City of Philadelphia
Combined Sewer Overflow Program

CSO Documentation

Implementation of the Nine Minimum Controls

Submitted to:

Pennsylvania Department of Environmental Protection
Bureau of Water Quality Management

in partial fulfillment of

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Executive Summary

The Philadelphia Water Department recognizes that its efforts to address combined sewer overflows from Philadelphia's combined sewer system is a significant undertaking. In order to develop technically sound, cost-effective plans to address CSOs that satisfy NPDES permit conditions, help meet PaDEP's objectives for water quality improvement and improve Philadelphia's water environment, PWD has established a CSO program to which it has already committed significant resources. The Department has been operating and maintaining the City's sewer system competently for many years. However, this NPDES permit-inspired CSO program has led to a more thorough and comprehensive examination of the collection system than has ever been performed at any time in the past. The program is helping the Department to learn more about the sewer system and to look for better and more efficient ways to operate and maintain it.

The CSO Program currently is staffed by 5 consultants and 2 full-time PWD personnel located in a 1000 square foot program office at PWD's downtown headquarters, and by more than the equivalent of 2 full-time PWD staff positions located at the Fox Street computer facility. Initial program efforts have focused on development and integration of state-of-the-art tools for the CSO management: computer models of the combined sewer system which demonstrate how the system currently performs and simulates alternative strategies for enhanced performance; a database of the physical system and of the maintenance activities performed on it; a geographic information system (GIS) used to manage and interpret spatial information; and a computerized monitoring network to provide field measurements of the depth of sewage flows at key locations throughout the Northeast drainage district, used to optimize operational efficiency. Each of these elements is now in place and operational, and together these resources provide PWD with the tools necessary to successfully develop and implement Philadelphia's CSO program by providing an accurate characterization of the combined sewer system components and inputs, the system condition, measurements of its behavior and simulation of its performance both now and in the future.

The computer facility at the Fox Street location and the field monitoring system currently are undergoing a major expansion. Beginning in the late 1980's, the PWD began implementing a comprehensive program of sewer system monitoring which employs the latest electronic technology to measure sewer system flow levels and automatically collect and process the data at a centralized location. This program of electronic surveillance, currently being expanded in a $6.5 million equipment installation project which will greatly increase the number of monitored sites and add the capability to measure flow rates as well as levels, is a key element in PWD's CSO program. By continuously monitoring sewer system conditions in real time, PWD is reducing the need for frequent visits to remote sites to verify proper operation, thereby freeing up resources which can be deployed for system-wide operational improvements to optimize the performance of PWD's existing system in minimizing CSO impacts.

PWD is developing a state-of-the-art computer model of Philadelphia's combined sewer system. This model will be a fundamental part of PWD's CSO program, supporting all phases of CSO related activities - evaluation of plan alternatives, sizing and design of facilities, and analysis of the efficacy of controls. Because Philadelphia's combined sewer system is one of the largest and most complex systems in the U.S., PWD is implementing a suite of computer models in a modeling process that has been carefully designed to evolve in a growth path that parallels the planning process. This modeling process, employing a two-tiered modeling strategy, enables PWD to meet their permit requirements for hydraulic characterization, NMC implementation and long-term planning by focusing model detail on the key system elements first, and expanding the level of model detail to support the needs of the planning process for increasingly detailed information.

Initial model development in the first tier effort has therefore focused on detailed simulation of the system of interceptor sewers and regulators, using the **EX**tended **TRAN**sport (EXTRAN) block of the U.S. EPA's **S**torm**W**ater **M**anagement **M**odel (SWMM). Initial characterization of the capture and overflow of combined sewer flows has been developed using the U.S. Army Corps of Engineers' **S**torage, **T**reatment, **O**verflow, **R**unoff **M**odel (STORM) to support hydraulic characterization and NMC implementation. Additional detail on the trunk sewer system and combined sewersheds currently being added to the model in the second tier effort to support long-term control planning. This effort will enable PWD to more precisely characterize the combined sewer system using the RUNOFF and TRANSPORT blocks of SWMM. The process of model expansion and refinement will continue throughout PWD's CSO program, as the models evolve to support each phase of the program - from concept planning through implementation and post-construction assessment.

The City of Philadelphia has made a significant commitment to the proper collection and treatment of waste water and storm water. There are over 300 employees in the Department's Waste and Storm Water Collector Group dedicated to the operation and maintenance of Philadelphia's sewer system, with an annual operating budget in excess of 15 million dollars. In this upcoming year, the City will spend an additional 16 million dollars for a capital improvements program for sewer rehabilitation that is beyond the scope of the operation and maintenance budget. The City's combined annual operations and maintenance budget for the three water pollution control plants and the sludge processing facilities is almost 45 million dollars. Over 500 employees work at those facilities.

Much of the work of the Waste and Storm Water Collector Group relates directly to maximizing the storage of wet weather flows in the combined sewers and their transport through the sewer system to the water pollution control plants. For instance during this past year, in addition to the Departmental staff's cleaning of many miles of sewers, an outside contractor was retained for over $80,000 of specialized, large sewer cleaning work. This coming year, $300,000 is budgeted for specialized large sewer cleaning efforts.

A good example of the City's commitment to CSO control, and one that also was influenced by the CSO NPDES permit process, is the recently instituted practice of regularly cleaning and maintaining grit pockets at two critical locations in the trunk and interceptor system. For instance, the quarterly cleaning of the 100-foot deep siphon grit pocket located at the Central Schuylkill wastewater pumping station is a major undertaking requiring specialized equipment and the commitment of significant labor resources. This practice has been shown to reduce the hydraulic grade surface at the siphon, increasing the wet weather flow capacity to the Southwest treatment plant. Prior to the recent institution of this cleaning practice, the grit pit at this location had not been cleaned regularly in over 40 years.

Operation condition inspections of regulator chamber and backflow prevention devices are conducted for each structure approximately weekly, resulting in more than 10,000 inspections conducted each year. Additionally, comprehensive structural and preventative maintenance inspections are performed annually. The PWD staff is in the process of revising their comprehensive inspection forms to provide a more convenient format for their newly instituted computerized maintenance documentation and reporting procedures. The new forms will be similar to those used for the third-party verification activity that was documented in the PWD System Inventory and Characterization Report (March, 1995). The new forms will be customized for each structure. The City-wide expansion of the electronic surveillance monitoring of the sewer system is expected to supplement the inspection program, reducing the labor required for the weekly inspections, making more resources available for the comprehensive inspections.

The Waste and Storm Water Collector Group has made provisions to detect and deal with emergencies associated with the sewer system. The Emergency Response Program provides electronic notification of responsible individuals under certain conditions such as pump station failure, dry weather overflows (currently in the Northeast drainage district but soon to be City-wide), and certain other equipment failures. The system provides for the automated notification through equipment located in the field that automatically electronically pages supervisors, alerting them to the possible emergency condition so that on-call crews can be dispatched. In addition, calls handled through the City's main Emergency Desk are routed directly into the PWD's Emergency Program.

The City recently has begun a construction project that is installing emergency back-up electrical power generation at 8 wastewater pump stations that currently do not have dual power supply capabilities. Records from 1994 reveal that 95% of the pump station-related dry weather overflows occurring in that year (14) were related to power failures. The installation of the emergency power generation equipment is expected to greatly reduce the potential for pump station-related overflows. In addition, Department staff presently are developing a City-wide pump station predictive maintenance program that is intended to optimize station operation and minimize avoidable pump station-related dry weather overflows.

Another measure aimed at maximizing the wet weather flow of combined sewage to the wastewater treatment plants and the available effective treatment capacity at the plants is the planned construction project intended to provide backflow prevention devices for the emergency overflow weirs at a number of tide gates throughout the system. This will reduce the transmission and treatment capacity losses caused when extreme high tides enter the system over the top of some tide gates. This project is currently in the design phase and is scheduled to enter the construction phase in the near future.

In response to concerns raised during the process of developing of the System Inventory and Characterization Report (PWD, March 1995), the Department has installed temporary flow meters in several locations around the City. The Department has committed to reporting the results of these monitoring activities to PaDEP by March of 1996, along with an evaluation of any overflow conditions that may be documented. This is another good example of how the CSO permitting process has caused the Department to look more closely at a portion of the sewer system and to attempt to find ways to operate it better.

The operation and maintenance of the sewer system is comprehensively documented. Innovative computerized record keeping, data management and reporting techniques developed internally by departmental staff have provided a new basis for better operational management of the sewer system. These same techniques allow the preparation of timely and accurate overflow activity reports to satisfy CSO permit requirements.

Planned action items for flow maximization and sewer system operation optimization under the Nine Minimum Controls include the implementation a number of improvements in the ways that the collection system is operated. A key element among the early-action items is the addition of dams to the 57 slot regulators in the combined sewer system that do not currently have dams. Although these structures generally do not bypass during dry-weather, the absence of a diversion dam at the downstream side of the orifice opening renders these sites more susceptible to dry-weather overflow. The addition of a dam will not only provide greater factor of safety in preventing dry-weather overflows, but will also provide greater hydraulic head on the orifice, increasing the flow into the interceptor sewers and in some cases potentially increasing the maximum hydraulic gradient in the interceptor sewer prior to overflow. The net effect of these improvements will be better protection against dry-weather overflows and better capture of combined flows in the interceptor during wet weather. PWD is committed to installing dams in all 57 locations within the next 2 years.

A key element of PWD's NMC plan is the adjustment and modification of the regulator structures at the interface between the combined trunk and interceptor sewer systems. These structures were revealed in the development of the System Hydraulic Characterization Report (PWD; June 27, 1995) to protect the WPCPs by significantly constraining the release of combined sewer flows to the interceptor sewers during wet weather. NMC4 describes a program to more effectively utilize the capacity of the interceptor sewers and WPCPs treatment processes to capture and remove pollutants from the combined sewer system during wet weather. The proposed modifications are predominantly the adjustment of the float-operated gate ("Brown & Brown") regulators and the addition of dams at slot regulators that currently do not have diversion dams in place. These modifications will be implemented in a staged program of modification and evaluation, to enable PWD to properly adapt to changes in the wet-weather operation of the collection and treatment system as the modifications are implemented.

PWD recognizes that solids and floatables discharged from CSOs may represent a potentially significant impact to Philadelphia's receiving streams. The City currently expends considerable effort to minimize the potential discharge of solids and floatables. The Department performs over 50,000 inlet cleanings each year preventing many tons of street surface-related materials from discharging to waterways through CSOs. As mentioned previously, the significant pipe cleaning and grit removal activities conducted by the department also removes a great deal of material that otherwise might discharge through CSO outlets during wet weather. The City sponsors a number of public education and public involvement programs aimed at solids and floatables pollution prevention and source control.

Further control of solids and floatables may be a significant undertaking, and one which should be predicated on a solid understanding of the location of the impacts, the extent of the impacts, and the source or sources of the pollutants. Only when this information is available can specific approaches that will effectively control solids and floatables be developed. In order to obtain the necessary information, PWD is developing a program to monitor the impacts of solids and floatables on the receiving streams and characterize their sources. As PWD gains a better understanding of the solids and floatables issue, appropriate strategies for addressing the impacts will be developed.

Over the years, the Water Department has implemented a rigorous industrial pretreatment program. The effectiveness of this program has allowed the City to develop one of the largest and most successful biosolids beneficial reuse programs in the nation. As part of the nine minimum controls effort, the Department is committed to taking actions to encourage industries to better manage their process water discharges to the sewer collection system during wet weather periods.

Pollution prevention programs can help to reduce the amount of contaminants and floatables that enter the CSS. Such measures include street sweeping, catch basin cleaning, litter control, public education, etc. Philadelphia has implemented a number of pollution prevention programs and established city ordinances that address these concerns. Public education programs are considered an effective method of reducing the amount of litter and contaminants on the streets and ultimately the amount of floatables and pollution reaching the receiving water.   The Public Affairs Division of the Water Department will conduct eight new public education initiatives in direct support of the City's efforts to implement minimum control technologies for CSOs, including:

- ■Developing a comprehensive educational package to include:
  - -General information on the City's combined and separate sewer systems
  - -Maps of the sewer systems and the locations of CSOs
  - -Explanations of the EPA national CSO Policy and the Nine Minimum Controls
  - -Tips on what citizens can do
  - -A CSO/stormwater newsletter
- ■Develop materials for and set-up meetings with City Council members, friends groups, Environmental organizations, etc.
- ■Media workshops focused on expected environmental improvements associated with the City's CSO program
- ■Produce newsletters twice each year for sewer shed areas served by combined sewer systems
- ■Set up community CSO workshops with friends groups
- ■Produce bill stuffers for stormwater, CSOs and Household Hazardous Waste Programs
- ■Work with local newspapers to develop articles to discuss general awareness of CSOs and their potential impacts on receiving waters and the potential impact within the regional receiving waters
- ■Expand the mission of the City's existing Stormwater Advisory Committee to integrate CSO issues and work with the Committee to set CSO education priorities and objectives.

Understanding of the Nine Minimum Control Documentation Requirements

On April 11,1994, the Environmental Protection Agency (EPA) issued the final Combined Sewer Overflow (CSO) Control Policy. This Policy establishes a comprehensive national strategy to ensure that municipalities, permitting authorities, water quality standards authorities, and the public engage in a coordinated planning effort to develop and implement cost effective CSO controls that ultimately meet appropriate environmental and health objectives. The Policy is implemented through the National Pollution Discharge Elimination (NPDES) permit program under the provisions of the Clean Water Act (CWA).

There are two key objectives of the CSO Policy: (1) the implementation of the Nine Minimum Control (NMC) measures, and (2) the development and implementation of the Long-term CSO Control (Facilities) Plan (LTCP). The NMCs represent low cost technology-based actions or measures that can help to reduce CSO pollutant discharges and their effects on receiving water quality. These controls, as detailed in the NPDES permits for Philadelphia's CSO discharges, include:

- Review of operation and maintenance programs
- Maximum use of the collection system for storage
- Review and modification of pretreatment programs
- Maximizing flows to publicly owned treatment works (POTW)
- Prohibiting CSO discharges during dry weather
- Control of the discharge of solids and floatable materials in CSOs
- Pollution prevention programs
- Public notification
- Inspection/Monitoring/Reporting

These nine measures are recognized by EPA as minimum technology-based limitations for combined sewer overflow permits to meet minimum Best Conventional Technology/Best Available Technology (BCT/BAT) requirements on a best professional judgement (BPJ) basis. The sections of the three Philadelphia Water Department (PWD) NPDES permits that cover the CSOs suggest that, at a minimum, technology-based control measures must include best management practices and/or other non-capital intensive measures to minimize discharges and water quality impacts. The permit also contains a condition that control measures suggested in the EPA guidance documents should be considered for implementation but only where their implementation is feasible.

The nine minimum controls are essentially EPA's "action now agenda" for CSO control. That is, they are beneficial, appropriate for particular aspects of systems, and able to be safely, economically, and effectively applied early-on in the planning process. The intent of the NMCs is not to eliminate CSOs, but to provide some level of control of CSO discharges while long-term CSO control plans are being developed and implemented. NMCs should not require significant engineering studies or construction and generally should be implementable in a relatively short time frame by proper operation and maintenance of CSO systems. It is the intent of the CSO Control Policy that the NMC measures be compatible with the Long Term Facilities Plan.

The PWD NPDES permits directs the Department to immediately undertake a process to demonstrate implementation of the nine minimum controls. This report is the direct result of that requirement. The remainder of the report is divided into nine sections, one addressing the documentation of each of the Nine Minimum Controls.

Section 1
Minimum Control No. 1
Review of Operation & Regular Maintenance Programs

1.1 INTRODUCTION & REGULATORY CONTEXT

1.1.1 Regulatory Context

Federal and state CSO regulations require the Philadelphia Water Department (PWD) to document its operations and maintenance (O&M) programs for inspecting and maintaining the combined sewer system and its related facilities. These O&M programs and practices must comply with the requirements of PWD's NPDES Permit and the United States Environmental Protection Agency (EPA) National CSO Control Policy's "Nine Minimum Controls". Minimum Control Number 1 states that documentation of proper operation and regular maintenance programs for the sewer system and the combined sewer overflow discharge points must be submitted to the Pennsylvania Department of Environmental Protection (PaDEP).

For the purposes of the National CSO Control policy, a proper operation and maintenance program should include the following elements:

- The organizations and/or people responsible for various aspects of the O&M program
- The human and financial resources allocated to operation and maintenance activities
- Procedures for preparing and approving annual budgets for O&M of the combined sewer system and its related facilities
- Identification and documentation of the facilities that are critical to the performance of the combined sewer system

- Written procedures and schedules for routine, periodic maintenance of major equipment items and/or CSO diversion facilities and written procedures/protocol to assure that regular maintenance is provided

- Written procedures, including procurement procedures (if applicable), for responding to non-routine maintenance and/or emergency situations

- A process for periodic inspections of the facilities that are critical to the performance of the combined sewer system (as identified above)

- Policies, procedures, or protocol for training O&M personnel (new and existing employees)

- Process for periodic review and revision of the O&M program

The objective of this minimum control is to reduce the frequency and magnitude of CSOs by having operating procedures and management practices in place and effectively implemented to enable the existing facilities to perform as optimally as they can and that appropriate records are maintained. The steps involved in implementing this minimum control include the following:

- Define the extent of the existing established O&M program

- Determine whether or not it needs to be improved to satisfy the intent of the CSO policy

- Develop and implement the required improvements to address CSOs

- Document the O&M actions and report them to PaDEP

1.1.2 Organizational Structure of PWD Personnel Responsible for O&M

The Philadelphia Water Department (PWD) has a well established and effective maintenance program that provides inspections, evaluations, cleaning, rehabilitation, and repairs to the various components of the collection system through ongoing and preventative maintenance. Operation and maintenance of the collector system is the responsibility of the Waste and Storm

Water Collection Group. The group is directed by the Chief Water Transport Operations Engineer and is comprised of the following four units. Each unit is directed by a superintendent who reports directly to the Engineer.

- Flow Control Unit
- Sewer Maintenance Unit
- Inlet Cleaning Unit
- Collector System Support Unit

A copy of the organizational chart illustrating the chain-of-command and lines of communication within the Waste and Storm Water Collection Group is provided in Figure 1.1. Descriptions of the organizational structures and the available human resources within the units are provided in report Sections 1.2 through 1.4.

In order to allow for more efficient management of the collection system and its related facilities, the Data Acquisition Group, CSO Chamber Maintenance Group, and Wastewater Pumping Unit were recently merged to form the Flow Control unit. The Flow Control Unit is responsible for the operation, inspection, cleaning, maintenance, and repair of wastewater pumping stations, regulators, tide gates, diversion chambers, siphon valves, and related wastewater control devices. The Unit's area of responsibility covers all waste and storm water pumping stations, combined sewer regulator chambers, tide gate chambers, and diversion chambers within the City. These chambers are located along the Delaware and Schuylkill Rivers and the Pennypack, Frankford, Talcony, and Cobbs Creeks. As a result of the recent merger with Data Acquisition, the Unit is now responsible for the Northeast CSO Control and Monitoring system, wastewater metering chambers, City-wide rain gage network, CCTV inspection equipment maintenance, and the calibration and repair of confined space air monitors.

The Sewer Maintenance unit is charged with the maintenance of the City-wide combined, sanitary, and stormwater systems and their appurtenant structures. Included in this category are all branch, interceptor, and main sewers; the maintenance of inlet laterals, inlets, and manholes; cleaning and repair of drainage ditches and outlets; maintenance of drainage rights-of-way and lands for public use; and CSO outlets. In addition to repairing sewers, much of the unit's work involves cleaning and clearing choked sewers using high pressure jet machines, and rodder machines.

