8 - Semi-Annually	

ITEM (a.)	RAW (b.)	PRIMARY EFFLUENT (c.)	MIXED LIQUOR (d.)	FINAL (e.)	(f.) SLUDGE RAW	SLUDGE SUPER-NATANT	DIGESTER (g.)	RECEIVING STREAM (h.)
1. BOD								
2. SUSPENDED SOLIDS								
3. SETTLEABLE SOLIDS			1	1			1	
4. SUSPENDED VOLATILE								
5. DISSOLVED OXYGEN			1	1			1	
6. TOTAL SOLIDS								
7. VOLATILE SOLIDS								
8. pH			1	1			1	
9. TEMPERATURE	1			1				
10. COLIFORM DENSITY								
11. RESIDUAL CHLORINE				1				
12. VOLATILE ACIDS								
13. M B STABILITY								
14. ALKALINITY								
15.								
16.								
17.								
18.								
19.								

COMMENTS

E. PLANT PERSONNEL INVENTORY

(c.) CERTIFICATION: VOLUNTARY [ ] MANDATORY [X]

PERSONNEL CLASSIFICATION (a.)	EMPLOYMENT (b.) ACTUAL: MAN-HOURS PER WEEK	ACTUAL: NUMBER	NUMBER BUDGETED	NO. RE-COMMENDED	(c.) CERTIFICATION: NO. RECOMMENDED OR REQUIRED BY STATE	ACTUAL NO. CERTIFIED	TRAINING REQUIRED NEXT 12 MONTHS (d.): NEW HIRES	UPGRADE (Promotion or skill improvement)
1. MANAGEMENT/SUPERVISOR		1			1	1		
2. OPERATOR		3			3			
3. LABORATORY					1		1	
4. MAINTENANCE					5			
5. OTHER PLANT WORKERS					2			
6. OTHER OFFICE/CLERICAL								
7. TOTAL		4			7.5	1		

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OMB No. 158-R0035

F. GUIDE - VISUAL OBSERVATION - UNIT PROCESS

RATING CODES: S = Satisfactory; U = Unsatisfactory; M = Marginal; IN = in Operation; OUT = Out of Operation

	CONDITION OR APPEARANCE	RATING	COMMENTS
GENERAL	GROUNDS		
	BUILDINGS		
	POTABLE WATER SUPPLY PROT		
	SAFETY FEATURES		
	BYPASSES		
	STORM WATER OVERFLOWS		
PRELIMINARY	MAINTENANCE OF COLLECTION SYSTEMS		
	PUMP STATION		
	VENTILATION		
	BAR SCREEN		
	DISPOSAL OF SCREENINGS		
	COMMINUTOR		
	GRIT CHAMBER		
	DISPOSAL OF GRIT		
PRIMARY	SETTLING TANKS		
	SCUM REMOVAL		
	SLUDGE REMOVAL		
	EFFLUENT		
SLUDGE DISPOSAL	DIGESTERS		
	TEMPERATURE AND pH		
	GAS PRODUCTION		
	HEATING EQUIPMENT		
	SLUDGE PUMPS		
	DRYING BEDS		
	VACUUM FILTER		
	INCINERATION		
	DISPOSAL OF SLUDGE		
OTHER	FLOW METER AND RECORDER		
	RECORDS		
	LAB CONTROLS		
SECONDARY-TERTIARY (*List items as required*)			
CHLORINE	EFFLUENT		
	CHLORINATORS		
	EFFECTIVE DOSAGE		
	CONTACT TIME		
	CONTACT TANK		

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OMB No. 158-R0035

G. NOTATIONS BY EVALUATOR

1. OPERATION AND MAINTENANCE PROBLEMS/DEFICIENCIES

CHECK EACH OF THE FOLLOWING ITEMS IN TERMS OF THEIR ESTIMATED ADVERSE AFFECT ON THE PERFORMANCE OF THE PLANT.

ITEM	MAJOR	MINOR	NONE	ITEM	MAJOR	MINOR	NONE
STAFF COMPLEMENT		X		OVERLOADS *(type)*			
PERSONNEL TRAINING			X	HYDRAULIC			
OPERATING BUDGET			X	PERIODIC	X		
LABORATORY CONTROL (1)		X		CONTINUOUS			
INSTRUMENTATION		X		ORGANIC			
INDUSTRIAL WASTE [illegible]	X			PERIODIC			
PLANT OBSOLESENCE			X	CONTINUOUS [illegible]		X	
EQUIPMENT FAILURE:				OVERLOAD CAUSE(S):			
TREATMENT PROCESSES				INFILTRATION [illegible]	X		
SLUDGE HANDLING				COMBINED SEWERS			
AND PROCESSING				INDUSTRIAL GROWTH			
EQUIPMENT MAINTENANCE			X	RAPID POPULATION GROWTH			
SPARE PARTS INVENTORY				INCREASED SERVICE AREA			
POWER FAILURE			X	OTHER:			
				OTHER:			

2. DESCRIBE BRIEFLY THE MAJOR PROBLEMS INDICATED ABOVE *(include follow-up actions needed see instructions)*

[illegible]

3. PURPOSE OF INSPECTION

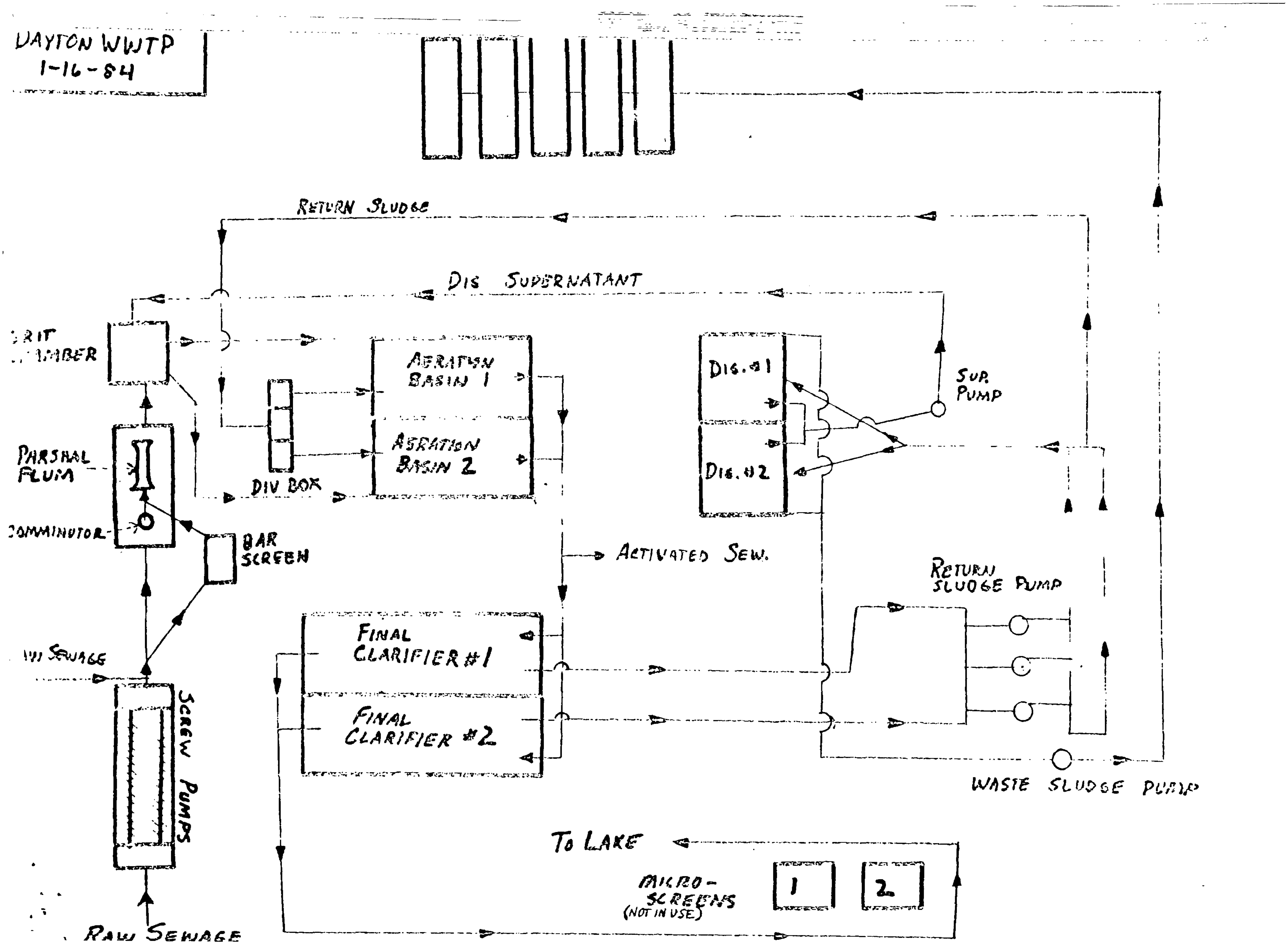
- ☐ GRANT COMPLIANCE
- ☐ PERMIT COMPLIANCE
- ☐ FOLLOW-UP
- ☒ OTHER: O+M

4. GENERAL RATING

ACCEPTABLE	
CONDITIONAL ACCEPTANCE	X
UNACCEPTABLE	

EVALUATION PERFORMED BY	TITLE	ORGANIZATION	DATE
[illegible]	[illegible] II	[illegible]	[illegible]

INFORMATION FURNISHED BY	TITLE	ORGANIZATION	DATE



DAYTON WWTP
1-16-84
RETURN SLUDGE
DIS SUPERNATANT
GRIT CHAMBER
AERATION BASIN 1
AERATION BASIN 2
DIS. #1
DIS. #2
SUP. PUMP
PARSHAL FLUM
DIV BOX
COMMINUTOR
BAR SCREEN
ACTIVATED SEW.
RETURN SLUDGE PUMP
SEWAGE
FINAL CLARIFIER #1
FINAL CLARIFIER #2
SCREW PUMPS
WASTE SLUDGE PUMP
TO LAKE
MICRO-SCREENS
(NOT IN USE)
1
2
RAW SEWAGE

CITY OF DAYTON
BUDGET 1983-84
WATER & SEWER FUND

Sewer Expenses

Salaries	66,000.
Employee Benefits - OASI	4,500.
Employee Benefits - Ins.	5,100.
Employee Benefits - Ret.	3,500.
Materials & Supplies	12,500.
Maintenance of Facility	15,000.
Freight	250.
Gas, Oil, Tires, Flats, Washes, etc.	1,600.
Maintenance of Vehicles	1,000.
Purchase, Maintenance, Rental of Small Equip.	500.
Billing	5,200.
Legal & Accounting	2,800.
Bad Debts	1,300.
Other Ins.	5,200.
Training	250.
Telephone	500.
Utilities	50,000.
Interest Expense	35,300.
Depreciation - Sewer	85,950.
Miscellaneous	1,000.
Capital Outlay	5,000.
Bond Amortization	150.
Micro Screen Study	2,000.
Industrial Pretreatment	750.
Unemployment Comp.	100.
Contingency	1,000.
Total	306,450.

NNESSEE DEPARTMENT OF PUBLIC HEALTH

FICE CORRESPONDENCE

FROM	TO	DATE

TE: May 24, 1984

: Garland Wiggins, Nashville

DM: Gene Scrudder, Chattanooga EOS

BJECT: City of Dayton's WWTP
TN0020478 CSI

Enclosed are two (2) copies of the CSI Report for the City of Dayton's WWTP, Rhea County. One copy is to be forwarded to EPA.

CS - 7
8
9
10

EOS/dfp

Enclosures

PH-0001
SR 3/77

DAILY TEST & WORK ASSIGNMENTS
DAYTON WASTEWATER TREATMENT PLANT

Rainfall	Temperature		Temp.-Wastewater		Dissolved Oxygen		PH	
	H	L	R	F	R	F	R	F

Suspended Solids in Wastewater

Raw ________ Final ________
Red. ________ % Red. ________

Chlorine ____________ lbs used

Residual ____________ PPM in 24 hrs.

Digesters

One

PH ____________ Sett. Sol. ____________

Two

PH ____________ Sett. Sol. ____________

Aeration Basins

DO	PH	MLSS	Sett. Sol.	SV1
#1	#1	#1	#1	#1
#11	#11	#11	#11	#11

Checked Pumping Station

Time ____________________

Condition ____________________

By: ____________________

Coliform Count

1. ____________ /100 ml

2. ____________ /100 ml

Final Effluent

Sett.Solids in Wastewater

Raw ________ Final ________

Red. ________ Red. ________

FLOW

Raw Wastewater ____________________ Return Sludge ____________________

Final Effluent ____________________ Waste Sludge ____________________

COMMENTS

HERALD PRINT—DAYTON

DATE ____________

WORK ASSIGNMENTS

First Shift

1. Skim two (2) times ____________
2. Wash all basin walls two (2) times ____________
3. Clean the Div. Box, Bar Screen, Div., Gate, two (2) times ____________
4. Fill the oilers on the eff. pumps ____________
5. Grease the screw lift at 8:00 AM ____________
6. Clean the flushing water fitter and micro jets two (2) times ____________
7. Check the Lift Station ____________
8. Put a water seal on the B.O.D. ____________
9. •Clean the samplers inside and out ____________
10. Clean the skimmer basket at the digester ____________

By: ____________

Second Shift

1. Skim two (2) times ____________
2. Wash all basin walls two (2) times ____________
3. The Second Shift will wash the Final Clarifiers each day ____________
4. Clean the Div. Box, bar screen, div. gate, two (2) times ____________
5. Fill the oilers on the eff. pumps ____________
6. Grease the screw lift at 8:00 PM ____________
7. Clean the flushing water filter and micro jets two (2) times ____________
8. Put a water seal on the B.O.D. ____________
9. Clean the bath room ____________
10. Clean the skimmer basket at the digester ____________
11. Check the Lift Station between 9:00 PM - 10:00 PM ____________

By: ____________

Third Shift

1. Skim two (2) times ____________
2. Wash all basin walls two (2) times ____________
3. Clean the div. box, bar screen, div. gate two (2) times ____________
4. Fill the oilers on the eff. pumps ____________
5. Clean the flushing water filter and micro jets two (2) times ____________
6. Put a water seal on the B.O.D. ____________
7. Clean the Skimmer basket at the digester ____________
8. Sweep and mop the Lb. Bldg. each day ____________

By: ____________

Appendix B
Sample Service Plans

PIPPA PASSES, KENTUCKY
WASTEWATER TREATMENT PLANT PROFILE
JUNE 22, 1984
(0.1 M.G.D. CONTACT STABILIZATION)

I. PROBLEMS:

This plant was in some degree of operation when it was picked for the Comp Train Project. However, by the time we arrived to do the Comp Train plan of work this wastewater plant experienced major mechanical breakdowns. These breakdowns made it impossible to operate the plant. Since our work schedule was so tight we did not have time to pick an alternate treatment plant that would fit the Comp Train Process. Therefore we evaluated the condition of the plant and gave what assistance we could in guiding the needed rehabilitation work plan for this plant.

Pippa Passes wastewater plant was originally picked for the Comp Train Project because the May 1984 Compliance Sampling Inspection (C.S.I) found the plant to be in significant non-compliance. The area of non-compliance that needed to be addressed were:

1.) N.P.D.E.S. limits are not being met in regards to $B.O.D._5$, S.S., and Dissolved Oxygen.
2.) There are no flow records (flow records are missing).
3.) The plant is not being properly operated and maintained. The final clarifier is encrusted in solids. The drying beds are not being used.
4.) There is a leak in the chlorine equipment.
5.) The aeration tank is very low in mixed liquor suspended solids (M.L.S.S).

The problems that existed after we made our evaluation are listed below.

1.) Raw Influent Wet Well - has accumulated a large amount of grit. Of the two raw sewage pumps in this wet well only one is dependable. One has a loud knocking noise. Also these pumps are wired direct without breaker protection. The electrical control panel for these pumps is in need of repair.

2.) The comminutor does not work.

3.) This plant has three blowers. Only one of these is operational. Two of the blowers and two of the electric motors are bad. The air filters for these blowers are also bad. The electric control panel for the motors have bad breaker contacts and fuses.

4.) The aeration basin has clogged diffusers with only partial mixing. This basin also has a large accumulation of anaerobic sludge on the bottom several feet thick.

5.) The final clarifier electric motor, drive chain, and gear mechanisms that drive the sludge rakes are out of service and need to be completely rehabilitated.

6.) The aerobic digester is full of septic solids and need to be cleaned.

7.) The entire plant needs to be drained, cleaned, sand blasted, painted, and refurnished with proper working components.

8.) The chlorine feed unit needs to be replaced.

9.) The chlorine contact basin needs to be cleaned of septic solids and the baffles repaired.

10.) A new effluent flow meter needs to be installed.

11.) The sludge drying beds need to be cleaned and completely overhauled. The sludge drying bed valves also need to be replaced for some of them have cracked and are leaking sludge. These valves were cracked because of winter freezing this would not have happened if the water had been drained from them. This means the valve from the aerobic digester should also be checked for leaks. If this valve leaks it should be repaired or replaced or the drying beds valves would freeze again this winter.

12.) This facility also needs a sludge disposal permit or an approved sludge management scheme for disposing of the sludge off the sludge drying beds.

II. ACTION TO SOLVE PROBLEMS:

We contacted Mr. Jim Bergman, Chairman of the Caney Creek water District, Pippa Passes, Kentucky Mr. Bergman was aware of some of the problems at the wastewater plant and had already negotiated a contract with Kennoy Engineers out of Lexington, Kentucky to do the wastewater plant improvements. Mr. Bergman had obtained H.U.D. & A.R.C. Block grants to rehabilitate the plant. Mr. Bergman was able to obtain this grant because the city and Alice Lloyd College had received considerable flood damage to the water treatment plant. The wastewater plant received only minor damage.

We reviewed the specifications and scope of work to improve the wastewater plant and added the following recommendations to Mr. Bergman's scope of work. See attachment #1.

Also we gave Mr. Delmar Slone, Caney Creek Plant Process Control training at the Whitesburg Wastewater Plant so that he would know more about wastewater treatment plant operation and maintenance. Also Mr.

Slone was Certified a Class I wastewater treatment plant operator after passing the certification exam.

PROGNOSIS:

This wastewater treatment plant should give good performance and be able to meet its N.P.D.E.S. permits limits if all the rehabilitation work is done correctly and if properly operated and maintained.

At present Mr. Delmar Slone is the only operator for both the Water and Wastewater plants. This is not adequate or a safe situation. There should be at least two workers for the wastewater plant. Otherwise, the plant will most likely go down hill again.

FINAL STATEMENT:

This plant got into this bad condition through eight years of neglect. Management must do its part to insure that adequate maintenance and repairs are made and that the plant is adequatly staffed and operated. This should be done as responsible stewardship of our tax dollars. See attachment #1 on our advice to Mr. Bergman.

ATTACHMENT 1

HARLOTTE E. BALDWIN
SECRETARY

MARTHA LAYNE COLLINS
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FORT BOONE PLAZA
18 REILLY ROAD
FRANKFORT, KENTUCKY 40601

July 6, 1984

Mr. Jim Bergman, Chairman
Caney Creek Water District
Pippa Passes, KY 41844

Re: Wastewater Treatment Plant
Rehabilitation Project

Dear Mr. Bergman:

We have received a copy of Kennoy Engineers specifications relative to subject project and we find that, since the work does not involve either a modification of the treatment process or expansion of plant capacity, the approval of plans and specifications by this branch is not required. We can, therefore, only make recommendations to you regarding the contract which is to be awarded and items of work to be performed as follows:

(1) Negotiate a reasonable reduction in the lump sum bid for relieving the contractor of the responsibility of draining and disposing of the plant's contents.

(2) Negotiate a reasonable reduction in the lump sum bid for replacement items of equipment which you may find unnecessary.

(3) Negotiate a reasonable reduction in the lump bid for either deleting the flow meter or substituting a less expensive scheme such as the Stevens 6IR flowmeter, Catalog No. 17638 (copy of specs enclosed).

(4) Negotiate a reasonable price for two new motors for the blowers.

(5) Negotiate a reasonable price for rehabilitating the electrical control panel for the blowers.

(6) Negotiate a reasonable price for rehabilitating the chlorine feed equipment.

(7) Negotiate a reasonable price for construction of two additional sand beds, and specify proper gradation of sand to be placed in the beds. In order to maintain the necessary sludge disposal schedule, these additional beds are needed. The alternate would be to sludge tank truck loading scheme.

(8) Negotiate a reasonable price for installing a dividing wall and overflow weir so as to constitute a sludge reaeration compartment.

This is necessary in order that the plant can function in the contact stabilization treatment mode. The plant capacity in the extended aeration mode is about 450 population equivalent, and since it is now serving about 800 persons, conversion to contact stabilization should be a high priority item in that its rated capacity would then become 1,000 persons.

I believe that the draining and disposal of plant contents would constitute enough money to provide for the additional items recommended.

Very truly yours,

Paul K. Wood RLO.

Paul K. Wood
Environmental Engineer
Division of Water

PKW:fml

cc: Kennoy Engineers

SOLIDS MANAGEMENT PLAN

Caney Creek Wastewater Treatment Plant

The entire plant will have to dewatered and cleaned in preparation for the sandblasting and painting so it will be necessary to set up a very tight schedule for draining and the disposal of the plant's contents.

The total volume in the plant (including the chlorine contact basin) is 90,000 gallons. The characteristics of the wastes range from that of raw sewage to that of partially digested sludge. Measurements made by D.O.W. personnel indicate that about 2,000 pounds of dry solids are contained in these wastes, and this means the average suspended solids concentration would be 2,666 mg/l (0.2%) which would render it suitable for land application. The average width of the farmland lying between the highway and Caney Creek is about 250 feet. It seems that a gravity discharge to be the downstream property would be the most feasible application site. If applied to say a strip 300 feet x 150 feet, the average depth of application would be 3 inches. At 100 gallons per minute, 15 hours would be required to complete this task.

This plan has been discussed with the Division of Wastes Management and there is no indication of disapproval.

ATTACHMENT 2

KENNOY ENGINEERS INC.

851 Corporate Drive
Lexington, Kentucky 40503
606-223-1000

June 28, 1984

Mr. Oerther
Department of Natural Resources
and Environmental Protection Cabinet
Division of Water
18 Reilly Road
Frankfort, Kentucky 40601

RE: Caney Creek Water District
Wastewater Plant Improvements

Dear Mr. Oerther:

Mr. Woods, of your department, was recently in Pippa Passes and spoke with Mr. Jim Bergman, Chairman of Caney Creek Water District, regarding the upcoming wastewater treatment plant improvements. He had several inquiries which Mr. Bergman relayed to me and I would like to try to clarify some of these items.

I have enclosed one (1) copy each of the following pages from the specifications: TS-A-001, 002: B-001, 002: D-001 and 002. These pages delineate the scope of the work on the wastewater treatment plant. However, they do not specifically instruct the contractor as where to dispose of the material removed from the clarifier. Some of this material could be placed upon the sludge drying beds but, the contractor will have to find an additional and alternate site to dispose of the balance of the material. I think Mr. Woods indicated that he was aware of a local property owner who would be willing to receive this material.

The second inquiry was related to the amount of funds set aside for the removal of waste material from the clarifier. The project was bid as a lump sum amount and I have enclosed a copy of the bids submitted by the low bidder, Titus Construction Company, for your information.

Any further inquiries regarding this matter should be directed to either Steve Hollar or myself at your convenience.

Sincerely,

Ora C. Main, P.E.

Ora C. Main, P.E.
Principal - Project Manager

OCM/scm
Enclosure
cc: Mr. Jim Bergman
Mr. Steve Hollar

TECHNICAL SPECIFICATIONS

SEWAGE TREATMENT PLANT IMPROVEMENTS

SECTION A

GENERAL

1. DESCRIPTION AND SCOPE OF WORK

1.1 The scope of work to be done by the Contractor includes the furnishing of all labor, tools, materials, and equipment necessary to complete the work as stipulated herein and in other Contract Documents. The work to be done is more particularly described but not limited to the following:

1.1.1 Circular Contact Stabilization Package Sewage Treatment Plant: Removal and replacement of scrapper mechanism, including the drive unit, skimmer, scum collector, inlet well with scum gate, sludge collector, comminutor, and blades. Also the removal and replacement of the diffusers and drop headers. Sand blasting the interior and exterior along with repainting all interior, exterior, inner compartment walls, piping, equipment new and existing. This also includes the removal and proper disposal of all discarded existing equipment.

1.1.2 Control Building: Removal of existing blowers and replacement with new blowers and air filters and the installation of a new flow recorder/totalizer.

1.1.3 Chlorine Contact Basin: Furnishing and installation of a new ultrasonic flowmeter. The removal and replacement of reinforced concrete baffle walls.

1.1.4 Sludge Drying Beds: Removal of existing sand in both compartments, and replacement of sand to a depth of six inches (6") in both compartments, and modifications to and replacement of the sludge influent valves and piping.

1.1.5 Lift Station: Replacement of two (2) submersible sewage pumps and assemblies, electrical control panel, guide rails, precast concrete top slab, and hatch cover.

1.1.6 Yard Piping: All main line process piping between each unit shall be replaced as in accordance with Section B thru L Contract II & III of this specification. Pipe material shall be Class 160 PVC and conformed to above referenced specification. This item will be paid for on a unit price basis as presented in the bid documents.

2. ALTERNATE I: This alternate will consist of removal of the gate valves and check valves from the wet pit of the pump station and installed in a separate manhole outside the pump station as shown on the plans. Included in this alternate is all additional piping, fittings and manhole necessary for a complete and functional installation.

TECHNICAL SPECIFICATIONS

SECTION B

SEQUENCE OF CONSTRUCTION

1. GENERAL

1.1 All construction and renovation work shall be scheduled so as to minimize down time of the treatment facility. This section outlines the sequence of renovation work under this contract and procedures to follow for legal bypassing of the facility.

2. BYPASSING OF EXISTING FACILITIES

2.1 In order to accomplish the work as outlined in this specification intermittant bypassing of unit process is required. Bypassing shall be in compliance with all state regulations as prescribed by the Kentucky Natural Resources and Environmental Protection Cabinet, Division of Water, Enforcement Branch, 18 Reilly Road, Frankfort, Kentucky. At a minimum the Contractor is required to notify the state and the Engineer of any intentional bypassing at least 24 hours prior to its scheduled occurance. Information required in this notification shall be the beginning date and time of the bypass operation, anticipated duration of the bypass, and the estimated quantity of wastewater flow to be bypassed. Bypassing of the package treatment plant will require notification of the state and Engineer in writing at least 14 days prior to this operation and shall be accompanied with a schedule of construction for repair work on the plant. All construction shall be scheduled so as to minimize the duration of any bypass.