Waste & Stormwater Collector Systems Group

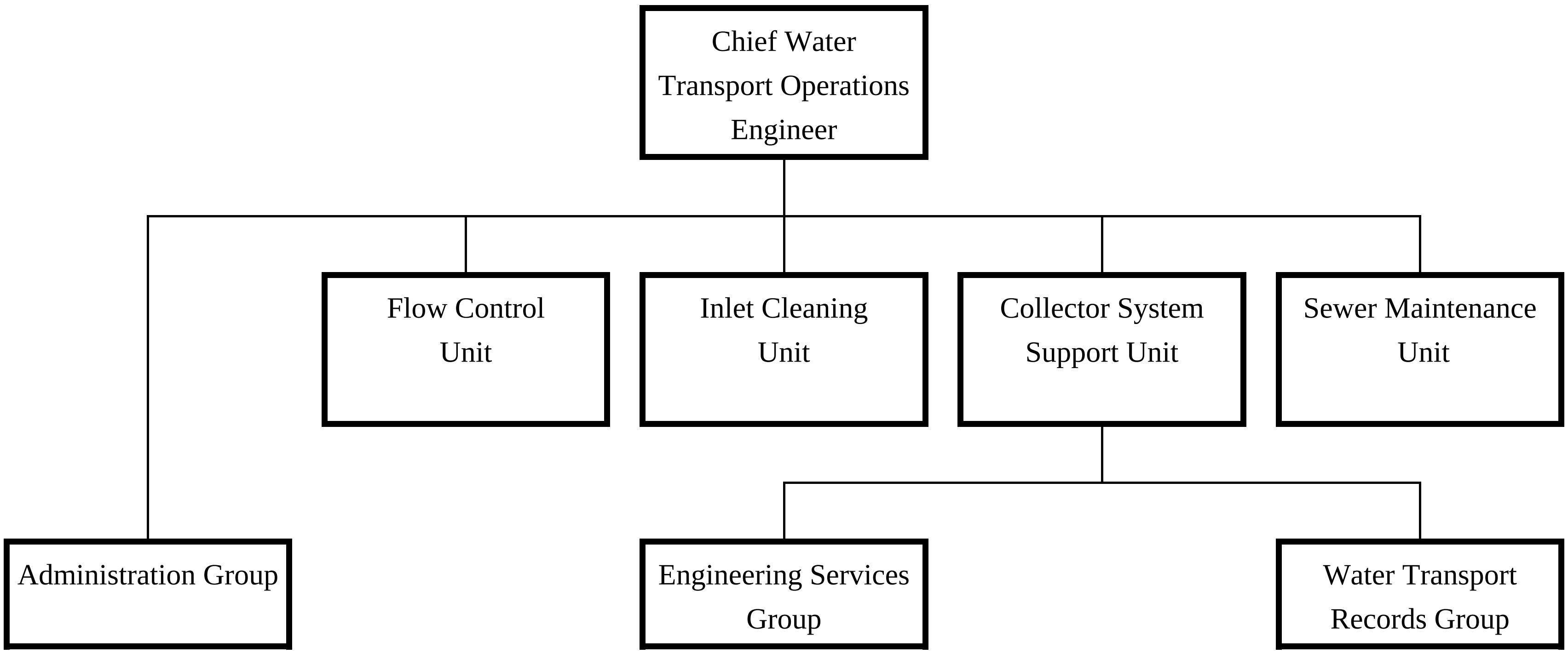


Figure 1.1

The Inlet Cleaning Unit is primarily responsible for the inspection and cleaning of approximately 75,000 storm water inlets within the City. The Unit is also charged with the following additional responsibilities: retrieving and replacing inlet covers, installing original replacement covers, and installing locking covers; unclogging choked inlet traps and outlet piping so that inlets can take water; and alleviating flooded streets and intersections when hydrants are opened during fire-fighting operations.

The Collector System Support Unit is primarily responsible for providing technical expertise to the operating units through engineering evaluations and studies. The Unit works with other departmental units, various city agencies, and federal and state regulatory agencies on projects related to waste and stormwater collection. Collector Support is often requested to conduct engineering studies in order to resolve a problem that may be caused by age-related deterioration, past building practices, or new regulatory mandates. The Unit also conducts hydraulic analyses of the collector system by coordinating field, office, and technical resources.

Operation and maintenance of the headworks and primary treatment facilities at each of the three PWD wastewater treatment plants is provided by treatment plant maintenance personnel. Because many of the O&M procedures performed by treatment plant maintenance personnel are similar to those performed by the collector support personnel, many opportunities exist for the sharing of equipment between the two groups.

1.1.3 Facilities Critical to the Performance of the Combined Sewer System

The organizational structure described above provides for the operation and maintenance of the combined sewer system components that are considered to be "critical" to the performance of the PWD sewer system. These components are documented and described in detail in the *System Inventory and Characterization Report and the Hydraulic Characterization Report* and summarized briefly below.

There are 13 wastewater pump stations that are critical to maintaining collection system flow to the treatment plants. Three additional pump stations introduce storm water flow into the combined sewer system and can affect the wet weather flow characteristics of downstream CSOs.

There are 175 combined sewer regulator chambers in the PWD sewer system with regulator devices that control the diversion of wastewater flow to the interceptor system. These regulator chambers discharge through 168 NPDES permitted point sources. The chambers are critical to the performance of the system in that they control the frequency, duration and quantity of CSO discharges during wet weather.

There are 21 storm relief diversion chambers in the PWD system with relief dams that allow excess flow during storm events to be diverted to storm relief sewers. These storm relief chambers constitute an additional 10 NPDES permitted point sources. The storm relief chambers are critical to the performance of the system in that they prevent the trunk lines from excessive surcharge conditions that could potentially cause basement flooding or discharges from manhole covers.

Tide gates are maintained at approximately half of the CSO regulator chambers in the PWD system that prevent tidal inflow into the combined sewer system from the estuary receiving water body. These gates are critical to the performance of the system because inflow from the receiving water body can adversely affect the combined sewer system and treatment facilities by reducing system capacities.

There are several key interceptor segments that field inspections have shown to be susceptible to the accumulation of solids. These accumulations are monitored and grit periodically removed to prevent an excessive loss of conveyance capacity which could result in increased CSO discharges.

1.1.4 Procedure for Preparing & Approving the Annual Operating Budgets

Background Information: The Water Department was established by Charter with the power and duty to operate, maintain, repair and improve the City's water and wastewater systems. The Charter requires the Water Department to fix and regulate rates and charges for potable water supply and for wastewater treatment service in accordance with standards established by City Council. Such standards must enable the City to realize revenues at least equal to operating expenses and debt service charges on any debt incurred or to be incurred for the water and wastewater systems, and proportionate charges for all services performed for the Water Department by all officers, departments, boards or commissions of the City. The Charter also authorizes the Water Department, with the approval of City Council, to enter into contracts for supplying wastewater treatment service to users outside the limits of the City.

The operations of the Water Department are budgeted for in the Water Fund, which is an enterprise fund of the City. The Water Fund is an accounting convention established pursuant to the Charter for the purpose of accounting for the assets, liabilities, revenues, expenses and rate covenant compliance on a legally enacted basis for the water and wastewater systems.

The Water Department was established by the Charter as one of the City's ten operating departments. As such, the Water Department reports to the Office of the Managing Director. The Water Department relies on other City departments and agencies for support of its operations. Four of these departments receive a direct appropriation from the Water Department's operating budget at the beginning of each fiscal year to fund the support services to be rendered to the Water Department in such fiscal year. These four departments are the Revenue Department (Water Revenue Bureau) for meter reading, billing and collection services; the Law Department for legal services; the Department of Public Property for the rental of office space; and the Office of Fleet management for vehicle acquisition and maintenance.

Thirteen City departments and agencies, including the Revenue Department and the Department of Public Property, provide additional services to the Water Department during the year for which they are paid at the close of each fiscal year. These additional services include purchasing of services, supplies and equipment by the Procurement Department; telephone and other communication services by the Public Property Department; street repairs by the Streets

Department; disbursements and cash management by the Director of Finance; and auditing services by the Office of the City Controller.

Operating Budget: Operating expenses consist of all costs deemed necessary and appropriate for the operation, maintenance, and administration of the water and wastewater systems during each year, including interdepartmental charges. Operating expenses include personal services, purchased services including power, materials and supplies, equipment, fringe benefits, and indemnities.

The Water Department's finance division performs an analysis of the previous year's budget and compares it to actual expenditures. A breakdown by functional unit and object class within each unit is then used to adjust the proposed fiscal year's base budget items to reflect actual expenses incurred. Projections of human resource budget items are performed to reflect wage adjustments occurring through negotiated labor agreements. Purchased services, materials and supplies, and equipment expenditures are also expected to increase at 4 percent annually from the adjusted 1996 budgeted expenditures.

The fiscal year of the City is defined by the period from July 1 through June 30. Budget preparation activities typically commence in the fall to allow sufficient time for the review and approval process. Each of the three superintendents (Flow Control, Sewer Maintenance, and Inlet Cleaning Units) are responsible for the preparation of the annual operating budget for their respective unit. The superintendents first review the base budget prepared by Finance, to confirm accuracy and completeness. The superintendents then consult their front line supervisors to determine the specific labor and equipment needs and any new maintenance programs that would need funding through an increase package. The superintendents submit their completed annual operating budgets to the Chief Water Transport Operations Engineer who reviews them and makes any required revisions. The finalized draft annual operating budgets are then submitted to the Deputy Water Divisional Commissioner for review, revision, and approval.

The Charter requires City Council to adopt a balanced operating budget for the fiscal year on or before May 31 of each year. The Mayor has traditionally presented his operating budget proposal to City Council on or about March 31 of each year but has presented the operating budget in January in each of the last three fiscal years. The Mayor's operating budget is developed from proposed budgets submitted by the various departments of the City, including the Water Department. The Water Department typically begins preparation of its proposed operating budget in the fall of each fiscal year when all divisions were supplied with documentation to complete and return to the Finance Division reflecting their budgetary requests for the next fiscal year. For example, budget preparations for the Fiscal Year 1996 budget would begin in October 1994. The Water Department has developed and installed a computerized budgeting system to enable each division to prepare budget requests based on historical and current operating experience. Divisional budget proposals setting forth estimated obligations from the ensuing fiscal year and are submitted to the Finance Division by November of each year. Revenue estimates are prepared by the Water Revenue Bureau under the direction of the City's Finance Department and the Water Department. The Water Commissioner reviews all divisional budget proposals and the Water Revenue Bureau's budget with the assistance of the finance Divisions and submits the Water Department's proposed budget to the City's Budget Bureau and the City's Managing Director in early January. The Mayor approves the Water Department's Operating Budget and incorporates it into his proposed budget to City Council in the latter part of January. City Council typically adopts the fiscal year budget by March.

The fiscal year 1995 budget for the Waste and Storm Water Collection Group is summarized in Table 1.1 below.

Table 1.1

Budget Category	Sewer Maintenance Unit	Inlet Cleaning Unit	Flow Control Unit	Collection System Support	Total
Personnel	$5,200,000	$2,857,000	$1,713,000	$1,001,000	$10,771,000
Service Contracts, Parts, & Equipment	$900,000	$1,397,000	$1,665,000	$1,787,000	$5,749,000
Total Budget	$6,100,000	$4,254,000	$3,378,000	$2,788,000	$16,520,000

1.1.5 Overview of Documentation & Record Keeping

The PWD's NPDES permit and the National CSO Control Policy's *Nine Minimum Controls* require that complete and consistent record keeping and procedures for report development and archiving are properly developed. A series of field reports and managerial summary reports have been developed, implemented, and archived by PWD personnel. The intent and purpose for the documentation is summarized below:

■Document observed conditions and maintenance activities performed in the field;

■Summarize and monitor key operational parameters of the system;

■Supervise annual preventative maintenance schedules, chart maintenance progress; and

■Prepare required monthly and annual reports for regulatory agency review.

The report narrative will briefly describe the various reports that are used by PWD field and managerial personnel. The descriptions include the name of the report, the person(s) who complete(s) the report, the information contained within the report, and how the report is used. For clarity the report description summaries have been grouped by the operational units that use the reports.

1.1.6 Training of New & Existing Employees

A formal training program for all collector system personnel was developed and administered by the Training and Development Unit of the PWD. Specific training programs have been developed for each department and position and consist of lectures, demonstrations, videos, practical exercises, and hands-on experience. Lead worker positions on the maintenance crews are available only after years of on the job training in a particular trade field. Training for the subordinate worker positions is provided according to the employees job specialty and level of experience. An orientation video is available for new employees. PWD training programs insure that personnel responsible for O&M activities are properly trained by a systematic and ongoing education program. Education programs typically include the following four elements:

■Informal Training

■Formal Training
■Specific Equipment Training
■Safety Training

A summary of available training programs and materials is provided in Appendix A-1. Brief descriptions of the four education program elements are provided below.

Informal Training: The group leaders within each department are responsible for deciding individual needs and providing training to broaden workers' knowledge in their field. Training sessions are scheduled on a bi-monthly basis and typically include videos from the Department's library of over 250 instructional videos.

Formal Training: The PWD Training and Development Unit provides employees with formal training according to their job specialties and level of experience. The courses attended are determined by the worker's immediate supervisor and are geared toward the employee's particular specialty.

Specific Equipment Training: In addition to generic trades training, employees receive specific maintenance training on how to properly service the specific equipment they use in performing their jobs.

Safety Training: The PWD Safety Office provides annual safety training classes in confined space entry and awareness, first aid, and CPR to assure that proper confined space entry procedures are understood and followed by all field personnel who made manhole entries. In addition, topics such as safe lifting practices, chemical handling, and eye protection are presented approximately four times a year.

1.2 FLOW CONTROL UNIT

1.2.1 Organizational Structure & Human Resources

The Flow Control Unit has been delegated the primary responsibility for operating and maintaining the CSO elements of the PWD system. The unit is headed by the Flow Control Superintendent and is divided into three operational groups; the CSO Maintenance Group, Wastewater Pumping Station Maintenance Group, and the CSO Instrumentation Group. Each group is headed by a front line supervisor (supervisor, crew chief, and/or group leader) who reports directly to the superintendent. The primary lines of communication for all CSO maintenance activities occurs between the Flow Control Superintendent and the front line supervisors within the three groups. These supervisors have been delegated the responsibility and authority to produce the daily work schedules for the crews, oversee implementation quality, and insure that adequate documentation has been prepared and submitted to the superintendent. A copy of the organizational chart illustrating the chain-of-command and lines of communication within the Flow Control Unit is provided in Figures 1.2 and 1.3.

The CSO Maintenance Group is responsible for the combined sewer regulator chambers, storm relief diversion chambers, and back-water gates at CSO outfalls within the PWD system. The CSO Maintenance Group is presently funded for a work force of 23 people. The group is supervised and managed by two Interceptor Supervisors who report directly to the Flow Control Unit Superintendent. The work force is organized into seven crews, each comprised of three people; typically a Senior Interceptor Service Worker, an Interceptor Service Worker, and a Semi-Skilled Laborer. The Senior Interceptor Service Worker acts as the crew leader receiving the daily assignment sheet; directing the activities of the crew; inspecting the crew truck to insure that required tools, protective clothing, and safety equipment are accounted for; and preparing written inspection reports. Six of the seven crew leaders are assigned a specific district area to maintain which has helped the crews to develop a strong familiarity with the locations of the CSO control structures in their district area, special site-specific maintenance requirements, and specific problem areas needing special attention. The seventh crew leader is responsible for running the vactor equipment. When the vactor equipment is not in use, the vactor crew members assist the other six crews or are assigned to visual inspections.

The Wastewater Pumping Station Maintenance Group is responsible for maintaining the 13 wastewater pump stations and three additional stormwater pump stations along the PWD collection system. The pump station group is presently funded for a work force of 19 people. The group is jointly supervised and managed by a Process Machinery Group Leader, an Instrument Crew Chief and an Electrical Group Leader who report directly to the Flow Control Unit Superintendent. Rather than forming fixed operating teams, the workers are assigned specific tasks and grouped into crews on a daily basis by the group leaders based upon specific maintenance needs. This organizational arrangement makes the group flexible and adaptable to changing maintenance needs. The group is comprised of industrial process machinery mechanics, machinery and equipment mechanics, electricians, instrument technicians, and laborers so that all technical disciplines required to maintain the pump stations are represented.

The CSO Instrumentation Group is responsible for maintaining and calibrating the automated monitoring and control equipment installed along the PWD system. The group is comprised of electronic technicians and instrument technicians. The instrumentation group is presently funded for a work force of ten people. The group is jointly supervised and managed by an Electronic Equipment Crew chief and an Instrument Service Crew Chief who report directly to the Flow Control Unit Superintendent. Like the pump station group, the workers are assigned specific tasks and grouped into teams on a daily basis by the crew chiefs. This makes the group flexible and adaptable to specific maintenance needs from day to day.

Flow Control Unit

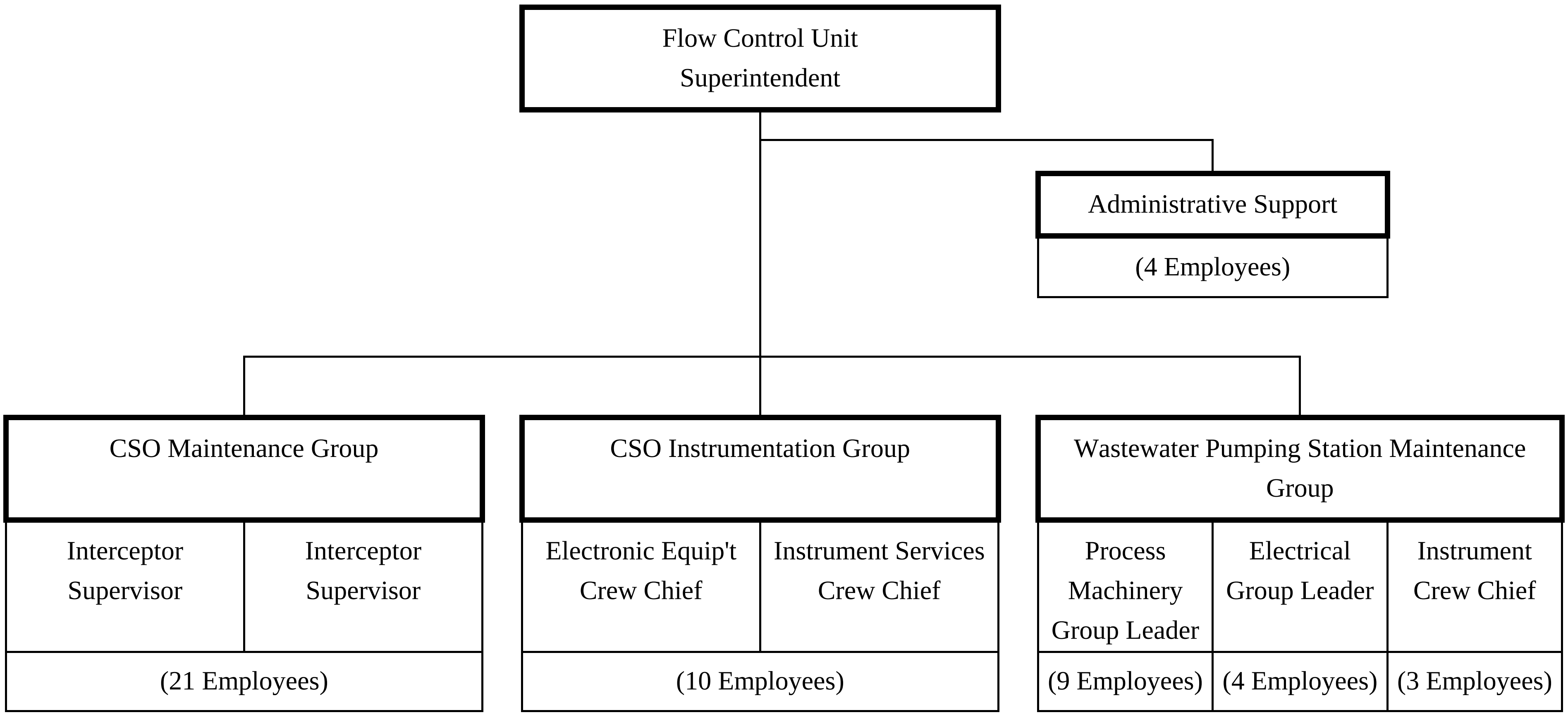


Figure 1.2

Flow Control Unit

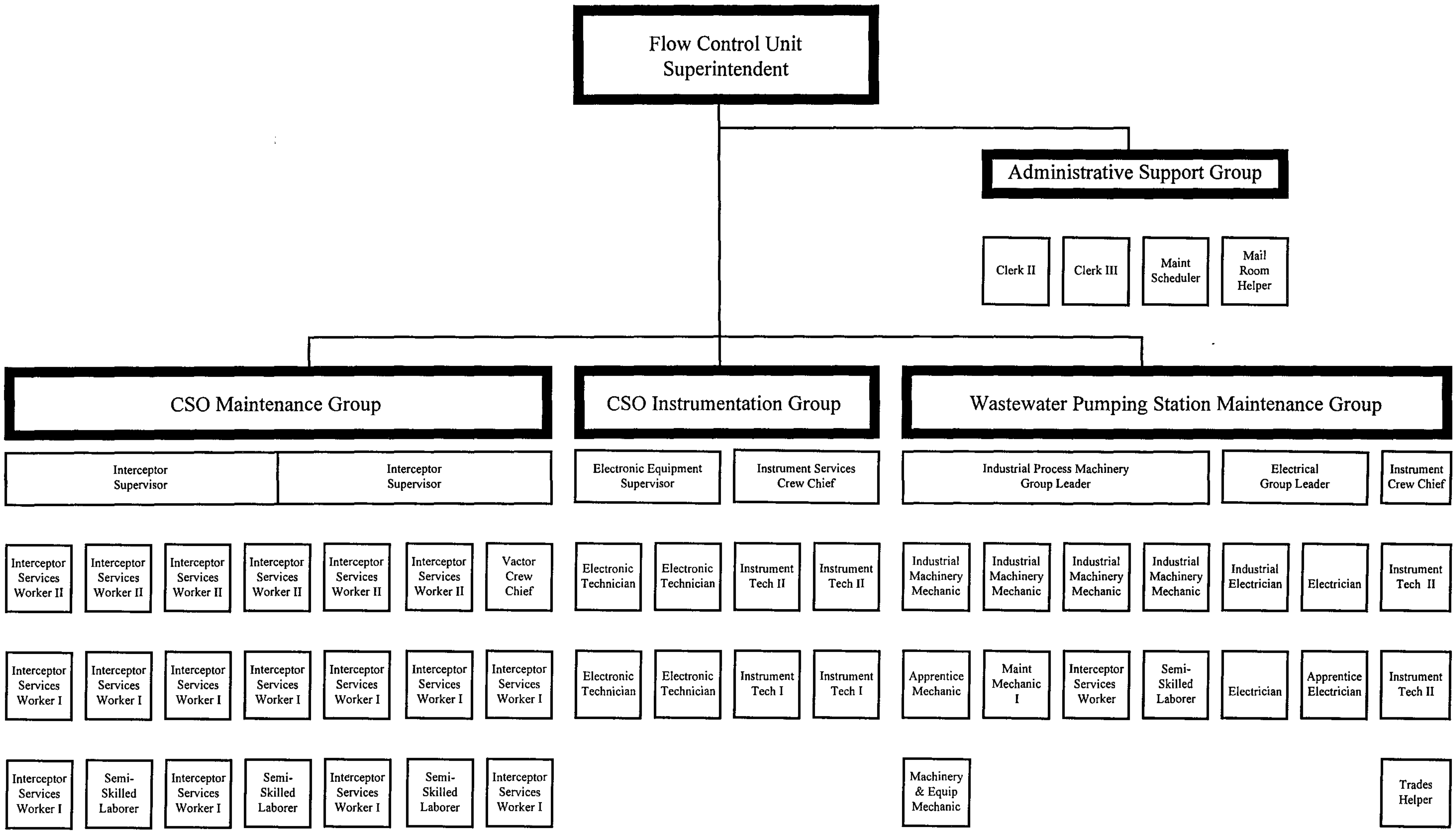


Figure 1-3

1.2.2 Operating and Equipment Funding and Resources

The fiscal year of the PWD is defined by the period from July 1 through June 30. Budget preparation activities typically commence in the fall to allow sufficient time for the review approval process as discussed in detail in Section 1.1.4. The Superintendent is responsible for the preparation of the annual budget for the Flow Control Unit. The Superintendent consults the front line supervisors to determine the specific labor and equipment needs or any special maintenance projects that would need funding. The superintendent submits the completed annual budget to the Chief Water Transport Operations Engineer who reviews the draft, makes any required revisions, and obtains required approvals.

The fiscal year 1995 budget for the Flow Control Unit is summarized in Table 1.2 below.

Table 1.2

Budget Category	Personnel	Service Contracts, Parts, & Equipment	Total
Total Budget	$1,713,000	$1,665,000	$3,378,000

Equipment that is available to Flow Control Unit personnel for use in their O&M responsibilities is summarized briefly in Table 1.3 below.

Table 1.3

Equipment Inventory Summary Flow Control Unit			
Quantity	Equipment Item	Manufacturer	Model
1	Vactor Unit	Ford	Unspecified (1)
7	Utility Truck	International Ford Ford	Varies (5) E 350 (1) F350 (1)
4	Transportation Truck	Chevy Chevy Ford	Blazer (1) Suburban (1) Explorer (2)

1.2.3 Procedure & Schedules for O&M, CSO Maintenance Group

The duties of the CSO Maintenance Group are divided into the following activity categories conducted at each of the CSO regulator chambers and storm relief diversion chambers within the crews' assigned district areas:

- Conduct brief visual inspections at frequent intervals

- Conduct detailed chamber inspections and maintenance as assigned daily by the supervisors

- Perform routine preventative maintenance on chamber equipment

- Perform comprehensive maintenance and repair on CSO control equipment

- Remove accumulations and debris from the chamber regulators and gates as required

The primary vehicle for preventing dry weather CSOs in the PWD system is the extensive maintenance program to inspect and service the combined sewer regulator chambers, storm relief diversion chambers, and tide gates. During or after a significant storm, one of the maintenance crews and/or the vactor crew is scheduled to conduct visual inspections of targeted sites. The other crews are directed to the high priority areas within their assigned sewer districts. The priority areas are determined by the supervisors and lead crew workers either from automated monitor information, visual inspections, or historical experience. It typically takes several days to complete the cycle of post-storm inspection activities at all the chambers and gates. All routine maintenance problems, such as obstructions caused by debris build-up, are corrected by the maintenance crews as they are discovered. Any atypical maintenance situations encountered are documented in a Maintenance Request Report which is submitted to the supervisors. Corrections are then scheduled accordingly. The CSO Chamber Maintenance Group performs approximately 10,000 site inspections per year. Historical records indicate that most blockages are cleared within two hours of their being detected.

In the Northeast Sewer District, problem areas are detected by automated depth monitors and by visual inspections conducted after every significant storm or snow-melt event. The field monitors are interrogated daily via by the central computer. The data is processed through computer software and corresponding graphical summaries are then forwarded to the Interceptor Supervisors who prepare the daily work schedules for the Northeast Drainage District maintenance crews. The supervisors review the graphical summaries and pass them on to the corresponding lead crew worker. The supervisors and lead crew workers look for any unusual flow conditions that would indicate the presence of a maintenance problem.

During extended dry weather periods, after storm-induced maintenance requirements have been completed, the monthly cycles of preventive maintenance activities are continued. Detailed chamber inspections are assigned daily by the supervisors. The inspections include exercising the control gates and back-water gates, inspecting the slot regulators for obstructions, checking for equipment malfunctions, lubricating control devices, and other routine maintenance measures. Any observed debris, sediment accumulations, or obstructions are broken up and removed, and any required equipment repairs or replacements are made. Computer-produced reports and spread-sheets are used to track preventative maintenance activities and to guide managers in the production of daily work schedules. All combined sewer regulator chambers and tide gates in the PWD system are visually inspected at least four to five times per month. Based upon previous field experience, selected chambers are inspected more frequently. More intensive and thorough preventive maintenance inspections are conducted on an annual schedule.

Comprehensive maintenance measures consist of a thorough scope of work performed on the regulating chamber equipment. The work includes measuring the equipment settings and making the necessary adjustments to bring the equipment into the manufacturer's specifications. The control equipment units are cleaned, lubricated, and exercised, and all equipment conditions are noted on inspection reports. Parts are inspected and replaced when they show signs of wear.

A specialized vactor truck crew is reserved for maintaining the CSO structures. When chamber inspections reveal a problem, the vactor crew and equipment are used to clean grease and sediment accumulations from interceptor lines, CSO controls, and back-water gates and to clear debris accumulations from regulator chamber walls and floors. In addition, the crews are used to assist the pumping station group in cleaning screenings and debris from grates in siphons and pump stations, and providing grease removal for the pump stations.

The CSO Maintenance Group also has other specialized responsibilities such as monitoring grit levels at certain combined sewer locations. For example, the Somerset Interceptor grit chamber is cleaned on a regular basis at four month intervals. Similarly, the group performs specialized maintenance activities at the Central Schuylkill Pump Station. Crews inspect and clean the bar screens at the upstream side of the inverted siphon, remove grit from the siphon grit pockets, and remove any other observed debris accumulation.

1.2.4 Procedures & Schedules for O&M, Wastewater Pumping Station Maintenance Group

The preventative maintenance program is the primary vehicle for ensuring the uninterrupted conveyance of wastewater at each of the PWD pump stations. This responsibility has been assigned to the Wastewater Pumping Station Maintenance Group. The duties of the group are divided into the following general classifications of O&M activities conducted at each of the pump stations along the PWD interceptor system:

- Routine preventive maintenance to the mechanical and electrical equipment

- Complete overhauls of mechanical and electrical equipment

- Special investigations and reports for predictive maintenance

Pump station problems are detected by remote sensors/alarm monitors which are interrogated daily via modem by the Maintenance scheduler. A remotely sensed alarm condition automatically produces a warning sheet that is transmitted directly to the supervisors for remedial action. The supervisors look for any unusual conditions that would indicate the presence of a maintenance problem. The Mechanical Group Leader schedules the daily activities of the equipment mechanics, the Electrical Group Leader prepares the daily schedules for the electricians, and the instrument technicians are directed by the Instrument Crew Chief.

Corrective maintenance activities are rarely required because of the effectiveness of the preventative maintenance program in preventing pump station equipment failures and service disruptions. Reactive maintenance comprises approximately nine percent of all pump station maintenance activities while preventive maintenance represents approximately 91 percent of the total pump station maintenance effort. Any electrical or mechanical equipment problems detected by the automated remote sensors/alarm monitors are promptly scheduled to be remedied by the appropriate maintenance crew. Special visual inspections are scheduled only during extreme storm events as a precautionary measure.

The preventive maintenance program is scheduled and performed in a series of monthly and annual cycles. The various work activities are assigned daily by the group managers. Computer-produced reports and spreadsheets are used to track preventative maintenance activities and guide managers in the production of daily work schedules. Routine preventative maintenance on mechanical equipment is scheduled and conducted on a monthly basis. Preventative maintenance on electrical equipment and pump station instruments is scheduled and conducted on a bi-monthly basis. All routine maintenance problems are corrected by the maintenance crews as they are discovered. Any serious or unusual maintenance problems are documented in a Maintenance Request Report which is submitted to the group managers and the required corrections are scheduled accordingly. The mechanical and electrical equipment in each of the pump units are completely overhauled on a rotating schedule. Goals are established to complete these equipment overhauls at a rate of ten pump units in a year. This goal has been met nine of the past ten years. The system-wide average frequency of equipment overhauls for any individual wastewater pump unit is approximately 2.8 years.

Routine preventive maintenance activities for the pump station mechanical equipment include inspections of the pumps, valves, buildings and grounds, and lubrication of motors and bearings. Daily maintenance activities include cleaning the bar screens and rakes and hosing down the sumps and stations. Preventive maintenance activities for the electrical equipment include inspecting and cleaning all panels and cubicals, and diagnostic tests such as motor current measurements, battery voltage and specific gravity measurements, and phase voltage readings. Infrared hot spot measurements are also taken. These measurements and readings are recorded on separate forms and submitted to the Flow Control Superintendent. Activities for preventive maintenance and calibration of the instruments include inspection and cleaning of the level and flow monitoring equipment, switches, and relays; checking the compressors and air hoses for the bubbler system; and verifying/adjusting the calibration coefficients for the monitored depths and flows.

Activities for overhauling the mechanical equipment include disassembling the pumps and carefully inspecting all the component parts (such as casing, shaft, impeller, gaskets, packing, bearings, etc.). Any worn or damaged parts are re-machined or replaced. Similarly, the valves, couplings, and seal rings are also thoroughly inspected and repaired/ replaced as required. Activities for overhauling the electrical equipment include a thorough inspection of the electrical motors used to run the pumps, compressors, and valves for worn or damaged parts. Worn bearings and brushes are replaced and electrical switchgears, relays, frequency drives, and transformers are checked.

Activities for special investigations and predictive maintenance include sampling and testing the oil filled transformers every three years to determine when oil filtering or changing is required or if replacement of the entire transformer would be necessary. All medium to large pump stations are scheduled for infrared thermography on a three year cycle. These tests compliment the Bi-monthly infrared hot spot tests performed during preventative maintenance and go to greater detail. All pumps and motors are checked twice per year with a vibration meter. The intent is to track the long-term trends in vibration history and better predict when maintenance is required. Twice per year the instrument technicians test the pumps in order to verify that they are performing at their rated flow capacity. These tests are conducted in addition to the flow tests done in conjunction with equipment overhauls. Flow is determined using the well draw-down/time/inflow calculation which is the most accurate method for measuring pump capacity .

1.2.5 Procedures & Schedules for O&M, CSO Instrumentation Group

The CSO Instrumentation Group is responsible for maintaining and calibrating the automated monitoring and control equipment installed along the PWD system. This equipment includes the depth monitors installed at the CSO sites in the Northeast sewer district and the computer controlled CSO diversion and sluice gates. The duties of this group are divided into the following general descriptions of O&M activities conducted for the automated monitoring and control equipment:

- Perform on-site maintenance and repairs to equipment

- Perform bench-work maintenance, repairs, and calibrations of equipment

- Perform on-site calibration of monitoring equipment

- Install, maintain, and interrogate temporary level and flow monitors

The data for the monitored CSO sites is downloaded on a daily basis. Any problems with the monitoring or control equipment is usually detected during the interpretation of the daily data by the Instrument Services Crew Chief. In addition, warning sheets are produced by the central computer that detect inconsistencies with typical data acquisition parameters. Report summaries are produced and forwarded to the Electronic Equipment Crew Chief. Repair or recalibration of any anomalous data collection devices are then scheduled accordingly.

The Electronic Equipment Crew Chief schedules the daily activities of the electronic technicians and the Instrument Services Crew Chief directs the activities of the instrument technicians. Computer-produced reports and spread-sheets are used to track preventative maintenance activities and guide managers in the production of daily work schedules. Corrective maintenance and repairs are scheduled and conducted on an "as-needed " basis as equipment problems are discovered. Preventative maintenance and equipment calibrations are conducted on a periodic schedule. Monitoring equipment is inspected and calibration coefficients are checked and adjusted on a regular basis to insure it performs to the manufacturer's specifications.

On-site maintenance and repairs are required to support the flow monitors, level sensors, rain gages, and the associated telemetry devices that relay the field data to the central computer. Debris, solids, oils, and grease can accumulate on the sensors and are removed on a regular basis during the routine calibrations. In addition, loose connections are tightened, and corroded contact points are cleaned.

When a required repair cannot be implemented in the field, the equipment is replaced and the damaged equipment is returned to the instrument maintenance shop where specialized diagnostic equipment and tools are available for bench-work repair and maintenance. This equipment includes scopes and signal generators, digital and analog multimeters, current loop generators, and pneumatic calibrators. Once repaired, the instruments are thoroughly cleaned, inspected, and tested to insure that they will perform to the manufacturer's specifications.

All monitoring equipment is field tested and calibrated on a regular basis to insure that it remains in correct calibration. Flow depths are field measured to calibrate the pressure transducers and temporary test jigs are set up to calibrate the ultrasonic sensors. These field measurements are used to calculate the corresponding calibration coefficients and required adjustments are made.

The PWD maintains an inventory of level only and level/velocity monitors that are temporarily installed for special studies an investigations. The CSO Instrumentation Group installs, maintains, and interrogates the temporary monitors for the duration of the investigation.

1.2.6 Procedures for Responding to Emergencies

The Flow Control unit is responsible for addressing emergency situations associated with the CSO regulators, pump stations, and control equipment. One of the four front line supervisors are on call on a rotating basis. Similarly, one of the two first line supervisors from the CSO

Instrumentation Group is also on call on a rotating basis. The computer controlled chamber equipment automatically sends out a alarm in the event of equipment failure. The alarm triggers an automated beeper/pager message to the supervisor who is on call. Anomalies (e.i. dry weather discharges) reported by citizens would be relayed through the City's emergency desk to the supervisor on call.

Similarly, the automated pump station equipment also sends out an alarm and triggers an automated beeper/pager message should a pump station fail. Most pump station failures are presently caused by power outages. The automated alarm/pager system allows the on call supervisor to notify the electric utility (PECO) within 3 minutes of a power failure so that PECO crews may be dispatched to restore service. Currently, five of the thirteen wastewater pump stations are equipped with dual sources of power to provide emergency electrical service in the event of a power failure. A project is presently in the design stage to install emergency back up power generators at the eight wastewater pump stations that are presently single source. This project is scheduled to be bid by January 1996 and should eliminate most of the pump station emergencies currently experienced. In 1994 for example, 95 percent of the pump station down time hours and 95 percent of the pump station overflow volume was caused by fourteen power outages. Only five percent of the down time and overflow volume was caused by mechanical equipment failures.

To supplement the capabilities of the in-house crews, the PWD has pump station electrical and mechanical equipment maintenance contracts in place with a 24 hour response requirement for emergency pump station maintenance. These maintenance contracts would be exercised should emergency maintenance needs ever exceed the in-house capabilities of the PWD Wastewater Pumping Station Maintenance Group. In addition, the PWD has contracts to maintain an inventory of replacement parts and maintain performance certifications on the control gates. The contract also provides emergency repair services should emergency maintenance situations ever exceed the capability of the CSO Chamber Maintenance Group.

The Flow Control Superintendent may authorize expenditures up to $500 in petty cash funds in the event of an emergency maintenance situation. For emergency expenditures that are not included in the approved annual budget, the supervisor would submit an emergency order to the Chief Water Transport Operations Engineer of the Waste and Stormwater Collector Systems Section. The chief operations engineer would be responsible for getting the necessary approvals.

1.2.7 Documentation and Record Keeping, CSO Maintenance Group

The following reports have been developed for and are utilized by field personnel in the CSO Chamber Maintenance (CSO-CM) Group. Copies of typical examples of these reports are provided in Appendix A-2, Section I-A.

■Somerset Grit Chamber Debris Removal Report

Prepared by:Lead worker in the CSO Chamber Maintenance Crew

Reviewed by:Superintendent of Flow Control

Purpose:Used to keep track of the rate of grit buildup, removal dates, and quantities at the Somerset grit chamber. Ensures that the grit is being monitored and removed according to a four month schedule.

■CSO Regulator PM / Inspection Report

Prepared by:Lead worker on the CSO Chamber Maintenance crew

Reviewed by:Supervisors and Superintendent of Flow Control

Purpose:Documents the conditions and settings for each type of regulator. It is used to ensure that proper regulator settings are maintained and that system changes are documented. The report also documents the preventative maintenance which is performed on a yearly basis. A customized report for each individual regulator structure is presently being developed.

■Tide Gate Preventative Maintenance Report

Prepared by:Lead worker on the CSO Chamber Maintenance crew

Reviewed by:Supervisors and Superintendent of Flow Control

Purpose:To document the conditions of the tide gates and surrounding structures at the CSO sites. Preventative maintenance is scheduled at each tide gate once a year.

■Outfall Connection Inspection Record

Prepared by:Lead worker on the CSO Chamber Maintenance crew

Reviewed by:Flow Control Superintendent and Manager of Collector System

Purpose:To document the type, size and location of all connections in the outfalls at all CSO locations. Also noted if the connections are active in dry weather and if it appears to be discharging sewage. Samples are taken and analyzed if sewage is suspect.

■CSO Dry Weather Discharge Report

Prepared by:Lead worker on the CSO chamber maintenance crew

Reviewed by:Flow Control Supervisors and Collector System Support Personnel

Purpose:To document all occasions of dry weather discharges observed by the CSO maintenance crews. The cause, time and duration is recorded and it elicits suggestions from the front line workers for the prevention of similar occurrences.

■Flow Control Daily Work Report (used by all Flow Control Unit groups)

Prepared by:Lead workers in each CSO Chamber Maintenance crew

Reviewed by:The maintenance scheduler who keys the information into the database

Purpose:To maintain a current computerized record of all CSO maintenance performed at each of the Flow Control sites.

■Daily Work Sheet Database Entry Listing (used by all Flow Control Unit groups)

Prepared by:Lead workers in each CSO Maintenance crew to assign codes to the Daily Work Sheets

Reviewed by:The lead workers who assign the codes to Daily Work Sheets

Purpose:To ensure that proper site and job codes are recorded on the forms which insures the completeness and accuracy of the data base information.

The following reports have been developed for and are utilized by the Flow Control Unit Superintendent to summarize and chart CSO Maintenance Group progress. Copies of example reports are included in Appendix A-2, Section II-A.

■CSO Monthly Inspection / Discharge / PM Report

Prepared by:Flow Control Supervisors in the CSO Chamber Maintenance Group

Reviewed by:Flow Control Superintendent

Purpose:Tallies the number of site inspections for the month and the chambers that received preventative maintenance. The report totals the inspections from the workers' daily work sheets. It is then used to compile the Regulating Chamber Monthly Inspection Totals Report.

■Regulating Chamber Monthly Inspection Totals

Prepared by:Flow Control Superintendent

Reviewed by:Manager of Collector System and Collector System Support Personnel

Purpose:To track CSO site inspections and discharges by location for the fiscal year. It is used to track patterns of discharges as well as ensuring that adequate inspection frequency in maintained fore all CSO sites.

■CSO Inspections 1989 to 1995 Totals

Prepared by:Flow Control Superintendent

Reviewed by:Manager of Collector System and Collector System Support Personnel

Purpose:To track CSO site inspections and discharges by collector system, for the past eight fiscal years. It is used to compare inspection and discharge frequencies over a period of time. It is a key indicator of the effectiveness of the CSO chamber maintenance program.

■Annual Report Blockages / Inspection Trend Report

Prepared by:Superintendent of Flow Control

Reviewed by:Superintendent and other managers

Purpose:To trend the number of CSO inspections, blockages corrected before a discharge developed and the number of actual discharges observed. It is useful to quickly compare current activities to previous years performance.

■Collector System CSO Alterations Record

Prepared by:Superintendent of Flow Control

Reviewed by:CSO Program Coordinator and Manager of Collector System

Purpose:To document the date and reason for any modifications made to the collector system or CSO control structures by Flow Control personnel.

■Monthly CSO Status Report

Prepared by:Dry Weather Status Report (Part 1) completed by Flow Control Unit Superintendent. Wet Weather Status Report (Part 2) completed by Collection System Support Group. Together they make the monthly CSO Status Report submitted to PaDEP and EPA Region III.

Reviewed by:CSO Program Coordinator, Manager of Collector System, PaDEP, and EPA.

Purpose:Documents the date, time, duration, and location of known CSO discharges as well as the associated rainfall and cause of the discharge. Used to meet NPDES permit requirement to submit monthly reports of CSO discharges to PaDEP and EPA Region III.

1.2.8 Documentation and Record Keeping, Pumping Station Maintenance Group

The following reports have been developed for and are utilized by field personnel in the Pumping Station Maintenance Group. Copies of typical examples of these reports are provided in Appendix A-2, Section I-B.