3. INTERIM TREATMENT OF BYPASSED FLOW

3.1 At a minimum all bypassed flows shall receive chlorination. The Contractor shall make all temporary arrangements and connections necessary to achieve point chlorination. In the operation of bypassing the package treatment plant the influent shall be diverted to the chlorine contact chamber where it will receive chlorination and limited primary settling. The Contractor shall be responsible for any temporary connections necessary to accomplish this operation. In addition any settled material remaining in the chlorine chamber after completion of the work on the package plant shall be removed to the aeration compartment for treatment.

4. SEQUENCE OF CONSTRUCTION

Scheduling of work shall be done so as to decrease down time of the plant and minimize bypassing. Therefore, the following recommendations shall be incorporated into the contractor's schedule of construction.

4.1 No work shall begin on the package treatment facility until all equipment and materials are on the plant site. This includes equipment and material for painting of the tank's interior. Any equipment that can be preassembled prior to placement in the tankage must be done prior to shutdown of the facility. Shutdown of the plant shall not be allowed until the Engineer has been given the opportunity to inventory all material and equipment at the job site. This inventory shall in no way relieve the Contractor of his responsibility for insuring all equipment and material is present at the site. Realizing time delays due to the manufacturing process of this equipment, a request for time extension shall be considered based on a presubmitted date of delivery. Any work not associated with the delivery of the replacement equipment and which can be performed while the plant is in operation shall not be included in this request.

4.2 Construction shall proceed in the following recommended sequence:

1. Replacement of baffle walls in chlorine contact chamber. This will require bypassing of this unit process, therefore, temporary chlorination and effluent line will need to be provided. Influent and effluent lines to this unit process should be replaced at this time.

2. Replacement of sand in sludge drying beds.

3. Replacement of equipment and painting of interior of the package treatment plant, replacement of the influent sewage pumps, and piping changes at the sludge drying beds. All related process piping shall be replaced at this time.

4. Replacement of the blowers and sandblasting and painting of the external portion of the package plant after the plant has been returned to service.

4.3 Contractor shall schedule work to minimuze weather related delays, most specifically, in relation to work on the package plant. In the event of rain during painting of the interior of the tank, the Contractor shall make provision to temporarily cover the tankage and provide heating to prevent any delays.

TECHNICAL SPECIFICATIONS

SECTION D

CIRCULAR CONTACT STABILIZATION PACKAGE

1. SCOPE

1.1 The work under this section covers the removal of the existing and replacement of new scraper mechanism, including the drive unit, skimmer, scum collector, inlet well with scum gate, sludge collector, blades and comminutor. Also the removal of the existing diffusers and replacement with new ones and replacement of the drop pipe and headers. Also sand blasting the interior and exterior, along with repainting all interior, exterior, inner compartment walls, remaining piping, and equipment existing and new.

2. CIRCULAR CONTACT STABILIZATION PACKAGE SEWAGE TREATMENT PLANT

2.1 No work shall begin on the Package Sewage Treatment Plant until ALL equipment pertaining to the Package Sewage Treatment Plant is on the site, and has been inspected for damage and preassembled, if necessary, for installation.

2.2 The Contractor shall remove and properly dispose of the existing equipment as indicated on the plans.

2.3 All field welding by the Contractor shall be in conformance with the information shown on the equipment manufacturer's drawings regarding location, type, size, and length of all welds in accordance with "Standard Welding Symbols" AWS A2.0 of the American Welding Society, and special conditions as shown by notes and details. All field welds shall be touched up with compatible paint.

2.4 All replaced equipment shall be Smith and Loveless. All Smith and Loveless equipment shall be in accordance with the specifications of the existing equipment.

2.5 The existing circular contact stabilization package sewage treatment plant is Smith and Loveless Model No. 34R100, 100,000 gallon/day. The tank has an inside diameter of thirty-four feet (34') and a side depth of fourteen feet, six inches (14'-6"). The tank floor has a slope of one inch (1") in twelve inches (12") towards the center where the sludge well with agitator is located.

2.6 The following equipment shall be removed and replaced with new equipment as manufactured by Smith and Loveless:

Drive Unit and Motor
Drive Tube
Skimmer
Scum Collector
Sludge Collector
Inlet Well with Scum Gate
Scraper Mechanism
Blades
Comminutor Model Number 7R
All Existing Diffusers
All drop pipe and header pipe for diffusers
Foam control pump

KNOTT COUNTY FISCAL COURT

WASTE WATER SYSTEM IMPROVEMENTS AT PIPPA PASSES, KENTUCKY

BID SCHEDULE

CONTRACT III

Bid By: Titus Construction, Inc.

The low bidder shall be determined based on the lowest total lump sum bid.

ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL PRICE
1.	This work basically involves the replacement of most of mechanical equipment including the influent sewage pumps, blowers, flowmeter, aeration piping and diffusers. Also included is the replacement of the sand media and influent piping and valves at the sludge drying beds and reconstruction of baffle walls in the chlorine contact chamber.	L.S.	111,745.	1	111,745.
2.	6" CL 160 PVC Pipe (Installed)	L.F.	12.00	100	1,200.
	10" CL 160 PVC Pipe (Installed)	L.F.	20.00	30	600.00
3.	DEDUCTIVE ALTERNATE I This work involves relocation of the existing valves inside the influent pump station wet well to an outside valve vault	L.F.	2,400.	1	2,400.
	TOTAL BID (Figures)				$ 115,945.

LONDON, KENTUCKY

WASTEWATER TREATMENT PLANT PROFILE

OCTOBER 29-31, 1984

(4.0 M.G.D. R.B.C. PLANT)

PROBLEMS:

The undersized secondary sludge pump allows periodic overflows from the pump well. These overflows are recycled through the screen to the first stage RBC's and impose undue organic loadings.

The dissolved oxygen concentration are low enough to allow prolifiration of the nuisance type growths on the RBC's.

The rotational speed of the RBC's is less than 1.5 rpm. Besides reducing the oxygen transfer rate, the slow rotation may induce excessive biomass buildup.

Solids are settling in the first two or three RBC basins. Besides exerting additional oxygen demand, those solids deposits create additional O & M problems when ultimately flushed from the RBC basins.

The clarifier sludge is not being completely picked up as evidenced by the clumps of solids rising to the surface and the maroon hues imparted by tubifex (blood worms).

It appears that the plant is subjected to "slug loadings".

The sludge thickener, while producing what seems to be a very good quality overflow, does not produce the desired concentration of solids in its underflow. There is fortunately, an excellent sludge disposal scheme in effect; so the low solids concentration presently affects only the operational costs, but may eventually shorten the life span of the disposal site.

ACTION:

The baffles between the first two RBC stages have been removed. This reduces the design stages from six to five, but, more importantly, doubles the number of RBC's in the first stage.

The sludge blanket depth is maintained at about ten inches, as this is the depth which produces the thickest sludge.

Only three of the five RBC trains are used. This reduces the detention time through the RBC's from about 10 hours to about 6 hours (at the present dry weather flow volumes). This, in turn discourages denitrification in the clarifiers. The use of the trains is rotated, and this requires flushing out the dead biomass from the deactivated RBC'S.

PERFORMANCE:

The plant loadings average about 30% of its flow capacity and up to 80% of its BOD capacity, and yet it seems to be under great stress and out of compliance with respect to its BOD limit of 10 mg/l. The operators seem to be knowledgeable and industrious, and are adequately supported by management. It seems probable that, considering the Industrial Waste (I.W.) control program along with plant operational needs, two additional operators that have capabilities for Class III certification will be needed.

PROGNOSIS:

The London plant is not the typical municipal facility in that 50% of the organic load is expected to be from industrial sources. It is expected that extreme diligence will be required in the I.W. control program, and that above average plant operational skills will be needed as the plant approaches its design loadings. Also, in order that the plant can meet all its permit conditions on a continuous basis, it seems likely that some in-plant modifications/additions will be required. Increasing the secondary sludge pumping capabilities to about 800 GPM and experimenting with air diffusion in the first two or three RBC basins are recommended for immediate action. Secondarily, it is recommended that a gauge for measuring RBC axle loads be obtained, and that two portable automatic samplers be procured for in-plant sampling as needed for operational control practices. These portable samples will also be needed in the I.W. Monitoring Program.

LONDON
EVALUATION OF COMPOSITE SAMPLES BEFORE AND AFTER
COMPTRAIN PROGRAM

	BEFORE			AFTER		
	IN		OUT	IN		OUT
Flow MGD	2.8		2.8	2.1 MGD		
Permit %	4.0		4.0			
C.O.D. mg/l	388		20			
C.O.D. lbs	9,061		467			
C.O.D. %		Reduction	95			
B.O.D.$_5$ mg/l	230		12	228		7
B.O.D.$_5$ lbs	5,371		280	3,993		123
B.O.D.$_5$ %		Reduction	95		Reduction	97
Permit %		Reduction	85		Reduction	85
S.S mg/l	127		16	160		4
S.S. lbs	2,966		374	2,802		70
S.S. %		Reduction	87		Reduction	98
Permit %		Reduction	85		Reduction	85
V.S.S. mg/l	108		16			
V.S.S. lbs	2,522		374			
V.S.S. %		Reduction	85			
T.S. mg/l	500		290			
T.S. lbs	11,676		6,772			
T.S. %		Reduction	42			
V.T.S. mg/l	265		72			
V.T.S. lbs	6,188		1,681			
V.T.S. %		Reduction	73			
NH_3-N mg/l	2.92		1.97	N/A		1.5
NH_3-N lbs	70		46	N/A		26
NH_3-N %		Reduction	34			
Permit mg/l	N/A		10	N/A		10
pH	6.7		7.6	7.0		7.4
Permit	N/A		6-9			6-9
D.O. mg/l			8.1			7.2
Permit mg/l			7.0			7.0

LONDON
EVALUATION OF COMPOSITE SAMPLES BEFORE AND AFTER
COMPTRAIN PROGRAM

	BEFORE		AFTER	
	IN	OUT	IN	OUT
Fecal Coliform per/100 ml	N/A	10	N/A	<5
Permit	N/A	200	N/A	200

Livingston, Kentucky
Wastewater Treatment Plant Profile
June 28, 1984
(0.04 M.G.D. Extended Aeration)

I. Problems:

This wastewater treatment plant has design and equipment problems that make the plant difficult to operate. This plant is also located in a floodplain and has been flooded twice in the last three years. Also, this plant does not have a certified wastewater operator and has not been keeping records or submitting monthly (DMR's) Discharge Monitoring Reports. These problems have caused this plant to be in significant noncompliance.

II. Problems Defined and Actions Taken:

(A) Design Problem:

The design capacity of subject plant is 27.8 GPM (40,000 GPD) and the usual practice for influent pump station is to design the pumps for about twice the design flow rate of the plant on the theory that the pump would be operating about 50% of the time. In this case, 60 GPM pumps were specified, but it is most impractical to employ a centrifugal pump of less than 100 GPM, so rather than change the station's design from wet pit pumping to pneumatic ejection, submersible centrifugal pumps with 100 GPM outputs were installed. Another usual design practice is to limit the influent flow to 2.5 times design flow rate (2.5 x 27.8 = 69.5 GPM = 100,000 GPD). Due to manner in which the pump controls operate the static pumping head is less than that shown on the plans, therefore, the pump output may be as much as 200 GPM on occasions and for a very short duration. On the first day, there were 15 pump cycles and the 70 GPM limit was exceeded on 8 occasions for an average duration of 3 minutes. On the second day there were 21 pump cycles with essentially the same quantity of influent flow (these additional cycles were induced by recycling digester supernatant), but the 70 GPM rate was exceeded only twice at about 3 minutes duration each time.

Plant performance is not adversely affected by the high pumping rates. Lower pumping rates may reduce power usage and should have a favorable influence on plant performance.

The reason plant performance is not adversely affected at present is because the plant is only receiving one third of its hydraulic load. This plant needs surge control as the plant approaches its design loading.

Actions to Solve Problem:

The city should investigate the cost of installing a speed control device on these 100 gal/min pumps. This may also result in an energy savings for the city. By controlling the (rpm) speed of these pumps the problem of surging can be eliminated. See attached brochure for more information on this subject (see attachment #4).

(B) Equipment Problem:

The location of the return sludge and waste sludge splitter box on the top side of the aerobic digester wall causes about 1/3 of the return sludge to continually splash over into the aerobic digester. This causes the operator to have no control over the waste sludge or return sludge flow rate and also causes the aerobic digester to overflow continuously.

Action:

The return sludge and waste sludge splitter box was removed from the wall of the digester and placed over the aeration basin 3 feet from the digester. A section of pipe was then added to the box and extended into the digester. This pipe is properly called the waste sludge line. The operator now has control of both the return sludge and waste sludge flows.

(C) Equipment Problem:

The final effluent weir trough leaked and the weir was unlevel causing severe short circuiting in the final clarifier at high flow rates.

Action:

The final effluent weir was removed cleaned and coated with asphalt roofing compound along the edge of adjustment and then realined, leveled, and placed back into operation. The weir no longer leaks and problems of short circuiting have been eliminated.

(D) Equipment Problem:

Number two blower has a stuck pressure relief valve.

Action:

The pressure relief valve broke while trying to free it so a new one was installed.

(E) Certification Problem:

No certified wastewater operator.

Action:

Mr. Robert Wilson was trained in the proper operation of the treatment plant. He was also taught how to run the various process control test and how to plot and use trend charts. Mr. R. Wilson was given the Class I wastewater certification exam and he passed the exam. Mr. R. Wilson is now a Class I certified wastewater plant operator.

(F) Records, Testing, and Reporting Problems:

Records and testing for the (N.P.D.E.S.) Permits were not being done.

Action:

Livingston signed an agreement with Allegheny Labs of London, Kentucky to do testing in the Livingston Lab. The (D.M.R.) Discharge Monitoring Report for the N.P.D.E.S. permit for the months of April and May, 1984 have been received by the Commonwealth of Kentucky, Division of Water, London Field Office. These reports were in compliance with their permit.

(G) Other Problems and Actions Taken:

Problem:

The chlorine contact basin had 2 feet of anaerobic sludge on the bottom.

Action:

The chlorine contact basin was pumped down and the solids were pumped back to the head of the aeration basin. The chlorine tank was then hosed down, cleaned and placed back into operation.

(H) Problem:

The aerobic digester had about 1 1/2 feet of sludge in the bottom that had compacted and could not be mixed. Also, when the solid level in the digester reached about 12,000 mg/l the contents of the digester could not be mixed adequately. Only about half of the digester could be mixed and aerated at 12,000 mg/l. Problem- insufficient aeration capacity and mixing.

Action:

Top half of digester is = 12,000 ppm. or 1.2% solids; the bottom of the digester is = 26,000 ppm. or 2.6%. Therefore, 1.2% + 2.6% = 3.8%,(3.8% ÷ 2) = 1.9% or 2% average solids in the digester. The aerobic digester was drained by filling two sludge drying beds with sludge at about 2% solids or 20,000 ppm.

Comment:

The flat bottom tank of the digester makes it difficult to remove thick heavy sludge. Thick sludge was pushed to the pump with scrapers and was sometimes diluted with water so the pump could lift it. After cleaning, the digester was placed back in operation.

(I) **Problem:**

No permit to dispose of sludge from the sludge drying bed.

Action:

A sample of the sludge was taken and is being tested at the state Department for Environmental Protection's Lab for pH, T.S.S., T.V.S., T.K.N., NH_4-N, No_3-N, Cd, Cu, Ni, An, Pb, and PCB.

Also a site for ultimate disposal has been selected and presently the Division of Waste Management is processing the permit application for this site.

III. Performance:

This treatment plant is performing very well because the treatment plant is only receiving 1/3 of its hydraulic and organic loading. This treatment plant was headed for serious performance problems because of the lack of operator skill and knowledge of waste treatment. With the corrective actions taken above, serious performance problems have been averted.

IV. Prognosis:

This treatment plant is now in compliance and should give excellent performance for quite sometime. The two major problems that could cause noncompliance would be damaged because of major spring flooding and if surge control is not monitored as the plant approaches its design loading.

Analysis of Composite Samples Before and After Comptrain Program.

See attachment #1.

Analysis of Flow:

See attachment #2 - flow chart from Stevens Recorder with notations.

Analysis of Computerized Mathematical Model:

The computerized model does not work on small wastewater treatment plants or plants smaller than 0.200 M.G.D. unless the model is calibrated to satisfy the condition of smaller plants. (See Attachment #1 - top of Page 2).

Analysis of Sludge for Land Spreading:

See attachment #3 for analysis. There is no problems with toxic material for land spreading this sludge.

ATTACHMENT #1

AERATION TANK MIXED LIQUOR SUSPENDED SOLIDS

	Before	After	Computer
M.L.S.S.	1,900 mg/l	3,390 mg/l	2,800 mg/l
M.L.V.S.S.	1,380 mg/l	1,940 mg/l	1,176 mg/l
% Volatile	73%	57%	42%

* Note - A problem exists with the accuracy of the $B.O.D._5$ test. The $B.O.D._5$ test as reported do not correlate with the other test data. A good correction can be made for $B.O.D._5$ by taking the C.O.D. and multiplying it by 0.4 for the influent, and by 0.2 for the effluent. By doing this, a good figure for $B.O.D._5$ can be obtained form the C.O.D. This method of obtaining a $B.O.D._5$ answer from the C.O.D. was developed by taking 20 municipalities with domestic sewage only and averaging the $B.O.D._5$ and C.O.D. ratios. These $B.O.D._5$ and C.O.D. relationships correlated with other test data and were reliable. Therefore, the true $B.O.D._5$ for Livingston would be as follows:

CORRECTIONS

Before - Influent

150 C.O.D. x 0.4 $B.O.D._5$/C.O.D. = 60 mg/l $B.O.D._5$

This influent $B.O.D._5$ is low because of infiltration and inflow problems which dilute the $B.O.D._5$ and C.O.D. Note the difference between flow of 0.023 M.G.D. on Before Survey and flow of 0.00698 on After Survey. The first is wet weather flow the second is dry weather flow.

Before - Effluent

29 C.O.D. x 0.2 $B.O.D._5$/C.O.D. - 6 mg/l $B.O.D._5$

After - Influent

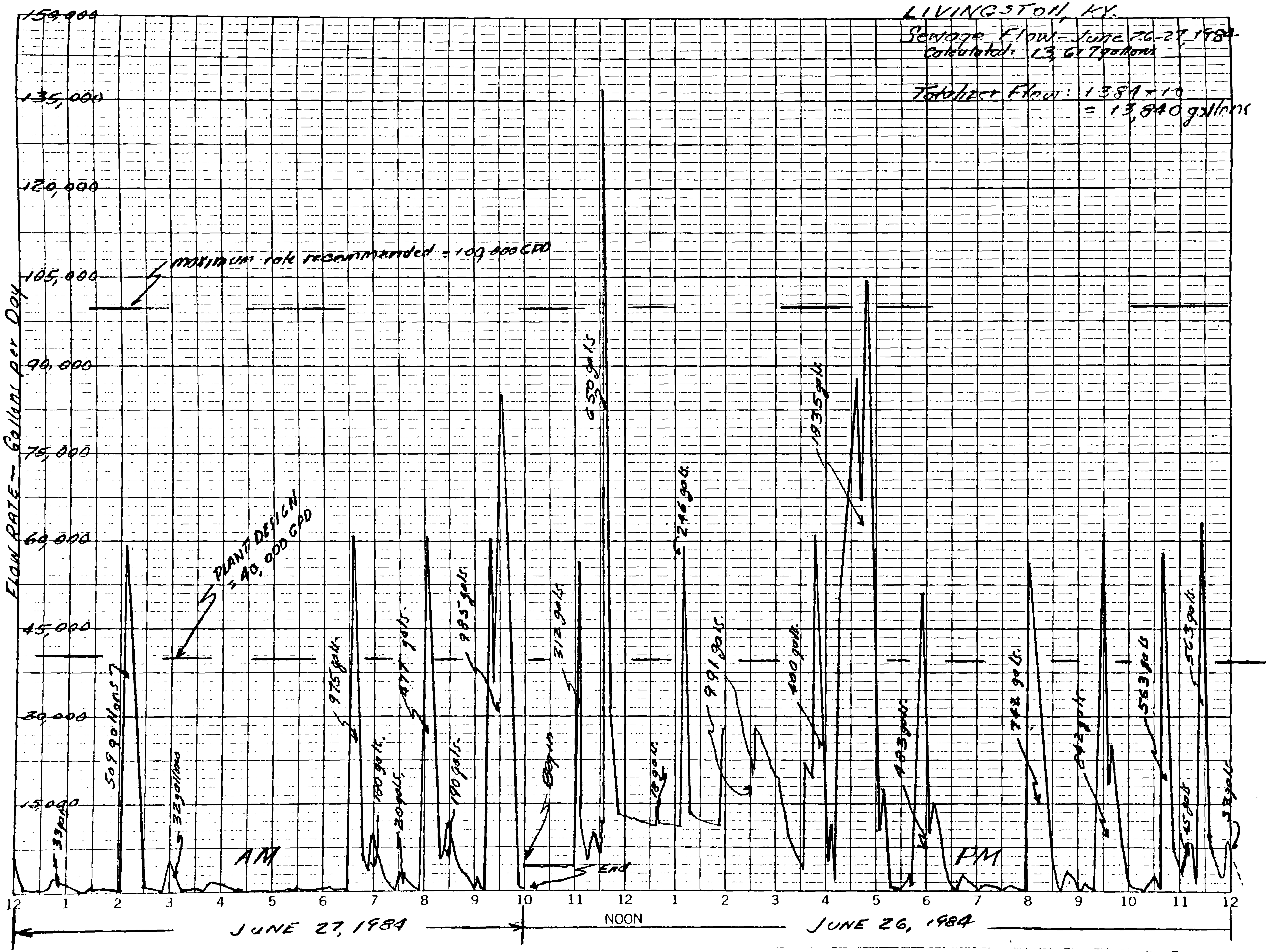
547 C.O.D. x 0.4 $B.O.D._5$/C.O.D. = 218 mg/l $B.O.D._5$

After - Effluent

31 C.O.D. x 0.2 $B.O.D._5$/C.O.D. = 6 mg/l $B.O.D._5$

* Corrected lbs and % reductions for $B.O.D._5$ are attached to evaluation sheet.

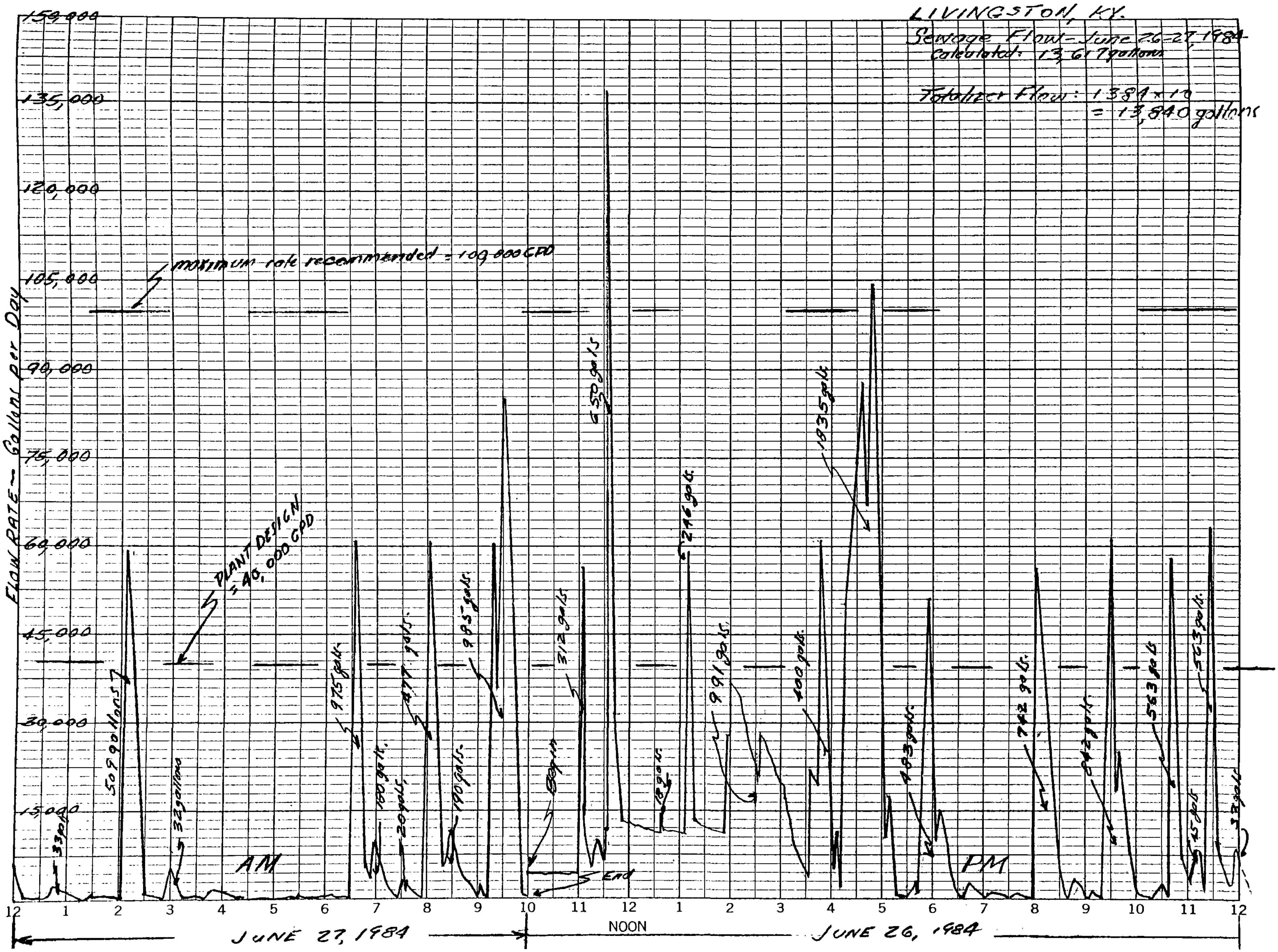
ATTACHMENT #2



LIVINGSTON, KY.
Sewage Flow - June 26-27, 1984
Calculated: 13,617 gallons
Totalizer Flow: 1384 × 10
= 13,840 gallons
150,000
135,000
120,000
105,000
90,000
75,000
60,000
45,000
30,000
15,000
FLOW RATE ~ Gallons per Day
maximum rate recommended = 100,000 GPD
PLANT DESIGN = 40,000 GPD
33 gals
509 gallons
32 gallons
AM
975 gals
180 gals
477 gals
20 gals
985 gals
190 gals
Begin
End
312 gals
650 gals
18 gals
246 gals
991 gals
400 gals
1935 gals
493 gals
PM
742 gals
842 gals
563 gals
15 gals
563 gals
33 gals
12
1
2
3
4
5
6
7
8
9
10
11
12
NOON
1
2
3
4
5
6
7
8
9
10
11
12
JUNE 27, 1984
JUNE 26, 1984

Livingston Wastewater Treatment Plant
Evaluation of Composite Samples Before and After
Comptrain Program

	BEFORE		AFTER	
	IN	OUT	IN	OUT
Flow Permit %	0.023 M.G.D. 0.56 maximum	0.023 M.G.D. 0.56 maximum	0.00698 M.G.D. 0.56 maximum	0.00698 M.G.D 0.56 maximum
C.O.D. mg/l C.O.D. lbs C.O.D. %	150 29 reduction	29 6 79	547 32 reduction	31 2 94
$B.O.D._5$ mg/l **$B.O.D._5$ lbs** **$B.O.D._5$ %**	**60** **12** **reduction**	**6** **1** **92**	**218** **13** **reduction**	**6** **0.4** **97**
Corrected Figures - See Page 2 of this attachment for method of correction.				
S.S. mg/l S.S. lbs S.S. % Permit %	77 15 reduction reduction	14 3 80 85	144 8 reduction reduction	7 0.4 95 85
V.S.S. mg/l V.S.S. lbs V.S.S. %	66 13 reduction	14 3 77	112 7 reduction	3 0.007 99.9
T.S. mg/l T.S. lbs T.S. %	355 68 reduction	304 58 15	772 45 reduction	601 35 22
V.T.S. mg/l V.T.S. lbs V.T.S. %	146 28 reduction	91 18 36	304 18 reduction	100 6 67
NH_3-N mg/l NH_3-N lbs NH_3-N % Permit %	9.0 1.72 reduction mg/l	0.13 0.024 98.6 30 maximum	35 2.03 reduction mg/l	0.15 0.0087 99.5 30 maximum
pH Permit %	7.6 maximum 6.0	7.6 maximum 9.0	7.9 minimum 6.0	7.7 maximum 9.0
D.O. mg/l Permit %	--- ---	8.2 4.0	--- ---	2.0 4.0
Fecal Coliform per/100 ml Permit	--- ---	80 400 maximum	--- ---	15,000 400 maximum


LIVINGSTON, KY.
Sewage Flow - June 26-27 1984
Calculated: 13,617 gallons
Totalizer Flow: 1384 × 10
= 13,840 gallons
maximum rate recommended = 100,000 GPD
PLANT DESIGN = 40,000 GPD
FLOW RATE ~ Gallons per Day
150,000
135,000
120,000
105,000
90,000
75,000
60,000
45,000
30,000
15,000
33 gals
509 gallons
33 gallons
975 gals
100 gals
20 gals
477 gals
190 gals
985 gals
Begin
End
312 gals
650 gals
246 gals
991 gals
400 gals
1835 gals
703 gals
742 gals
842 gals
563 gals
45 gals
563 gals
33 gals
AM
PM
12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12
NOON
JUNE 27, 1984
JUNE 26, 1984

ATTACHMENT #3

CHARLOTTE E. BALDWIN
SECRETARY

MARTHA LAYNE COLLINS
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FORT BOONE PLAZA
18 REILLY ROAD
FRANKFORT, KENTUCKY 40601

July 20, 1984

Report No: A02-2022
SA No: 84-1690

TO: Division of Water
#18 Reilly Road, Fort Boone Plaza
Frankfort, Kentucky 40601

Re: Livingston WWTP

ATTN: Bob Oether

FROM: William E. Davis, Director SB for WED
Division of Environmental Services

Sample Collector: Bob Oether Date: 06/28/84 Time: 1600

Sample Identification: Sludge from Drying Bed

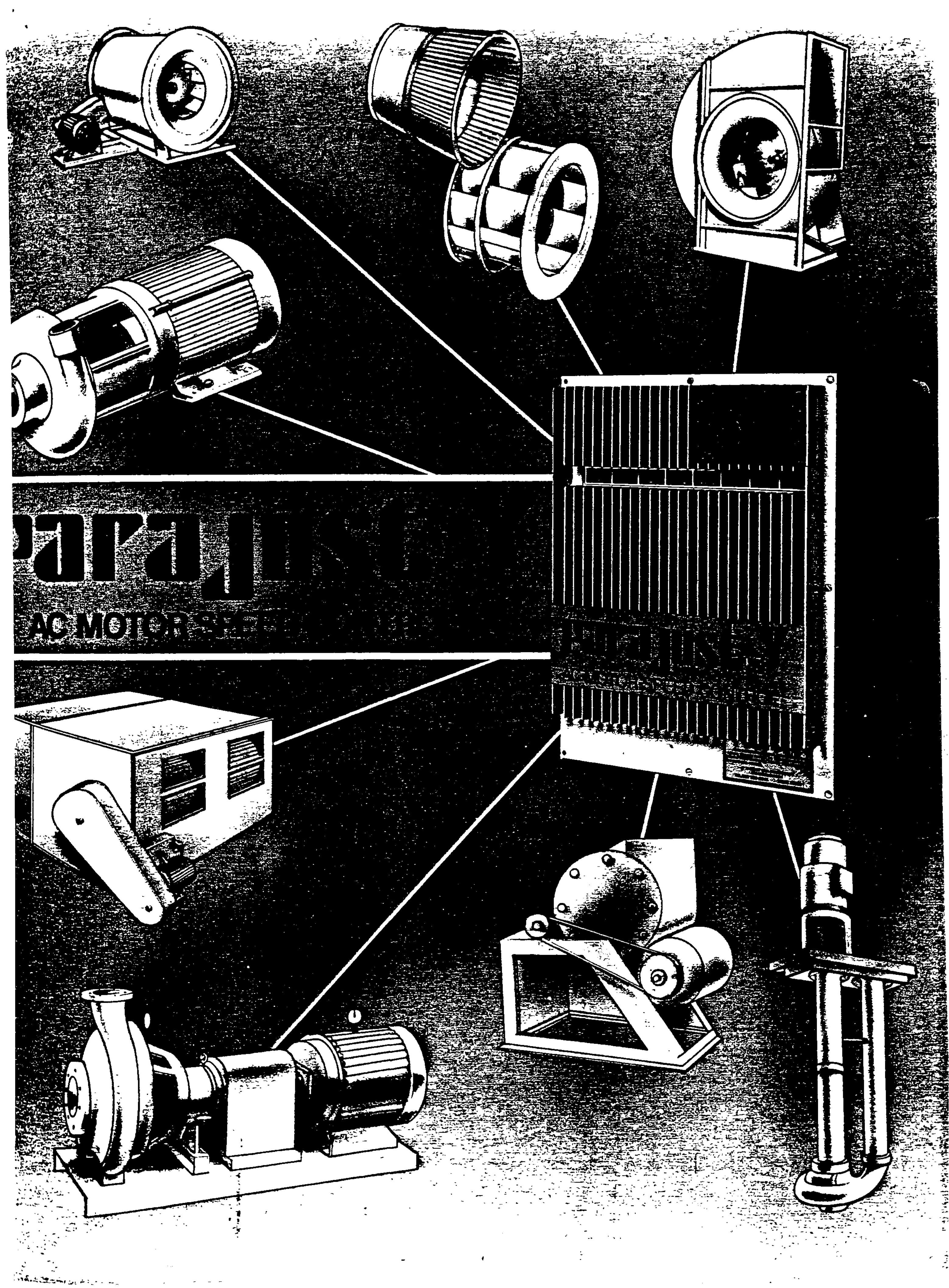
Received: 06/29/84 Started: 07/06/84 Finished: 07/18/84

Results:

PARAMETER	CONCENTRATION (mg/kg)
pH	6.5
Volatile Total Solids	43.7%
Ammonia Nitrogen	1,430
Nitrate-Nitrite Nitrogen	575
Cadmium	0.015
Copper	0.059
Iron	11,700
Lead	325
Nickel	1.03
Zinc	1,290
Hexachlorobenzene	0.031
Hexachlorocyclohexane, alpha isomer	<0.05
Hexachlorocyclohexane, gamma isomer	<0.05
Heptachlor	0.069
Aldrin	<0.05

Heptachlor Epoxide	0.056
t-Chlordane	0.28
c-Chlordane	0.22
O, P' - DDE	<0.05
P, P' - DDE	<0.05
Dieldrin	<0.05
Endrin	<0.05
O, P' - DDD	<0.05
P, P' - DDD	<0.05
O, P' - DDT	<0.05
P, P' - DDT	<0.05
Total DDT	<0.05
Methoxychlor	<0.05
Mirex	<0.05
Endosulfan I	<0.05
Endosulfan II	<0.05
Endosulfan Sulfate	<0.05
Endrin Aldehyde	<0.05
Endrin Ketone	<0.05
Toxaphene	<0.5
Technical Chlordane	2.33
Aroclor 1016	<0.5
Aroclor 1221	<0.5
Aroclor 1232	<0.5
Aroclor 1242	<0.5
Aroclor 1248	<0.5
Aroclor 1254	<0.5
Aroclor 1260	<0.5
Aroclor 1262	<0.5
Aroclor 1268	<0.5

ATTACHMENT #4


AC MOTOR

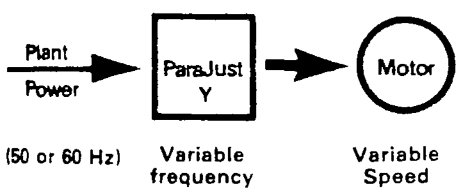
Vary simple
Vary economical
Vary reliable

ParaJust Y is a variable frequency speed control for three phase AC motors. It was specifically designed for speed control of motors used to drive pumps, fans or blowers so as to save energy on these applications.

Variable Frequency

If a three phase AC motor operates on variable frequency, the motor becomes a variable speed motor. Its speed is directly proportional to the frequency on which it operates.

ParaJust Y is a solid state electronic device which is wired between plant power and the motor. It converts the normally fixed frequency of plant power (50 or 60 Hz) to infinitely variable frequency power to make the motor a variable speed motor.



Parametrics, manufacturers of ParaJust Y, has built approximately 50,000 variable frequency controls. The concept is well proven with units operating worldwide.

Pumps, Fans & Blowers

Centrifugal pumps as well as fans and blowers are ideal candidates for variable speed operation to provide energy savings. Ideal because:

- As the flow of the pump fan or blower is varied through speed control, the horsepower required to operate the device changes in proportion to the cube of the speed. Thus, at half flow only 1/8 of design hp is needed, for example, and considerable energy is saved.
- Most pumps, fans and blowers are oversized and have or could have reduced output to save energy. Variable speed is the most efficient means of reducing output. In addition, it will often pay to replace other flow control devices, if used, with ParaJust Y.

The benefits of ParaJust Y operation on pumps fans & blowers are outlined in detail on page 3.

Vary Simple

ParaJust Y uses the very latest state-of-the art electronic circuitry.

Control circuits employ microprocessor technology.

Power circuits employ gate turn off devices, the latest in power-switching technology.

These design innovations reduce parts count and space consumption and improve efficiency.

To the best of our knowledge, ParaJust Y is the most optimally designed AC motor speed control for centrifugal loads.

Vary Economical

ParaJust Y has been designed specifically for flow control for fans and blowers. The nature of this application allows cost savings in some respects and necessitates options and accessories not required with industrial drives. The cost reduction items include:

- Limited overload capacity. Only 10% overload ability is required compared with 50% in industrial applications.
- Limited starting torque. Pumps, fans and blowers do not require the high break-away torque of industrial drives. These two factors, alone, allow major cost reductions in ParaJust Y controls compared with Parametrics' industrial product offerings. Most options and accessories can be programmed into the ParaJust Y's E-Prom, furnishing low costs on these items.

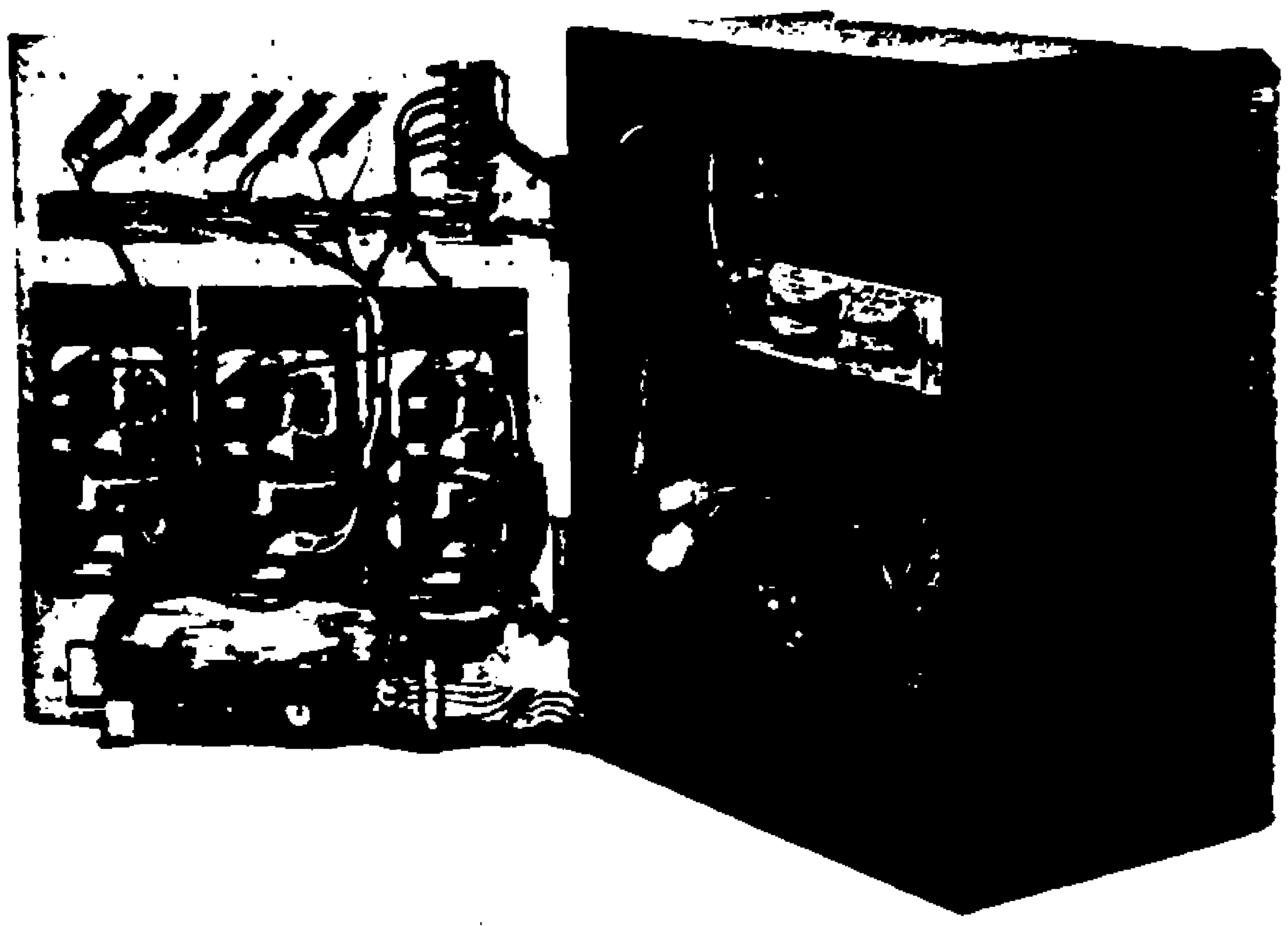
Vary Reliable

Pumps, fans and blowers are used on sensitive applications where round the clock control operation is critical. Parametrics understood this as a parameter of the product's design and every consideration was given to reliability of circuits and components. Product design was accomplished with an actual blower load for testing throughout the program. A high priority was given to long term testing and to protective features. See page 5.

Vary Beneficial

ParaJust Y Will Pay for Itself in Less Than 2 Years on Energy Savings Alone

- When used to control flow from a centrifugal pump, compared to the cost of power with valve-controlled flow
- When used to control flow from a fan or blower, compared to the cost of power with constant air flow systems.



Payback is only one user benefit of the ParaJust Y. Some others include:

Small Size

The small physical size of ParaJust Y is evidence of its efficiency and economical design. The ease with which it can be located and mounted pays dividends to the user.

Use Any Motor

Motors of any manufacturer, of any enclosure, of any speed may be used. New motors or old motors. Motor maybe changed in the future to handle service problems or new requirements. Parametrics has no "axes to grind" in promoting one motor over another. Sometimes those who manufacture motors *and* controls find themselves defending superceded motor designs.

No Inrush Current

When ParaJust Y accelerates a motor to speed, there is no inrush current. Current is limited to 110% of ParaJust Y rating. No overheating of motor nor ParaJust Y. No penalty for "demand". This can be an important, consideration on blowers where high inertias are common.

Essentially Unity Power Factor

Regardless of load or speed ParaJust Y operates on customer's power line at essentially unity power factor. In a control designed to pay for itself in a short time period, we do not believe the customer should pay a penalty for poor power factor.

Completely Enclosed

ParaJust Y is standardly furnished in an oiltight industrial enclosure to exclude dust, oil mist, and solid contaminants from interior of controller. This means that ParaJust Y does not have to be located in a motor control room.

Isolated Control Circuits

ParaJust Y's control circuits are isolated from the input power lines. Thus no consideration need be given to possible ground loops when speed control and/or start-stop signals are wired into ParaJust Y circuits.

No Load Operation

ParaJust Y can be operated with no connected load. This is important in startup because the control can be run less motor for checkout. Furthermore, a disconnecting device must be located near the motor and in some installations this may be quite a distance from the ParaJust Y. Opening of such a disconnecting device, even when operating, does not damage ParaJust Y.

Electrically Silent

There are no SCR's, nor other devices across the incoming power lines to create line notching, only diodes with a capacitive load. The result is a significant reduction in incoming line noise which can affect other equipment.

No Line Reactors

ParaJust Y operates directly from 460v plant power (optional voltages available) with no need for line reactors, nor any other devices to add to system cost, space or complexity.

Reduced Equipment Maintenance

When pump or blower flow is reduced by speed control, maintenance is materially reduced on the entire-pumping or air flow system.

Vary Compact

ParaJust Y is constructed on two chassis which form the front and rear of the enclosure.

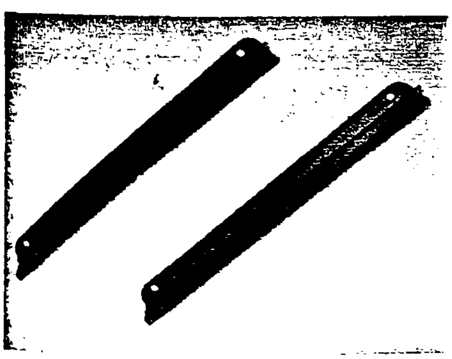
When the front door is opened, the two chassis are exposed for set up, wiring, adjustment, service, etc.

If desired, the two chassis may be removed from the enclosure and remounted in another enclosure.

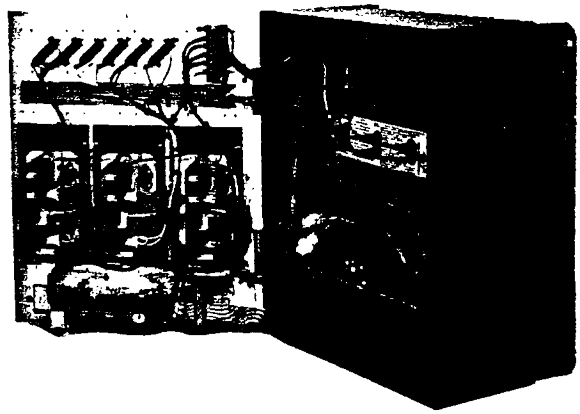
If the chassis are to be mounted in another enclosure, they can be mounted with their fins against the enclosure and no exposed fins would be used. The enclosure must be able to dissipate heat as follows, maintaining internal air temperature at 40 deg. C or less.

ParaJust Y	Heat Dissipation
Y1xxxx	350 watts
Y2xxxx	750 watts
Y3xxxx	1120 watts
Y5xxxx	* N/A

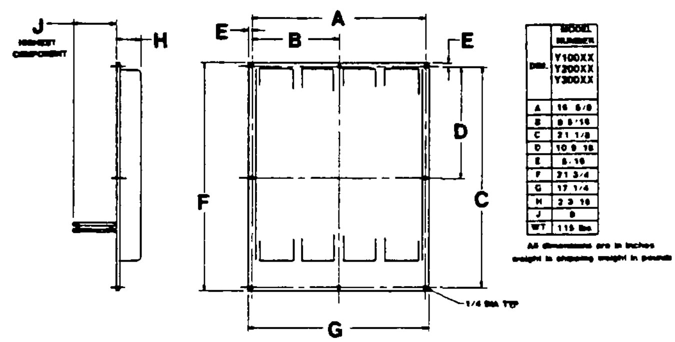
If chassis mounting is selected, order an additional set of mounting feet for the front chassis (2 feet). The standard ParaJust Y mounting feet are used for the rear chassis. See page 8.

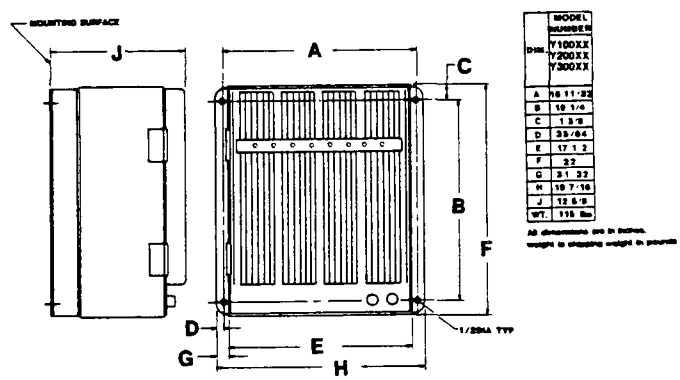


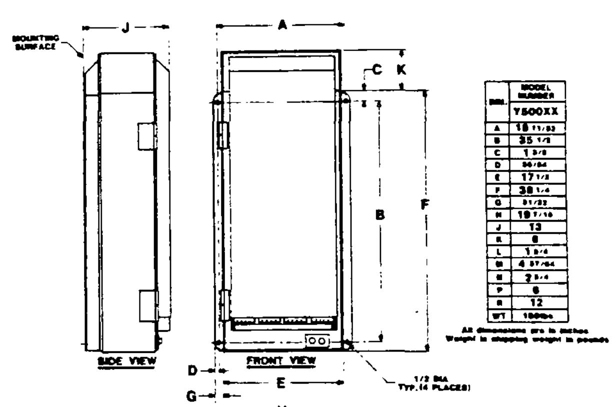
* The Y5xxxx controls are externally fan cooled and cannot be chassis mounted.



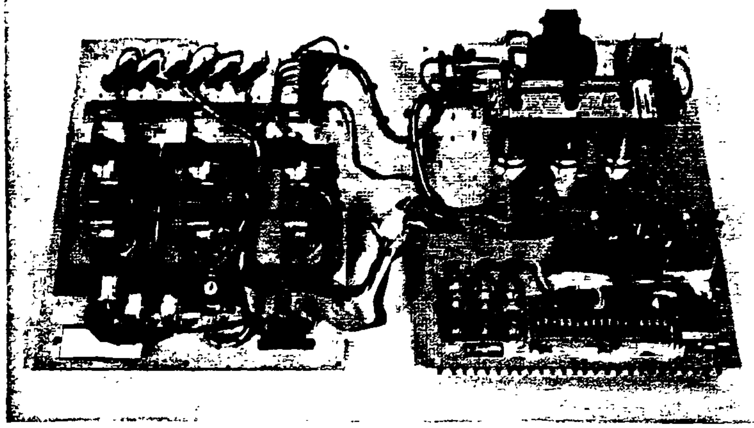
ParaJust Y with front door open.







Note: ParaJust Y must always be mounted with fins vertical and with clear access for air flow 6" above and below chassis. Ambient air temperature around fins must not exceed 40 deg C. Avoid mounting heat producing devices under ParaJust Y controller.



Chassis Style Mounting

Note: Mount chassis side by side 1" to 8" apart. Do not cut, splice or alter factory supplied interconnecting harnesses.

Vary Informative

An eight-function LED status indicating panel is mounted on the front door of the ParaJust Y. These lights are duplicated on the inside of the door so they may be read when the unit is chassis mounted or when the door is opened.

Power

This light will be illuminated when input power is applied to the ParaJust Y. If input voltage is too low or high, the under voltage or over voltage light will also be illuminated. The power light should be on in order for ParaJust Y to operate.

Zero Speed

Illuminates if ParaJust Y is not receiving a speed command. Will illuminate whether ParaJust Y is enabled or not should it not receive a speed command.

Enabled

Illuminates when ParaJust Y is "on." There are many methods of enabling a ParaJust Y explained on Page 6.

Over Temperature

Illuminated when the internal temperature of the ParaJust Y exceeds set point. This light will blink if internal temperature is within 10 deg. C of the set point. If set point is exceeded ParaJust Y will shutdown and this light will be illuminated.

Current Limit

Illuminates whenever output current from ParaJust Y exceeds 110% of rated current but is less than 150% of rated current. If unit is in this mode during acceleration or deceleration ParaJust Y will cease accelerating or decelerating until current drops below 110% at which time accel or decel will resume. If unit is in this mode during running, output frequency will be reduced until current is reduced to 110% of rated current. Illumination will continue if ParaJust Y is incapable of creating output frequency commanded by speed signal.

Over Current

Should output current exceed 150% of rated current this light will be illuminated and ParaJust Y will shut down.

Under Voltage and Over Voltage

Should the input power source experience low or high voltage, these lights will be illuminated and the ParaJust Y will shut down. The following set points are used:

Nominal Input Voltage	Under Voltage Trip	Over Voltage Trip
460V	404V	515V
415V	365V	515V
380V	335V	515V
230V	202V	515V
208V	183V	515V

Additional Indicators

LED's are also located on each driver module (3 modules 2 LED's per module) to indicate the power semiconductors receipt of turn-on information.

Specifications

Input Power

3 phase
50 or 60 cycles
460 volts ± 10%
380v and 415 volt versions are available, also ± 10%. These versions have an adaptor cable (P/N 700542 for 380v, P/N 700541 for 415v) inserted in one of the internal wiring harnesses. These adaptor cables reconnect the logic control transformer from voltage to voltage. Adaptor cables can be ordered for conversion of any unit. ParaJust Y can be supplied with 230 volt logic control transformers. By inserting adaptor P/N 700761, these units will operate on 208v plant power. Note significant reduction in HP rating for 208 and 230 volt controls. See current ratings below.

Output Power

3 Phase
2-60 Hz if unit is ordered for 208, 230 or 460v input.
2-50 Hz if unit is ordered for 380 or 415v input. E-Proms may be ordered (spare parts) to change output frequency range in the field.
0-460v (if 208, 230, 380 or 415 volt controllers are ordered, the output voltage is arranged for 0-208, 230, 380 or 415 volts respectively, in the E-Prom.)

Model	Rated Amps	
	At 460V	At other voltages
Y1xxxx	15	16.5
Y2xxxx	27	33
Y3xxxx	40	40
Y5xxxx	65	70

Output Frequency

Output frequency will be held ± 0.1% of maximum frequency regardless of load, input voltage (± 10%) or ambient temperatures.