■Station Outage / Discharge Report

Prepared by:Lead worker assigned to correct pump station problem

Reviewed by:Flow Control Superintendent

Purpose:To document any occurrence of a pumping station outage and/or discharge. The report records the date and time the station went out of service, the time and duration of a discharge if applicable, as well as the reason for the outage. It is used to develop the report to the DEP for any dry weather discharges from the pumping stations.

■Wastewater Pumping Maintenance Request

Prepared by:Lead workers and supervisors in WWP Maintenance Group

Reviewed by:Maintenance Scheduler, Supervisors and Superintendent

Purpose:Initiates a maintenance request to appropriate trades workers from the pump station monitor interrogations or conditions observed during routine station inspections.

■Instrumentation Monthly Preventative Maintenance Report

Prepared by:Lead worker in the Instrument Crew

Reviewed by:Instrument Supervisor and Superintendent

Purpose:To ensure that all pumping station controls are serviced and calibrated bi-monthly.

■Vibration History Report

Prepared by:Lead worker in the Instrument Crew

Reviewed by:Instrument Supervisor and Superintendent

Purpose:To monitor the vibration of the rotating machinery twice per year or whenever a pump is placed back in service after an overhaul. This report, along with others, is a preliminary step in developing the predictive maintenance program.

■Pump Flow Timings Record

Prepared by:Instrumentation Lead Worker

Reviewed by:Supervisors and Superintendent

Purpose:To accurately measure the pump capacity twice per year and after a pump overhaul. This ensures that the pumps are operating at their rated capacity. it is used to schedule pump overhauls, determining suction problems (girt in wells) and calculate the station flow reports.

■Pump Overhaul Report

Prepared by: Lead mechanic performing the equipment overhaul.

Reviewed by:Flow Control Superintendent and Supervisors

Purpose:Documents the pump conditions found during overhaul and replacement parts. used.

■Motor Overhaul Report

Prepared by:Lead Industrial Electrician performing the equipment overhaul

Reviewed by:Flow Control Superintendent and Supervisors

Purpose:To document the motor conditions found during overhaul and replacement parts used.

■Pump Station Monthly Mechanical Preventative Maintenance Report

Prepared by :Lead mechanic assigned to job.

Reviewed by:Flow Control Mechanical Group Leader

Purpose:To document the work performed and conditions found while performing the station maintenance. Station mechanical equipment is scheduled for preventative maintenance once per month.

■Pump Station Monthly Electrical Preventative Maintenance Report

Prepared by:Lead Industrial Electrician performing work

Reviewed by:Industrial Electrician Group Leader

Purpose:To document the condition and work performed on a monthly electrical PM. The amperage and infrared readings are part of the performance factors used in the Predictive Maintenance Program being developed.

■Central Schuylkill Pump Station Daily Station Record

Prepared by:Central Schuylkill Pump Station Operators

Reviewed by:Flow Control Supervisors and Superintendent

Purpose:To document the pumps that are running, station flows, monitor readings, gate positions, and sewer levels. The automatic control log is used to document the activities associated with the new automatic control systems.

■Flow Control Daily Work Report (used by all Flow Control Unit groups)

Prepared by:Lead workers in each Pump Station Maintenance crew

Reviewed by:The maintenance scheduler who keys the information into the database

Purpose:To maintain a current computerized record of all CSO maintenance performed at each of the pump stations

■Daily Work Sheet Database Entry Listing (used by all Flow Control Unit groups)

Prepared by:Lead workers in each Pump Station Maintenance crew to assign codes to the Daily Work Sheets

Reviewed by:The lead workers who assign the codes to Daily Work Sheets

Purpose:To ensure that proper site and job codes are recorded on the forms which insures the completeness and accuracy of the data base information.

The following reports have been developed for and are utilized by the Flow Control Unit Supervisor to summarize and chart key operational parameters and Wastewater Pumping Station Maintenance Group progress. Copies of example reports are included in Appendix A-2, Section II-B.

■Dry Weather Discharge Report (Pump Stations)

Prepared by:Superintendent of Flow Control

Reviewed by:Pa Department of Environmental Protection

Purpose:To report on any occurrences of dry weather discharges from the pumping stations.

■Station Outage and Dry Weather Discharge Record

Prepared by:Superintendent of Flow Control

Reviewed by:Manager of Collector System and Collector System Support Personnel

Purpose:To keep track of pump station outages and dry weather discharges. This report was useful in determining the need for a backup power source due to the frequency of discharges due to loss of power at the stations.

■Pump Station Control Level Settings Report

Prepared by:Superintendent of Flow Control

Reviewed by:Instrumentation Crew Chief

Purpose:To ensure that proper operating levels are maintained.

■Monthly Pump Run Time Readings

Prepared by:Maintenance Scheduler

Reviewed by:Supervisors

Purpose:Tracks the run time hours on the main pump units. It is used to determine the pump overhaul schedule and to calculate the station flows for the monthly reports.

■Year-to-Date Run Time Report

Prepared by:Superintendent of Flow Control

Reviewed by:Superintendent of Flow Control

Purpose:To track changing patterns in pump hours over the previous months and years.

■Main Pump Flow Capacity Test Report

Prepared by:Superintendent of Flow Control

Reviewed by:Superintendent of Flow Control

Purpose:To track pump performance over time.

■Pump Performance Report

Prepared by:Superintendent of Flow Control

Reviewed by:Superintendent of Flow Control

Purpose:To compare pump performance to rated capacity and to generate the flow coefficients used in the pump station flow reports.

■Monthly Flow Report

Prepared by:Maintenance Scheduler

Reviewed by:Superintendent of Flow Control

Purpose:Used to report pump station flow for various reports throughout the year.

■Record of Pump Performance Test

Prepared by:Superintendent of Flow Control

Reviewed by:Superintendent of Flow Control

Purpose:To record the pump conditions and nameplate data when new pumps are accepted and installed at any pump stations. It is used for a baseline for the predictive maintenance program being developed.

■Main Pump Unit Out of Service Hours Report

Prepared by:Superintendent of Flow Control

Reviewed by:Superintendent of Flow Control

Purpose:Tracks all hours that a main pump unit is out of service for repairs for more that 4 hours. The database is used to compare percentage of breakdowns to preventative maintenance and to calculate the availability on the main pump units.

■Main Pump Availability History Report

Prepared by:Superintendent of Flow Control

Reviewed by:Superintendent of Flow Control

Purpose:To compare the main pump availability over the years. This is a key indicator of how well a pump maintenance program is working.

■Wastewater Pumping Fiscal Year Overhaul Schedule

Prepared by:Flow Control Superintendent and Supervisors

Reviewed by:Flow Control Superintendent and Supervisors

Purpose:To schedule main pump and auxiliary equipment overhauls. The units are scheduled by reviewing run time, pump flow capacity tests, and various other performance factors.

1.2.9 Documentation and Record Keeping, CSO Instrumentation Group

The following reports have been developed for and are utilized by field personnel in the CSO Instrumentation Group.   Copies of typical examples of these reports are provided in Appendix A-2, Section I-C.

■ADS Ultrasonic Level Monitor Site Calibration Report

Prepared by:Lead Technician performing the site calibration

Reviewed by:Instrument and Electronic Equipment Crew Chief

Purpose:To document the servicing and calibration of the level monitors in the CSO monitoring network located in the Northeast drainage district. Calibrations are done once a year.

■Pressure Sensor Level Monitor Site Calibration Report

Prepared by:Lead Technician performing the site calibration

Reviewed by:Instrument and Electronic Equipment Crew Chief

Purpose:To document the servicing and calibration of the level monitors in the CSO monitoring network located in the Northeast drainage district. Calibrations are done once a year.

■Computer Control Chamber Preventative Maintenance Report

Prepared by:Lead Technician performing the site maintenance

Reviewed by:Instrument and Electronic Equipment Crew Chief

Purpose:To document the work performed and the equipment conditions at the CSO computer control chambers. The work is scheduled on a monthly basis.

■Township Metering Chamber Equipment Preventative Maintenance

Prepared by:Lead Technician performing the site maintenance

Reviewed by:Instrument and Electronic Equipment Crew Chief

Purpose:To document the work performed and equipment conditions at the Township metering chambers. The work is scheduled on a monthly basis.

■Metering Chamber Calibration Record

Prepared by:Lead Technician in the CSO Instrumentation Maintenance Group

Reviewed by:Instrument Crew Chief and Superintendent

Purpose:To document the proper calibration of the flow meters at the Township Metering sites. The calibrations are performed twice per year.

■Computer Control Chamber Calibration Record

Prepared by:Lead Technician performing the site calibration

Reviewed by:Instrument Crew Chief and Superintendent

Purpose:To document the work performed and the equipment calibrations at the CSO computer control chambers. The work is scheduled on a yearly basis.

■Flow Control Daily Work Report (used by all Flow Control Unit groups)

Prepared by:Lead workers in each instrumentation group

Reviewed by:The maintenance scheduler who keys information into database

Purpose:To keep track of all maintenance performed at all monitoring and instrumentation sites

■Daily Work Sheet Database Entry Listing (used by all Flow Control Unit groups)

Prepared by:Lead workers in the instrumentation group to assign codes to Daily Work Sheets

Reviewed by:The lead workers who assign the codes to Daily Work Sheets

Purpose:To ensure that proper site and job codes are recorded on the forms which insures the completeness and accuracy of the data base information.

The following reports have been developed for and are utilized by Flow Control Superintendent for the CSO Instrumentation Group. Copies of example reports are included in Appendix A-2, Section II-C.

■Temporary Site Monitor Request

Prepared by:Requestor of the site monitor

Reviewed by:Superintendent and monitor requestors

Purpose:To document the temporary site monitors installed in the collector system.

■Temporary Level / Flow Monitor Site Record

Prepared by:Instrument Crew Chief

Reviewed by:Superintendent and CSO Project Coordinator

Purpose:To document the status of the temporary monitors installed into the collector system.

1.3 SEWER MAINTENANCE UNIT

1.3.1 Organizational Structure & Human Resources

The sewer maintenance Unit is responsible for the maintenance of the city-wide combined, sanitary, and stormwater systems and their appurtenant structures. Included in these responsibilities are all branch, interceptor, and main sewers; the maintenance of inlet laterals, inlets, and manholes; cleaning and repair of drainage ditches and outlets; maintenance of drainage rights-of-way and lands for public use; and CSO outlets. In addition to repairing sewers, much of the unit's work involves cleaning and clearing choked sewers using high pressure water jet machines, and rodder machines.

The Sewer Maintenance Unit is presently comprised of a work force of 174 authorized positions. In order to insure full City coverage and keep travel time to a minimum, the unit is organized and operated from three maintenance yard locations; one at Fox Street and Abbottsford Avenue

(Fox Street Yard), a second at 50th Street and Paschall Avenue (West Philadelphia Yard.), and a third at Milnor and Robins Streets (Lardeners Point Yard). Each maintenance yard has a Sewer Maintenance Supervisor who reports directly to the Sewer Maintenance Superintendent. Each of the yard groups is a self-sufficient unit capable of responding to all sewer maintenance and rehabilitation needs. The City is divided into six districts that are identical to the inlet cleaning and highway districts. This makes referrals of work between departments much easier.

PWD personnel at each of the yards are organized into crews with specific duties and equipment necessary for the maintenance of the municipal sewer system. Descriptions of these crews and their duties are as follows:

- Examination Crew: These crews are responsible for making above ground examination of sewers, manholes, inlets, fresh air inlets, and cave-ins. They also pump water from basements that have become flooded from sewer back-ups.

- Entry Crew: These five person crews are staffed with two sewer maintenance inspectors and are responsible for making confined space entry examinations of sewers, laterals, inlet pipes, and cave-ins in branch sewers.

- Reset Crew: These crews repair and reset inlets and manholes, replace inlet and manhole castings, and repair sewers.

- Vactor/Flusher Crews: These crews are responsible for cleaning and opening choked sewers with high pressure water machines.

- Rodder Crew: These crews clean small branch sewers and open choked or clogged sewers with a section power rodder similar to a "Roto-Rooter" machine.

- Main Sewer Crew: These crews specialize in confined entry and examining sewers larger in diameter then four feet. The employed technique is to begin examination where the sewer is four feet in diameter and following it downstream until it connects with the main interceptor sewer.

- Excavation Crew: These crews specialize in the major sewer repair jobs and make excavations to expose inlet pipes and laterals when they need repair.

■TV Inspection Crew: These crews are responsible for making video tape inspections of sewers via a closed circuit television system. They are a valuable tool for examining small diameter sewers and providing documentation of a sewer's condition.

■Drainage Right-of-Way Crew: These crews clean and maintain drainage rights-of-way by removing debris, dead trees, and weeds that accumulate in these areas. They are adapt at relieving choked sewers in remote areas and assist in performing excavations when necessary.

■Rodent Control Crew: This crew is under the jurisdiction of the Health Department although it receives its administration and guidance from Sewer Maintenance. The crew is under a federally funded program to locate and excavate sources of rodent infestations in the sewer system.

A copy of the organizational chart illustrating the assignment of these various crews to the maintenance yards, the chain of command, and lines of communication within the Sewer Maintenance unit is provided in Figures 1.4 and 1.5.

1.3.2 Operating & Equipment Funding & Resources

The fiscal year of the PWD is defined by the period from July 1 through June 30. Budget preparation activities commence in the fall to allow sufficient time for review and approval. The Superintendent is responsible for the preparation of the annual budget for the Sewer Maintenance Unit. The Superintendent consults the front line supervisors to determine the specific labor and equipment needs or any special maintenance projects that would need funding. The superintendent submits the completed annual budget to the Chief Water Transport Operations Engineer who reviews the draft, makes any required revisions, and obtains required approvals.

The fiscal year 1995 budget for the Sewer Maintenance Unit is summarized in Table 1.4 below.

Table 1.4

Budget Category	Personnel	Service Contracts, Parts, & Equipment	Total

Total Budget	$5,200,000	$900,000	$6,100,000

Sewer Maintenance Unit

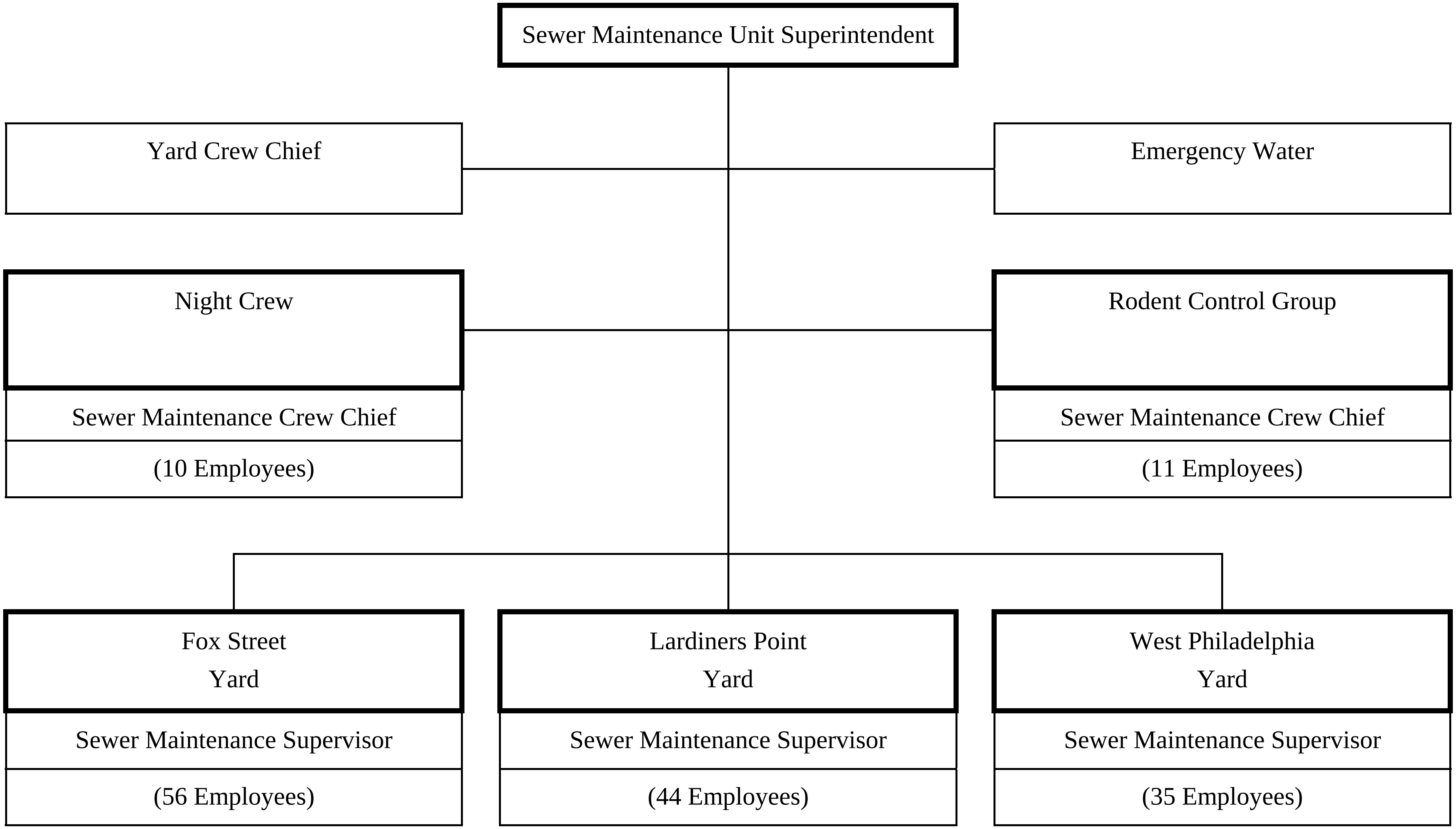


Figure 1.4

Sewer Maintenance Unit

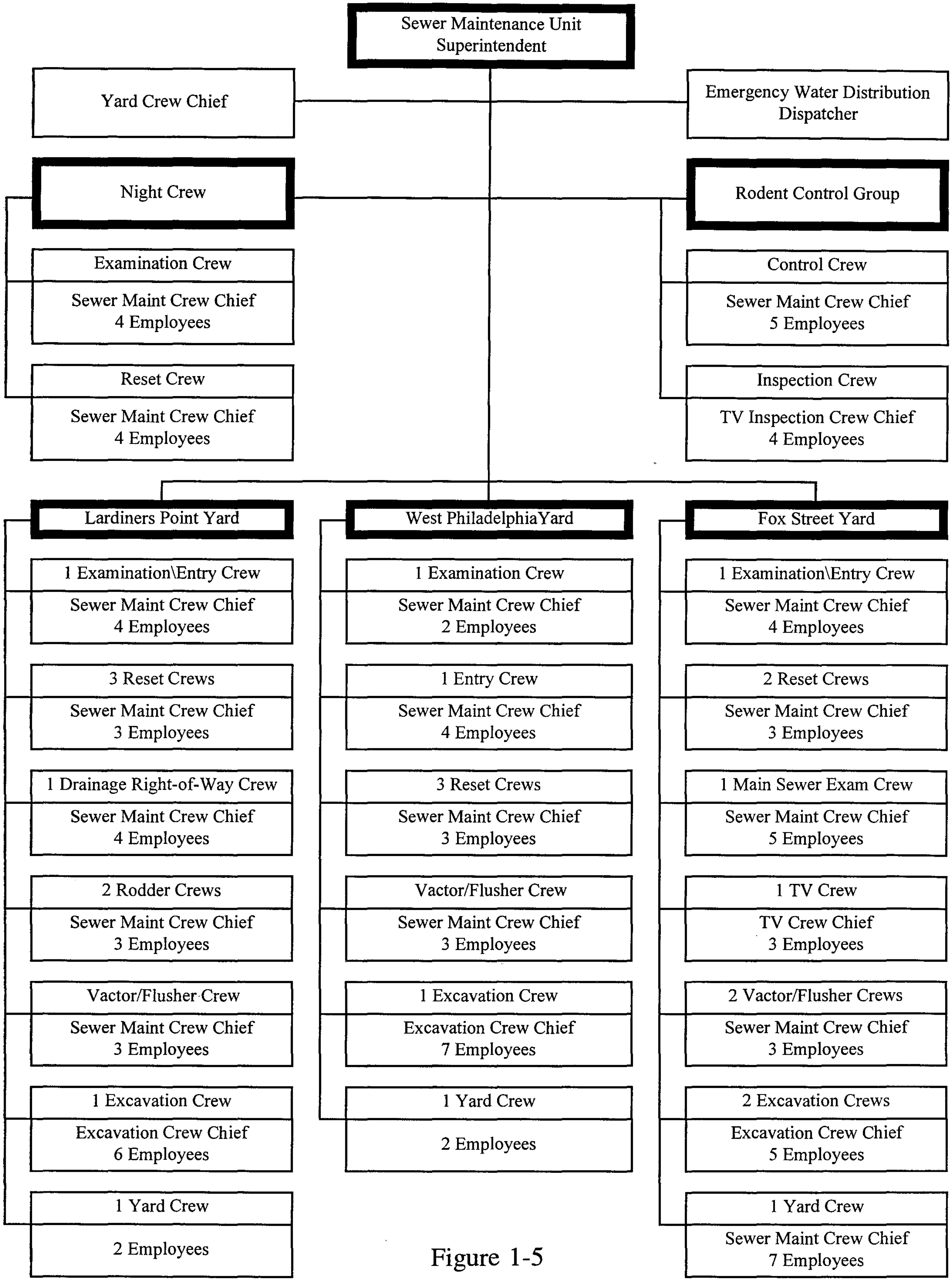


Figure 1-5

Equipment that is available to Sewer Maintenance Unit personnel for use in their O&M responsibilities are summarized briefly in Table 1.5 below.

Table 1.5

Equipment Inventory Summary Sewer Maintenance Unit			
Quantity	Equipment Item	Manufacturer	Model
2	TV Inspection Van	Chevy GMC	Unspecified (1) Unspecified (1)
3	Vactor Unit	Ford	L8000 (3)
3	Stinger Unit	Ford	F800 (3)
2	Jet Rodder Unit	International	S1900 (2)
1	Mechanical Rodder Unit	Ford	F700 (1)
4	Forklift	Allis Chalmers I.C.M. Bakerlift Nissan	Unspecified (1) Unspecified (1) B-80-PD (1) Unspecified (1)
7	Backhoe	Case Case	580K (2) Unspecified (5)
1	Dozer	Fiat	FL10C (1)
1	Tractor	John Deer	Unspecified
7	Trailer	Unspecified	Unspecified (7)
15	Compressor	Ingersol Rand	Unspecified (15)

Table 1.5 (continued)

Equipment Inventory Summary Sewer Maintenance Unit			
Quantity	Equipment Item	Manufacturer	Model
1	Generator	Unspecified	Unspecified (1)
1	6 Inch Pump	Unspecified	Unspecified (1)
45	Utility Truck	Ford Ford Ford International International International International	E250 (5) E350 (3) F600 (8) S1600 (3) S1654 (6) S1700 (4) Unspecified (16)
5	Dump Truck	Ford International	F800 (1) Unspecified (4)
14	Transportation Trucks and Vans	GMC Chevy Chevy Ford	Jimmy (6) Blazer (1) Suburban (1) Explorer (6)

1.3.3 Procedures & Schedules for Routine Maintenance & Inspections

The majority of the maintenance activities conducted by the Sewer Maintenance unit crews are corrective maintenance measures. Problem areas identified by referrals from other PWD units and customer complaints are brought to the attention of the supervisors who schedule the required work with the labor crew chief of the corresponding geographic area. Daily work requirements are scheduled with the crew chiefs who organize the activities of the individual maintenance crews.

Customer complaints are received through the 24 hour Customer Affairs Hot-Line and subsequently logged into the Sewer Maintenance Operations Information System (SMOIS) by a data support clerk. The SMOIS is a computer based complaint and work order handling system developed by the PWD's Collector Systems Division. The system operates on the Department's Hewlett Packard HP 3000 computer. The computer system automatically assigns each complaint to a yard and Sewer Maintenance Supervisor. The Maintenance Supervisor receives a printed work list of complaints within his geographic area. Crew numbers are assigned to each work list task, and individual work order tickets are printed out. The Maintenance Supervisor places the tickets onto the clipboard carried by each of the maintenance crews out on the street. The crews perform the work requested on each ticket in the order they were given. When finished with a work order request, the crews mark off the parts of the ticket which describe their observations, actions, materials used, etc., and sign the ticket. At the end of the day, clipboards are collected from the crews and the information is entered into the central computer to revise the current status of each work order ticket. Any referrals indicated by the crews are logged into the computer for scheduling subsequent corrective measures.

The PWD program for interceptor inspection and maintenance is designed to prevent the excessive accumulation of grease, gravel, and/or sediment in the interceptor system which can decrease the conveyance capacity, cause hydraulic surcharging, or cause control mechanisms to fail. The trunk lines, interceptors, dry weather outlet pipes, and stormwater outlets are checked by the Flow Control Unit and any excessive accumulations are reported to the Sewer Maintenance Supervisors. Vactor/flusher crews are subsequently scheduled to remove the material and clean the lines. If the quantity of accumulated material is found to exceed the capabilities of the PWD vactor unit, the a contract is initiated to have an outside contractor remove the material.

1.3.4 Procedures for Responding to Emergencies

The Sewer Maintenance Unit is responsible for handling emergency situations associated with the collection system such as a line collapse or failure. The Sewer Maintenance Unit has a night crew comprised of ten people under the direction of a crew chief. The night crew typically works from four o'clock p.m. to twelve o'clock midnight. A standby supervisor for each of the three geographic yard areas is on call on a rotating basis. When a supervisor receives an emergency call, required labor resources are determined, and a list of workers is called to assemble the needed crew or crews. Supervisors who are on call have take-home privileges with PWD maintenance vehicles to enable them to respond directly to an emergency call.

The Sewer Maintenance Superintendent may authorize expenditures up to $500 in petty cash funds in the event of an emergency maintenance situation. For emergency expenditures that are not included in the approved annual budget, the supervisor would submit an emergency order to the Chief Water Transport Operations Engineer of the Waste and Stormwater Collector Systems Section. The chief operations engineer would be responsible for getting the necessary approvals.

1.3.5 Documentation & Record Keeping

The following report has been developed for and is utilized by the Sewer Maintenance Unit Superintendent, Supervisors, and crew chiefs to summarize and chart progress on maintaining the collection systems that are tributary to the combined sewer regulators and interceptors:

■Sewer Maintenance Work Order Ticket

Prepared by:Maintenance Supervisor at each yard area.

Reviewed By:Sewer Maintenance Supervisor

Purpose:Lists the work order logged on the Sewer Maintenance Operations Information System (SMOIS) computer and the crew assigned to complete the associated maintenance work. Used to schedule maintenance crews and track the status of maintenance measures.

A copy of this report is included in Appendix A-2, Section D. Other sewer maintenance reports are used by the Unit but are not included in this report because they are not directly pertinent to CSOs.

1.4 INLET CLEANING UNIT

1.4.1 Organizational Structure & Human Resources

The inlet cleaning unit is responsible for the inspection and cleaning of approximately 75,000 storm water inlets within the City. The Inlet Cleaning Unit is presently comprised of an authorized work force of 99 people. In order to provide full City coverage and keep travel time to a minimum, the work force is organized and operates from six district areas of the PWD service area. The inlet cleaning districts are identical to the Sewer Maintenance and City Highway districts which makes referrals of work between departments easier.

Each of the district work groups is headed by a labor crew chief who reports directly to the Inlet Cleaning Supervisor. Work teams are formed around the inlet cleaning equipment. The Inlet Cleaning Unit has 31 combination clam-shell/dump truck vehicles, called combo units, and four vactor units. The combo units are used to remove large quantities of accumulated debris and solids. The combo units are operated by a two person crew and are assigned to specific geographic areas. The vactor units are used to remove more moderate quantities of debris and solids when combo units are not required. The vactor units are operated by a three person crew and are rotated among the geographic areas on an as-needed basis.

A night crew group, comprised of five individual crews and supervised by a Labor Crew Chief, is used to complete scheduled inlet cleaning, in any of the six districts, that the day crews could not finish.

A copy of the organizational chart illustrating the chain of command and lines of communication within the Inlet Cleaning Unit is provided in Figure 1.6.

1.4.2 Operating & Equipment Funding & Resources

The fiscal year of the PWD is defined by the period from July 1 through June 30. Budget preparation activities commence in the fall to allow sufficient time for the review and approval process. The Superintendent is responsible for the preparation of the annual budget for the Inlet Cleaning Unit. The Superintendent consults the front line supervisors to determine the specific labor and equipment needs or any special maintenance projects that would need funding. The superintendent submits the completed annual budget to the Chief Water Transport Operations Engineer who reviews the draft, makes any required revisions, and obtains required approvals.

The fiscal year 1995 budget for the Inlet Cleaning Unit is summarized in Table 1.6 below.

Table 1.6

Budget Category	Personnel	Service Contracts, Parts, & Equipment	Total
Total Budget	$2,857,000	$1,397,000	$4,254,000

Inlet Cleaning Unit

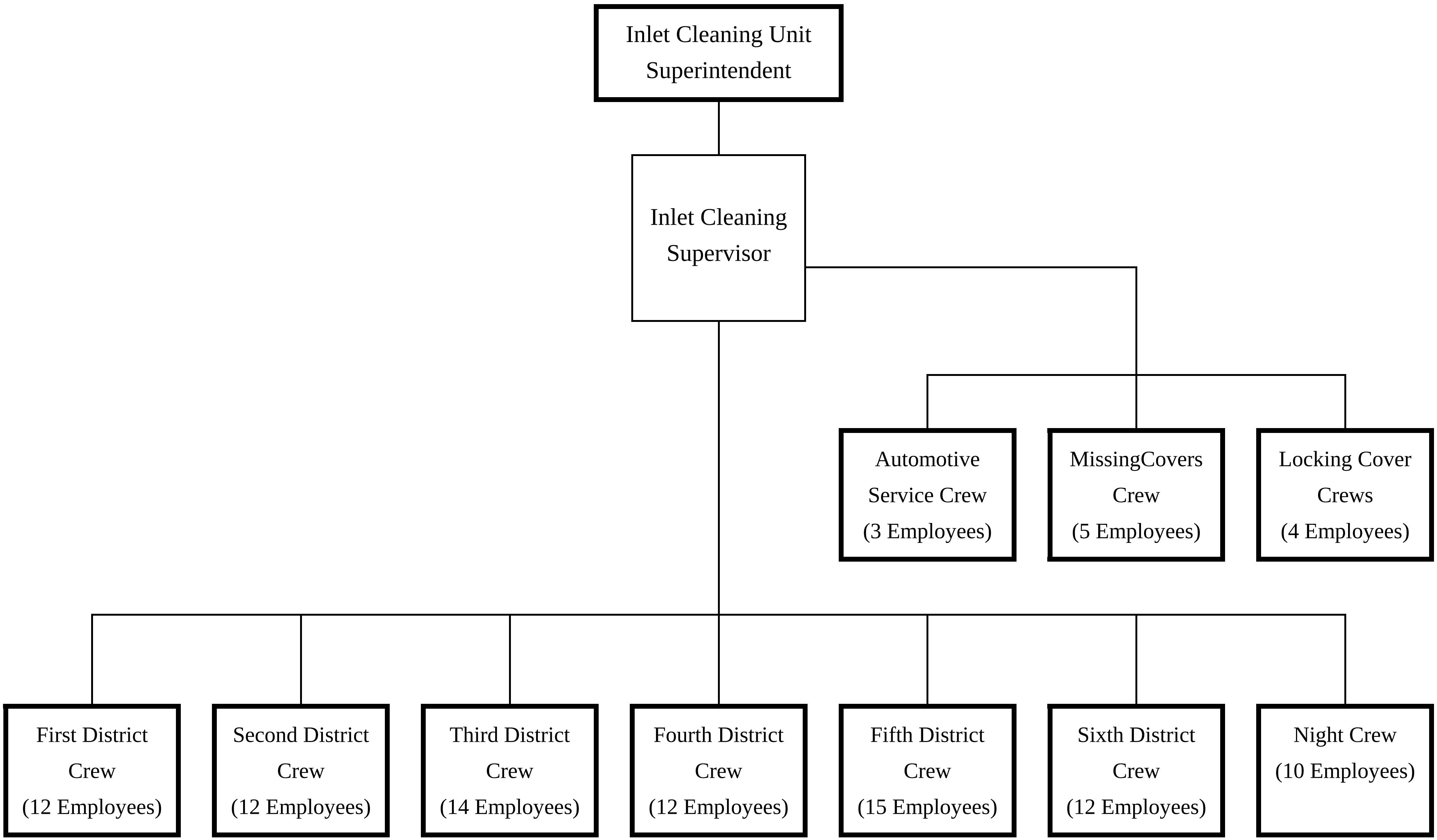


Figure 1.6

Equipment that is available to Inlet cleaning Unit personnel for use in their O&M responsibilities are summarized briefly in Table 1.7 below.

Table 1.7

Equipment Inventory Summary Inlet Cleaning Unit			
Quantity	Equipment Item	Manufacturer	Model
30	Combination Units	Ford International	Unspecified (21) S1900CMB (9)
2	Vactor Units	Ford	LN800 (2)
10	Utility Truck	Ford	E250 (1) E350 (5) F800 (3)
10	Transportation Trucks and Vans	Chevy Ford GMC International	Sta. Wagon (4) Explorer (2) S15 Jimmy (2) Van (2)

1.4.3 Procedures & Schedules for Routine Maintenance & Inspections

Over 90 percent of the maintenance activities performed by the Inlet Cleaning Unit Crews are complaint driven. Customer complaints are received through the Customer Affairs Hotline and logged into the SMOIS computer by a data support clerk. The computer produces daily work order lists sorted by district area. These automated lists are given to the crew chiefs who schedule the daily activities of the combo unit and vactor unit crews within their assigned district areas.

In order to insure the efficient operation of the City's inlets and connecting sewers, it is necessary to work with various units of the PWD as well as other City agencies. For example, communication and cooperation is maintained with the Sewer Maintenance Unit since the functions of the two units are interrelated. The Unit is also called upon frequently by the Police Department to perform searches of inlets for law enforcement reasons.

1.4.4 Procedures for Responding to Emergencies

The Inlet Cleaning Unit provides service 24 hours a day, seven days a week, responding to emergency cleaning needs at night, weekends, holidays, or whenever they might occur. Storm water inlet emergency situations (such as street flooding from a blocked inlet) are typically reported by City citizens to the 24 hour Customer Affairs Hot-Line. The information is transferred to the PWD Emergency Desk where the nature of the emergency is determined. The Emergency Desk dispatcher addresses the urgency of the situation and either notifies the appropriate crew chief for immediate action or defers action to the following day. A standby supervisor is on call on a six week rotating schedule.

Routine night-time maintenance is provided by the night crew. The Inlet Cleaning Unit night crew supplements the day crews and typically works from eleven o'clock PM. to seven o'clock AM. and on weekends. The night crew is comprised of ten people under the leadership of the crew chief.

1.4.5 Documentation & Record Keeping

The following reports have been developed for and are utilized by field personnel in the Inlet Cleaning Unit:

■Inlet Maintenance Work Order Ticket

Prepared By:Issued by the Supervisor from automated SMOIS work lists. Completed by the lead crew worker on a maintenance crew as the work is completed.

Reviewed by:Inlet Control Superintendent and Supervisor

Purpose:Documents the location, date, time, and description of the problem or complaint; the maintenance measures employed; the time required to complete the maintenance measure; and the associated materials and cost. Used to schedule and document the activities of the maintenance crews and to monitor their performance.

1.5 ASSESSMENT OF THE EXISTING O&M PROGRAM

1.5.1 Process for Periodic Review & Revision of the O&M Program

Existing Operations and Maintenance programs, including training and record keeping, are reviewed continuously. Once a week the unit superintendents are scheduled to meet individually with the Chief Water Transport Operations Engineer to discuss the effectiveness of the O & M programs, resolve any problems, and remove any barriers. Once a month, the unit superintendents are scheduled to meet collectively with the Operations Engineer. Program changes are made as necessary.

1.5.2 Proposed Revisions to the O&M Program

Revisions to the PWD O&M program are made as necessary. It is presently assumed that existing O&M practices satisfy the intent of the National CSO Control policy. Current examples of future goals and proposed revisions to the O&M program are summarized below.

- The existing Flow Control Unit goal is to have all CSO chambers serviced at least once a year. Future goals include increasing the frequency of these scheduled inspections to twice a year.

- A project is presently in the design stage to install emergency back up power generators at the eight wastewater pump stations that are presently single source. This project is scheduled to be bid by January 1996 and should eliminate 95% of the pump station failures currently experienced.

- A Wastewater Pump Station Predictive Maintenance program is currently being developed to anticipate maintenance needs before they develop into problems.

- A customized CSO Regulator PM / Inspection Report Form is presently being developed for each individual regulator structure within the PWD system. The reports will be used to document the preventative maintenance which is performed on a yearly basis, ensure that proper regulator settings are maintained, and that system changes are documented.

- The network of monitoring equipment will be expanded and alarm capabilities will allow anomalies in the combined sewer system to be detected automatically. This will reduce the frequency of visual inspections performed by field crews, thus freeing time to work on preventive and specialized maintenance activities.

Section 2
Minimum Control No. 2
Maximum Use of the Collection System for Storage

This section provides the documentation for Minimum Control Measure No. 2 (NMC2)- Maximum Use of the Collection System for Storage. NMC2 is defined as: “As a minimum control, maximum use of the collection system for storage means making relatively *simple* modifications to your CSS to enable it to store wet-weather flows until downstream sewers and treatment facilities can handle them.” Use of the collection system for storage (refered to herein as “in-system storage” has long been recognized as a potentially cost-effective means to mitigate the occurrence and impacts of CSOs. U.S.EPA research reports dating back at least as far as 1971 describe the use of the collection system for storage of combined wastewater (<u>Maximizing Storage in Combined Sewer Systems</u>; U.S.EPA; Project No. 11022 ELK; December, 1971).

A number of technical approaches to utilizing in-system storage are available, which range in cost and complexity from static tide gates and minor modifications to overflow weirs, to sophisticated multiple sluice gate structures controlled in real-time with digital computers. PWD has been implementing in-system storage in Philadelphia’s combined sewer system for nearly twenty years, using a variety of technologies. The strategy for continued implemention of the various approaches for in-system storage, evaluation of the available storage in PWD’s combined sewer system, and proposed implementation of in-system storage are described in the following sections.

2.1 IN-SYSTEM STORAGE STRATEGY

PWD has been evaluating and implementing facilities for in-system storage in the combined sewer system for many years. In the 1980's, PWD designed and installed eight computer controlled outfall/regulator gate facilities in the Northeast Drainage District that use level monitors to control the position of the dry-weather outlet (DWO) gate and tide gate at each CSO location. The tide gate is maintained in a closed position for as long as possible, and when opened is maintained at the smallest possible opening allowed by a maximum water surface elevation. This operation retains as much flow as possible within the combined sewer system, minimizing the release of combined wastewater as CSO, and maximizing the use of in-system storage.

The computer controlled outfall facilities described above apply real-time control (RTC) mechanisms to maximize in-system storage. The use of RTC allows the capture and delivery to the treatment works of flow at the maximum rate at which it can be treated, with storage in the combined sewer system of as much of the excess flow as possible. This approach is attractive in terms of optimizing the use of the existing sewer system to capture combined wastewater and minimize CSOs. However, PWD's experience in the use of RTC facilities demonstrates that this approach is not feasible on a system-wide basis as a **minimum** control (under NMC #2) for a system as large as Philadelphia's, since the costs (both capital and O&M) for such a system would be significant, and the cost-effectiveness of system-wide RTC facilities cannot be determined until the LTCP defines the costs for other CSO control approaches. Since the incremental cost to increase the capacity of other CSO control facilities could be less than the cost of RTC facilities, it would be inappropriate to implement system-wide RTC facilities prior to LTCP evaluation of the full range of CSO control alternatives.

Although RTC allows the optimal use of the collection system for capture of combined wastewater, other less complex system improvements (without RTC) can also allow the available in-system storage volume to be used for control of CSOs. One approach that is particularly effective is to use the natural tidal variation at tidally affected outfalls to raise the wet-weather water surface in the combined trunk sewers prior to overflow. By installing a tide gate at the outfall to prevent tidal intrusion into the regulator, the overflow elevation is effectively raised from the overflow weir elevation to the tidal stage, which causes additional flow to be stored within the system. PWD maintains tide gates at each of the 88 CSO locations which are tidally affected (System Inventory and Characterization Report; Philadelphia Water Department; March 27, 1995), and Section 1 of this report described PWD's program of inspections and maintenance operations to ensure the continued proper operation of these facilities.

Another approach that can be implemented to gain additional in-system storage is to raise the overflow elevation by physically modifying the overflow structure (e.g. raising an overflow weir). However, this approach must be implemented cautiously, since raising the overflow elevation also raises the hydraulic grade line in the combined trunk sewer during storm flows, and therefore increases the risk of basement and other structural flooding within the upstream sewer system due to backup or surcharge problems.

2.2 ANALYSIS OF AVAILABLE IN-SYSTEM STORAGE VOLUMES

A certain volume of storage of combined wastewater occurs incidentally during wet-weather, as flow depths increase within the system to achieve the hydraulic gradient necessary for flow conveyance through the network of sewer conduits. This incidental storage can be thought of as dynamic storage, to distinguish it from static storage, or that storage which exists as the volume of the "pool" behind flow controls constructed within the combined sewer system. At a minimum, there is generally at least a small volume of static storage available behind the regulator structure at each CSO location (the exception in PWD's system is at slot regulators without diversion dams). Although termed "static" storage here to denote the static nature of pooled storage available behind regulators or other structures, it should be noted that the actual volume of the available static storage that is occupied will vary dynamically throughout wet-weather events.

Dynamic storage is very difficult to measure, as it varies from event to event as a function of the rate of runoff and solids deposition conditions in the combined sewer network, and from sewer reach to sewer reach as a function of the hydraulic characteristics of each sewer segment. Although it is theoretically possible to deterministically model the transport of flows within the combined sewer network (which inherently determines dynamic storage volumes), it is generally impractical to do so at the planning stage, where dynamic storage is more appropriately handled as a lumped calibration parameter together with static storage . Static storage on the other hand can be measured, which provides the basis for the lumped storage parameter, leaving the dynamic storage component to be estimated.