Reversing

By making and maintaining a connection between two screw terminals, the ParaJust Y will decelerate the motor to zero speed and accelerate the motor to set speed in the opposite direction. Opening that connection will reverse the process. This feature is most often used to reverse the flow of propeller fans.

Ambient Conditions

Operating 0 to 40 deg C
Storage – 20 to 60 deg C
Not to be mounted in sunlight or exposed to rain and/or snow.
0-95% relative humidity
0-3000 ft. altitude.

Speed Command

ParaJust Y will follow any of following signal sources:
0-5 vdc
0-10 vdc
4-20 ma d. c.
A selector switch is provided which allows ParaJust Y to follow inverted speed signals, i. e. 20 ma = 0% speed and 4 ma = 100% speed
Setting of 5000 ohm potentiometer
Setting of 135 ohm potentiometer
Output frequency will be proportional to any of above signals with a linearity of ± 0.5%.

Start-Stop (Enabling) Commands

ParaJust Y will start and stop (become enabled and disabled) with any of the following:

- Operaton of momentary stop and start pushbuttons
  or
- Closure of contact rated 50 ma, 115 VAC or
- Application & removal of 115v on-off signal or
- Application & removal of input power.

Speed Reference Signal

A 0-5 vdc signal is furnished to indicate output frequency. The signal varies in direct proportion to the output frequency and may be used with a load having an impedance of 100k ohms or greater

Protective Trip

ParaJust Y will cease operating if:

- Output current exceeds 150% of rated current
- Input voltage exceeds 515 VAC.
- Input voltage falls below 88% of rated voltage.
- Internal temperature exceeds set point.

Appropriate indicator lights will be illuminated if the ParaJust Y trips protectivety (see page 5).

Remote Indication

In addition to the eight door-mounted indicating lights and six additional internal LED's (see page 5) the following signals are available for customer use:

- Relay contact rated 1 amp resistive, 115 vac, is furnished with one n. o. and one n. c. contact with the following truth table.

no power → relay deactivated
power applied → relay activated
power applied, ParaJust enabled → relay activated
power applied, ParaJust tripped → relay deactivated

- A 115 vac signal is standard to indicate that the ParaJust Y is enabled. Even if a trip circuit disables the ParaJust, this signal remains available.

A 115 vac signal is standard to indicate that input power is applied.

A total of 50 va is available from the two 115v signals.

Internal Adjustments

- Acceleration time adjustable from 10-100 seconds linear from zero to full speed. Longer 10:1 ranges available as an option.
- Deceleration time is independently adjustable from 10-100 seconds linear from full to zero speed. Optional longer acceleration ranges affect deceleration range as well.
- Input signal offset adjustable from 0-50% of input signal. Allows zero speed operation from signals not reaching zero, i. e. 4-20 MADC.
- Input signal gain from 1:1 to 10:1. Allows full speed operation from signals which do not reach standard levels, i. e. 0-8 VDC.
- Volts per hertz may be adjusted ± 10%. If more adjustment is needed another E-prom must be ordered.
- Maximum frequency can be set at 0-100%.
- Minimum frequency can be set at 0-80%.

The max and min adjustments are operable with potentiometer speed settings as well as all external speed commands, i. e. 0-10V, 4 – 20 MADC etc.

Should ParaJust Y shut itself off in response to over voltage, under voltage, overcurrent or over temperature, it can be restarted by removal of stop (disable) command and reapplication of the start command (enable). An automatic restart is available as an option (See page 7).

Basic Control

Full specifications of ParaJust Y are given on page 6. Every ParaJust Y meets these specifications. Additional features are shown on Pages 3, 4 and 5.

Standard Offerings

Model Numbers

HP	460v	415v	380v*	230v*	208v*
10	Y100xx	Y111xx	Y121xx	Y131xx	Y141xx
20	Y200xx	Y211xx	Y221xx	Y231xx	Y241xx
30	Y300xx	Y311xx	Y321xx	Y331xx	Y341xx
50	Y500xx	Y511xx	Y521xx	Y531xx	Y541xx

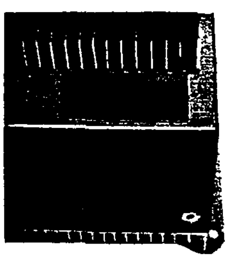
*HP ratings do not apply. Size by current capacity. See OUTPUT POWER PAGE 6.
xx Refers to options (shown below).

Options

Use 5th and 6th Digit of ParaJust Y to specify options as follows:

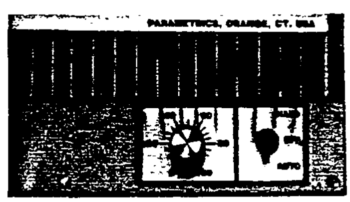
00 **No options.** Unit described on pages 3 through 6

01 **3-15 psi signal.** Has ⅛" NPT pipe fitting at bottom of ParaJust Y enclosure. Customer applies 3-15 psi air signal to ParaJust Y and its output frequency (2-60 or 2-50 Hz) will be directly proportional to the signal

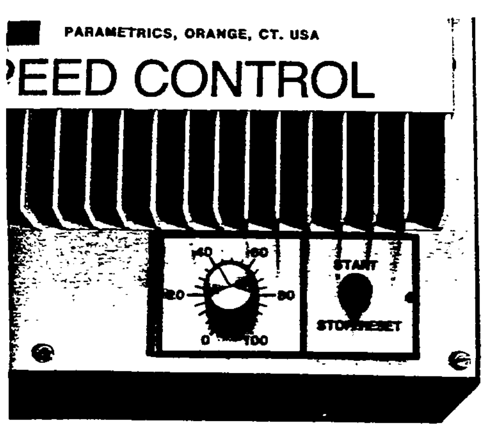


02 **Automatic Restart.** After ParaJust Y has tripped on overcurrent, it will attempt to restart after 20 seconds. If unable to restart after 5 attempts it must be restarted by hand. (Disable then re-enable).
If tripped due to overtemperature, over voltage or undervoltage, ParaJust Y will attempt to restart five times, such attempt taking place 20 seconds after the fault has been resolved.
The five-times circuit resets to zero with 10 minutes of successful operation.

03 **Hand-Off-Automatic, Speed Potentiometer.** H-O-A switch mounted in cover of ParaJust Y starts it in "Hand" and allows its output frequency to be set with speed control potentiometer mounted in cover.
When in "Auto" it's starting and stopping as well as its output frequency are controlled from some other devices and in "off" it will not operate.



04 **Start, Stop/Reset, Speed Potentiometer** full manual speed control is furnished using devices mounted in the front cover of the ParaJust Y.



05 **3-15 psi signal, Automatic Restart.** Combines 01 and 02 options in same ParaJust Y

06 **3-15 psi signal Hand-off Automatic, Speed Potentiometer.** Combines 01 and 03 options in same ParaJust Y.

07 **3-15 psi signal Automatic Restart, Hand-off Automatic Speed Potentiometer.** Combines 01, 02 and 03 options in same ParaJust Y.

08 **Auto Restart, Hand-Off Automatic, Speed Potentiometer.** Combines options 02 and 03 in same ParaJust Y.

09 **Auto Restart, Start/Stop/Reset, Speed Potentiometer.** Combines options 02 and 04 in same ParaJust Y

10 **Special** (Specify). Control furnished to customer specifications

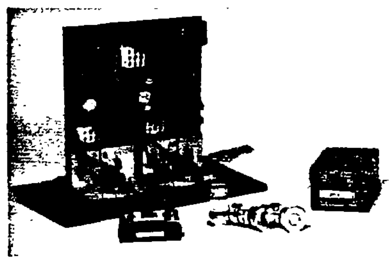
Chassis Mounting Feet

Two brackets for attachment to front chassis when chassis are to be mounted in customer's enclosure with fins inside the enclosure. Use brackets furnished as standard with rear chassis for mounting the rear chassis. P/N 700413.

Spare Parts Kit

For support of single ParaJust Y. Kit consists of one Dual Driver Module, one input power module and ten (10) input fuses.

Model	P/N
Y1xxxx	700854
Y2xxxx	700630
Y3xxxx	700631
Y5xxxx	700855



Voltage Adaptor Cables

When ParaJust Y is operated on 208v, 380v or 415v, an adapter cable is connected in the control transformer wiring harness. This cable reconnects the transformer for the proper supply voltage. If the ParaJust Y is ordered for 208v, 380v or 415v the cable is supplied at no charge. Order adaptor cable only if a change is to be made to supply voltage after ParaJust Y is shipped.

Voltage	Cable P/N
208	700761
380	700542
415	700541

New Identification Labels

If adaptor cables and/or E-Proms (above) are field-installed in ParaJust Y's the original identification labels will show incorrect voltage and/or frequency. Contact Parametrics with full information on original identification labels requesting new labels reflecting the change.

Isolation Transformers

ParaJust Y controllers require 460 Volt input power (380 or 415 Volt optional). They can be operated from 208, 230, or 575 Volt plant power by inserting one of the following transformers between the power line and the ParaJust Y input terminals. Note that isolation transformers not only supply correct input voltage, they also protect the ParaJust Y controller from ground faults. An isolation transformer for 460 Volt plant power is also offered.

Isolation transformers are strongly recommended when ParaJust Y controllers are used with motors located in high-moisture or wash-down installations. 65 Amp (Y5xxxx) ParaJust Y controllers have solid state ground fault protection. Isolation transformers not required on these ratings

ParaJust Model	Transformer Rating	For 208 V Plant Power	For 230 V Plant Power	For 460 V Plant Power	For 575 V Plant Power
Y100XX	10 KVA	P/N 680521	P/N 680160	P/N 680343	P/N 680524
Y200XX	20 KVA	P/N 680431	P/N 680432	P/N 680390	P/N 680433
Y300XX	34 KVA	P/N 680435	P/N 680436	P/N 680391	P/N 680437
Y500XX	50 KVA	P/N 680525	P/N 680526	P/N 680527	P/N 680528

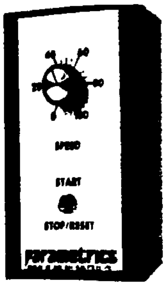
Non-Isolating Buck Transformers

Two single-phase buck transformers are used. Instructions are furnished for connection in an open delta configuration to furnish three phase 460v input power to the ParaJust Y.

For 575 V Plant Power	Y200XX	24.8KVA	P/N 680434
	Y300XX	41.0 KVA	P/N 680438

Operator's Stations.

NEMA 1
General Purpose.



Die Cast Aluminum enclosure. Speed Control Potentiometer. Start-Stop/Reset toggle switch with spring return on "start"; maintained "stop/reset" position. P/N 680001.
To substitute 10-turn speed control potentiometer for 1-turn potentiometer, order P/N 680001 with P/N 900463.

NEMA 7-9 Explosion-Proof.
For Class I, Group C & D and Class II, Groups E, F, and G locations. Shipped unassembled.

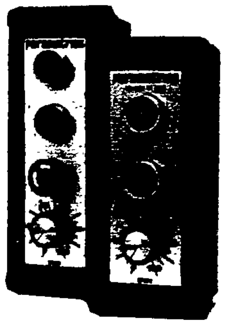
Three-Function Stations.
Start. Stop/Reset. Speed Control. P/N 680007.

Four-Function Stations.
Start, Stop/Reset, Speed Control, Jog/Run P/N 680057.
Start, Stop-Reset, Speed Control, Manual/Auto P/N 680058.

To substitute 10-turn speed control potentiometer for 1-turn potentiometer, order operator's station by Part Number "with P/N 900463."
Contact Parametrics for other Explosion-Proof Operator's Stations.

Shielded Cable.

All remote Start, Stop and Speed Control wiring must be made with shielded cable. Order three-conductor, size-22. Specify length required, P/N 680292. Use one cable for start-stop (enabling) circuitry and a second cable for speed control.



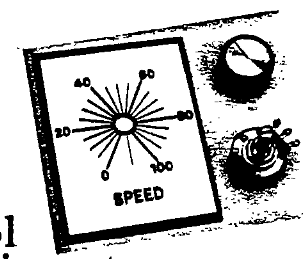
NEMA 4-12 Washdown Duty.
Enclosures are fiberglass. Operator's devices meet NEMA 4 (watertight) requirements and NEMA 12 (oiltight) requirements.

Three-Function Stations.
Start, Stop-Reset, Speed Control. P/N 680018.

Four-Function Stations.
Start, Stop-Reset, Speed Control, Jog/Run. P/N 680054.

Start, Stop-Reset, Speed Control, Manual/Auto. P/N 680055.

Contact Parametrics for other NEMA 4-12 Operator's Stations.



Speed Control Potentiometer.

Furnished unassembled, for customer mounting. With dial plate (3" x 4" high) and knob. (5K2W potentiometer). Order P/N 680002.

Ten-turn Potentiometer.

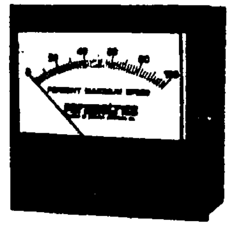
For accurate setting of speed. Has digital readout 0-999. Supplied loose for customer mounting (5K 2 watt potentiometer). Order P/N 900463 (fits ¾" hole).

Motor Operated Potentiometer.

Allows speed to be adjusted from more than one location when more than one set of "Increase" and "Decrease" pushbuttons is used. Consult Parametrics.

Meters.

Speed Indicator (Frequency Meter). Customer wires meter to ParaJust motor output terminal block. Meter displays actual output frequency of ParaJust (motor speed) and is calibrated 0-100% speed.



Includes calibration potentiometer. Meter may be removed from enclosure for mounting in customer panel.
P/N 680423. Please specify if special calibration is desired and use P/N 680424.

Ammeter (Motor Load Meter).
Same size meter and enclosure as Frequency Meter. Customer wires meter into one of the ParaJust-to-motor leads. Meter displays actual motor current. May be removed from enclosure for mounting in customer panel.

SCALE	P/N
0-30 AMP	680286
0-50 AMP	680290
0-80 AMP	680425

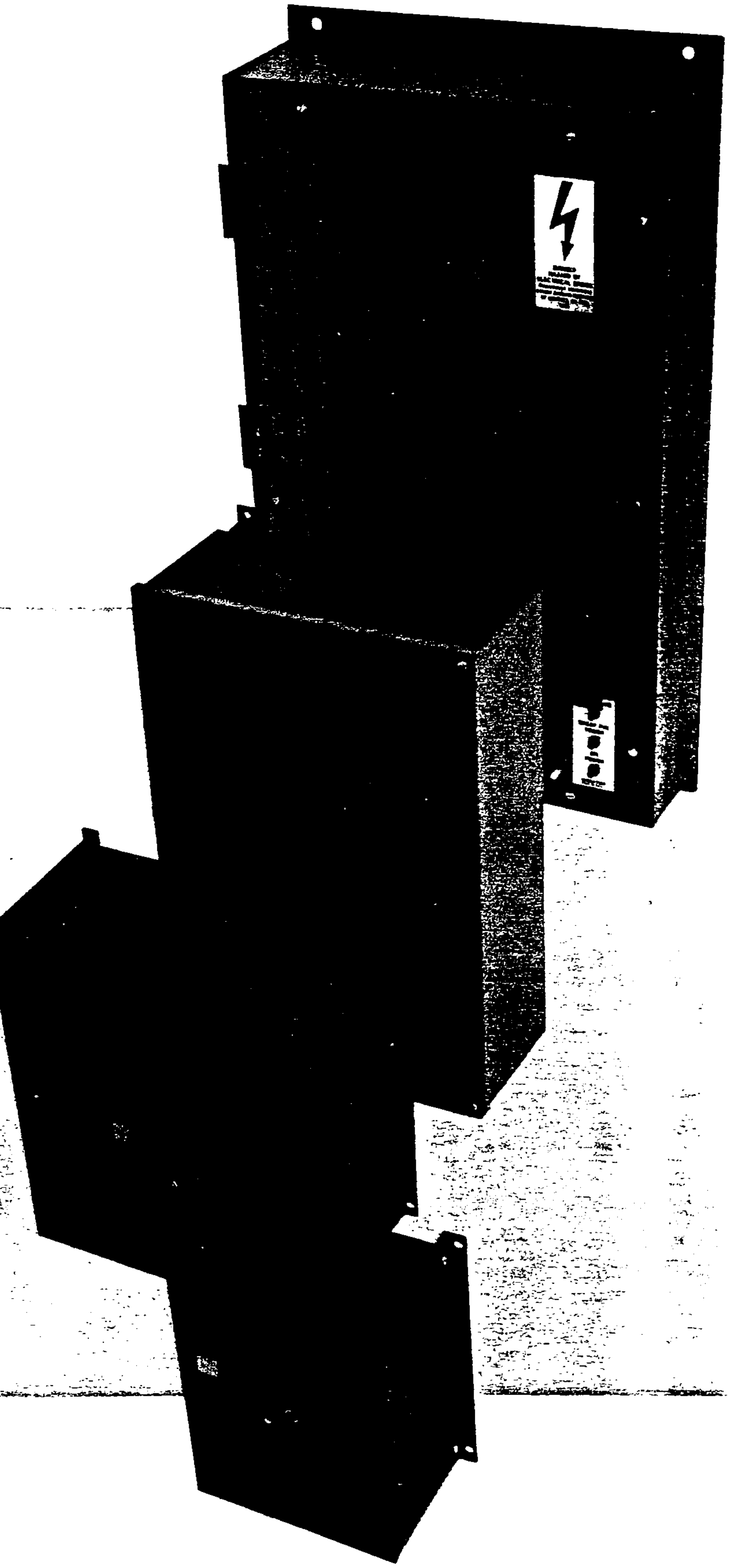
Voltmeter.
Same size meter and enclosure as frequency meter. 0-600 VAC scale indicates output voltage of ParaJust Y. P/N 680417.

Technical Services.

Parametrics can furnish special wiring diagrams and documentation, and field service (including start up supervision) maintenance training, service engineering, etc. as ordered by our customers.

Fractional through 50 HP.

ParaJusts and accessories are available for virtually every speed control application through 50 HP. Contact your distributor for full catalog information and our award-winning Application Manual.



Warranty

Parametrics a unit of Barry Wright, the manufacturer, warrants that for a period of twelve (12) months from date of shipment by the manufacturer or 12 months from Parametrics receipt of Warranty Registration card, not to exceed 18 months from date of shipment, it will repair, or at its option replace, any new apparatus which proves defective in material or workmanship, or which does not conform to applicable drawings and specifications approved by the manufacturer. All repairs and replacements shall be F.O.B. factory. All claims must be made in writing to the manufacturer.

In no event and under no circumstances shall manufacturer be liable for (a) damages in shipment; (b) failures or damages due to misuse, abuse, improper installation or abnormal conditions of temperature, dirt or corrosives; (c) failures due to operation, intentional or otherwise, above rated capacities, and (d) non-authorized expenses for removal, inspection, transportation, repair or rework. Nor shall manufacturer ever be liable for consequential and incidental damages, or in any amount greater than the pruchase price of this apparatus.

This warranty is in LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING (BUT NOT LIMITED TO) ANY IMPLIED WARRANTIES OF MERCHANT ABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE TERMS OF THIS WARRANTY CONSTITUTE ANY BUYER'S AND/OR USER'S SOLE AND EXCLUSIVE REMEDY, AND ARE IN LIEU OF ANY RIGHT TO RECOVER FOR NEGLIGENCE, BREACH OR WARRANTY, STRICT TORT LIABILITY OR UPON ANY OTHER THEORY. Any legal proceedings arising out of the sale or use of this apparatus must be commenced within eighteen (18) months of the date of shipment.

RETURNED GOODS — No goods will be accepted for return unless there is prior written authorization by the home office. In all cases, transportation charges must be prepaid.

INTERPRETATION — There are no conditions or understandings whatsoever, verbal or otherwise, except as written herein and this statement contains the complete and exclusive agreement between the buyer and manufacturer. No waiver, alterations or modification of any of the provision hereof shall be binding upon the manufacturer unless made in writing and signed by a duly authorized officer of the manufacturer.

Parametrics

a unit of ***Barry Wright***

284 Racebrook Rd.
Orange, CT 06477
(203) 795-0811 Telex: 643301
For Technical Support
800-243-4384

Form SM 6015A (10/83)

MOHLER

HAZARD, KENTUCKY
WASTEWATER TREATMENT PLANT PROFILE
OCTOBER 1-5, 1984
(1.5 M.G.D. TRICKLING FILTER PLANT)

PROBLEM:

The plant has design limitations, operational control handicaps, and lacks a sludge management plan. There is ample hydraulic capacity (1.50 MGD), but the shallow trickling filter limits the organic capacity to about 7,000 population equivalent. The anaerobic digester should accomodate a population equivalent of about 12,000. The sludge dewatering on sludge beds restricts the solids loadings to a population equivalent of about 7,500. At the present loadings and plant performance level, the bed dosage cycle will range from 30 to 50 days (dependent upon the degree of solids reduction and concentration achieved by the digester).

The plant influent pumping station contains two 1,050 GPM pumps and one 700 GPM pump. One of the 1,050 GPM pumps is inoperable and operation of the pumps must be manually controlled. The secondary effluent recirculation was intended to serve as makeup flow to the influent wet well so that one or more of the plant influent pumps would operate continuously. The recirculation control valve in the wet well valve was long ago eaten up by corrosion, so the recirculation rate is now fixed by manual operation of a shear gate in the effluent weir basin. It has not been possible to regulate the recirculation so as to prevent the on-off cycling of the plant influent pump which will usually occur about four times between midnight and 6:00 a.m. The trickling filter distributor arms will sag when the pump kicks off so that they hang up on the media and have to be manually re-started. It is believed that the filter distributor arms remain stationary after the first stoppage each night and remain that way until re-started the next day.

The grit collection equipment is badly corroded and not in operation.

The plant has a plunger pump (39 GPM) for primary sludge and a 300 GPM centrifugal pump for secondary sludge, and both are served by a single pump pit. This double used single pit scheme necessitates the opening and closing of the valves at the primary and secondary clarifiers each time the use is changed. This troublesome task results in minimal sludge withdrawals from the clarifiers because of the extra labor involved.

ACTION TO SOLVE PROBLEMS:

The control panel for the plant influent pumps must be rewired.

The City Manager and Division of Water personnel are seeking to expedite the processing of the permit for dewatered sludge from the sludge beds for disposal at the County Landfill. The City Manager has been advised that a back up plan for sludge disposal is needed. The City Manager was also advised as to the rehabilitative needs of the sand beds.

Work on replacing the corroded grit collection equipment is in progress.

The city engineers were furnished plans and specifications for the installation of a flow meter at the effluent weir basin.

The operators were given basic instructions in primary and secondary sludge pumping schedules, digester supernatant recycling, sand bed dosage and dosing cycles, and secondary effluent recirculation rates.

PERFORMANCE

The plant performance has been generally below its design expectations and has been out of compliance with its permit with respect to BOD, Suspended Solids and Fecal Coliform. The plant has never had valid flow measurement and the analyses of effluent samplings are performed by a commercial laboratory.

PROGNOSIS

With optimum operational and maintenance practices, the plant could be in compliance with its permit (25 B.O.D./30 S.S./12 NH_3-N/2 D.O.) for probably not more than four months out of the year. It seems probable that a moderate amount of plant improvements would enable permit compliance to be achieved for as much as eight months out of the year. The improvements recommended are:

1. Revise piping so that secondary sludge could be returned to the primary influent on a continuous basis.
2. Extend the secondary effluent recirculation pipe downward to within about 12 inches of the intended high water level in the wet well, and then install a butterfly valve which would control the recirculation flow rate in inverse proportion to the raw sewage flow.
3. Construct three or more new sand beds, and reserve one bed to serve as a filter for the digester supernatant return.
4. Install bar screen with 1/2 inch spacings at the downstream end of the Parshall Flume.
5. Install plastic sprockets to mate up with the plastic chains in the primary clarifier sludge collection equipment.

6. Purchase two portable automatic samplers so as to provide basis for operational controls and to furnish representative performance data. Consideration should be given to the conducting of sample analyses by plant personnel.

7. Construct a chlorine contact basin downstream from the effluent weir basin. Consideration should be given to flow proportioned chlorine feed equipment.

CONCLUSIONS:

The foregoing recommendation will not increase the plant's BOD capacity. Increasing the depth of media in the Trickling Filter appears to be the most cost-effective means of increasing the BOD capacity.

As is, the plant's BOD population equivalent capacity is about 7,000.

It appears that, without the wastes from Airport Gardens, the plant loadings are about 6,500 population equivalent. Whenever the Airport Gardens wastes are received the BOD loadings will be very near to plant capacity.

Submission of a schedule for upgrading the treatment facilities should be required, and approval for future tap-ons should be contingent on compliance with this schedule.

HAZARD
EVALUATION OF COMPOSITE SAMPLES BEFORE AND AFTER
COMPTRAIN PROGRAM

	BEFORE		AFTER	
	IN	OUT	IN	OUT
Flow	0.773 MGD	0.773 MGD		
Permit %		Flow meter went out of service during survey.		
C.O.D. mg/l	483	113	365	165
C.O.D. lbs	3,114	728		
C.O.D. %	Reduction	77		
$B.O.D._5$ mg/l	168	32	178	65
$B.O.D._5$ lbs	1,083	206		
$B.O.D._5$ %	Reduction	81		
Permit %	Reduction	85		
S.S mg/l	520	34	96	20
S.S. lbs	3,352	219		
S.S. %	Reduction	93		
Permit %	Reduction	85		
V.S.S. mg/l	224	20		
V.S.S. lbs	1,444	129		
V.S.S. %	Reduction	91		
T.S. mg/l	955	556		
T.S. lbs	6,157	3,584		
T.S. %	Reduction	42		
V.T.S. mg/l	313	119		
V.T.S. lbs	2,017	767		
V.T.S. %	Reduction	62		
NH_3-N mg/l	11	9	16	13
NH_3-N lbs	71	58		
NH_3-N %	Reduction	18		
Permit mg/l	N/A	12		
pH	6.9	7.4	7.0	6.9
Permit	N/A	6-9		
D.O. mg/l	N/A	5.2		
Permit mg/l	N/A	2.0		

HAZARD
EVALUATION OF COMPOSITE SAMPLES BEFORE AND AFTER
COMPTRAIN PROGRAM

	BEFORE		AFTER	
	IN	OUT	IN	OUT
Fecal Coliform per/100 ml	N/A	>1000,000	Not run by lab	
Permit	N/A	200		

JACKSON, KENTUCKY
WASTEWATER TREATMENT PLANT PROFILE
AUGUST 20 - 23, 1984
(0.300 M.G.D. EXTENDED AERATION)

I. PROBLEMS:

During the period the Comptrain project was conducted, 5 of the 11 lift stations were out of service. Included in the inoperable group was the main lift station from Jackson and the lift station which pumps the wastewater from the neighboring town of Quicksand. No percise count of 75% sewer service connections was available at this time. The estimated population in Jackson and Quicksand is 2,300 and 1,500, respectively. A guess at the population being served is 3,000. Estimating 150,000 GPD. The measured flow during this period was 54,000 GPD, and on this basis, 64% of the sewage flow from the two towns is being discharged to North Fork Kentucky River.