In order to support the implementation of in-system storage, the available static storage volumes within the combined trunk sewers upstream of each CSO location in the PWD system were determined. This was accomplished by collecting the required trunk sewer data (invert elevations, cross-sectional size and shape, and length) for each sewer segment at an elevation sufficiently low to be available to provide static storage. Storage availability was determined by comparing the critical elevation (elevation at which overflow begins, typically the overflow weir elevation or tide elevation) to combined sewer invert elevations. Sewer segments with at least one endpoint (node) invert below the critical elevation were determined to be available for static storage. Where CSO locations are tidally affected, both the mean tide and mean high tide elevations were used to compute static storage volumes for both tidal conditions.

Storage volumes were computed for each available sewer segment by calculating the static storage depth at each node (the difference between the critical elevation and the node invert elevation), from which the average submerged conduit cross-sectional area was computed. This value and the sewer segment length were used to compute available volume. The upstream-most available pipe segment volume was computed using an adjusted length to include only the submerged portion of the segment.

The available static storage volumes have been summarized for each CSO location in Tables 2-1a, 2-1b and 2-1c. These tables indicate storage volumes available during both mean tide and mean high tide conditions. The additional storage volumes available due to tidal variation at gate-protected tidal outfalls has been incorporated into the lumped storage parameter used in the models of the combined sewer system. Tables 2-1 also indicate the incremental storage that is potentially available if the critical elevation (overflow activation elevation) were to be modified with a nominal 1.0-foot increase. This information is useful in screening the various regulator locations to identify the locations where the greatest increases in storage can be realized by regulator modifications to increase the effective overflow elevation. Although modifications would need to be determined on a site-specific basis, the nominal 1-foot increase across all locations is useful as an indicator for screening purposes.

As Table 2-1b shows, the Southeast Drainage District has available considerably greater in-system storage volumes (by roughly one order of magnitude) than the other two districts. This reflects the relatively large, flat combined trunks in this district. In-system storage in all three districts is very sensitive to tidal variation, with in-system storage values at mean high tide exceeding mean tide values by a factor of roughly 3-4 in each district.

2.3 PROPOSED IMPLEMENTATION OF IN-SYSTEM STORAGE

Given the significant in-system storage volumes that are utilized at the tidally affected outfalls, especially during the higher tidal cycles, it is important that PWD continue to inspect and maintain the tide gates in good working order at each of the 88 tidally affected outfall

TABLE 2-1A
NORTHEAST SYSTEM STORAGE SUMMARY

MEAN TIDE

Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)
FRANKFORD HIGH LEVEL		
T_15	0	0.00000
T_14	487,987	0.00332
T_13	0	0.00000
T_12	0	0.00000
T_11	0	0.00000
T_10	0	0.00000
T_9	0	0.00000
T_8	35,218	0.00128
T_7	0	0.00000
T_6	0	0.00000
T_5	0	0.00000
T_4	0	0.00000
T_3	0	0.00000
T_1	3,016	0.00101
TOTAL	526,222	0.00295
PENNYPACK		
P_5	26,013	0.01597
P_4	0	0.00000
P_3	192	0.00018
P_2	0	0.00000
P_1	396	0.00016
TOTAL	26,602	0.00318
LOWER FRANKFORD LOW LEVEL		
F_25	504,562	0.07711
F_24	24,148	0.03706
F_23	2,885	0.00208
F_21	151,333	0.00617
F_14	0	0.00000
F_13	2,740	0.00229
TOTAL	685,668	0.00589
UPPER FRANKFORD LOW LEVEL		
F_12	0	0.00000
F_11	5,361	0.00056
F_10	63,813	0.03456
F_09	1,343	0.01236
F_08	5,540	0.00358
F_07	3,375	0.00152
F_06	8,506	0.00681
F_05	1,566	0.00240
F_04	67	0.00001
F_03	0	0.00000
TOTAL	89,570	0.00084

MEAN HIGH TIDE

Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)
FRANKFORD HIGH LEVEL		
T_15	0	0.00000
T_14	487,987	0.00332
T_13	0	0.00000
T_12	0	0.00000
T_11	0	0.00000
T_10	0	0.00000
T_9	0	0.00000
T_8	35,218	0.00128
T_7	0	0.00000
T_6	0	0.00000
T_5	0	0.00000
T_4	0	0.00000
T_3	0	0.00000
T_1	3,016	0.00101
TOTAL	526,222	0.00295
PENNYPACK		
P_5	26,013	0.01597
P_4	0	0.00000
P_3	192	0.00018
P_2	0	0.00000
P_1	396	0.00016
TOTAL	26,602	0.00318
LOWER FRANKFORD LOW LEVEL		
F_25	958,455	0.14647
F_24	24,148	0.03706
F_23	35,904	0.02593
F_21	398,308	0.01625
F_14	1,958	0.00288
F_13	40,700	0.03407
TOTAL	1,459,473	0.01712
UPPER FRANKFORD LOW LEVEL		
F_12	0	0.00000
F_11	157,216	0.01654
F_10	63,813	0.03456
F_09	1,343	0.01236
F_08	5,540	0.00358
F_07	3,375	0.00152
F_06	8,506	0.00681
F_05	1,566	0.00240
F_04	67	0.00001
F_03	0	0.00000
TOTAL	241,425	0.00623

CRITICAL ELEVATION + 1 FOOT

Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)
FRANKFORD HIGH LEVEL		
T_15	3,441	0.00065
T_14	843,459	0.00573
T_13	1,677	0.00056
T_12	1,322	0.00541
T_11	1,620	0.00149
T_10	2,405	0.00148
T_9	1,823	0.00204
T_8	77,950	0.00282
T_7	1,528	0.00256
T_6	19	0.00000
T_5	427	0.00031
T_4	2,711	0.00147
T_3	475	0.00019
T_1	11,171	0.00269
TOTAL	950,028	0.00454
PENNYPACK		
P_5	35,792	0.02197
P_4	145	0.00012
P_3	1786	0.00169
P_2	4398	0.00141
P_1	2350	0.00092
TOTAL	44,472	0.00344
LOWER FRANKFORD LOW LEVEL		
F_25	1,108,855	0.16945
F_24	24,148	0.03706
F_23	59,670	0.04309
F_21	527,032	0.02150
F_14	8,345	0.01229
F_13	68,844	0.05762
TOTAL	1,796,893	0.05127
UPPER FRANKFORD LOW LEVEL		
F_12	2,234	0.00175
F_11	109,571	0.02388
F_10	80,371	0.04353
F_9	5,101	0.04697
F_8	18,699	0.01208
F_7	9,499	0.00427
F_6	26,218	0.02099
F_5	14,803	0.02272
F_4	2,902	0.00107
F_3	2,207	0.00052
TOTAL	271,604	0.00910

TABLE 2-1A, CONTINUED
NORTHEAST SYSTEM STORAGE SUMMARY

	MEAN TIDE		MEAN HIGH TIDE		CRITICAL ELEVATION + 1 FOOT	
Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)
SOMERSET						
D_25	76,692	0.00160	553,213	0.01152	961,622	0.02003
D_24	0	0.00000	867	0.00290	5,288	0.01771
D_23	874	0.00095	874	0.00095	3,908	0.00423
D_22	60,434	0.00600	617,728	0.06132	1,051,561	0.10439
D_21	79,065	0.03272	301,411	0.12473	437,721	0.18113
D_20	62,510	0.02449	325,207	0.12742	493,077	0.19319
D_19	102,952	0.04034	548,626	0.21495	803,268	0.31472
D_18	74,575	0.01308	537,385	0.09424	795,953	0.13959
D_17	118,950	0.01537	633,142	0.08182	911,875	0.11784
TOTAL	576,052	0.00720	3,518,453	0.04384	5,464,273	0.06808
UPPER DELAWARE LOW LEVEL						
D_15	190,936	0.06827	190,936	0.06827	275,617	0.09855
D_13	81	0.00007	26,208	0.02354	48,465	0.04353
D_12	0	0.00000	8,126	0.01760	16,533	0.03582
D_11	357,413	0.05956	357,413	0.05956	456,843	0.07613
D_09	471	0.00044	471	0.00044	3,963	0.00374
D_08	866	0.00133	9,223	0.01415	14,066	0.02158
D_07	1,079,452	0.09816	1,079,452	0.09816	1,391,168	0.12651
D_06	0	0.00000	3,066	0.00209	14,110	0.00962
D_05	60,068	0.00299	60,068	0.00299	146,908	0.00732
D_04	0	0.00000	2,544	0.00335	11,892	0.01564
D_03	153,207	0.04587	153,206	0.04587	209,095	0.06261
D_02	360,595	0.03088	360,595	0.03088	1,045,397	0.08954
TOTAL	2,203,088	0.03667	2,251,307	0.03728	3,634,056	0.06018
TOTALS	4,107,201	0.00424	8,023,481	0.01709	12,161,327	0.02570

TABLE 2-1B
SOUTHEAST SYSTEM STORAGE SUMMARY

MEAN TIDE			MEAN HIGH TIDE			CRITICAL ELEVATION + ONE FOOT		
Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)	Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)	Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)
OREGON			OREGON			OREGON		
D_72	943,781	0.18198	D_72	2,847,634	0.54909	D_72	3,777,980	0.72848
D_71	375,445	0.06461	D_71	915,545	0.15756	D_71	1,213,543	0.20885
D_70	1,300,842	0.14216	D_70	3,062,208	0.33465	D_70	3,725,093	0.40710
D_69	243,460	0.03832	D_69	861,458	0.13558	D_69	1,197,760	0.18851
D_68	87,292	0.00742	D_68	586,034	0.04985	D_68	924,048	0.07860
TOTAL	2,950,820	0.09375	TOTAL	8,272,880	0.23615	TOTAL	10,838,424	0.28328
LOWER DELAWARE LOW LEVEL			LOWER DELAWARE LOW LEVEL			LOWER DELAWARE LOW LEVEL		
D_73	294,275	0.02986	D_73	2,030,214	0.20598	D_73	3,059,575	0.31042
D_67	139,460	0.04280	D_67	628,019	0.19275	D_67	816,131	0.25048
D_66	121,276	0.01885	D_66	425,549	0.06613	D_66	598,036	0.09293
D_65	336,868	0.04809	D_65	735,043	0.10493	D_65	927,676	0.13242
D_64	1,598	0.00588	D_64	1,598	0.00588	D_64	3,039	0.01119
D_63	88,059	0.00785	D_63	229,250	0.02044	D_63	339,088	0.03024
D_62	0	0.00000	D_62	7,912	0.02242	D_62	15,808	0.04478
D_61	0	0.00000	D_61	2,290	0.00281	D_61	6,317	0.00776
D_58	26,840	0.02824	D_58	63,197	0.06650	D_58	82,782	0.08711
D_54	706,860	0.05971	D_54	1,136,065	0.09596	D_54	1,264,107	0.10678
D_53	265	0.00005	D_53	4,580	0.00093	D_53	7,844	0.00160
D_52	6,906	0.01339	D_52	19,521	0.03784	D_52	26,376	0.05113
D_51	0	0.00000	D_51	0	0.00000	D_51	806	0.00034
D_50	10,448	0.02565	D_50	29,180	0.07164	D_50	31,243	0.07671
D_49	1,847	0.00850	D_49	3,410	0.01570	D_49	3,639	0.01675
D_48	89,397	0.00653	D_48	294,479	0.02152	D_48	401,810	0.02936
D_47	2,556	0.00070	D_47	30,925	0.00850	D_47	44,813	0.01232
D_46	40,375	0.04797	D_46	67,697	0.08043	D_46	72,764	0.08645
D_45	352,664	0.01413	D_45	2,046,797	0.08203	D_45	2,658,725	0.10655
D_44	30,536	0.01584	D_44	214,939	0.11149	D_44	345,845	0.17940
D_43	0	0.00000	D_43	4,239	0.01201	D_43	5,291	0.01499
D_42	0	0.00000	D_42	1,484	0.00341	D_42	4,803	0.01106
D_41	1,470	0.00081	D_41	38,509	0.02117	D_41	64,296	0.03534
D_40	0	0.00000	D_40	5,162	0.00432	D_40	16,507	0.01382
D_39	23,367	0.00244	D_39	197,319	0.02065	D_39	297,235	0.03110
D_38	285,429	0.01698	D_38	804,125	0.04784	D_38	1,318,823	0.07847
D_37	207,913	0.02857	D_37	901,240	0.12385	D_37	1,230,345	0.16908
TOTAL	2,560,496	0.02196	TOTAL	9,922,744	0.07216	TOTAL	13,643,722	0.09935
TOTALS	5,511,316	0.04193	TOTALS	18,195,624	0.11490	TOTALS	24,482,146	0.13928

TABLE 2-1C
SOUTHWEST SYSTEM STORAGE SUMMARY

MEAN TIDE

Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)
SOUTHWEST MAIN GRAVITY		
S_51	0	0.00000
S_50	278,843	0.03423
S_47	1,324	0.00043
S_43	60	0.00002
S_40	307	0.00014
S_39	0	0.00000
S_34	864	0.00013
S_30	0	0.00000
S_28	0	0.00000
S_27	45,814	0.00055
TOTAL	327,213	0.00307
LOWER SCHUYLKILL WEST SIDE		
S_45	454,602	0.03417
S_38	47,641	0.01194
S_33	620	0.00022
S_32	0	0.00000
TOTAL	502,863	0.02813
LOWER SCHUYLKILL EAST SIDE		
S_46	77,197	0.01269
S_44	226,686	0.03380
S_42A	0	0.00000
S_42	0	0.00000
S_37	2,070	0.00068
S_36A	3,726	0.00079
S_36	0	0.00000
S_35	0	0.00000
S_31	0	0.00000
TOTAL	232,481	0.01606
CENTRAL SCHUYLKILL WEST SIDE		
S_24	0	0.00000
S_22	1,081	0.00035
S_20	329	0.00004
S_14	412	0.00034
S_11	1,634	0.00251
S_04	0	0.00000
S_03	0	0.00000
S_02	0	0.00000
S_01	18,956	0.00143
TOTAL	22,413	0.00085

MEAN HIGH TIDE

Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)
SOUTHWEST MAIN GRAVITY		
S_51	0	0.00000
S_50	643,751	0.07903
S_47	1,324	0.00043
S_43	60	0.00002
S_40	307	0.00014
S_39	0	0.00000
S_34	864	0.00013
S_30	0	0.00000
S_28	0	0.00000
S_27	45,814	0.00055
TOTAL	692,121	0.00649
LOWER SCHUYLKILL WEST SIDE		
S_45	1,182,732	0.08890
S_38	107,966	0.02705
S_33	24,212	0.00841
S_32	5,611	0.00861
TOTAL	1,320,522	0.07203
LOWER SCHUYLKILL EAST SIDE		
S_46	775,303	0.12747
S_44	936,411	0.13962
S_42A	0	0.00000
S_42	43,729	0.00506
S_37	2,070	0.00068
S_36A	3,726	0.00079
S_36	0	0.00000
S_35	0	0.00000
S_31	0	0.00000
TOTAL	985,935	0.03595
CENTRAL SCHUYLKILL WEST SIDE		
S_24	0	0.00000
S_22	1,081	0.00035
S_20	329	0.00004
S_14	36,199	0.03030
S_11	1,634	0.00251
S_04	32,168	0.01823
S_03	0	0.00000
S_02	630	0.00080
S_01	18,956	0.00143
TOTAL	90,999	0.00316

CRITICAL ELEVATION + ONE FOOT

Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)
SOUTHWEST MAIN GRAVITY		
S_51	158	0.00097
S_50	744,589	0.09141
S_47	5,359	0.00175
S_43	1,353	0.00036
S_40	5,384	0.00245
S_39	224	0.00009
S_34	6,142	0.00089
S_30	228	0.00042
S_28	149	0.00020
S_27	102,742	0.00122
TOTAL	866,169	0.00803
LOWER SCHUYLKILL WEST SIDE		
S_45	1,479,004	0.11116
S_38	786,268	0.19699
S_33	123,892	0.04305
S_32	13,069	0.02006
TOTAL	2,402,233	0.15333
LOWER SCHUYLKILL EAST SIDE		
S_46	1,134,703	0.12898
S_44	1,295,626	0.13479
S_42A	529,854	0.04702
S_42	144,137	0.01334
S_37	14,942	0.00491
S_36A	17,281	0.00366
S_36	777	0.00358
S_35	363	0.00111
S_31	4,524	0.00105
TOTAL	2,007,503	0.05916
CENTRAL SCHUYLKILL WEST SIDE		
S_24	325	0.00028
S_22	5,861	0.00191
S_20	1,296	0.00016
S_14	58,022	0.04857
S_11	11,284	0.01732
S_04	55,166	0.03126
S_03	1,586	0.00389
S_02	2,742	0.00348
S_01	50,420	0.00381
TOTAL	186,378	0.00501

TABLE 2-1C, CONTINUED
SOUTHWEST SYSTEM STORAGE SUMMARY

	MEAN TIDE		MEAN HIGH TIDE		CRITICAL ELEVATION + ONE FOOT	
Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)
CENTRAL SCHUYLKILL EAST SIDE						
S_26	3,819	0.00039	67,047	0.00686	114,791	0.01178
S_25	2,389	0.00117	2,389	0.00117	6,237	0.00306
S_23	1,018	0.00099	1,018	0.00099	2,740	0.00266
S_21	0	0.00000	0	0.00000	396	0.00133
S_19	1,249	0.00329	2,703	0.00711	2,703	0.00711
S_18	2,082	0.00046	22,882	0.00502	37,323	0.00818
S_17	0	0.00000	0	0.00000	17	0.00002
S_16	0	0.00000	128	0.00016	1,028	0.00131
S_15	3,945	0.01038	3,945	0.01038	2,059	0.00542
S_13	0	0.00000	0	0.00000	43	0.00006
S_12A	0	0.00000	0	0.00000	127	0.00029
S_12	3	0.00003	3	0.00003	1,257	0.01158
S_10	12,993	0.00684	12,993	0.00684	27,119	0.01427
S_09	30,519	0.00540	122,046	0.02161	175,726	0.03111
S_08	0	0.00000	1,652	0.00608	4,625	0.01703
S_07	14,343	0.00714	59,253	0.02949	85,690	0.04265
S_06	14,957	0.00396	80,022	0.02120	123,150	0.01517
S_05	476	0.00020	40,967	0.01754	83,009	0.00413
TOTAL	87,791	0.00145	417,047	0.00986	668,042	0.01105
COBBS CREEK HIGH LEVEL						
C_37	0	0.00000	0	0.00000	266	0.00070
C_36	0	0.00000	0	0.00000	294	0.00072
C_35	281	0.00074	281	0.00074	281	0.00074
C_34	0	0.00000	0	0.00000	678	0.00089
C_33	0	0.00000	0	0.00000	827	0.00098
C_32	1,564	0.00096	1,564	0.00096	2,034	0.00125
C_31	0	0.00000	0	0.00000	1,245	0.00121
C_18	0	0.00000	0	0.00000	225	0.00008
C_17	0	0.00000	0	0.00000	3,311	0.00011
C_16	0	0.00000	0	0.00000	174	0.00080
C_15	0	0.00000	0	0.00000	31	0.00007
C_14	0	0.00000	0	0.00000	72	0.00003
C_13	0	0.00000	0	0.00000	434	0.00026
C_12	0	0.00000	0	0.00000	80	0.00004
C_11	0	0.00000	0	0.00000	2,974	0.00140
C_10	218	0.00201	218	0.00201	653	0.00602
C_09	0	0.00000	0	0.00000	145	0.00006
C_07	0	0.00000	0	0.00000	255	0.00020
C_06	0	0.00000	0	0.00000	255	0.00020
C_05	0	0.00000	0	0.00000	11,993	0.01636
C_04A	0	0.00000	0	0.00000	8	0.00000
C_04	0	0.00000	0	0.00000	142	0.00021
C_02	0	0.00000	0	0.00000	261	0.00120
C_01	25	0.00004	25	0.00004	1,944	0.00256
TOTAL	2,088	0.00074	2,088	0.00074	28,022	0.00042

TABLE 2-1C, CONTINUED
SOUTHWEST SYSTEM STORAGE SUMMARY

MEAN TIDE

Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)
COBBS CREEK LOW LEVEL		
C_30	0	0.00000
C_29	0	0.00000
C_28A	32	0.00004
C_27	0	0.00000
C_26	0	0.00000
C_25	0	0.00000
C_24	0	0.00000
C_23	59	0.00054
C_22	0	0.00000
C_21	0	0.00000
C_20	0	0.00000
C_19	0	0.00000
TOTAL	91	0.00010
TOTALS	1,174,940	0.00553

MEAN HIGH TIDE

Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)
COBBS CREEK LOW LEVEL		
C_30	0	0.00000
C_29	0	0.00000
C_28A	32	0.00004
C_27	0	0.00000
C_26	0	0.00000
C_25	0	0.00000
C_24	0	0.00000
C_23	59	0.00054
C_22	0	0.00000
C_21	0	0.00000
C_20	0	0.00000
C_19	0	0.00000
TOTAL	91	0.00010
TOTALS	3,508,802	0.01539

CRITICAL ELEVATION + ONE FOOT

Site ID	TOTAL STORAGE (GAL)	TOTAL STORAGE (IN)
COBBS CREEK LOW LEVEL		
C_30	121	0.00019
C_29	240	0.00027
C_28A	730	0.00090
C_27	243	0.00032
C_26	53	0.00028
C_25	102	0.00008
C_24	521	0.00053
C_23	347	0.00320
C_22	1,731	0.00112
C_21	407	0.00043
C_20	238	0.00034
C_19	876	0.00055
TOTAL	1,997	0.00055
TOTALS	6,160,344	0.02252

locations. In particular, the eight existing computer-controlled gate facilities in the NEDD are effective in maximizing the use of in-system storage and should continue to be maintained in good working order.