The Division of Water's records show the subject plant to be the extended aeration process with a rated hydraulic capacity for 3000,000 GPD. This hydraulic capacity should provide organic loading equivalent to a population of 3,000. Calculations based on the construction drawings show the following data:

Aeration Compartment Volume = 26,716 cubic feet (199,835 gallons)
Digester Compartment Volume = 9,157 cubic feet (68,494 gallons)
Clarifier Compartment Volume = 47,285 gallons
Sludge Drying Bed Area = 2,664 square feet
Clarifier Net Surface Settling Area = 415 square feet

On the bases of the foregoing calculations, the hydraulic capacity is 200,000 GPD and the organic capacity in terms of population equivalent is for 1998 people. The surface area of the clarifier is the limiting hydraulic factor. Adding the digester volume to the aeration volume could (theoretically) increase the BOD capacity to 2,688 population equivalent, but the hydraulic loading should be pegged at not more than 250,000 GPD. The digestion compartment, properly used, would be of more value in burning off surplus solids production.

Theoretically, converting to the Contact Stabilization mode would nearly double the BOD capacity, but this would not be feasible because the clarifier surface area would still limit the hydraulic capacity to 250,000 G.P.D. Besides, the trade off would be about a 300% increase in surplus solids production.

The Spring flooding inundated the sludge drying beds which has necessitated replacing all of the sand. High poroscity sand with very little fine material is available locally. City personnel have immediate plans for securing and placing this media on the beds.

II. PROBLEMS DEFINED AND ACTIONS TAKEN:

A.) Problem:

No operation control proceedures have been practiced.

Action Taken to Solve Problem:

The wastewater operators were given instructions in the basic principals of operational controls.

B.) Problem:

The wastewater plant is oprating without licensed wastewater operator.

Action Taken to Solve Problem:

The wastewater operators were given training and were instructed to take the Class I and II wastewater examanation as soon as they obtain the needed experience.

C.) **Problem:**

Routine housekeeping chores have been neglected for a long period of time.

Action Taken to Solve Problem:

High pressure hosing was used to wash off solids which were caked on the walls and the aeration piping.

D.) **Problem:**

The aeration compartment contained about 12 inches of compacted solids. The great majority of those solids seemed to consist of grit.

Action Taken to Solve Problem:

There was no action taken to solve this problem during the Comp Train Project. The city was instructed that all compartments should be drained and cleaned during the month of November and December, because of the load that would be imposed on the stream during the period of bypassing. Also, the Department of Environmental Protection, Division of Water, should be notified prior to this work. This accumulation of solids take up volume and reduce plant capacity.

E.) **Problem:**

There was a large backlog of surplus mixed liquor suspended solids (M.L.S.S.) in all the plant compartments.

Action Taken to Solve Problem:

There was no action taken to solve this problem during the Comptrain Project. The city was instructed to refurbish the sludge drying beds so that sludge could be wasted. The sludge after it has been dried on the sludge beds can be removed and taken to the Perry Co. Landfill for incorporation with the cover material.

F.) **Problem:**

The aerobic digester compartment was not being used as design. About 70% of the return sludge was routed through what was designed to be the digester supernatant overflow.

Action Taken to Solve Problem:

The air supply to aerobic digester was shut off long enough to allow the sludge blanket to settle. The clear supernatant was then pumped to the aeration compartment. The adjustable digester supernatant over flow weir was elevated to its maximum height so that the digester solids would not escape while under aeration. The operators were instructed to the settling and pumping method to extract the maximum amount of water from the digester sludge so as to increase the effectiveness of the sludge drying beds.

G.) **Problem:**

Several of the air diffusers appeared to be clogged.

Action Taken to Solve Problem:

There was no action taken to solve this problem during the Comptrain Project. When the city drains the plant they are to repair this equipment.

H.) **Problem:**

All the metal work is in need of sand blasting and painting.

Action Taken to Solve Problem:

The city was informed that this needed to be done.

I.) **Problem:**

Working conditions in the laboratory and office are intolerable because of noise and heat.

Action Taken to Solve Problem:

There is no action that could easily solve this problem. It is bad design when the blowers are put in the same building with the Lab and Office.

J.) **Problem:**

All four sludge drying beds received minor damage because of the flood. Most of the sand on the drying beds had been washed away.

Action Taken to Solve Problem:

New Sand - of the right uniform coefficient and effective size was ordered. The city has now completed the rehabilitation of the sludge drying beds.

K.) **Problem:**

The waste sludge valve on the waste sludge line was frozen shut and could not be unfrozen. This prohibits the wasting of sludge from the aerobic digester.

Action Taken to Solve Problem:

The city was instructed to replace these ball valves with gate valves.

L.) **Problem:**

On the day of the Comptrain Project five of the eleven lift stations were out of operation.

Action Taken to Solve Problem:

The Department of Environmetnal Protection, Division of Water, put a restraining order on the city of Jackson. See attachment #1.

M.) Problem:

The chlorine contact tank was full of solids about four feet.

Action Taken to Solve Problem:

The operators were instructed to pump these solids over into the aerobic digester.

III. PERFORMANCE:

This wastewater plant is not performing very well because of the above problems. This plant will not be in compliance unless elected officials take seriously their job and see that the plant is adequately staffed and run by certified wastewater plant operators who are willing to do the work necessary to keep this plant in compliance. This means the city should hire two full-time wastewater plant operators.

IV. PROGNOSIS:

This city will stay out of compliance until their attitude changes towards wastewater treatment. Their attitude is, "give us a grant and we will fix it." This is a syndrome of this region. The syndrome is, "receive federal and state grant monies and build what is required by law but do not spend money to take care of it. If it breaks down, ask for more grant monies to fix or replace it with a new one." The problem with this syndrome is that it is reckless stewardship of federal and state grant monies. Therefore, the return on the dollar is not cost effective. Maybe we should not give grant monies to cities with poor stewardship of past monies received? Maybe grant monies ought to go to cities with a good stewardship record? Then at least our grant monies have a better possibility of be well spent.

A tap-on ban has recently been enacted because of the bypassing of the pump stations etc. With marginal performance at 25% of its design loading, the plant should be carefully monitored after all the pump stations have been restored to service because it seems quite likely that the plant would then be at or very near its design loading. Without good operational and maintenance, the plant will not be able to meet its permit limitations under full loading conditions.

JACKSON
EVALUATION OF COMPOSITE SAMPLES BEFORE AND AFTER
COMPTRAIN PROGRAM

	BEFORE		AFTER	
	IN	OUT	IN	OUT
Flow	0.258	0.258		
Permit %				
C.O.D. mg/l	268	14		
C.O.D. lbs	577	65		
C.O.D. %	Reduction	89		
$B.O.D._5$ mg/l	97	0.1	The after C.S.I was not run because of five down lift station and only 54,00 gpd flow.	
$B.O.D._5$ lbs	209	0.2		
$B.O.D._5$ %	Reduction	99.9		
Permit %	Reduction	85		
S.S mg/l	80	3	The before C.S.I represents mostly rain water and 3 lift stations were down at the time of sampling. About 50% or more of the flow and organic load was not entering the wastewater plant.	
S.S. lbs	172	6		
S.S. %	Reduction	97		
Permit %	Reduction	85		
V.S.S. mg/l	66	3		
V.S.S. lbs	142	6		
V.S.S. %	Reduction	96		
T.S. mg/l	528	392		
T.S. lbs	1,136	843		
T.S. %	Reduction	26		
V.T.S. mg/l	162	70		
V.T.S. lbs	349	151		
V.T.S. %	Reduction	57		
NH_3-N mg/l	22	3		
NH_3-N lbs	47	6		
NH_3-N %	Reduction	87		
Permit mg/l		20		
pH	7.1	7.3		
Permit	6.0 - 9.0	6.0 - 9.0		
D.O. mg/l	N/A	2		
Permit mg/l	N/A	6		

JACKSON
EVALUATION OF COMPOSITE SAMPLES BEFORE AND AFTER COMPTRAIN PROGRAM

	BEFORE		AFTER	
	IN	OUT	IN	OUT
Fecal Coliform per/100 ml	N/A	40		
Permit	N/A	200		

	BEFORE	AFTER
Aeration Solids		
MLSS mg/l	6,620	
MLVSS mg/l	3,020	

ATTACHMENT 1

at the track

Above, a 250-yard race was the first race run at the new Paducah Downs in Paducah yesterday. At right, Tangie Randolph, left, Norman Randolph and David Burns, all from Nashville, Tenn., looked over race programs before the races at the quarter-horse track.

STAFF PHOTOS BY BILL KIGHT

Courier Journal - August 24, 1984

Court prohibits new sewer tap-ons in Jackson

By LIVINGSTON TAYLOR
Courier-Journal Staff Writer

FRANKFORT, Ky. — A court order temporarily barring the city of Jackson from approving new connections to its sewer system was obtained yesterday by attorneys for the state Natural Resources and Environmental Protection Cabinet.

A sewer tap-on ban issued through the state Division of Plumbing has been in effect at Jackson for the past year, a Division of Water official said later.

Yesterday's temporary restraining order, obtained from Franklin Circuit Judge William L. Graham, apparently will put more weight behind efforts to enforce the ban.

A complaint filed in court by the Cabinet yesterday alleges that the city has failed to comply with state laws and regulations by:

- Allowing sewage to bypass pumping stations and by not reporting the bypasses.
- Failing to meet allowed effluent-quality standards at its sewage-treatment plant, on the North Fork of the Kentucky River.
- Failing to obtain permits for the construction of sewer lines.

The complaint alleges that the city has violated a 1982 agreement in which it agreed to ban new sewer connections in the Quicksand area without state approval; report spills and bypasses; repair its plant; and maintain a treatment level sufficient to meet water-quality standards.

"The sewage-treatment system serving the Jackson area is still hydraulically and biologically overloaded, so that the system cannot handle additional influent without further detriment to the public health and environmental quality," the complaint alleges.

The suit asks for a permanent injunction against new sewer connections and an order requiring Jackson to remedy its sewer problems.

Claims made in a lawsuit give only side of a case.

Jackson Mayor Frank Noble could not be reached for comment.

Untreated sewage has been bypassing two pumping stations in the Quicksand area for several years, the Division of Water official said.

The stations were originally part of the Quicksand sewer district, which later was taken over by the city of Jackson.

The Division of Water's records on the case have been sent to the Cabinet general counsel's office, division officials said.

An attorney in the general counsel's office, Kathryn Hargraves, refused to release any records except those filed in court because "we're in the middle of an enforcement action."

ALBANY, KENTUCKY
WASTEWATER TREATMENT PLANT PROFILE
JULY 15 - 20, 1984
(0.45 M.G.D. OXIDATION DITCH)

I. PROBLEMS:

This wastewater treatment plant has design and construction problems that make the plant difficult to operate. This plant is operating without certified wastewater operators. Also, this plant does not have a sludge disposal permit. These problems have caused this plant to be in noncompliance.

II. PROBLEMS DEFINED AND ACTIONS TAKEN:

A. Design Problem:

High water marks in the plant influent pump well and plant drain metering pit indicate that manholes CF-1 through CF-9 in the plant influent line have been surcharged. It also appeared that manholes CF-2, CF-3, and CF-4 have been subject to inundation. This is probably the major source of silt and clay in the plant solids. This silt and clay are found throughout the plant basins, ditch, clarifiers, etc. One of the final clarifiers was drained in order to clean this silt and clay out of the clarifier.

Action to Solve Problem:

The city should investigate and eliminate the major sources of sand, silt, and clay entering the collection system. Manholes CF-2, CF-3, and CF-4 should possibly be raised to prevent inudation. Sand silt, and mud is to be were physically removed from the clarifier.

B. Design Problem:

Excessive harmonic wave action in the oxidatiton ditch prohibits the simultaneous operation of both rotors. This is a serious problem in that poor plant performance will be the result when the organic loadings exceed the oxygen transfer capability of one rotor.

Action to Solve Problems:

Lake Side Equipment has been contacted and they are going to visit the plant and correct the problem.

C. Design Problem:

The aerobic sludge digester is severely handicapped by the existing fixed level supernatant overflow scheme. This mode of operation does not provide for the maximum amounts of supernatant withdrawal, and this results in shortened solids retention time and decreased solids concentrations being applied to the beds.

Action to Solve Problem:

Replace the digester overflow pipe with a telescopic valve which provides a six foot elevation range for decanting supernatant.

D. Design Problem:

The solids in the chlorine contact basin must be physically shoveled to the drainage valves. About 12" of solids had accumulated in these basins. Flat bottom chlorine contact basins with drainage valves above the floor level is a common design problem which was found in this plant. (It required 3 hours of shoveling and washing to remove the solids.)

Action to Solve Problem:

Reconstruct the floor of the chlorine contact basins so that sludge will readily drain to the mud valves. See attached drawing.

E. Construction Problem:

The sludge drying beds were not constructed in conformance with the plans and specifications as approved by the Division of Water. An aggregate resembling pit gravel was substituted for sand. The plans and specifications called for an effective size of 1.0 mm to 3.37 mm with a uniform coefficient of 3.0 or less. The sieve analysis of the material on the drying beds showed the effective size to be 0.635 mm and the uniform coefficient to be 7.27. This material permitted sludge solids to penetrate about 2 inches into the media, and the filtrate produced contained a very high solids concentration.

Action to Solve Problem:

Remove the existing media from the sludge drying beds and purge the beds of sludge which may have penetrated to the course stone media, and replace with sand which will conform with the contract specifications. Final grant payments will not be made until this problem is corrected.

F. Construction Problem:

There is 1 to 3 inches of solids deposited in the screw pumps discharge area and in the comminutor by pass channel.

Action to Solve Problem:

Construct fillets in the corners of the plant influent structure. Also, slope the comminutor by pass channel floor so as to eliminate the grit accumulation.

G. Problem:

The lack of a flap valve in the plant influent pump pit allows for backup flooding of the plant drainage system at storm flow conditions.

Action to Solve Problem:

A flap valve has been ordered and will be installed to prevent flooding of the plant drainage system.

H. Problem:

The chlorine water supply scheme requires a considerable amount of maintenance. Excessive amounts of grease and plastics settle in the chlorine contact basin near the point where the water is withdrawn. This grease and trash clogs the chlorine feed equipment.

Action to Solve Problem:

Connect the chlorine feed equipment to the city water supply. Use the chlorine tank water only for wash down. A one inch diameter high pressure hose and nozzle is needed for wash down.

I. Certification Problem:

No certified wastewater operators.

Action to Solve Problem:

The operators were trained in the proper operation of the treatment plant. They were also taught how to run the various process control tests and how to plot and use trend charts. They are to attend the next certification school to take the exam for certification.

J. Problem:

There is no room to waste sludge into the aerobic digester. The digester is full of solids. Also there is an excessive amount of solids carried in the oxidation ditch.

Action Taken to Solve Problem:

Sludge was cleaned off of the five sludge drying beds and stored on the plant grounds. The five beds were then filled again with 28,793 gallons of sludge which contained 10,484 pounds of solids from the aerobic digester. The operators now have room to waste sludge into the digester again on a daily basis. The wastewater operators were trained how to waste sludge and balance solids. The MLSS in the Oxidation Ditch were lowered from 4,153 ppm to about 2,800 ppm to agree with the computer model.

K. Problem:

No permit to dispose of sludge from the sludge drying beds.

Action Taken to Solve Problem:

A sample of sludge from the drying beds is being run at a private laboratory to determine if any toxic material is present in quantities large enough to cause problems. If the sludge sample shows no prohibitive concentration of certain substances, Albany will be able to dispose of their sludge in the Clinton County permitted landfill while they pursue the selection of a site for sludge recycling and utilization of agricultural land.

III. Performance:

This new wastewater treatment plant is performing very well despite all of the above problems because the treatment plant is receiving only 25% of its design hydraulic and organic load. The harmonic wave problem in the ditch prevents the operation of both rotors together, and this will limit the plant's organic loadings to significantly less than its design intent. Serious operational problems will result from the faulty sand beds and the digester limitation, and this will most probably exert a negative affect on plant performance.

Prognosis:

Special Note: This plant will go out of compliance because of the lack of adequate sludge management equipment. Sludge drying beds alone are not sufficient because Kentucky receives more rainfall than evaporation and the sludge will not dry in wet weather. The sludge will then build up in the plant and then wash out in the effluent at high flow periods. Therefore the city needs to develope a sludge management plan that includes hauling liquid sludge to a permited agricultural site.

This plant is now experiencing a back log of sludge that needs to be wasted and they have neither the equipment or an approved way of doing this. The problem is getting worse every day.

Other problems that could cause noncompliance would be failure to correct the problems of mud and sand entering the plant, excessive infiltration and inflow, and organic loadings in excess of the ditch's oxygenation capability.

ALBANY

EVALUATION OF COMPOSITE SAMPLES BEFORE AND AFTER COMPTRAIN PROGRAM

	BEFORE		AFTER	
	IN	OUT	IN	OUT
Flow	0.170	0.170	0.232	0.232
Permit %				
C.O.D. mg/l	731	21	938	84
C.O.D. lbs	1036	30	1,902	163
C.O.D. %	Removal 97%		Removal 91.5%	
B.O.D.$_5$ mg/l	288	3.0	360	6.3
B.O.D.$_5$ lbs	408	4.25	697	12
B.O.D.$_5$ %	Removal 99%		Removal 98%	
Permit %				
S.S mg/l	278	4	568	10
S.S. lbs	394	5.7	1,099	19.34
S.S. %	Removal 98.5%		Removal 98%	
Permit %				
V.S.S. mg/l	163	<1	434	6
V.S.S. lbs	231	<1.41	839	12
V.S.S. %	Removal 99.9%		Removal 98.5%	
T.S. mg/l	932	283	1,200	475
T.S. lbs	1,321	401	2,322	919
T.S. %	Removal 70%		Removal 60%	
V.T.S. mg/l	462	44	672	83
V.T.S. lbs	655	62	1,300	161
V.T.S. %	Removal 90.5%		Removal 88%	
*NH_3-N mg/l	11.1	4.42	20	16
NH_3-N lbs	16	6.25	39	30
NH_3-N %	Removal 61%		Removal 23%	
Permit %				
pH	9.4	7.7	not run by lab	
Permit				
D.O. mg/l	not run by lab			
Permit				

ALBANY
EVALUATION OF COMPOSITE SAMPLES BEFORE AND AFTER COMPTRAIN PROGRAM

	BEFORE		AFTER	
	IN	**OUT**	**IN**	**OUT**
Fecal Coliform per/100 ml Permit	not run by lab			

	BEFORE	AFTER
Aeration Solids		
MLSS mg/l	7,000	3,630
MLVSS mg/l	3,350	1,930

* Ammonia Nitrogen removal was bad on the after C.S.I. This was because the operator blast wasted sludge and put 14" on the drying beds. This reduced the sludge age and the nitrifying bacteria causing the NH_3-N reduction to ~~deminish~~. I phoned the operator and told him to do this more slowly the next time and never put more than 8" of sludge on the beds.

ATTACHMENT 1

CHARLOTTE E. BALDWIN
SECRETARY

MARTHA LAYNE COLLINS
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FORT BOONE PLAZA
18 REILLY ROAD
FRANKFORT, KENTUCKY 40601

September 6, 1984

The Honorable Sid Scott, Mayor
City of Albany
P. O. Box 96
Albany, Kentucky 42602

Dear Mayor Scott:

In conducting the Comptrain Program for the Albany Wastewater Treatment Plant Operators, many shortcomings in the plant's design and operational features were brought to light. A copy of the report on the plant's status is enclosed for your information and use. The items in need of corrective action are listed in the order of priority as follows:

1. Replace the existing sludge drying bed media with the type of media as called for in the job specifications.

2. Secure a sludge disposal permit from the Division of Waste Management.

3. Provide flood protection for plant drain line.

4. Correct sources of mud entering collection system.

5. Connect chlorine feed equipment to a city water supply.

6. Install a telescopic valve for digester supernatant.

7. Procure a one inch high pressure hose and nozzle for plant washdown purposes.

8. Modify floor of chlorine tank as shown on enclosed drawings so that sludge will drain to the mud valves.

9. Construct corner fillets in screw pump influent chamber and slope floor in comminutor by-pass channel so as to prevent solids accumulation in these areas.

10. Install baffles in the ditch on the downstream side of each rotor.

The responsibility for construction in conformance with the plans and specifications as approved by this office lies solely with the city. This office can have no legal issue with agents the city may have employed to attend to the duties required in the construction, operation, maintenance and management of the facilities.

We have plans to follow up on the performance of the plant and the operators and will be available after November for any aid we can give towards making the needed improvements.

Very truly yours,

Paul K. Wood

Paul K. Wood
Environmental Engineer
Division of Water

PKW:fml

Enclosures

Loyall, Kentucky
Wastewater Treatment Plant Profile
August 23, 1984
(0.185 M.G.D. Extended Aeration)

I. Problems:

This wastewater treatment plant has operational problems because of the lack of operator knowledge, experience, and training.

II. Problems Defined and Actions Taken:

Problem:

The wastewater operators did not know how to balance the mixed liquor suspended solids (M.L.S.S.) in the three aeration tanks. Also they did not know at what level of M.L.S.S. in mg/l they should maintain for best operation.

Action Taken:

The operators were trained in process control procedures and were instructed on how to balance the solids in the reactors. The operators then balanced the solids in the reactors by splitting flow and solids equally between the reactors.

Problem:

The operators did not know how to draw off supernatant and waste sludge to control the M.L.S.S. in the aerators (2,800 mg/l level).

Action Taken:

The operators were instructed to obtain a portable pump with flexible hose connection, and one of the aeration tanks was converted to an aerobic digester. Then the operators were instructed how to operate this digester and how to waste sludge. The total solids inventory in the plant was calculated to be 9,619 lbs. and the total solids wasted by the end of the Comptrain Project was 4,246 lbs. The

M.L.S.S. in the aeration was lowered from an average of 4,500 mg/l to an average of 2,800 mg/l of M.L.S.S. which is the near the design level. One of the aeration basins could temporarily be converted to a digester because this plant is only receiving about 2/3 of its des gn hydraulic and organic loading.

Problem:

This plant has no sludge drying beds. Therefore, all sludge disposal has to be hauled off in the liquid form by tank truck. For a 1,000 gallon septic tank hauler this cost the city $100.00 a load. Also, one load 1,000 gallons, amounts to 100 lbs. of solids, and a 100 lbs of solids in what the city needs to waste each day. Therefore, it cost the city $100. a day to waste sludge by this method. This is cost prohibitive. Therefore, the city must search for a better scheme for solids disposal.

Action Taken:

The City is checking to see if they own or if they can purchase some land next to the treatment plant so that they can build some sludge drying beds. This would reduce their sludge hauling cost and volume tremendously.

Hauled Wet: .001 MGD x 8.34 x 12,000 p.p.m. = 100 lbs/day

Cost $100.00 per 1,000 gallons or $1.00 per lb.

100 lbs. waste each day = $100 per day

Drying Beds

Dry Sludge
65% solids
Hauled Dry

$$\text{Gallons} = \frac{100 \text{ lbs/day}}{650{,}000 \text{ ppm} \times 8.34} \times 1{,}000{,}000$$

Gallons = 18.4

Therefore 18.4 gal. ÷ 7.5 gal/ft^3

= 2.45 ft^3 of dry sludge/day

This volume could be hauled off in a pickup truck at the city's cost of their own labor and truck.

Problem:

The flow meter and totalizer are out of order.

Action to Solve Problem:

The flow meter is to be serviced on a regular scheduled basis in an agreement between the Seaboard Railroad and the city of Loyall. The railroad has a discharge to the city sewer system and they have to monitor the flow. Therefore, they will have their repair man service the city's flow meter also.

The city has not been charging the railroad for their discharge. This is now being changed with a price agreement is to be reached in the near future.

Problem:

This wastewater plant does not have an adequate operating staff. This plant should have two permanent daily operational personnel. That is they should not be called off their operational duties to take care of water line breaks and other city business. At present this is being done.

Action Taken to Solve Problem:

They were advised that this should not be done.

Other Problems:

The city is not collecting all of their sewer bills or property tax. Over one-third of the citizens and one council member do not pay their property tax.

Action to Solve Problem:

Set up a management system and enforcement collection of bills and back unpaid bills.

III. **Performance:**

This wastewater plant was performing very well at the time of Comptrain Project with a effluent B.O.D.$_5$ of about 10 mg/l.

Prognosis:

This treatment plant is in compliance except for flow measurement. They are submitting their monthly operational reports and also their discharge monitoring reports. The plant is being operated by a certified wastewater operator and the second operator will be certified as soon as he obtains enough experience.

I do not expect this plant to stay in compliance because of the cost of sludge disposal. The city just cannot meet this high cost. Therefore, it is absolutely necessary that the city construct sludge drying beds in order to dispose of solids and to stay in compliance. Also, the city should obtain a sludge disposal permit from the Division of Waste Management to dispose of the sludge by landfarming. Otherwise, they should take it to a permitted landfill site.

LOYALL
EVALUATION OF COMPOSITE SAMPLES BEFORE AND AFTER
COMPTRAIN PROGRAM

	BEFORE		AFTER	
	IN	OUT	IN	OUT
Flow Permit %	0.099	0.099	Flow meter stopped	No data for flow
C.O.D. mg/l C.O.D. lbs C.O.D. %	160 132 Reduction	13.7 11 92	351	25.1
B.O.D.$_5$ mg/l B.O.D.$_5$ lbs B.O.D.$_5$ % Permit %	72 59 Reduction	1.6 1.32 98	178	9.9
S.S mg/l S.S. lbs S.S. % Permit %	34 28 Reduction	6 5 82	87	13
V.S.S. mg/l V.S.S. lbs V.S.S. %	29 24 Reduction	6 5 79	73	5
T.S. mg/l T.S. lbs T.S. %	276 228 Reduction	217 179 21	681	608
V.T.S. mg/l V.T.S. lbs V.T.S. %	94 78 Reduction	59 49 37	220	78
*NH_3-N mg/l NH_3-N lbs NH_3-N % Permit %	10 8 Reduction	0.80 .66 92	22	0.065
pH Permit	7.2	7.1	7.2	7.4
D.O. mg/l Permit				

LOYALL
EVALUATION OF COMPOSITE SAMPLES BEFORE AND AFTER
COMPTRAIN PROGRAM

	BEFORE		AFTER	
	IN	OUT	IN	OUT
Fecal Coliform per/100 ml Permit	N/A	20	N/A	Not run

	BEFORE	AFTER
Aeration Solids		
MLSS mg/l	2,710	5,220
MLVSS mg/l	1,410	3,060

Appendix C
Financial-Management Activities Materials

COMPTRAIN PROJECT FINAL REPORT

The primary objective of the Comptrain Project was to bring a select number of small wastewater treatment plants into compliance with their NPDES permits. The way to achieve this goal was to provide over-the-shoulder technical assistance to the towns to upgrade the performance of the wastewater system. Special emphasis nationally was placed on operator training and financial management.