Although not affected by tidal flucuations in the receiving water, it is possible for regulators at elevations above the tidal stages to be subjected to backflows from the smaller streams during periods of high streamflows. In order to protect these regulators from potential inundation, PWD is initiating a program to install tide gates or other backflow prevention structures at these regulators. As with tide gates, these structures will prevent in-system storage and combined sewer flow capture capacities from being depleted by inundation from the receiving stream. The specific locations and schedules for implementation of this program will be documented in future updates to this report.

The relatively large in-system storage volumes that are available in the PWD, especially in the SEDD where more than 0.1 inches of storage is available at the mean high tide elevation, suggests that RTC-based facilities for utilization of this storage may represent a viable option for CSO control under the LTCP. It is recommended that PWD's LTCP carefully evaluate RTC-based in-system storage as an alternative long-term CSO control strategy, with particular emphasis on this approach in the SEDD.

As a means to increasing the hydraulic capacity of slot regulators without diversion dams, it is recommended under NMC4 that the flow maximization plan include the addition of dams at these locations. There are 57 locations at which the addition of dams has been identified; 40 locations in the SWDD, 15 locations in the NEDD and 2 locations in the SEDD.   These locations are identified on Table 2-2. The additional storage volume that will be realized with the addition of dams at these locations can and should be estimated and factored into the implementation plan for these facilities.

As a means to increase both the hydraulic capacity of the regulators and the available in-system storage, it may be possible to raise the overflow weir elevation at selected regulator locations. For example, it may be possible to add one or more rows of bricks, stoplogs or concrete to a diversion dam. However, this technique must be implemented with great caution, as it is generally impractical to evaluate *a priori* the potential increase in the risk of flooding of building structures connected to the combined sewer system. It is generally more appropriate to implement the modification incrementally, e.g. add a single row of bricks, and observe the performance of the system during several relatively large rainfall events to evaluate the possibility of flooding problems before possibly raising the weir further. This approach should only be applied to outfalls above which there are no known flooding problems. Where flooding problems are observed, the reduced flow conveyance area associated with the higher diversion dam may exascerbate the existing problems.

The specific locations for any modifications to increase available in-system storage will be determined by merging the locations where potential storage increases can be most effectively realized (based on the information in Tables 2-1) with the regulator improvement locations to be defined under NMC4 (see Section 4 of this report). The specific locations and implementation schedules for any modifications will be documented in future updates to this report. This information will be developed considering operating criteria which define where improvements will be most effective, fiscal constraints on increased operating costs associated with greater flow volumes treated at the WPCPs, and the ability of the WPCPs to accept higher flowrates while continuing to meet NPDES permit conditions.

Table 2-2

Potential Additional Dams at Slot Regulators

Regulator	Type	Drainage District	Trunk Dia.-in.	Dam Height-in.
S03	SLOT	SW	36	6
S12	SLOT	SW	24	4
S12A	SLOT	SW	42	7
S13	SLOT	SW	36	6
S17	SLOT	SW	36	6
S35	SLOT	SW	30	5
S36	SLOT	SW	27	4
C01	SLOT	SW	42	7
C02	SLOT	SW	30	5
C04	SLOT	SW	30	5
C04A	SLOT	SW	63	10
C05	SLOT	SW	28	5
C06	SLOT	SW	48	8
C07	SLOT	SW	36	6
C09	SLOT	SW	54	9
C10	SLOT	SW	27	4
C12	SLOT	SW	39	6
C13	SLOT	SW	54	9
C16	SLOT	SW	30	5
C18	SLOT	SW	54	9
C32	SLOT	SW	42	7
C34	SLOT	SW	36	6
C35	SLOT	SW	24	4
C36	SLOT	SW	24	4
C37	SLOT	SW	24	4
S28	SLOT	SW	39	6
S30	SLOT	SW	39	6
S39	SLOT	SW	42	7

S40	SLOT	SW	66	10
S51	SLOT	SW	30	5
C19	SLOT	SW	42	7
C21	SLOT	SW	42	7
C23	SLOT	SW	27	4
C24	SLOT	SW	39	6
C25	SLOT	SW	42	7
C26	SLOT	SW	27	4
C27	SLOT	SW	39	6
C28A	SLOT	SW	36	6
C29	SLOT	SW	36	6
C30	SLOT	SW	42	7
D42	SLOT	SE	42	7
T03	SLOT	NE	60	9

Table 2-2, continued

Regulator	Type	Drainage District	Trunk Dia.-in.	Dam height-in.
T04	SLOT	NE	48	8
T05	SLOT	NE	42	7
T07	SLOT	NE	36	6
T09	SLOT	NE	48	8
T10	SLOT	NE	60	9
T11	SLOT	NE	36	6
T12	SLOT	NE	24	4
T13	SLOT	NE	57	9
T15	SLOT	NE	66	10
P01	SLOT	NE	42	7
P02	SLOT	NE	60	9
P04	SLOT	NE	39	6
F03	SLOT	NE	84	13
F12	SLOT	NE	54	9

Section 3
Minimum Control No. 3
Review and Modification of
Pretreatment Programs

3.1 INTRODUCTION

Minimum Control Measure No. 3 (NMC No. 3) requires the examination of industrial pretreatment programs and the development of program modifications as appropriate to reduce the environmental impact of combined sewer overflows (CSOs). Through the implementation of Control No. 3, EPA anticipates the control of "nondomestic discharges" to the combined sewer during storm flow. In this context, EPA defines non-domestic as "... industrial and commercial —restaurants, gas stations, etc..."

The process by which the implementation of these controls should be accomplished is identified in the EPA draft guidance, and in general, consists of three components:

- Prepare an inventory of nondomestic discharges to the system
- Assess the significance of the nondomestic discharges to the system
- Consider/evaluate alternatives and select new pretreatment program requirements to regulate the significant nondomestic discharges to the system

If the total number of nondomestic users contributing to the system is so large that regulations would be excessively burdensome, then the guidance allows that the emphasis of the program should be on those discharges having the greatest potential impact relative to CSOs.

The evaluation performed under NMC3, and details of the intended program modifications based on the evaluation, must be documented as part of the control. Documentation should include:

- The inventory of "nondomestic discharges" to the system
    - An assessment of the significance of the "nondomestic discharges" to the system
- A description of the program modifications
    - An assessment of the feasibility and effectiveness of pretreatment program modifications
- An estimate of the loading reduction of pollutants of concern based on the implemented changes
- A schedule for implementation of the program modifications

The remainder of this report identifies all actions taken by the Philadelphia Water Department (PWD) to evaluate NMC3.

3.2 OVERVIEW

The initial consideration for the effort is the extent of the nondomestic sewage discharge inventory. Before assessing the potential impact of nondomestic sewage discharges on CSOs and selecting new controls for these discharges, it is necessary to determine the criteria for identifying nondomestic discharges that are significant to CSOs.

3.2.1 PWD Sewer System

The sewers in the combined service areas accept and transport domestic sewage and industrial wastewater, along with stormwater runoff and some groundwater infiltration. Dry weather flow, consisting primarily of domestic sewage and industrial process wastewater, is intercepted at the system's diversion structures and conveyed by the interceptor system to one of the WPCPs for treatment. These interceptors also are conveying domestic sewage and industrial wastewater from separate sewer areas, which are located outside of the combined areas. While stormwater runoff from the combined areas is collected by the interceptors with the sanitary and industrial wastewater flow, runoff from the separate areas normally does not contribute to the interceptors.

In addition to interceptor system flow from the separate areas, there are direct discharges to interceptors from several industrial users located in the combined areas. These flows have minimal impact on CSOs because they are discharged directly to the interceptor system rather than to the combined sewer.

During wet weather, the stormwater runoff and the sanitary and industrial wastewater flow from the tributary combined areas usually exceed the capacity of the combined sewer. This results in the initial mode of overflow at the CSO points. The secondary mode occurs when the high volume of stormwater runoff causes the interceptors to exceed capacity and forces the interceptor flow out into the CSO points.

There also are portions of the separate sewer areas where flow ultimately discharges through intercepting sewers. Where ever process flows enter intercepting sewers, these process flows may impact CSOs in those combined areas during storm flow.

3.2.2 Existing Industrial Pretreatment Program

The PWD has wastewater control regulations that prohibit any discharges to the collection system that may be detrimental to the wastewater treatment processes, or ultimately, to receiving waters. These regulations establish specific load limitations for discharges to the system. The program also sets forth permitting requirements for certain wastewater dischargers.

All Significant Industrial Users (SIUs) contributing to the system must hold a wastewater discharge permit. SIUs are industrial users subject to any National Categorical Pretreatment Standard; any industrial users that discharge an average of 25,000 gallons per day or more of process wastewater to the system or contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the of the treatment plant; or any industrial users that are found by the City, PADEP, or EPA to have a reasonable potential, either alone or in conjunction with other discharges, to adversely affect the system. The program enables the PWD to monitor and enforce the requirements for discharging wastewater.

The City's sewer system serves 143 SIUs, which includes those located in the City of Philadelphia and those located in outlying communities. In Philadelphia, there are 118 nondomestic dischargers classified as SIUs. Table 3-1 lists these Philadelphia SIUs and provides the GIS Identification Number of each facility, depicting the geographical locations within the City of Philadelphia as shown in Figure 3-1 (located in the back of this report). The table also indicates the drainage district accepting flow from each user, and whether the service area for each facility location is combined or separate.

In addition, there are 15 SIUs that are not located in Philadelphia, but that have process flows conveyed through the City's sewer system. Discharges from these SIUs are located in other systems that flow by gravity into the City's sewer system. These SIUs are presented in Table 3-2, and will be incorporated into applicable program efforts.

Table 3-1

Philadelphia Water Department
Permitted Industrial Dischargers in City of Philadelphia

GIS Id No.	Drainage District	Significant Industrial User	Street	Interceptor	Subbasin	Comb./or Separate
1	NE	A.T.C.	11350 Norcum Rd.	UDLL	POQ4-S	S
2	NE	Abaco Platers	1814-20 E. Russell St.	SOM	D1920-B	C
3	NE	Abbey Color Inc.	400 E. Tioga St.	SOM	D25-B	C
4	NE	Abbotts	2103 Wishart St.	SOM	D22-B	C
5	SE	Acme Plating	712 Chestnut St.	LDLL	D54-D	C
6	NE	AcmeUniform	1900 E. Clemintine St.	SOM	D22-B	C
7	NE	Action Manufacturing	100 E. Erie Ave.	SOM	D25-B	C
8	NE	Aeco, Inc.	4923-25 Arendell St.	UDLL	UPD1-S	S
9	NE	Ajax	1900 Woodhaven Rd.	UDLL	POQ4-S	S
10	SE	All Brite Metal Finishing, Inc.	2148 E. Tucker St.	LDLL	D3738-D-DV	C
11	NE	Allied Fibers	Margaret & Bermuda	LFLL	F25-A	I (C)
12	NE	American Packaging Corp	Grant & Ashton Rd.	PP	PEN4-S	S
13	NE	Anchor Dye	Adams Ave. & Lieper St	UFLL	F05	C
14	SW	Angelica Health Care Services	58TH & Lindbergh Blvd.	LSWS	S45-C	C
15	SE	Anzon	2545 Aramingo Ave.	LDLL	D38-B	C
16	SE	Arbill Industries	2207 W. Glenwood Ave.	LDLL	R08-D	C
17	NE	Arway Uniform	1696 Foulkrod St.	UFLL	F11-B	C
18	SW	Belmont Water Treatment Plant	4300 Ford Road.	SWMG	S27-J	C
19	SW	C.C.A	5000 Flat Rock Rd.	CSES	UPS6-S	I (S)
20	NE	Cardone Industries	5660 Rising Sun Ave.	FHL	T04-A	C
21	SE	Cattie Galvanizing Corp.	CORP. 2520 E. Hagert St.	LDLL	D38-B	C
22	NE	CCL	4600 N. Fairhill St.	FHL	T14-C	C
23	SE	Chelsea Plating	920 Pine St.	LDLL	D54-E	C
24	NE	Chestnut Display Systems Inc.	6809 State Rd.	UDLL	D05-A	C
25	NE	Cintas	10080 Sandmeyer Lane	PP	PEN5-S	S
26	NE	Clean Rental Services, Inc.	4352 N. American St.	FHL	T14-A	C
27	SE	Columbia Silk Dyeing Co.,Inc.	1726 N. Howard St.	LDLL	D44-B	C
28	NE	Computer Components Corp.	3030 Darnell Rd.	UDLL	POQ4-S	S
29	SW	Connelly Container, Inc.	4368 Main St.	CSES	UPS6-S	I (S)
30	NE	Continental Baking	9801 Blue Grass Rd.	PP	PEN4-S	S
31	SE	Coopers Cooperage	320-326 Brown St.	LDLL	D45-B	C
32	SW	Coyne Laundry	4825 Brown Street	SWMG	S27-G	C
33	NE	Cutler Dairy Products	612 W. Sedgly Ave.	SOM	D25-F	C
34	NE	Delaware Valley Wool	3419 Richmond Ave.	SOM	D21	C
35	NE	Dietz & Watson	5701 Tacony St.	UDLL	D11-A	C
36	NE	Domestic Linen	4100 Frankford Ave.	UFLL	F06	C
37	SW	DuPont	3500 Grays Ferry	LSES	S31	I (C)
38	NE	Durand Products, Inc.	11200 H Roosevelt Blvd.	UDLL	POQ4-S	S
39	NE	Frankford Plating	2505 Orthodox St.	LFLL	F25-B	C
40	NE	Franklin Smelting & Refining Corp.	Castor Ave. E. of Richmond St.	SOM	D17	C
41	SE	Freda Corp. Inc.	1334 S. Front St.	LDLL	D65	C
42	SW	G. Whitfield Richards Co.	4202 Main St.	CSES	UPS6-S	S
43	NE	Garfield Refining Co.	810 E. Cayuga St.	FHL	T14-A	C
44	NE	Gatx Terminals Corp.	Allegheny & Delaware Ave.	SOM	D22-A	C
45	NE	GE Apparatus Shop	1040 E. Erie Ave.	SOM	D1722-DV	C
46	NE	General Felt Industries, Inc.	2121 Wheatsheaf Lane	UFLL	F12	C
47	NE	Gilbert Spruance Co.	3501 Richmond St.	SOM	D19	C
48	NE	Globe Dye Works	4550 Worth Street	UFLL	F11-A	C
49	SW	Good Humor Corporation	43Rd & Woodland Ave.	SWMG	S50-A	C
50	NE	Gross Metal Products	P.O. BOX 46096	SOM	D25-D	C
51	NE	Harvey M. Stern	6350 Germantown Ave.	FHL	T14-R	C
52	NE	Heintz Corp.	11000 Roosevelt Blvd.	UDLL	POQ4-S	S
53	NE	Henshell	2922 N. 19th	SOM	R07-G	C
54	NE	Hillock Anodizing, Inc.	5101 Comly St.	UDLL	D08	C
55	SW	Hygrade	8400 Executive Ave.	CCLL	MIN2-S	S
56	NE	Imperial Metal & Chemical Co.	2050 Byberry Rd.	UDLL	POQ4-S	S
57	SE	Inolex	Jackson & Swanson	LDLL	D68-C	C
58	NE	International Paper Co.	2100 Byberry Rd.	UDLL	POQ4-S	S
59	NE	Janbridge	Van Kirk & Walker	UDLL	D07-A	C
60	SE	Jerome Foods	1401 N. Delaware Ave.	LDLL	D41	C
61	NE	John V. Potero Co.	4225-35 Adams Ave.	UFLL	F06	C
62	SE	JWS Delavau	2140 Germantown Ave.	LDLL	D39-C	C
63	NE	Kelly's Cooperage	2173 E. Rush St.	SOM	D25-A	C
64	NE	Kurz Hastings	Dutton and Darnell	UDLL	POQ4-S	S
65	SW	LaFrance Corporation	8425 Executive Ave.	CCLL	MIN2-S	S

Table 3-1 (continued)

Philadelphia Water Department
Permitted Industrial Dischargers in City of Philadelphia

GIS Id No.	Drainage District	Significant Industrial User	Street	Interceptor	Subbasin	Comb./or Separate
66	NE	Lannett Co. Inc.	9000 State Rd	PP	PEN1-S	S
67	SW	Laurel Linen Service	4601 Girard Ave.	SWMG	S27-G	C
68	NE	Lavelle Aircraft Co.	275 Geiger Rd	PP	PEN5-S	S
69	NE	Lustrik	4329 Paul St.	UFLL	F11-A	C
70	NE	Martin's Metal Specialties	7327 State Rd.	UDLL	D02-A	C
71	NE	Max Levy Autograph Inc.	220 W. Roberts Ave.	FHL	T14-K	C
72	NE	McWhorter	7600 State Rd.	UDLL	D02-A	C
73	NE	Merin Studios	Grant Ave. and Ashton Rd	PP	PEN4-S	S
74	NE	Michel's Bakery Inc.	5698 Rising Sun Ave.	FHL	T04-B	C
75	NE	Model Finishing	4949 Cottman Ave.	UDLL	D02-A	C
76	SE	Mrs. Resslers	175 W. Oxford St.	LDLL	D44-B	C
77	NE	Mutual	1100 Orthodox St.	UFLL	F04-B	C
78	NE	Nabisco Biscuit Co.	12000 East Roosevelt Blvd.	UDLL	POQ4-S	S
79	SE	National Chemical	401 N. 10th St.	LDLL	D48-D	C
80	NE	Neatsfoot Oil Refineries, Inc.	East Ontario & Bath Sts.	SOM	D20	C
81	NE	Newman & Co.	6101 State Road	UDLL	D07-A	C
82	NE	Paper Manufacturers Co.	9800 Bustleton Ave.	PP	PEN4-S	S
83	NE	Parachem Southern, Inc.	3325 Rorer St.	SOM	D22-C	C
84	NE	Penn Maid Foods Inc.	2701 Red Lion Rd.	UDLL	POQ4-S	S
85	SW	Penn Tackle	3028 W. Hunting Park Ave.	CSES	SO1T	S
86	NE	Penn Ventilator	Amber & Venango St.	SOM	D18	C
87	NE	Pepsi Cola	Roosevelt Blvd. & Comly Rd.	UDLL	POQ4-S	S
88	NE	Phila. Rustproof	Amber & Willard	SOM	D2122-DV	C
89	SW	Phila. Thermal	2600 Christian St.	CSES	S25	C
90	NE	Philadelphia Baking Co.	9088 Blue Grass Rd.	PP	PEN4-S	S
91	NE	Philadelphia Coca-Cola Bottling Co.	725 E. Erie Ave.	SOM	D1722-DV	C
92	NE	Philadelphia Gas Works	Venango St.	SOM	D18	C
93	SW	Philadelphia Gas Works	3100 Passyunk Ave.	LSES	S42A-B	C
94	SW	Philadelphia Newspapers Inc.	400 N. Broad St.	CSES	S0607-DV	C
95	NE	Premier Medical	10090 Sandmeyer Lane	PP	PEN5-S	S
96	NE	Purolite	3620 G St.	SOM	D1722-DV	C
97	SE	Queen Lane Water Treatment Plant	3110 Queen Lane	UWHL	WIS1-S	S
98	NE	Ready Foods	10975 Dutton Rd	UDLL	POQ4-S	S
99	NE	Regal International Leather	3795 Sepviva St.	UFLL	F12	C
100	NE	Richlyn Laboratories AKA Global	3775 Kensington Ave.	UFLL	F08	C
101	NE	Rohm Haas	5000 Richmond St.	LFLL	F24	I (C)
102	NE	Sanofi	1741 Tomlinson Rd.	UDLL	POQ4-S	S
103	SW	Smith-Kline Beecham	1530 Spring Garden St.	CSES	S0607-DV	C
104	NE	Soabar	7700 Dungan Rd.	PP	PEN3-S	S
105	NE	SPD	13500 Roosevelt Blvd.	UDLL	POQ4-S	S
106	NE	Stone Container Co.	Tulip & Decatur	PP	P05	C
107	NE	Stone Container Corp.	9820 Blue Grass Rd.	PP	PEN4-S	S
108	SW	Tank Cleaning Inc.	67th & The Schuylkill River	LSWS	S45-B	C
109	SW	Tasty B Baking Co.	2801 W. Hunting Park Ave.	CSES	SO1T	S
110	SE	U.S.Mint	5th & Arch Streets	LDLL	D53-B	C
111	NE	United Color	2940 E. Tioga St.	SOM	D19	C
112	SW	US Banknote	55TH & Sansom Sts.	CCHL	R01-B	C
113	SE	US Uniform	900 Jefferson St.	LDLL	D45-E	C
114	NE	Valley Proteins, Inc.	3000 E. Ontario St.	SOM	D20	C
115	NE	Viz Manufacturing Co.	335 E. Price St	FHL	T14-Q	C
116	SE	Wade Technology, Inc.	445 N. 11th St.	LDLL	D48-D	C
117	SE	Wolf	1633 N. 2nd St.	LDLL	D44-B	C
118	SW	Yeager Industries, Inc.	2615 Hunting Park	CSES	SO1T	S

Table 3-2

Philadelphia Water Department
Permitted Industrial Dischargers Outside of City
(Bucks and Montgomery Counties)

Drainage District	Significant Industrial User	Street	Interceptor
NE	Arrowhead Industrial Water, Inc.	95 Lower Morrisville Road	UDLL
NE	Atochem	2375 State Road	UDLL
NE	Automotive Rebuilders	1670 b Winchester Road	UDLL
NE	C.W. Industries	130 James Way	UDLL
NE	Curtiss Laboratories	2510 State Road	UDLL
NE	Fleetwash Mobile	various	UDLL
NE	Ketema	2115 Sate Road	UDLL
NE	Keystone Shower Door Company	2nd Street Pike & Keystone Road	closed
NE	Matlack Trucking	1000 Imperial Road	UDLL
NE	Northeast Environmental	1224 Hayes Road	UDLL
NE	Q Tech	Bldg. BC, Heddly Place	UDLL
NE	Sixtron Circuits	1660 Loretta Ave.	UDLL
NE	SPS Technologies Inc.	Highland & Mt. Carmel Streets	FHL
NE	United Chemical Technology	2731 Bartam Ave.	UDLL
NE	Vibroplating Co.	356 Camer Drive	UDLL

There are 10 SIUs located in the Delaware County Regional Sewer Authority (DELCORA) service area that have process flows that are pumped by a force main to the plant. The DELCORA SIUs are not considered potential contributors to CSOs and are not addressed by this program effort.