In the state of Mississippi, operator training is under the jurisdiction of the Department of Natural Resources, Bureau of Pollution Control (BPC). BPC has three training regions in the state. Operators throughout the state received training in the areas of chlorination, plant inspection, laboratory procedures, lagoon operations, math, and troubleshooting operation and maintenance problems. Even with the on-going effort by BPC to provide technical training to the state's small town wastewater treatment system, there still exist the need to address the problem of inadequate financial management of these systems.

To ensure that small wastewater systems received financial management assistance, the Mississippi Institute for Small Towns (MIST) contracted with the National Demonstration Water Project to administer a project aimed at increasing the financial management capacity of 10 small town wastewater treatment systems. MIST is a non-profit organization that provides technical assistance to rural, low-income communities in the areas of community development, planning and management. Keenan D. Grenell, Public Administration Specialist for MIST, was responsible for program implementation and on-site assistance for the project.

The initial step in the project was to construct a program implementation schedule. This document was used by MIST staff as a guide to pinpoint activites that needed to be carried out over the duration of the project. The first phase of the schedule involved participant selection. MIST staff received a list of twenty-three (23) towns from BPC that the agency felt could benefit from financial management assistance.

Virginia. The towns selected by MIST to participate in the project are listed below:

Bolton	Mound Bayou
Crosby	Shubuta
Falcon	Union
Marion	Woodville
West	Rosedale

MIST project towns are small (below 3,000 in population) and among the poorest in the state. A majority of these towns have unpaved streets, substandard housing, inadequate water and wastewater systems, high rates of low-income and elderly citizens, and very little economic activity. For instance, Mound Bayou a predominantly black city, has a median family income of $3,100. In March of 1984, BPC levied a fine of $1,000 a-day for failure to correct cited deficiencies in the municipal sewer system. In order to get the towns to participate each town was mailed a letter explaining the project and general scope of services to be rendered along with an acceptance form. Those communities that were reluctant to participate were visited by MIST staff and an official from the Bureau of Pollution Control. With the help of BPC, MIST was able to convince at least two towns to participate in the project which probably would not have without this joint effort.

The second phase of the program implementaiton schedule was the development and completion of the participant needs assessment. In this phase MIST staff used a wastewater treatment facilities financial management evaluation survey and a wastewater facility cost assessment to assess the needs of participant towns. The wastewater treatment facilities financial management evaluation survey concentrated on areas such as overall utility organization, budgeting, accounting, debt service, cost recovery and operation and maintenance. The wastewater facility cost assessment looked at the current user fee rate for both water and sewer, how the present system was financed, the indebteness of the system, shut-off policy for consistently delinquent accounts, and the expenditures and revenues for the system on a monthly basis. Once the data had been gathered and the needs of the towns analyzed, they were then ranked according to an established program of work.

A major component of this phase of the program implementation strategy was that of site visits to individual project towns. Much of the activity in the site visits included analyzing the current rate structure, budgeting and accounting system, operation and maintenance procedures and other areas of importance for the wastewater system.

The site visits worked to achieve greater concern for the wastewater system among local elected officials. More attention and emphasis began to be placed on management of the towns systems. MIST staff bridged the communication gap between the elected officials, town clerks, and plant operators.

MIST's over-the-shoulder-approach to providing technical assistance helped several town clerks in developing new and innovative ways to keep records and to make available timely and accurate information to local decision makers. For instance, in Rosedale, the town clerk developed a new accounting system to separate the entries made to the ledger to show water and sewer as distinct activities. In West, the town clerk constructed a semianual reporting form to report the status of the wastewater system to local officials in terms of receipts and disbursements.

The third phase was the preparation and submission of an evaluative report which recommended corrective action to participant towns. Each participant received a report highlighting the present deficiencies in the financial management of their wastewater system. The reports contain remedies and steps to take to make the corrections.

In an effort to further assist the project towns with financial management a Small Utilities Financial Management Workshop was held at the Holiday Inn I-55 North in Jackson, Mississippi on July 26, 1984. The purpose of the workshop was to bring about a comprehensive understanding of small utility financial management. Approximately seven of the seventeen project towns were in attendance, along with other small towns throughout the state, BPC officials, and MIST staff. The facilitators for the workshop were Beth Ytell, Trainer for Great Lakes Rural Network in Freemont, Ohio, and Jim Fagan, NDWP Financial Management Consultant.

The Comptrain Project has opened communications with project towns and their larger, more sophisticated neighbors. For instance, an informal service agreement has been established between Falcon (population 260) and Clarksdale (population 21,137) where the Superintendant of Clarksdale's Wastewater Treatment Plant has agreed to make staff available on weekends to make routine maintenance checks on Falcon's wastewater system. The agreement was reached as a direct result of project staff assistance.

During the course of the project, MIST encouraged participant towns to share with other project towns information that might be useful in their day-to-day management of the wastewater system. At the Small Utilities Financial Management Workshop the mayor of Shubuta informed other participants that her town's financial management services had been contracted out. The inception of this idea relieved her of political pressures from local citizens. The service agreement between Shubuta and Systems Management Incorporated takes away the burdensome responsibility of collecting all revenues, making the necessary repairs in the system, reading all meters, and maintaining and operating the system. Other towns at the workshop seemed interested in this "privatization" concept.

Because of the Comptrain Project in Mississippi, local elected officials have begun to define policy needs broad enough to encompass full wastewater system activities for a self sustaining system. Project town officials now realize that ineffcient management of the wastewater system is a serious impediment to future development. The wastewater system is the most important capital facility in small towns. Therefore, small towns must be willing to carefully operate and maintain their system. This can be achieved through installing a workable financial management system.

FINAL COMPTRAIN PROJECT SUMMARY

SOUTH CAROLINA

MANAGEMENT CONSULTANT - WASTEWATER FACILITIES

Monthly summary reports and copies of recommendations have already been provided to indicate progress at each of the towns that were participants in the Comptrain Project. This report summarizes the status of each community.

Batesburg

The Batesburg wastewater treatment plant provides service for about 1600 customers. Their cash flow and financial status had been very tight in the past. As a result of the Comptrain project and meetings with their Public Works Commission, they have become more aware of budget items and their relationship with operation of the facility. Thirteen major recommendations were made to them including personnel practices, safety considerations, determining tap fees, rate structure, separation of administrative costs, use of an activity budget, computer billing, and prorated debt distribution. Implementation has started on many of the items with emphasis on changing from an old machine billing system to computer billing. The commission and utility clerk have been very responsive.

Clover

The Clover wastewater treatment plant serves about 1500 customers. It is an old system that is due for replacement within the next two years. Since it is an old plant providing essentially primary treatment, the rates have been low. This gave a sense of well-being when in reality some financial problems existed. Thirteen major recommendations were made including personnel practices and safety considerations, determining twp fees, rate structure, separation of administrative costs between water and sewer, use of an activity budget, computer billing, prorated debt distribution, and the use of a formal monthly operations report. The Mayor and Council were very receptive to all recommendations and are eager to implement them as soon as possible.

Dillon

Dillon was the largest town included in the project with two wastewater treatment plants serving 2600 customers. About middle way in the project year, a new city manager was hired. He was very receptive to Comptrain and the thirteen recommendations that were made, which included some refinements to personnel practices, cost of sewer taps and deposit fees, proration of administrative costs and debt distribution, use of an activity budget, issuance of a monthly operating report, and the installation of a computer billing system. As a result of the recommendations, the city manager wanted more computer information for a possible network system. There has been considerable improvement in their management.

Hardeeville

Hardeeville was among the smallest population grouping, but it had the unique status of having a high transient population because of the many motels located near I-95. The overall revenues were good, but they had high expenses with a new wastewater treatment plant that had an inadequately trained staff. Thirteen major recommendations were made including personnel practices, tap fees and deposit, rate structure, capital replacement costs, formal operating report and computer billing. About half way through the project, a new town administrator was hired. He became very interested in implementing the recommendations, especially the use of computers to help them better perform their administrative functions. At the end of the Project, they asked for a review of a contract operations proposal of their wastewater treatment plant. They have been extremely responsive to the project.

Kershaw

The Kershaw wastewater treatment facility has several operations problems in its service to 1100 customers. The overall rates are in the upper level for its size, but the community has some management problems. A CPA firm performs all of the accounting and financial reporting, but does not participate in any financial planning. Thirteen major recommendations were made for improving personnel practices, determining tap fees and deposits, rate structure, use of an activity budget, separation of administrative costs between water and sewer, capital replacement of equipment, use of a formal wastewater operations report, and computer billing. Several meetings were held with the Mayor to explain the issues, but it is doubtful any improvements will be apparent for a long time. Implementation will be very slow.

Ridgeland

The Ridgeland wastewater treatment plant is an old under-sized facility that is planned for upgrading. The new plant will be funded by internal financial arrangements of the town using accumulated funds, loans, and community block grants, but no EPA funds. The new town administrator was very receptive to the Comptrain project. Thirteen major recommendations were made which included some revision to personnel practices, salary and wage reviews, deposit fees, cost and debt distribution, separation of administrative costs between water and sewer, capital replacement costs, and a formal operations report. The community has been using an old computer billing system and wants to upgrade to a new system. The town administrator will probably implement most of the recommendations, but at a slow pace. He was very receptive to most management concept discussions and improvements.

Saluda

Saluda has a new wastewater treatment plant serving 1100 customers. The utility is under a Public Works Commission with a full time superintendent. The superintendent is open to suggestions, but reluctant to change some procedures for those that are new and different. The utility bookkeeping is very outdated, but a new computer was purchased for billing using a simplified program developed by the vendor to complete the sale. Thirteen major recommendations were made including improved personnel practices, determining tap fees and deposit, rate structure, use of a new commercial computer program to give much more needed information, use of an activity budget, prorated debt distribution, and more formal operations reporting. The superintendent quickly responded to operating cost management recommendations and been keeping better track of expenditures. Some improvement to personnel management was also noted. The other items will be implemented much slower, especially anything pertaining to the computer.

Whitmire

The Whitmire wastewater treatment facility serves about 1100 customers. There has been a number of problems with its operation and management and the financial standing of the overall utility. The system never had a budget until last year, and it did not reflect the true conditions of its operation. The Mayor and Clerk were friendly during the visits, but claimed they had little time to consider any changes. Several recommendations were made, but implementation will be very slow because of many problems. The Mayor stated during the last visit, that perhaps he had not shown much enthusiasm for the project, but that in due time they might make some changes. He appreciated the effort.

Conclusions

This was the first time any of these communities ever participated in a management study of their systems. It was totally new to them, but all could see the need for such a project. Each utility was given a detailed report with a summary and recommendations for their operation. It was the first time any of them had ever seen graphic representation of their financial information. All of the communities, even those that respond slowly, have become much more aware of their management and financial responsibilities.

A REPORT ON

WATER RESOURCES ASSISTANCE CORPORATION

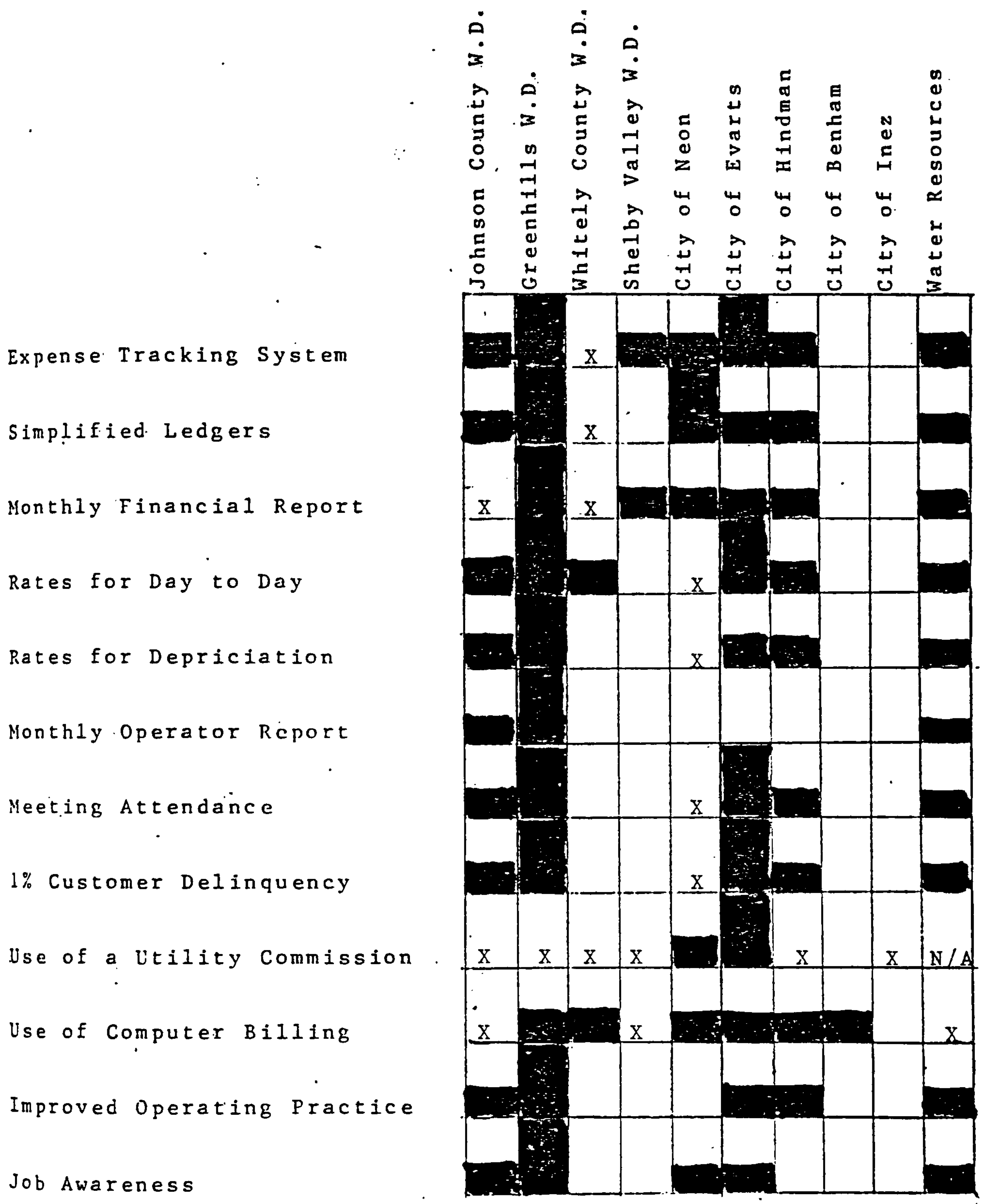
1984 COMPTRAIN ACTIVITIES

ACCOMPLISHMENTS

The COMPTRAIN program set out to train the clerk to do FmHA reporting and to make the clerk, operator and politicians aware of the true financial status of the system. Once completed, WRAC would strive to establish in the system the characteristics that a well managed water and/or sewer system would exhibit in its regular routine. The characteristics are as follows: (1) an expense sheet which tracked the incoming bills for the month and if they were paid, (2) use of a simplified ledger acceptable to FmHA, (3) preparation of a monthly financial report and review of it by the clerk, operator and the politicians, (4) water and sewer rates sufficient to meet the day to day operating expenses, (5) water and sewer rates sufficient to fund a depreciation and reserve account, (6) a monthly operator report outlining the water used, water loss, and hours worked, (7) attendance at all utility meetings by the clerk, operator and politicians, (8) a customer delinquency rate of 1%, (9) a special utility commission to oversee utility operations, (10) use of a computer billing service or process, (11) repair of minimum physical structure to have water loss below 15%, 24 hour a day service, and economical operation, and (12) awareness by operator, clerk and politicians of each person's role. Obviously, this was an energetic goal.

No community was able to reach all these goals but we did well. Many of the systems had special issues like receivership or grant problems which required attention before consideration of good operation of the utilities could be improved.

Besides working directly with the communities, WRAC engaged in five special projects. The first project was assisting Great Lakes Rural Network with a financial management workshop. The second project was preparing a sewer management plan for a county in the region and exploring a non-profit sewer management company to implement the plan. Work on the project resulted in selection of the county for an indepth EPA study on rural wastewater. The third project was coordination of a workshop to explain innovative financing of water meters and the affects on cash flow. The fourth project was evaluation of different computer billing and maintenance programs. The fifth project was presentation of a report on contract management for small wastewater systems at the annual meeting of the Kentucky-Tennessee Section of AWWA.



NOTES: X — The activity was already being performed by the system in it's regular routine.

The activity was discussed or tried but had not been accepted into the regular routine.

The activity was successfully integrated into the regular routine of the utility.

The activity was never really discussed.

"SMALL UTILITIES AND FINANCIAL MANAGEMENT WORKSHOP"

June 26 - 27, 1984

South Carolina Water Quality Institute
Sumter Area Technical College
506 Guignard Drive
Sumter, South Carolina 29150
(803) 778-1961

A **COMPTRAIN** project activity sponsored by...
National Demonstration Water Project
South Carolina Water Quality Institute
Great Lakes Rural Network

Great Lakes Rural Network
P.O. BOX 568
FREMONT, OHIO 43420

"Small Utilities and Financial Management Workshop"

ABOUT THE COMPTRAIN PROJECT...

The goal of the Comptrain Project is to field test a method for bringing small water and wastewater treatment plants into compliance with federal-state performance standards. The method involves: (a) intensive, on-site, plant-specific training in equipment operation and process control; (b) community-specific management and financial training; and (c) efforts to bring about policy and program changes leading to improved plant performance. The training targets are plant operators, municipal officials, and state officials.

Comptrain is funded by the U. S. Environmental Protection Agency and the Appalachian Regional Commission. NDWP conducts the project through its national and field staff, through contractors as appropriate, and sometimes through state agencies. In 1982-83, the two-year project worked in West Virginia, Kentucky, Tennessee, South Carolina, Mississippi, and Louisiana. In 1984, the target states are Kentucky, Tennessee, South Carolina, Mississippi, and Alabama. In addition, NDWP hopes, through the Comptrain Project, to have an impact on national policy in the area of water and wastewater treatment operator training.

"SMALL UTILITIES AND FINANCIAL MANAGEMENT WORKSHOP"

In conjunction with the COMPTRAIN Project, the Great Lakes Rural Network is planning a workshop on FINANCIAL MANAGEME This workshop will address the problems and concerns experienced by SMALL COMMUNITIES. The training will explore the specific needs of small water/wastewater treatment plant staff.

WHO SHOULD ATTEND: Clerks ● Recorders ● Mayors ● Board/Council Members ● Treatment Plant Operators

PURPOSE: By involving the key staff and decisionmakers of small utilities, we hope to bring about a comprehensive understanding financial management. The topics and materials presented will focus on:

- Managing Money .... an overview of the financial management process
- What Steps to Take .... planning
- How to Get the Credit and Capital to Fund Your System .... financing
- Knowing Where the Money Goes .... budgeting
- Finding the Money to Operate and Manage your System .... cost recovery
- Managing Information Before it Manages You .... record keeping and information systems

AGENDA

Tuesday, June 26th	9:00 a.m. – 9:30 a.m.	Registration
	9:30 a.m. – 12:00	Morning Session
	12:00 – 1:00 p.m.	Lunch (Restaurants Nearby)
	1:00 p.m. – 4:30 p.m.	Afternoon Session
Wednesday, June 27th	8:30 a.m. – 12:00	Morning Session
	12:00	Adjourn

Lodging — Holiday Inn of Sumter
(803) 775-2323
Downtown Sumter Motor Lodge
(803) 775-6303

1.0 Hours Continuing Education Units (CEU) will be issued on completion of this workshop.

For more information contact:
Andy Fairey, NDWP Field Operations Director, Columbia, South Carolina
(803) 799-9709 or
Beth Ytell, Trainer, Great Lakes Rural Network, Fremont, Ohio
(419) 334-8911

REGISTRATION FORM
(Please Print or Type)

Community/Organization ____________________

Address ____________________

City ____________________ State ____________________ Zip Code ______

Phone ( ) ____________________

Persons Attending	Title
____________________	____________
____________________	____________
____________________	____________

There is NO registration fee. Please return to: Beth Ytell, Great Lakes Rural Network, P. O. Box 568, Fremont, Ohio 4 by June 21, 1984.

"SMALL UTILITIES AND FINANCIAL MANAGEMENT WORKSHOP"

July 26, 1984

10:00 a.m. - 5:00 p.m.
Holiday Inn - North
5075 I-55 N - P.O. Box 16083
Jackson, Mississippi 39206
(601) 366-9411

A COMPTRAIN project activity sponsored by...
National Demonstration Water Project
Mississippi Institute of Small Towns
Great Lakes Rural Network

Great Lakes Rural Network
P.O. BOX 568
FREMONT, OHIO 43420

"Small Utilities and Financial Management Workshop"

ABOUT THE COMPTRAIN PROJECT...

The goal of the COMPTRAIN Project is to field test a method for bringing **small water and wastewater treatment plants into compliance with federal-state performance standards.** The method involves: (a) intensive, on-site, plant-specific training in equipment operation and process control; (b) community-specific management and financial training; and (c) efforts to bring about policy and program changes leading to improved plant performance. The training targets are **plant operators, municipal officials, and state officials.**

COMPTRAIN is funded by the **U. S. Environmental Protection Agency** and the **Appalachian Regional Commission.** The **National Demonstration Water Project** conducts the project through its national and field staff, through contractors as appropriate, and sometimes through state agencies. In 1982-83, the two-year project worked in West Virginia, Kentucky, Tennessee, South Carolina, Mississippi, and Louisiana. In 1984, the target states are Kentucky, Tennessee, South Carolina, Mississippi, and Alabama. In addition, NDWP hopes, through the COMPTRAIN Project, to have an impact on national policy in the area of water and wastewater treatment operator training.

"SMALL UTILITIES AND FINANCIAL MANAGEMENT WORKSHOP"

In conjunction with the COMPTRAIN Project, the Great Lakes Rural Network is planning a workshop on FINANCIAL MANAGEMENT. This workshop will address the problems and concerns experienced by **communities with populations of less than 5,000.** The training will explore the specific needs of small water/wastewater treatment plant staff.

WHO SHOULD ATTEND: Clerks ● Recorders ● Mayors ● Board/Council Members ● Treatment Plant Operators

PURPOSE: By involving the key staff and decisionmakers of small utilities, we hope to bring about a comprehensive understandin financial management. The topics and materials presented will focus on:

- **Managing Money** .... an overview of the financial management process
- **What Steps to Take** .... planning
- **How to Get the Credit and Capital to Fund Your System** .... financing
- **Knowing Where the Money Goes** .... budgeting
- **Finding the Money to Operate and Manage your System** .... cost recovery
- **Managing Information Before it Manages You** .... record keeping and information systems

AGENDA

Thursday, July 26th	9:30 a.m. – 10:00 a.m.	Registration
	10:00 a.m. – 12:30 p.m.	Morning Session
	12:30 p.m. – 1:30 p.m.	Lunch
	1:30 p.m. – 5:00 p.m.	Afternoon Session
	5:00 p.m.	Adjourn

Lodging — Holiday Inn - North
5075 I-55 N
P. O. Box 16083
Jackson, Mississippi 39206
(601) 366-9411

For more information contact:
Keenan Grinell, Mississippi Institute of Small Towns, Jackson, Mississippi
(601) 981-9737 or
Beth Ytell, Great Lakes Rural Network, Fremont, Ohio
(419) 334-8911

REGISTRATION FORM
(Please Print or Type)

Community/Organization ______________________________

Address ______________________________

City ____________ State ____________ Zip Code ________

Phone ( ) ____________

Persons Attending	Title
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____________	____________
____________	____________

There is NO registration fee. Please return to: Beth Ytell, Great Lakes Rural Network, P. O. Box 568, Fremont, Ohio 4
by July 16, 1984.

"SMALL UTILITIES AND FINANCIAL MANAGEMENT WORKSHOP"

July 11, 1984
10:00 a.m. - 5:00 p.m.
Kentucky River Area Development District Office
381 Perry Park Road
Hazard, Kentucky 41701
(606) 436-3158

A **COMPTRAIN** project activity sponsored by . . .
National Demonstration Water Project
Water Resources Assistance Council
Kentucky Association of Community Action
Kentucky River Area Development District
Great Lakes Rural Network

Great Lakes Rural Network
P.O. Box 568
FREMONT, OHIO 43420

"Small Utilities and Financial Management Workshop"

ABOUT THE COMPTRAIN PROJECT . . .

The goal of the **COMPTRAIN** Project is to field test a method for bringing **small water and wastewater treatment plants into compliance with federal-state performance standards.** The method involves: (a) intensive, on-site, plant-specific training in equipment operation and process control; (b) community-specific management and financial training; and (c) efforts to bring about policy and program changes leading to improved plant performance. The training targets are **plant operators, municipal officials, and state officials.**

COMPTRAIN is funded by the **U.S. Environmental Protection Agency** and the **Appalachian Regional Commission. The National Demonstration Water Project** conducts the project through its national and field staff, through contractors as appropriate, and sometimes through state agencies. In 1982 - 83, the two-year project worked in West Virginia, Kentucky, Tennessee, South Carolina, Mississippi, and Louisiana. In 1984, the target states are Kentucky, Tennessee, South Carolina, Mississippi, and Alabama. In addition, NDWP hopes, through the **COMPTRAIN** Project, to have an impact on national policy in the area of water and wastewater treatment operator training.

"SMALL UTILITIES AND FINANCIAL MANAGEMENT WORKSHOP"

In conjunction with the **COMPTRAIN** Project, the Great Lakes Rural Network is planning a workshop on FINANCIAL MANAGEMENT. This workshop will address the problems and concerns experienced by communities with populations of less than 5000. The training will explore the specific needs of small water/wastewater treatment plant staff.

WHO SHOULD ATTEND: Clerks • Recorders • Mayors • Board/Council Members • Treatment Plant Operators

PURPOSE: By involving the key staff and decisionmakers of small utilities, we hope to bring about a comprehensive understanding of financial management. The topics and materials presented will focus on:

- **Managing Money**............ an overview of the financial management process
- **What Steps to Take**............ planning
- **How to Get the Credit and Capital to Fund Your System**............ financing
- **Knowing Where the Money Goes**............ budgeting
- **Finding the Money to Operate and Manage Your System**............ cost recovery
- **Managing Information Before It Manages You**............ record keeping and information systems

AGENDA

Wednesday, July 11th	**9:30 a.m. - 10:00 a.m.**	**Registration**
	10:00 a.m. - 12:30 p.m.	**Morning Session**
	12:30 p.m. - 1:30 p.m.	**Lunch** (provided)
	1:30 p.m. - 5:00 p.m.	**Afternoon Session**
	5:00 p.m.	**Adjourn**

Lodging

LaCitadelle Motel
Hazard, KY
(606) 836-2126

For more information contact:

Rob Nicholas, Water Resources Assistance Council
Prestonburg, Kentucky **(606) 886-1071** or
Beth Ytell, Great Lakes Rural Network,
Fremont, Ohio **(419) 334-8911**

REGISTRATION FORM
(Please Print or Type)

Community/Organization ______________________________

Address ______________________________

City ____________________ **State** ____________________ **Zip Code** __________

Phone ( ) ____________________

Persons Attending	**Title**
____________________	____________________
____________________	____________________
____________________	____________________

There is NO registration fee. Please return to: Beth Ytell, **Great Lakes Rural Network, P.O. Box 568, Fremont Ohio 4342C by July 2, 1984.**

COMPTRAIN II
FINANCIAL MANAGEMENT TRAINING
FINAL REPORT

December, 1984

Submitted To:

THE NATIONAL DEMONSTRATION WATER PROJECT

TABLE OF CONTENTS

I.

BACKGROUND

The COMPTRAIN project is a two-year pilot program conceived of by the National Demonstration Water Project (NDWP). The purpose of the project is to field test a method of on-site training and technical assistance to upgrade the operations and management of rural water and wastewater systems.

During Year I, NDWP contracted with the Great Lakes Rural Network (GLRN) to conduct a review of the existing financial management capabilities in eleven target plants located in West Virginia. The information compiled revealed that the majority of the plants were experiencing similar difficulties. Based upon the evaluation in the first year of COMPTRAIN, GLRN recommended that a set of training materials for small treatment plant staff and decision-makers be developed and field tested. These tasks were then carried out by the Great Lakes Rural Network in Year II of the project.

The Great Lakes Rural Network, Fremont, Ohio administers a regional training and technical assistance project designed to assist rural, low-income communities in water and wastewater management. GLRN is primarily funded by the Office of Community Services, U.S. Department of Health and Human Services.

Elizabeth Ytell, Program Developer for the Great Lakes Rural Network was the project manager. GLRN collaborated with JWF Associates, Annadale, Virginia, in the program design and implementation. JWF Associates is a small consulting firm specializing in providing management assistance to small utilities and regulatory agencies. James W. Fagan, JWF Associates, and Ms. Ytell were responsible for developing the training materials and conducting the workshops.

The project was conducted in Kentucky, Mississippi, and South Carolina. GLRN collaborated with NDWP's field staff and contractors in preparing the materials and workshop logistics. In South Carolina, the NDWP Field Operations Director and Larry Parker & Associates, Project Consultant, assisted GLRN along with the South Carolina Water Quality Institute in preparing the workshop. The workshop in Kentucky was coordinated with the Water Resources Assistance Council, Kentucky Association for Community Action and the Kentucky River Area Development District. GLRN worked with the Mississippi Institute of Small Towns and JWF Associates in planning the training session held in Mississippi.

II.

OBJECTIVES AND SCOPE

As in Year I, the primary goal of the COMPTRAIN project was to bring a selected number of small water and wastewater treatment plants into compliance with the NPDES permit program. The financial management of these small systems impacts upon their day-to-day operations. It was Great Lakes Rural Network's responsibility to contribute to the primary goal of the project.

The following objectives were established for the Financial Management Training Component of the program:

- Use the recommendations from the West Virginia project to develop a guide to financial management geared toward small utilities,
- Field test the guide as part of a series of workshops for local officials and treatment plant staff,
- Following the workshops, make the final revisions to the guide, and
- Assist in the ongoing evaluation of the project.

III.

PROJECT IMPLEMENTATION

The financial management training project was carried out in four phases:

- PHASE I - On-Site Interviews. The project team worked with the NDWP staff and consultants to assess the existing needs of the utilities participating in COMPTRAIN. On-site interviews were conducted in at least one utility in each of the three states.

- PHASE II - Development of Training Materials. Following Phase I, GLRN developed the draft version of the "Guide to Financial Management for Small Utilities". A case study and additional resource materials were compiled for use in the training sessions.

- PHASE III - Planning and Implementation of Training Sessions. A one-to-one and a half day workshop format was designed to provide the participants with an overview of the topics addressed in the guide book. Three sessions were held, one in South Carolina, one in Kentucky, and one in Mississippi.

- PHASE IV - Evaluation. In Phase IV, revisions were made to the guide book and submitted to NDWP for publication.

A detailed discussion of the project activities follows:

PHASE I - On-Site Interviews

During Year I of COMPTRAIN, GLRN completed a detailed review of the financial management capabilities of eleven utilities in West Virginia. These utilities were experiencing similar problems. These evaluations served as a primary source of information for beginning (PHASE I of) Year II.

Designing a training session to meet the needs of the small utilities in each state was an important task of Phase I. GLRN staff collaborated with the NDWP project staff and consultants to obtain "state specific" information which was incorporated into each of the workshops. These activities are summarized on the next page.

- South Carolina - NDWP's Field Operations Director, Andrew Fairey and Larry Parker, Project Consultant met with GLRN to review the status of COMPTRAIN activities in each community. A site visit was made to a town participating in the COMPTRAIN Project. Additional meetings were held with William Engel and Lynn Wrigley of the South Carolina Water Quality Institute. The Institute provided co-sponsorship for the workshop and assumed responsibility for the meeting logistics. (May, 1984)

- Kentucky - Project team members met with Robert Nicholas, Water Resources Assistance Council (WRAC) to review the training guide and become familiar with WRAC's technical assistance efforts in the state. WRAC staff accompanied the project team to Greenhills Water System, Stoney Fork, Kentucky. Two additional meetings were held with the Kentucky Department of Natural Resources (Division of Water) and the Kentucky River Area Development District Office. The Executive Secretary for the Kentucky Association of Community Action, Jesse Amburgey, assisted with the workshop logistics. (May, 1984)

- Mississippi - The site visit for Mississippi was completed in connection with the technical assistance efforts of Mississippi Institute of Small Towns (MIST) and JWF Associates. MIST provided GLRN with the mailing lists and JWF met with the Bureau of Pollution Control (on GLRN's behalf).

PHASE II - Development of Training Materials

Many of the materials on financial management currently available to utilities are aimed toward larger treatment facilities. This knowledge reinforced the project team's thinking that more information should be made available to the facilities with part-time staff and policy-makers.

Our interviews in Year I of the project indicated that a number of clerks and recorders had attended trainings that did not meet their needs. Their comments reflected dissatisfaction with sessions and materials aimed at more sophisticated financial management activities. It was the project team's objective to develop a manual written in a simple, easy to read format, including numerous resource materials.

The four major problem areas identified in Year I became the foundation for the guide. They include:

- Failure to recover costs for operation and maintenance
- Overall absence of planning,
- Lack of understanding about basic accounting procedures and record keeping by support staff, and
- Communities and governing boards not viewing utilities as self-sustaining or having the potential to be self-sustaining.

The draft of the "Guide to Financial Management for Small Utilities" was developed in module form. Six chapters addressed each of the following topics:

- An Overview of Financial Management,
- Planning,
- Budgeting,
- Financing
- Cost Recovery,
- Accounting, and
- Record Keeping.

PHASE III. - Planning and Implementation of Training Sessions

Based upon the work completed in Phases I and II of the project, a series of three workshops were scheduled. The training sessions were used as an opportunity to field test the "Guide to Financial Management". At two of the three workshops, Chris Stuver represented a Blacksburg, Virginia firm, TECNOMICS. Ms. Stuver demonstrated two software packages on utility billing and accounting. This software was designed especially for use by small utilities.

On June 25th and 26th, the workshop for South Carolina was held at the Water Quality Institute, Sumter Area Technical College, Sumter, South Carolina.

Twenty Six (26) individuals attended the session including representatives from the Department of Health and Environmental Control and the South Carolina Municipal Association. A presentation by TECNOMICS took place at this session.

A second workshop took place at the Kentucky River Area Development Office, Hazard, Kentucky on July 11th. The attendance at this workshop was thirty. The COMPTRAIN Field Coordinator from the Kentucky Department of Natural Resources was present. A demonstration of software by TECNOMICS was the final session for the day.

The third training session took place on July 25th in Jackson, Mississippi. Twenty (20) participants attended the workshop held at the Holiday Inn North. The Mississippi Institute of Small Towns was successful in obtaining funds (from local engineering firms) to cover travel costs for the workshop participants.

PHASE IV - Evaluation

Based upon the evaluations from the training sessions, the project team made the final revisions to the guide book. The guide book was submitted to the National Demonstration Water Project for printing.

IV.

RECOMMENDATIONS

As Year II of this project draws to a close, it is important to point out our recommendations based upon the implementation of the training sessions. They include:

- Until recently, the target group for the project has been virtually an untapped market. For this reason, it is necessary to identify the appropriate motivation and incentives to encourage their attendance at training sessions. Additional research needs to be conducted to identify motivation for changes in financial management practices.

- Paying a small registration fee would encourage participants to attend sessions. Because there was no charge, some individuals decided not to attend on the morning of the workshop. Whereas, an investment of a small sum of money might have served as an incentive.

- Utilize the cluster concept for scheduling workshops. By targeting sessions in "regions" of a state, individuals might be more likely to attend. Also, this would encourage "networking" with neighboring communities.

- Ongoing training conducted on a series of topics would help build a framework for consistency and follow through for participants. For example, if a problem arises, an individual could ask for help at a future session, instead of just giving up on the idea.

AGENDA

FOR

"CLEAN WATER FINANCE 1985: THE TENNESSEE INITIATIVES"

October 16 - 17, 1984

Tuesday, October 16, 1984

8:00 - 8:45	REGISTRATION (Danish/Coffee served in "Exhibit Area")
9:00 - 9:15	Convene: Vice Mayor John Franklin, President of TML, City of Chattanooga
9:15 - 9:45	Keynote Address: "The Tennessee Initiatives"
9:45 - 10:00	Stage of Events: Larry Silverman, Executive Director American Clean Water Association
10:00 - 10:15	Break
10:15 - 10:45	"Waters of Tennessee" - A slide presentation by Ms. Suzanne Haegert, Administrative Assistant, Department of Health and Environment
10:45 - 11:15	University of Tennessee's Technical Assistance Program: Tom Ballard, Executive Director, IPS; C. L. Overman, Executive Director, Municipal Technical Assistance Service
11:15- 11:45	Federal Program Initiatives: "What Tennessee Water Managers Should Expect from the U.S. Environmental Protection Agency"- Robert J. Blanco, Director Facility Requirements Division, Office of Water Programs Operation, U.S. Environmental Protection Agency
11:45 - 12:00	Break
12:00 - 1:30	Lunch (12:30 - 1:30 Luncheon Speaker) "Wall Street's Response to the Tennessee Initiatives" - Philip M. Richardson, Vice President of Ehrlich-Bober & Co., Inc. (Investment Bankers)

1:30 - 2:00	Visit Exhibit Areas
2:00 - 5:00	Concurrent Roundtable Discussions:
2:00 - 2:45	"Financial Programs, Loans, LDA, Grants, Privatization" - Ben Smith, Executive Director, Safe Growth Team; Tom Samuel, Executive Assistant to the Comptroller; Arnold Darrow, President, Whalen Corporation; Harvey Goldman, Partner, Arthur Young & Co.
2:00 - 2:45	"Rate Structure/Depreciation" - Joe Muscatello, Municipal Management Consultant, Municipal Technical Advisory Service; Dennis Dycus, Director of Municipal Audit, Comptroller's Office; Isabelle Condra, Retired Water Manager, Whitwell, Tennessee
2:45 - 4:00	"Enforcement" - (Also includes EPA Compliance Deadline) Elmo Lunn, Director, Water Management; Dr. Michael T. Bruner, Assistant Commissioner for Environment, Department of Health and Environment
2:45 - 3:15	"Federal Programs" - Larry Silverman, Executive Director, American Clean Water Association; Robert J. Blanco, Director, Facility Requirements Division, Office of Water Programs Operation, U.S. Environmental Protection Agency
3:15 - 3:30	Break
3:30 - 4:00	"Contract Management/Procurement" - Steve Gordon, Director, Professional Development/Research, National Institute of Government Purchasing, Inc.; Eugene Vanderbilt, P.E. Terraqua Resources Corporation
4:00 - 5:00	"Alternative Small Scale Technology" - Dr. Ed Thackston, Chairman of the Department of Civil and Environmental Engineering; Pio Lombardo, Lombardo & Associates, Consulting Engineers/Small Community Centers
4:00 - 5:00	"Training/Technical Assistance" - C.L. Overman, Executive Director, Municipal Technical Advisory Service; Andy Jordan, Manager of Utility Management Projects, Municipal Technical Assistance Service; Jack Hughes, Director of Operator Training Center, Murfreesboro, Tennessee

Wednesday, October 17, 1984

7:00 - 8:00	Continental Breakfast Served in "Exhibit Area" - Compliments of Air Products and Chemicals, Inc., Environmental Products Dept., Allentown, Pa.
8:15 - 8:30	Convene
8:30 - 9:15	"Tennessee General Assembly's Response"
9:15 - 9:30	"University of Tennessee Water Resource/Research" - Bill Brandes, Director of Water Resources Research, University of Tennessee; "Center for Excellence" - Dr. Rafael Bustamante, Chairman of the Department of Civil Engineers, Tennessee Technological University
9:30 - 10:30	"Pre-treatment" - Paul Davis, Director of Water Management Permit Section, Tennessee Department of Health and Environment; and George Smelser, Environmental Engineer, Division of Water Management, Tennessee Department of Health and Environment; "Pipeline Management" - Ralph Petroff, President, American Digital Systems
10:30 - 10:45	Break
10:45 - 12:00	Concurrent Roundtable Discussions: "Financial Programs" "Enforcement" "Training and Technical Assistance"
12:00	Adjourn

SPEAKERS & EXHIBITORS

Tom Ballard	Knoxville, Tennessee
Robert J. Blanco	Washington, D.C.
Bill Brandes	Nashville, Tennessee
Dr. Michael T. Bruner	Nashville, Tennessee
Dr. Rafael Bustamante	Cookeville, Tennessee
Edwin Cobb	Washington, D.C.
Isabelle Condra	Whitwell, Tennessee
Arnold Darrow	Dallas, Texas
Paul Davis	Nashville, Tennessee
Dennis Dycus	Nashville, Tennessee
John P. Franklin	Chattanooga, Tennessee
Kenneth Guthrie	Orlando, Florida
Suzanne Haegert	Nashville, Tennessee
Jack Hughes	Murfreesboro, Tennessee
Peter Lau	Allentown, Pennsylvania
Pio Lombardo	Boston, Massachusetts
Jess Lovelace	Pasadena, Texas
Elmo Lunn	Nashville, Tennessee
Chuck Mangum	Atlanta, Georgia
Hubert L. McCullough, Jr.	Nashville, Tennessee
U. A. Moore	Millington, Tennessee
Ralph Petroff	Huntsville, Alabama
Philip M. Richardson	New York, Nw York
Tom Samuel	Nashville, Tennessee
Mary Shahan	Nashville, Tennesse
Larry Silverman	Washington, D.C.
George Smelser	Nashville, Tennessee
Ben Smith	Nashville, Tennessee

SPEAKERS & EXHIBITORS

Stephen Sorrett	Washington, D.C.
Kathy Stanley	Washington, D.C.
Glenn L. Taylor, Jr.	Atlanta, Georgia
Dr. Ed Thackston	Nashville, Tennessee
William Whitson	Nashville, Tennessee
Roy L. Worthington	Manchester, Tennessee

THOMAS B. BALLARD: B.S., Communications, University of Tennessee; Executive Director of The University of Tennessee's Institute for Public Service; member: International City Management Association, American Management Association, Council for Advancement and Support of Education, Southern Consortium of University Public Service Association; participated in Tennessee Executive Development Program and University of Tennessee's Institute for Leadership Effectiveness in Higher Education; President of National Kidney Foundation of East Tennessee 1980-81; Board of Directors National Kidney Foundation of East Tennessee 1977-83; State of Tennessee Renal Disease Advisory Committee 1978 - present; Cited Outstanding Young Men of America in 1980.

ROBERT J. BLANCO: Started work at Washington Headquarters of U.S. Environment Protection Agency June 25, 1984; Director for Facility Requirements Division, Office of Water Program Operations; extensive background in areas of Environmental Impact Assessment, Water Planning, Air Programs, and Sewage Treatment Construction Grants; B.S., Civil Engineering, New York University; M.S., Environmental Engineering, New York University; Eight years professional experience with City of New York; Registered Professional Engineer in the State of New York.

COLONEL B. BRANDES: Graduate of the United States Military Academy; M.S., Engineering, University of Illinois; present position, Associate Professor of Civil Engineering, U.T. Knoxville; Director of Water Resources Research Center.

DR. M.T. BRUNER: B.S., Education, Southern Illinois University; M.S., Community Health Education and Community Organization, Southern Illinois University; Doctor of Public Health, University of Texas at Houston; 1980 to present, Assistant Commissioner for Environment, Tennessee Department of Health and Environment.

DR. RAFAEL BUSTAMANTE: Ph.D., Civil Engineering, Oklahoma State; M.S., Civil Engineering, Tulane University; B.S., Civil Engineering, Auburn University; Registered Professional Engineer; Chairman of the Department of Civil Engineering at Tennessee Technological University.

ISABELLE CONDRA: With the City of Whitwell since 1957; In 1972 took over management of the Whitwell Water System which was in default status; using practical and common sense approach had the Whitewell Water System in stable financial condition by 1975 where it has remained to date.

ARNOLD DARROW: B.S., Chemical Engineering, University of Minnesota; President and Chief Executive Officer of Whalen Corporation, a wholly owned subsidiary of Triton Energy Corporation, for almost 15 years, has been involved in providing private sector funding for water-related projects; is primarily responsible for the development and implementation of the concept the firm presently uses; member of a number of professional organizations; frequent speaker on subject of privatization.

PAUL DAVIS: B.S., Engineering, University of Tennessee at Knoxville; M.S., Engineering, University of Tennessee; Registered Professional Engineer; present position, Section Manager for Permits in Water Management, Division of Bureau of Environment, Tennessee State Department of Health and Environment.

DENNIS F. DYCUS: Graduate of Western Kentucky, Certified Public Accountant; Member of: American Institute of Certified Public Accountants, Tennessee Society of Certified Public Accountants, Association of Government Accountants, Governmental Finance Officers Association; Director of Division of Municipal Audit; 11 years with the Comptroller's Office; guest lecturer and speaker.

JOHN P. FRANKLIN: B.S., Physical Education, Fisk University; M.S., Educational Administratior Indiana University; post graduate work, The University of Tennessee, in Administration and Supervision; Chairman of the Chattanooga Board of Education; Member of the Executive Council of Tennessee School Boards Association; Member of National School Boards Association; President of Tennessee Municipal League, serves on Board of Directors for National League of Cities.

SUZANNE HAEGERT: B.A., Communication Design and Psychology; University of Tennessee; present position, Director of Public Relations, Bureau of Environment, Tennessee Department of Health and Environment.

JACK HUGHES: B.S., Physics, Marshall University, Huntington, West Virginia; M.A., Molecular Biology Vanderbilt University; has served 12 years as Director of Water Operator Training Center.

ANDY JORDAN: Twenty years of Utility Management experience with cities of Maryville, Athens, and Morristown, Tennessee, served as Director of Public Works and City Engineering in these systems; past president of the Tennessee Chapter of the American Public Works Association; presently serving on the Executive Board of the Water Quality Management Association; Project Manager for the newly created Utility Management Consultant Program through the University of Tennessee's Municipal Technical Advisory Service.

PIO LOMBARDO: B.S., Chemical Engineering, University of Massachusetts; M.S., Civil Engineering, University of Washington; President of Lombardo and Associates, a 20 person environmental engineering firm with offices in three states specializing in innovative and alternatives waste water management systems for medium and small size communities; Registered Professional Engineer in 17 states; consultant and lecturer to U.S. Environmental Protection Agency on alternative small community waste water management systems.

D. ELMO LUNN: J.D., YMCA Law School, Nashville; B.S., University of Tennessee; present position, Director of Division of Water Management, Bureau of Environment, Tennessee State Department of Health and Environment; past experience, Environmental Engineer.

COMMISSIONER HUBERT L. MCCULLOUGH, JR.: B.S., Middle Tennessee State University; on leave of absence as Chairman and Chief Executive Officer of McCullough Associates, Inc., an environmental engineering firm and McCullough Industries Inc., a Murfreesboro manufacturer of patented water meter boxes, to serve in Governor Alexander's cabinet; also served as Commissioner of the Department of General Services.

U. A. MOORE: Tennessee State Representative; member of 88th, 89th, 90th, 91st, 92nd, and 93rd General Assemblies; Professional Businessman; member of: Masons, Rotary, Optimist, Veterans of Foreign Wars.

JOE MUSCATELLO, JR.: B.S., West Virginia University; M.P.A., West Virginia University; served as City Manager of Welch, West Virginia; served as Municipal Consultant for Mid Ohio Valley Development Corporation; presently Municipal Consultant for The University of Tennessee's Municipal Technical Advisory Service, Cookeville, Tennessee; author of publication on Water Rate Structures.

C. L. OVERMAN: B.S., East Tennessee State University; M.S., City Management, East Tennessee State University; present position, Executive Director, University of Tennessee's Municipal Technical Advisory Service; professional organizations: International City Management Association, International Personnel Management Association, Tennessee Public Employee-Employer Relations Association; 1981 Outstanding Public Service Professional Award, University of Tennessee's Institute for Public Service.

RALPH G. PETROFF: B.S., Stanford University, Palo Alto, California; President of American Digital Systems, a firm that has worked for some 1500 cities in the area of water pollution control; recently testified before the U.S. Congress on Waste Water Issues; member of: APWA, WPCF, and Legislative Coordinator for NASSCO; recognized authority on Pipeline Management.

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SCHEDULE OF EVENTS

TUESDAY, OCTOBER 16, 1984

8:00-8:45 a.m.	Registration: (Danish/Coffee served in Exhibit Area)
9:00-9:15 a.m.	Convene
9:15-9:45 a.m.	Keynote **The Tennessee Initiatives**
9:45-10:00 a.m.	Stage of Events
0:00-10:15 a.m.	Break
0:15-10:45 a.m.	**Tennessee's Water Policies**
0:45-11:15 a.m.	**The University of Tennessee's Technical Assistance Program**
1:15-11:45 a.m.	**Federal Program Initiatives**
l:45-12:00 noon	Break
12:00-1:30 p.m.	**LUNCHEON** **Wall Street's Response to the Tennessee Initiatives** Philip M. Richardson, Vice President, Ehrlich-Bober & Company, Inc. (Investment Bankers)
1:30-2:00 p.m.	Visit Exhibit Area
*2:00-5:00 p.m.	**CONCURRENT ROUNDTABLE DISCUSSIONS** **Financial Programs, Loans, LDA, Grants, Privatization** 2:00-2:45 p.m. **Enforcement—Also includes EPA Compliance Deadline** 2:45-4:00 p.m.

Training/Technical Assistance
4:00-5:00 p.m.

Rate Structure/Depreciation
2:00-2:45 p.m.

Federal Programs
2:45-3:15 p.m.

Contract Management/Procurement
3:30-4:00 p.m.

Alternative Small Scale Technology
4:00-5:00 p.m.

3:15-3:30 p.m. Break

SCHEDULE OF EVENTS

WEDNESDAY, OCTOBER 17, 1984

7:00-8:00 a.m.	Continental Breakfast Served in Exhibit Area
8:15-8:30 a.m.	Convene
8:30-9:15 a.m.	**The Tennessee General Assembly's Response**
9:15-9:30 a.m.	**Water Resource/Recovery and Center for Excellence**
9:30-10:30 a.m.	**Pre-Treatment/Pipeline Maintenance**
10:30-10:45 a.m.	Break
10:45-12:00 a.m.	**CONCURRENT ROUNDTABLE DISCUSSIONS** **Financial Programs** **Enforcement** **Training and Technical Assistance**
12:00 noon	**ADJOURN**

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Appendix D
Toward a National Plan for Wastewater Treatment Operator Training

TOWARD A NATIONAL PLAN FOR WASTEWATER TREATMENT OPERATOR TRAINING

ABC • capital investment • certification • Clean Water Act • compliance • Comptrain • Congress • construction grants • design • development assistance • effluent • EPA • enforcement • engineers • environment • equipment • federal government • financial management • GAO • health department • implementation • industrial waste • infiltration/inflow • 109(b) centers • local government • maintenance • management • manuals • monitoring • municipality • NDWP • NPDES permits • operators • overloads • OWPO • performance audit • PL 92-500 • planning • plant classification • plant performance • primacy • priority lists • private sector • policy reviews • pollution • POTW • PPC • process control • rate-setting • responsibility • self-sufficiency • sludge handling • standards • state government • supreme law • technical assistance • treatment • training • wastewater

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December 1983

CONTENTS AND SUMMARY

TOWARD A NATIONAL PLAN
FOR WASTEWATER TREATMENT OPERATOR TRAINING

Mandates

In its fiscal year 1984 appropriations for the U.S. Environmental Protection Agency (EPA), the Congress included $2,625,000 for wastewater treatment operator training. Accompanying this action, however, was the stipulation, in the Conference report, that a "national plan" for such training be submitted by EPA by March 1, 1984.

This provision appears to reflect a number of Congressional concerns, as revealed in reports accompanying the appropriations legislation. The Senate report focuses on the impact of training, in particular the extent to which it actually improves effluent quality. EPA, the report advises, should be prepared to provide some answers to questions in this regard by the time FY85 hearings are held. But the Senate report also calls for a national plan "for phasing out Federal funding and achieving state self-sufficiency in operator training."

The House report on the appropriations legislation justifies the continued funding in terms of protecting the Federal capital investment in plant and equipment. Its call for a national plan also looks toward state assumption of responsibility for training but urges the multiyear plan as a way of making the transition orderly and effective.

Of the two reports, the House version comes closest to capturing the essence of the backstage maneuvering that has characterized the training appropriations process in recent years. From the beginning, the current administration has attempted to terminate federally-funded operator training, but the Congress, at the behest of environmental training groups, has continued minimum funding anyway. The uncertainty over funding has left training efforts in limbo. The House report says, in effect: "All right, the states should assume the responsibility for training, but please give us a well-thought-out plan for doing this so that training can be effective at the state level."

Responsibility for preparation of the plan is centered in EPA's Office of Water Program Operations, which oversees federal training efforts, although many EPA levels as well as the Office of Management and Budget will have to approve the final product. Groups with experience in wastewater treatment operator training, such as the National Environmental Training Association (NETA) and National Demonstration Water Project (NDWP) were invited to make suggestions regarding the national plan. The present document has been prepared in response to this invitation. EPA has submitted a preliminary report with the promise of a final report by March, 1985.

NDWP has been active for twelve years in improving water and wastewater facilities in small towns and rural areas, working both to develop new facilities and to upgrade operation and maintenance of existing facilities. To this end, it has carried out over $17 million worth of local projects, including operator training projects. NDWP's most extensive effort in training is currently underway. Called the Comptrain Project, this EPA-funded activity includes onsite training to bring plants into compliance, special management and fiscal training for communities, and work with state agencies to improve training programs.

NDWP's perspective on training is slightly different from any other organization. It is not a government agency, profit-making business or association of trainers or operators. It is a nonprofit development organization whose sole concern is the small community that needs assistance, and it views training as a means of bringing better, more cost-effective service to such communities.

Premises

If it is to be effective, a national training plan for wastewater treatment operator training must be based on a number of premises. The premises, in NDWP's view, represent statements of fact well-supported by studies and field experience.

Premise No. 1. It is incontrovertible that the nation's wastewater treatment plants, many of them built with federal funds, are not performing well. The most thorough independent studies of this were done by the U.S. General Accounting Office. The 1980 report (Costly Wastewater Treatment Plants Fail to Perform As Expected, CED-81-9, November 1980) found that 87 percent of the plants surveyed were in violation of their NPDES permits and 31 percent were in "serious" violation. This finding was consistent with EPA's statistical reports, which showed 50 to 75 percent of the plants in violation at any given point. A later GAO report revealed similar deficiencies.

NDWP's field experience, including intensive work in six states over the last year, suggests that the problem may be even worse. Many plants considered in compliance with federal effluent standards in fact file inaccurate information; others file no information at all. These problems are particularly prevalent in the smaller plants.

The net result of this is that EPA's goal of cleaning up the nation's waterways is being significantly retarded, and many thousands of communities are suffering pollution problems.

Premise No. 2. Operator training can improve plant performance. There is no question that onsite, how-to-do-it training will be reflected in improved effluent quality. In the first year of the Comptrain Project, for example, NDWP improved the performance of at least 90 percent of the plants in which it worked; nearly 50 percent were actually brought into compliance. The impact of formal (classroom) training is harder to perceive "at the end of the pipe," but it unquestionably has a place in an overall training program.

Premise No. 3. The problem of plant performance cannot be solved by operator training alone, because the reasons for poor performance are not always operational reasons. When GAO looked at the reasons for plant non-compliance, it found that nearly two-thirds of the plants examined intensively had operational problems. However, nearly all the plants had problems that could be traced to the construction of the system rather than the operator, such as design deficiencies, equipment failures, infiltration/inflow problems, and industrial waste overloads.

Thus the improvement of training in isolation from the other factors that cause plants to malfunction will have only a limited impact on the overall plant performance record.

Approaches

In the context of the above premises, there are two ways to approach a national training plan. One might be called the "minimalist" approach. This would involve evaluating activities that have traditionally been regarded as "training," recommending such improvements as seem warranted within the narrow context of training effectiveness, and leaving it to the states to carry on as best they can with assistance from private organizations and some EPA back-up.

The "maximalist" approach involves using the national training plan as an opportunity to forcefully address the plant performance problem. In this scenario, training would be the catalytic force in a clean water implementation structure that would include enforcement and construction funding. The focus would not be on operators and how best to train them but on plants and how to improve their performance.

NDWP strongly favors the maximalist approach. If we simply tidy up training, we will indeed improve some plants and this will be all to the good. But it may leave the impression that patient -- and relatively inexpensive -- effort expended over a period of years will solve the problem. Almost certainly, this is not true. Although most wastewater treatment plants can be improved by training, the primary reasons for their non-compliance with federal effluent standards are that they are poorly designed and constructed and that enforcement action is not a deterrent to non-compliance.

The construction grants program under the Clean Water Act supposedly sets standards and procedures to insure that federally-funded plants being brought on line can do the job for a long period of time.

In practice, communities repeatedly find themselves saddled with new facilities that never work properly. In addition, many existing plants were built before federal standards were codified. Often these older plants are far out of compliance.

The Clean Water Act was intended to be a law "with teeth." If plants did not come up to standard, people could ultimately be fined and imprisoned. However, such enforcement is effective only when there is no more than an occasional transgressor. When many transgress, as in the case of wastewater treatment, the threat of punishment ceases to be a real deterrent. Not surprisingly, enforcement action by EPA and the states has been inconsistent; it could hardly be otherwise. Enforcement is only one tool for improving plant performance, and a limited one at that.

On the other hand, if we use training as a beacon to focus the attention of both construction grants and enforcement programs on plant performance rather than compliance with the law in an administrative sense, we may be able to solve the problem.

Roles

Any extensive ameliorative effort under public auspices in the United States is likely to involve, in one way or another, all levels of government -- federal, state, and local. This is certainly true of the drive to clean up the nation's waters through better wastewater treatment because the problem extends beyond the borders of any municipality or state. If we adopt the maximalist approach to a national training plan, it is necessary to clarify the roles of the various units of government because all units must assume some burdens, and there is some tendency for all units to attempt to lighten their loads as much as possible.

The Legal Roles

It is the duty of municipalities to comply with the law and to incur whatever costs are necessary to remain in compliance. Federal law specifies the wastewater treatment standards to be met, and publicly-owned treatment works have no choice but to meet those standards.

The municipality must take the initiative in seeing that its wastewater is properly treated, installing the necessary facilities and supervising their operation and maintenance. It must use its bonding, taxing, and rate-setting powers as appropriate to accomplish these ends. If certified operators are required, it must hire and pay them; reporting requirements must be met.

In this sense, wastewater treatment in the United States is a local responsibility. Complain though it may of federal intrusion and lack of financial resources, the municipality is not at liberty to ignore the law.

If compliance is the first duty of the municipality, enforcement is the first duty of the federal government, EPA being the responsible agency in this case. Wastewater standards are matters of federal law, and federal law is the "supreme law of the land," according to the U.S. Constitution. EPA may delegate the implementation of the law, but it cannot delegate the responsibility. If federal wastewater standards are not met, EPA cannot blame the municipalities or the states; the ultimate responsibility is federal.

To carry out this responsibility, EPA must commit financial resources, establish appropriate procedures, and even undertake legal action if necessary.

Under the Constitution, federal law can be implemented directly without state participation. In practice, given the federal nature of the system, Congress tends to involve states, by statute, in implementation. The Clean Water Act of 1977, the major authorizing legislation for all EPA wastewater programs, gives an important role to the states in enforcement. The NPDES permit system is first of all state action, and most specific enforcement action comes from the state level.

The Policy Roles

Traditionally, when the federal government places a major legal responsibility on local government, such as the present wastewater standards, it also provides assistance in meeting the obligation. Thus a construction grants program, the largest public works program in American history, was established to help municipalities build the necessary facilities. As with enforcement, much of the implementation, including the priority list procedure, is state-based.

Congress also saw the need for training as a method of assisting municipalities, and this is authorized in Title I of the Clean Water Act. Under this mandate, EPA has carried out a variety of programs. It has provided funding for the so-called 109(b) state training centers (now found in over 20 states), underwritten the production of training materials, and financed many research and demonstration projects in the training area. As a result of these actions, municipalities have received a mixture of federal and state assistance, but EPA has never established and enforced basic policies on training as it has on enforcement and construction grants.

Logically, the major implementation of training should be lodged at the state level along with enforcement and construction grants. However, the ultimate <u>responsibility</u> for training, under Title I, is still that of EPA. Thus before states, in effect, "assume primacy" over training, they should have programs in place, and EPA should help them to establish these programs. This is the purpose of the national training plan.

To summarize the various roles:

(1) The municipality should -

- accept training assistance as required to bring their plants into compliance;
- be prepared to assume part of the cost of such training.

(2) EPA should -

- establish guidelines for state training programs;
- assist the states in setting up programs and monitor the performance of such programs;
- provide transitional funding until state plans for financial self-sufficiency are achieved;
- continue to carry out special training projects in the research and demonstration area.

(3) The states should -

- establish and operate training programs under EPA guidelines;
- gradually assume the financial responsibility for such programs.

Elements

Suppose that each state had an effective training program, one based on the premises discussed here and designed in accordance with the maximalist approach. What would be the key elements of the program? In other words, what would a model state training program look like? (See graphic, page 25). There are six elements.

Element No. 1. Plant Classification and Operator Certification

In every state, there should be a list of wastewater plants subject to federal-state regulation, and these should be classified in accordance with size (gallons per day capacity) and complexity of treatment process. A certified operator for each of these plants should be mandatory under state law. There should be classes of certification related to the classes of treatment plants. The assumption is, of course, that plants work better if there is a competent person in charge and that certification requirements are a means of insuring competence.

Although the principle of operator certification is well established at the state level, there is much slippage in practice. The Association of Boards of Certification (ABC), a kind of trade association for state boards, reports that the number of certified wastewater treatment plant operators tripled in the 1970s and numbered 73,000 in 1980. Certification is now mandatory in 44 states, voluntary in the others, but there continues to be some resistance to the general drive for professionalism in the operator ranks. It is appalling at a time when even beauticians must be licensed that people argue against the use of proficiency standards for persons on whom the health of the community depends.

Sometimes the objections are based not so much on principle as on money. Each time a profession or trade is upgraded through certification, its practitioners demand more money for their services. Many municipalities prefer the old days when the operator was part-time and incompetent but not very costly to the town. But there were no federal effluent standards to meet in the old days. Today, there are such standards, and the earlier methods will not do. Every state should require by law certified operators for every wastewater plant under its jurisdiction.

Of course, it is true that certification and competence are not the same thing -- a point frequently made by opponents of certification -- but if they are not, they should be made so. A medical license does not insure that the doctor is competent either, but it certainly makes it more likely because much effort has gone into training a doctor before the license is granted. We must do the same for wastewater operators.

Element No. 2. Operator Courses and Materials

Every state should provide the means whereby a person may become competent as an operator and thus certified. This means formal courses to take and appropriate materials to use. The formal courses should include both four-year and two-year college-level training programs. (All operators should have high school diplomas or equivalents.) In addition, since there are so many people now with plant experience but without the formal training, there should also be special "certificate" programs so that they may become certified without losing years in school. Finally, all operators should be required to upgrade their skills periodically, and special "short courses" serve well for this purpose. Periodic recertification, which should also be mandatory, should not be automatic in the absence of such upgrading.

Successful conduct of formal education programs necessitates the production of considerable written and graphic material -- manuals, booklets, trouble-shooting guides, O&M manuals and so on. Luckily, most states are well-supplied with these materials because EPA, over the years, put a great deal of money into materials production. But the materials need updating from time to time.

As with certification, formal education for operators is no stranger at the state level. There are now in existence at least 61 certification programs covering the entire U.S. and Canada, according to ABC. By and large, those who want to acquire the necessary skills can do so. The major problem lies in inducing municipal officials to insist on formally qualified operators for their systems and to provide pay and working conditions adequate to make the operator positions attractive.

A good deal is heard about the "turnover problem" among operators. Some even argue that it is self-defeating to train operators because the higher skill levels they achieve permit them to leave their jobs. But this happens in all occupational areas; the best people move up. The goal should be to create pools of qualified people at all levels, including the entry level. Those who upgrade their skills and move out of the lowest operator classifications are replaced by entry-level people from the formal training programs. Financial compensation at every level should be commensurate with training and experience. Vacancies thus become a normal part of a flexible and healthy job market. What absolutely must come to an end is the practice of filling vacancies with unqualified people simply because they can be had at lower prices.

Element No. 3. Management and Technical Assistance

Probably the most pressing training need at the state level today is for a vigorous program of onsite management and technical assistance to local communities. "Technical" assistance means working in the treatment plant to help the operator diagnose and correct operational problems, such as sludge handling. "Management" assistance goes beyond the plant to the organizational and fiscal aspects of system operations -- bookkeeping, budgeting, rate-setting. In both cases, the training comes "over-the-shoulder," not through classrooms or written materials.

NDWP's Comptrain Project, among other efforts, has demonstrated that this kind of trouble-shooting assistance can be effective in improving plant performance, and it is a cost-effective approach if the people doing the training are well-organized in their work and competent. Every state should have a small cadre of people -- not necessarily engineers or accountants but people who are experienced in process control and system operations -- to be dispatched to local communities on an as-needed basis. Each year they would map out and implement a program of work -- identifying target communities on a priority basis, doing the necessary diagnostic and corrective work, and engaging in follow-up actions as necessary.

This field staff should be backed up by a trouble-shooting "hot line" that would enable plant operators anywhere in the state to call in and get at least some direct assistance at any time. Indeed, the plant situation in an entire state could be computerized and updated as remedial action is taken.

Small communities will need this kind of assistance for many years. In the first place, it will be some time before every community has an efficient wastewater system, i.e., a competent and certified operator working under businesslike management practices. In any case, even if all systems were efficient operationally, there will still be plenty of problems encountered, given the design and construction deficiencies that are still being built in.

Some states do conduct technical assistance (management assistance rarely) on a limited basis; most states do not. Cost is usually a factor. In many cases, however, states are reluctant to assist plants because they fear this may compromise later enforcement actions. It is Catch-22 for the local community: no one helps them comply with the law because they are not in compliance with the law.

Element No. 4. Planning and Development Assistance

If all wastewater treatment plants were properly designed and constructed to begin with, they would have fewer operational problems. Unfortunately, they are not properly designed and constructed. They are frequently oversized or undersized for the communities they serve; they often include equipment that does not function as it should; they are built atop old sewer systems with tremendous infiltration/inflow problems; they must accept industrial waste they cannot adequately treat. Furthermore, the operation and maintenance planning is usually skimpy. Cost projections are hopelessly optimistic; rates are established that do not produce sufficient revenue; there is no provision for repairs or replacement of equipment.

Who is at fault in this situation? The design engineers? The state agency that processes the funds? EPA? The municipality? Usually, as GAO found, all parties can be blamed to some extent. One thing is clear. The primary responsibility must be assumed by the municipality. It must supervise the planning, design, and construction of the system; it must make arrangements for the necessary funds. A second thing is clear as well: the municipality needs help in doing all these things. At the present time, it is at the mercy of the engineering firms and the funding agencies, and each of them has a slightly different agenda than the municipality. To be sure, the engineers are well-intentioned, but they have to make a profit. Also, there are many reviews built into the EPA construction grants program, but all these are administrative reviews. They do not help the municipality make informed choices on basic matters.

As a part of its training component, every state should have a cadre of people, similar to the management and technical assistance specialists, who go into the field and help municipalities plan and develop wastewater systems. They would not review engineering drawings and advise on details. Neither would they duplicate the administrative reviews of the funding agency. Instead, they would make sure that the municipality asks the right questions and gets clear answers. Is a totally new system really needed? How much can the community afford to pay for a system, given its economic situation? Is the proposed plant properly sized? Is industrial waste likely to be a problem? Is the proposed rate structure adequate? If these kinds of questions are raised, at least the community can go into the matter with its eyes open.

At the present time, the municipality gets no impartial advice "on its side of the table." Its "advisers" are people who have other basic interests, such as making a profit or enforcing the state's priority lists. These are indeed legitimate interests, but they do not help the municipality make informed choices.

No state today really provides this kind of help on a regular basis. Sometimes there are private development assistance organizations (such as NDWP) that do. Certainly it goes beyond the traditional concept of training as instruction for plant operators. But this is precisely where more effort is needed if there is to be improvement in plant performance. If correcting mistakes in treatment plants is a legitimate state function, surely it is logical to take steps to prevent mistakes.

Element No. 5. Training Coordination and Leadership

Responsibility for the four "line" elements in the state training program -- those discussed above -- should be fixed in one state agency. This need not be a separate department but should be a separate component, if a part of a larger department. The important thing is that the training agency should be an important part of the state government and not simply a group that "does its thing" on the side. For example, in a state where the enforcement and construction grants functions for wastewater plants are lodged in the state health department, the training function should be there as well, but as a separate function not administratively subordinate to the other functions.

Having the training responsibility does not mean that the training agency would do everything on an in-house staff basis. Thus, given its quasi-judicial function, the state board of operator certification would be a separate entity. Likewise, training courses could, by and large, be conducted as a part of the existing state higher education system. In both cases, however, the training agency should maintain close liaison with and provide guidelines for these groups. Certification actions should be in accordance with established state policy, and training courses should reflect the state's training needs as determined by the training agency, not by an independent educational establishment.

Direct field assistance, both management-technical and planning-development will probably be most effective if conducted in-house by the training agency staff, but work could also be contracted to the private sector under clear agency guidelines.

In the end, if the state is to have an effective program, the training agency must exercise leadership, not simply engage in coordination. If it simply processes paper and lays all the work off on others, the program will quickly revert to the kind of training jumble that usually exists today. The training agency should be vigorous in pursuing plant peformance goals.

Are the state 109(b) centers the models for a state training agency? Possibly. However, the existing centers are mostly attached to educational institutions rather than the state's wastewater structure. If a state expands training to include all the elements outlined here, a different lead training agency may be called for, although the 109(b) centers would cetainly play a major role in environmental education. However, there is nothing magic about a particular bureaucratic structure, and the centers should not be ruled out as lead training agencies. The important thing is the program, not the precise structure.

Element No. 6. Plant Performance Coordination and Auditing

A major problem in wastewater plant performance at present is that enforcement, construction funding, and training programs are not closely related at the state level. Different groups, or groups of groups, are responsible for each function. They have different legislative mandates and they conduct their affairs with little reference to the others. As a result, no agency is responsible for plant performance as a whole.

As the final element in a model state training program, every state should create, by law, a Plant Performance Council composed of representatives from the enforcement, construction grants, and training agencies. This group would have no implementation responsibilities. Instead, it would be an advisory mechanism for coordinating the work of the operating agencies at the outset and assessing the results of that work on a plant performance basis. The PPC should be chaired by the training agency, which would also perform such staff work as was necessary, since there would be no separate PPC staff.

The PPC should periodically review the results of the various activities being conducted by its member organizations. What is the size of the backlog on the state priority list? How does this relate to the perceived need for new construction in the state? What communities particularly need planning and development assistance? How effective has onsite technical assistance been? What is the current picture with regard to certified operators? How many plants are out of compliance with their NPDES permits? Which seem most in need of direct assistance? Do policy changes seem needed in any of these areas?

Although the PPC should have a statutory basis, its authority should be advisory. The intent in establishing a formal body is to create a forum for the interchange of ideas and the exertion of peer pressure. The state as a whole has a job to do, namely to keep its wastewater treatment house in order, and the role of the PPC would be to serve as the principal agent for the discharging of this responsibility. In a sense, it would be an auditing agency, but its "audits" would be of performance, not dollars.

If all six elements described here are put in place at the state level, the state will be well on the road to dealing with its wastewater compliance problems. It will have more than a model training program; it will have a model Plant Performance Program, and that is the real objective: to use training as a lever to bring greater effectiveness to the entire construction-operation-compliance process.

Objections

Aside from problems of implementation (which will be discussed momentarily), there will surely be some objections to the plan itself. It is NDWP's view that there are no objections that cannot be answered, save possibly one: "We have not done it this way in the past." The only answer here is that what has been done in the past has not worked very well and something else should be tried. Here are some other likely objections.

Objection No. 1. State technical assistance will compete with the private sector, i.e., engineering firms. Not really. Engineering firms are rarely able to provide the kind of broad-brush advice the communities need at the development stage. At the operations stage, trouble-shooting is usually not cost-effective work for such firms. Where it is -- and where a firm has shown some ability to work on a community's behalf -- the firm may receive the work under contract. All the system design and construction work remains in the hands of private engineering firms. State assistance will even create private sector work. Many community systems are in such poor shape now that an engineer has little to offer.

Objection No. 2. Municipalities will never be willing to raise rates enough to cover the cost of proper system operation. This remains to be seen. Towns are rather testy about rates at present, but that is because it is usually a case of their users being asked to pay for someone else's mistakes. If municipalities have some confidence that the bills they are handed are the result of a rational process, they will pay the bills. A strong state assistance effort will encourage them to feel that the process is rational.

Objection No. 3. Enforcement, funding, and training are separate functions that should remain entirely separate. All these functions bear heavily on plant performance, and such performance is not likely to improve unless these functions are exercised in concert. It is what comes out of the pipe that matters. In any case, the agencies carrying out each function would continue to have independent administrative responsibility. The PPC would simply be a means of encouraging each agency to do its job in the larger context of plant performance.

Objection No. 4. Planning and development assistance is not really training and should not be a part of a training plan. What is being recommended is a plant performance program, not just a training plan, and development assistance is certainly important in that regard. Anyway, "training" is anything that helps people make better decisions.

Objection No. 5. The Plant Performance Council would never have any real power and would be just another layer of bureaucracy. Possibly. It depends upon the seriousness with which the parties involved go about it. However, the PPC would be a formal body with a statutory mandate, which is more than we have now. Function frequently does follow form. The lack of staff would militate against the PPC's becoming a new bureaucracy.

Actions

Before state training (or plant performance) programs of the kind described here become a reality, EPA has a good deal of missionary work to do. Thus a national training plan must give some attention to implementation.

Action No. 1. The states must be convinced that a plant performance program is necessary. A national conference devoted to this is one possible educational device. Also a short-term task force of interested parties might be useful as a prelude to the conference.

However, the task force should be charged with commenting on the EPA plan, not developing a new plan. If charged with the latter, the task force will produce the lowest common denominator of the various interests. The resulting plan will be easier to implement but is likely not to be worth implementing at all.

Action No. 2. EPA must issue specific training guidelines. The purpose of the conference should be to iron out these details. Once the guidelines were issued, states would not be allowed to "assume primacy" over training (and would receive no funds) without making progress toward the institution of appropriate programs. Program planning would have to cover proposed activities, administrative mechanisms, and funding strategies.

Action No. 3. EPA must assist the states in establishing programs. Program planning of this kind required will involve several state agencies. To bring these agencies together and link their efforts to EPA guidelines, EPA must send people into the field to pull things together.

Action No. 4. Some federal funds will be required in a transitional period. An effective training program will require skilled personnel to carry out the various activities. Some of these, particularly technical assistance, will be new activities for states. They are not in a position to suddenly commit resources to the activities. Until they are, there should be continued federal subsidies. However, states would be expected to assume full financial responsibility after a transitional period, and would be required, as a part of program planning, to prepare specific self-sufficiency plans. This could include schemes for charging the municipalities for services.

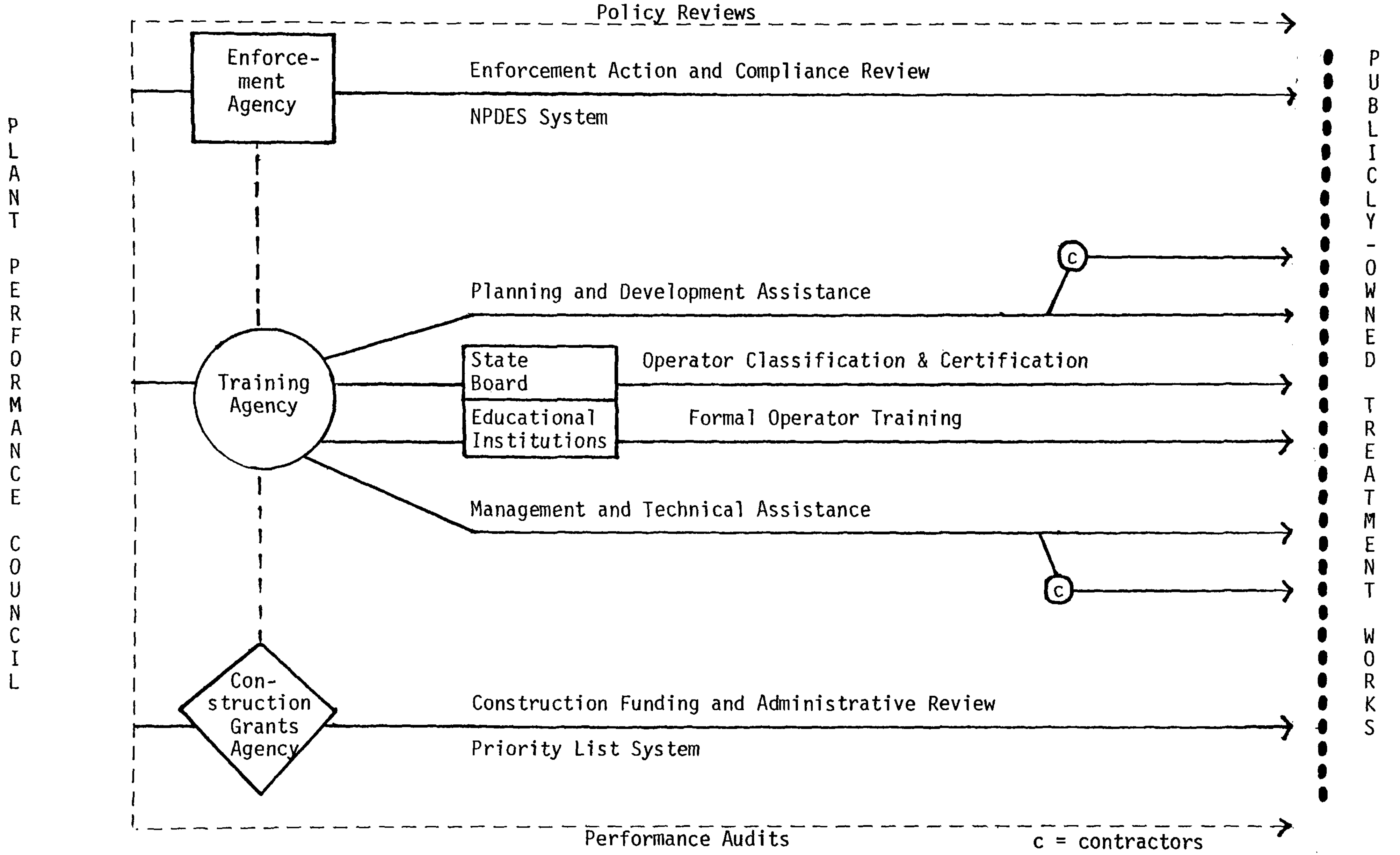
EPA should probably look toward a five-year period during which the training function will gradually shift to the state level. Once state programs are in place, EPA should continue to monitor their performance, as it monitors their performance in other areas.

Afterthoughts

The plan described in this document is written with publicly-owned treatment works in mind. These are the plants that receive EPA construction funds. However, private treatment works, i.e., industrial plants, are also subject to federal-state regulation and the NPDES permit system, and there is a need for trained operators and technical assistance for these plants as well as municipal systems. Accordingly, the Plant Performance Council should consider industrial plant performance as a part of its overall mandate.

In addition, water systems could eventually be made a part of the structure. These systems are subject to federal drinking water standards (Safe Drinking Water Act of 1974) and need training to meet these standards. EPA funds some water system training activities, chiefly through the National Rural Water Association and its individual state associations. In the long run, EPA might consider making this program a part of the total state training structure. EPA does not, by and large, fund water systems, but there are other federal agencies that do, especially the Farmers Home Administration in the U.S. Department of Agriculture. Sadly, water treatment plants fail to meet federal standards about as often as wastewater plants, according to GAO studies.

For the moment, it is certainly enough if effective state-level training programs, set in the context of plant performance and aimed at municipal wastewater plants, are created. Ultimately, however, industrial and water plants should be brought into the fold.



STATE PLANT PERFORMANCE PROGRAM