All of these SIUs are required to conduct periodic monitoring of their process flow, develop spill prevention plans, and are subject to facility inspections by the PWD industrial staff.

The remaining nondomestic dischargers to the system are subject to the general provisions of the City's Wastewater Control Regulations under the Industrial Pretreatment Program in the PWD service area and are not considered to be a major impact to the system based on individual discharge volume or pollutant loading.

3.3 PWD APPROACH TO MINIMUM CONTROL NO. 3

The PWD recognizes that the CSO Policy requirements are intended to control discharges upstream of CSOs during wet weather, should the discharges have the potential to adversely impact water quality. In general, the overall objective is to develop and implement effective modifications to the existing pretreatment program as appropriate for minimizing CSO impacts from industrial facilities for the long term. Current wastewater or industrial discharge permit holders within the service area, the current SIUs, clearly are encompassed by EPA's definition of nondomestic user. These nondomestic users have discharge permits due to the size and nature of their process discharges, and they have the greatest nondomestic potential impact with regard to CSOs based on these discharges. For these reasons, PWD has focused on the currently permitted users SIUs in the Philadelphia area in developing the inventory of nondomestic users, and the evaluation has been performed using the process flow information from the SIUs located within the City of Philadelphia.

The assessment of the significant nondomestic discharges, as conducted for this minimum control, provides an understanding of what potential impacts on CSOs can be expected in terms of discharge volume and pollutant loadings.

3.4 DETAILS OF MINIMUM CONTROL IMPLEMENTATION

As described in Section 3.2, process flow from both separate and combined service areas can discharge through CSOs. For this reason, the examination of the pretreatment program and the assessment of nondomestic discharges will include all SIUs in the Philadelphia area. For the purpose of the process flow assessment, the inventory of nondomestic discharges to the system has been developed from the 118 permitted system users in PWD's system, and the geographical locations of these users are shown in Figure 3-1.

3.4.1 Development of Inventory of SIUs and Process-related Pollutant Loadings

In accordance with EPA's guidance, PWD has prepared an inventory of the pretreatment program permittees and the loadings for the pollutants for which the process flow is monitored. The locations of these nondomestic discharges have been identified in Figure 3-1 for documentation under this Minimum CSO Control. For the purpose of this report, the data summarized for each of the SIUs includes the process flow as monitored by PWD and the parameters as they appear in each user permit. This information is included in Appendix B.

3.4.2 Process Flow Assessment

The assessment was performed to determine the relative potential impacts on CSOs based upon process flow quantities from the users and the associated potential contribution of pollutants. The effort consisted of first estimating flow volumes and pollutant mass loadings in process discharges from industries at each plant, all of which was obtained from the PWD monitoring data. The process flow volumes then were compared to wastewater flow volumes from other sources in the combined sewer areas of the City to determine whether the industrial process water flows are significant in a relative sense. Finally, the estimates of process water flows were compared with all sources of flow, including stormwater runoff volumes from the CSO areas.

The evaluation of the industrial process flows from the entire City relative to the City's total dry weather wastewater flows and the total stormwater runoff flows from the combined sewer areas was performed on an annual basis to elucidate the potential significance of process water flows to the City's CSO discharges.

Table 3-3 provides a summary of the flow sources at each of the three plants, including the industrial flow contributed by the SIUs in the City of Philadelphia. To assess the CSO impact of process flow, specific information relative to wet weather and industrial discharge procedures was required. The real potential for CSO discharges of industrial wastewater flow is limited to periods of actual runoff, which is approximately 500 hours on an annual basis (PWD CSO System Hydraulic Characterization Report; June, 1995).

Table 3-3 shows the flow during the annual runoff period for each of the wastewater treatment plants and the corresponding percentages of process flow to dry weather flow and source stormwater flows. City-wide, on an annual basis, industrial wastewater process flows, including water treatment plant (WTP) discharges, are estimated to contribute approximately 5.3% of the total dry weather wastewater flow and 1.4% of the total of dry weather flows and CSO-area-related stormwater runoff volumes. WTP discharges in the City's system account for an annual 4,748 million gallons (MG) of industrial flow, or about 271 MG during runoff periods. These discharges comprise some process sludge; however, the majority of the flow is filter backwash which is nonindustrial in nature. Therefore, an evaluation of the flow excluding the WTP discharges indicates that process flow contribution to total dry weather flow and total flow from all sources is as low as 2.5% and 0.6%, respectively.

Table 3-3

Philadelphia Water Department
CSO Program
Process Flow Contribution
at Plant

Plant	No. of Permitted Users	Total Permitted Industrial Flow During Runoff Periods (MG/Year)	Total Dry Weather Flow (DWF) During Runoff Periods (MG/Year)	Total Industrial Runoff Volume from CSO Areas (MG/Year)	Total Non-Industrial Runoff Volume from CSO Areas (MG/Year)	Total Runoff Volume from CSO Areas (SWRO) (MG/Year)	Total DWF + SWRO (MG/Year)	Range of CSO Discharge (MG/Year)
Northeast	79	145	4,439	2,245	11,010	13,255	17,694	7,430 - 10,150
Southeast	19	217	2,161	838	5,318	6,156	8,317	3,130 - 4,320
Southwest	20	148	3,072	792	7,807	8,599	11,671	4,070 - 5,610
Total	118	510	9,673	3,875	24,135	28,010	37,683	14,630 - 20,080

Plant	Permitted Industrial Flow	
	% Contribution DWF	% Contribution DWF + SWRO
Northeast	3.27%	0.82%
Southeast (With WTP/Without WTP)	10% / 0.4%	2.6% / 0.1%
Southwest (With WTP/Without WTP)	4.8% / 2.8%	1.3% / 0.7%
Total (With WTP/Without WTP)	5.3% / 2.5%	1.4% / 0.6%

Notes:
1. Evaluation of Process Flow Contribution does not include flow from SIUs located outside of the City.
2. Total DWF at Plant based on 1993 monitoring data.
3. Permitted industrial flow obtained from PWD monitoring data. See Appendix B, Tables 1, 2 and 3.
4. Baseflow is difference between total flow and permitted industrial flow.
5. Annual Runoff Period @ PWD = 3 Weeks or 21 days (or 500 hours).
6. SWRO= Industrial Runoff Volume from CSO Areas + Non-Industrial Stormwater Runoff Volume from CSO Areas

These estimates of the potential industrial process flow that discharge through CSOs are believed to be highly conservative for the following reasons:

- Contribution of process flow to overflow can only exist during actual periods of industrial discharges, and only the portion of process flow that is in the system during overflow periods may be discharged through a CSO. Since the majority of the current SIUs discharge during a 5-day work week and for an 8-hour shift, process flow from these industries may contribute to overflows during as little as 120 hours per year.

- The 500 hours used in the calculation represent the average annual hours of runoff. The actual average hours of CSO discharge is estimated to be closer to one half of that value.

- Some industrial flows discharge directly to the interceptor system. Some of the largest SIUs in the PWD service area, including Rohm & Haas, Allied Fibers, CCA and Connelly, discharge directly to interceptor system, where the opportunity for contributing to CSOs is reduced.

In accordance with EPA's CSO guidance, the process flow assessment should include a review of the system to ascertain whether the industrial discharges are concentrated in certain areas, thereby having the potential to impact specific overflow points. A review of the SIUs within the PWD system determined that the geographical distribution of these SIUs is such that there are no concentrated areas of permitted industrial discharges to an outfall. Based on the process flow assessment performed for this minimum control, no significant contributors of specific pollutants implicated in water quality problems were identified. In summary, the assessment indicates that the process flows are not significant contributors to CSOs.

3.4.3 Evaluation of Feasible Program Modifications

Because the relative contribution of industrial flows from the SIUs to the total dry weather flow to the City's system is small, the effect of increasing pollutant controls is expected to be small. However, the PWD proposes a proactive approach to evaluating opportunities for minimizing discharges of process flow during wet weather. PWD will accomplish this through the collection of information from the SIUs during interviews by PWD Industrial Waste Unit (IWU) inspectors during the semi-annual facility visits.

The PWD will utilize the information obtained to evaluate, on a site-by-site basis, the feasibility and effectiveness of process flow controls. In the event that low cost/no cost opportunities exist to reduce the discharge of process flows during wet weather, PWD will work with the industries to establish a protocol for reducing these flows.

3.5 SUMMARY

In accordance with EPA's CSO Policy and the requirements for NMC3, the industrial pretreatment program has been examined. Although modifications of the pretreatment program, based on the examination, do not appear to be necessary, continued efforts by PWD will include consideration of process flow controls deemed effective. PWD will document inspections, interviews, evaluations of no cost/low cost opportunities, scheduling and implementation of wet weather discharge minimization as part of this effort.

Appendix B

Summary of SIUs and Monitored Process Flow.

Table 1: Northeast Drainage District

Table 2: Southeast Drainage District

Table 3: Southwest Drainage District

Section 4
Minimum Control No. 4
Maximize Flow to the WPCPs

This section provides the documentation for Minimum Control Measure No. 4 NMC4 - Maximizing Flows to the POTW. NMC4 is defined as: "As a minimum control, maximizing flow to the publicly owned treatment works (POTW) means making simple modifications to your CSS and treatment plant to enable as much wet weather flow as possible to reach the treatment plant and receive treatment. The secondary capacity of the treatment plant should be maximized, and all flows exceeding the capacity of secondary treatment should receive a minimum of primary treatment (and disinfection, when necessary)."

4.1 FLOW MAXIMIZATION STRATEGY

The overall objective of this minimum control is to reduce the frequency, duration, and volume of CSOs by maximizing flows to the POTW through simple modifications to the CSS and treatment plant.

As part of the execution of NMC4 EPA suggests that the following activities/analyses be considered:

a. Determine the capacity of the major interceptor(s) and pumping station(s) to deliver flows to the treatment plant.

b. Analyze existing flow records to identify flows processed by the plant during wet versus dry periods and determine relationships between performance and flow.

c. Compare current flows with the design capacity for the overall facility, as well as for individual unit processes. Identify where available excess capacity exits.

d. Determine the ability of the facility to operate acceptably at incremental increases in wet weather flows and estimate the effect on POTW's compliance with its permit effluent limits.

e. Identify any old, currently inoperative/unused treatment facilities on the POTW site and whether or not it's possible to use them to store and/or treat wet weather flows.

f. Determine the effect of septage discharges to the collection system and/or treatment facility during periods when wet weather flows are being processed. Assess the feasibility of prohibiting septage discharges during these periods.

g. Develop cost estimates for the physical modifications you intend to make and the O&M costs at the treatment plant due to the increased wet weather flow.

Item a presently is being performed as part of the overall CSS modelling effort and CSO program. Items b and c for currently permitted plant and unit process conditions were performed as part of January 1995 report prepared by Greeley and Hansen, titled "CSO Mitigation Through Rating Analysis for Northeast WPCP, Southeast WPCP, Southwest WPCP". Item d will require the performance of stress testing at each WPCP and will be addressed in the Long Term Control Plan (LTCP) submittal (September 1996). Items e and f are discussed later in this report. Item g will be addressed as part of the LTCP.

Maximization of flow to the WPCPs involves examining both the WPCPs and the system of regulators and interceptor sewers that delivers flow to them. Maximum use of the existing collection and treatment facilities for CSO reduction is achieved when the maximum hydraulic capacity of the collection system is made available to capture combined sewer flows during wet weather, and when the treatment facilities remove the maximum pollutant load from the captured flow that the facilities are capable of processing under the existing permits. Although this may mean that excess flows (flows exceeding plant capacity) are captured more often, this represents positive CSO control for two reasons: (1) maximum pollutant removal is realized during periods when the full plant capacity is used, which only occurs when flows equal or exceed plant capacity; (2) if more flow is captured at upstream CSO locations, along the more sensitive receiving stream reaches, CSO impacts are mitigated, even if the captured flow must later be discharged at locations further downstream, where CSO impacts are less severe.

The flow maximization strategy therefore focuses on identifying modifications to the existing collection system that result in higher rates of combined sewer flow capture, establishing wet-weather WPCP operating protocols that maximize pollutant removal within permit limitations, and defining an implementation plan for staging the proposed modifications to maximize the benefits of increased flow capture.

The EXTRAN model of the interceptor sewers and regulators developed for hydraulic characterization during SHCR development formed the basis for examining various scenarios for maximizing flow capture. The SHCR defined the baseline for existing conveyance capacities in the system and from that analysis it was determined that the regulator structures generally limited the capacity of the existing system to capture wet-weather flow. Flow maximization strategies therefore focused a significant effort on regulator adjustments and modifications that can be implemented to increase flows. Hydraulic control points or other constraints in the interceptor system were also examined to determine if appropriate modifications are feasible for low maximization. The EXTRAN models of the interceptor sewers and regulators were revised to represent in the models the modifications to the regulators and other structures that were developed to maximize flow capture. EXTRAN simulations were performed using the modified representations of the system to quantify the increases in conveyance capacities throughout the system.

Reductions (or increases in some locations) in CSO frequencies and volumes resulting from the simulated flow maximization scenarios have been quantified using the STORM models of the combined sewer drainage area. STORM simulations have been performed for each of the combined sewer drainage areas using the EXTRAN-defined capacities for the flow maximization scenarios and the resulting CSO characteristics have been compiled and compared to those of the existing conditions.

4.2 DEVELOPMENT & SIMULATION OF FLOW CONVEYANCE IMPROVEMENT STRATEGIES

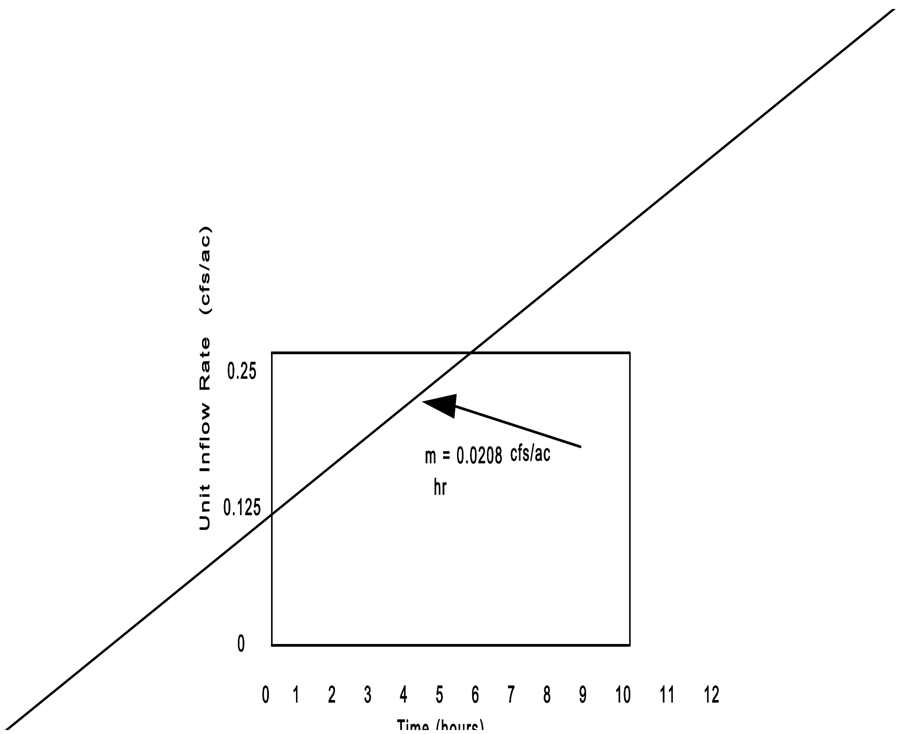
Existing conditions in the PWD combined sewer system do not maximize use of interceptor conveyance. A majority of the combined sewer regulators in the PWD service area limit flow into the interceptors, preventing full use of interceptor capacity. These conditions are documented in the System Hydraulic Characterization Report (SHCR; PWD; June 27, 1995).

Maximization of flow capture from a combined sewer system requires maximum use of interceptor conveyance. Since flow in PWD's interceptor systems is generally limited by regulator capacities, increases in regulator capacities will allow more combined flow to enter the interceptor system for treatment. This will generally decrease combined sewer overflow volumes and/or frequencies. Model simulations show that increases in regulator capacities due to flow conveyance improvements will vary depending on existing conditions. The simulations of conveyance improvement scenarios show that in some cases, especially at locations near the downstream end of the interceptors, individual regulator capacities may actually decrease due to surcharging of the interceptor caused by the increased conveyance of flow from other regulators within the interceptor sub-system. However, in each case overall net increases in flow capture are indicated for the system-wide conveyance improvement scenarios simulated to-date.

Hydraulic models were developed to represent the hydraulic response to a ramped (linear) inflow hydrograph (see Figure 4-1) for each of the seven types of regulators maintained by PWD:

- Slot Regulators
- Static Dam Regulators
- Manual Sluice Gates
- Computer Controlled Sluice Gates
- Water Hydraulic Sluice Gates
- Automatic Brown & Brown
- Computer Controlled Brown & Brown

Figure 4-1
Typical Synthetic Inflow Hydrograph



The existing condition models of the regulators developed for the SHCR generally operated externally to EXTRAN and generated synthetic outflow hydrographs for input to EXTRAN. These regulator types and existing condition EXTRAN model representations have been described in detail in the SHCR.

Modification scenarios for slot, manual sluice gate, water hydraulic sluice gate, and automatic Brown & Brown regulators were developed and simulated to evaluate maximization of their conveyance capacities. These scenarios comprise system-wide modifications to establish global changes in the system hydraulics associated with the improvements. During implementation of the improvements, it is expected that a wide variety of incremental (rather than system-wide) improvement scenarios will be developed and simulated to establish the specific influence of specific improvements. Existing conditions for static dam, computer controlled sluice gate, and computer controlled Brown & Brown regulators were not altered in the conveyance improvement scenarios because maximized capacities currently exist for these regulators.

Two flow maximization scenarios were evaluated for the various types of regulators in the PWD service area. The first flow maximization scenario assumes existing regulating gates on all automatic Brown & Brown, water hydraulic sluice gate, and manual sluice gate regulators are opened to the maximum settings and orifice plates are removed. Maximized gate settings were determined using field verified data collected during regulator inspections described in the SHCR. Slot regulators are simulated with slot plates in the full open position, and the DWO pipe is assumed to function as the controlling structure. For slots without dams, a dam was added to the model to divert additional flow to the interceptor. The simulated dam dimensions were based on the dimensions of existing dams at slot regulators in the PWD service area. Analysis of 13 existing slot regulators with dams yielded a consistent relationship between the trunk height (diameter) and the dam height. Trunk diameters ranged from 3 feet to 12 feet for these slot regulators, and the results of this analysis found that dam heights are approximately 15% of the trunk diameter. Therefore, for slots without dams, a dam was simulated downstream of the slot with a height equal to 15% of the trunk height. This first flow maximization scenario represents the maximum capture that can be achieved with reasonable modifications to the existing facilities.

The second flow maximization scenario assumes gates on all automatic Brown & Brown, manual sluice gate, and water hydraulic sluice gate regulators have been removed or modified so that the DWO pipe is the controlling structure. Slot regulators were modeled identically for both alternatives. This scenario represents the existing system operating at the maximum possible capture potential, with any modifications necessary to eliminate hydraulic constrictions at the regulators, and therefore effectively represents a theoretical limit on conveyance capacity, rather than a practical improvement scenario.

Changes were made in the model representations of regulators in both flow maximization scenarios. Unlike model representations of existing conditions, CSO regulators in maximization scenarios were modeled both externally and internally in the EXTRAN. Automatic Brown & Brown, water hydraulic sluice gate, manual sluice gate, and some slot regulators were modeled internally in the EXTRAN model. Ramped hydrographs similar to Figure 4-1 were loaded upstream of these regulators, and capacities were defined as flow rates through the regulator as overflows first occurred. The remaining slot regulators were modeled externally to EXTRAN as orifices with invert elevations and DWO dimensions taken from field verified measurements.

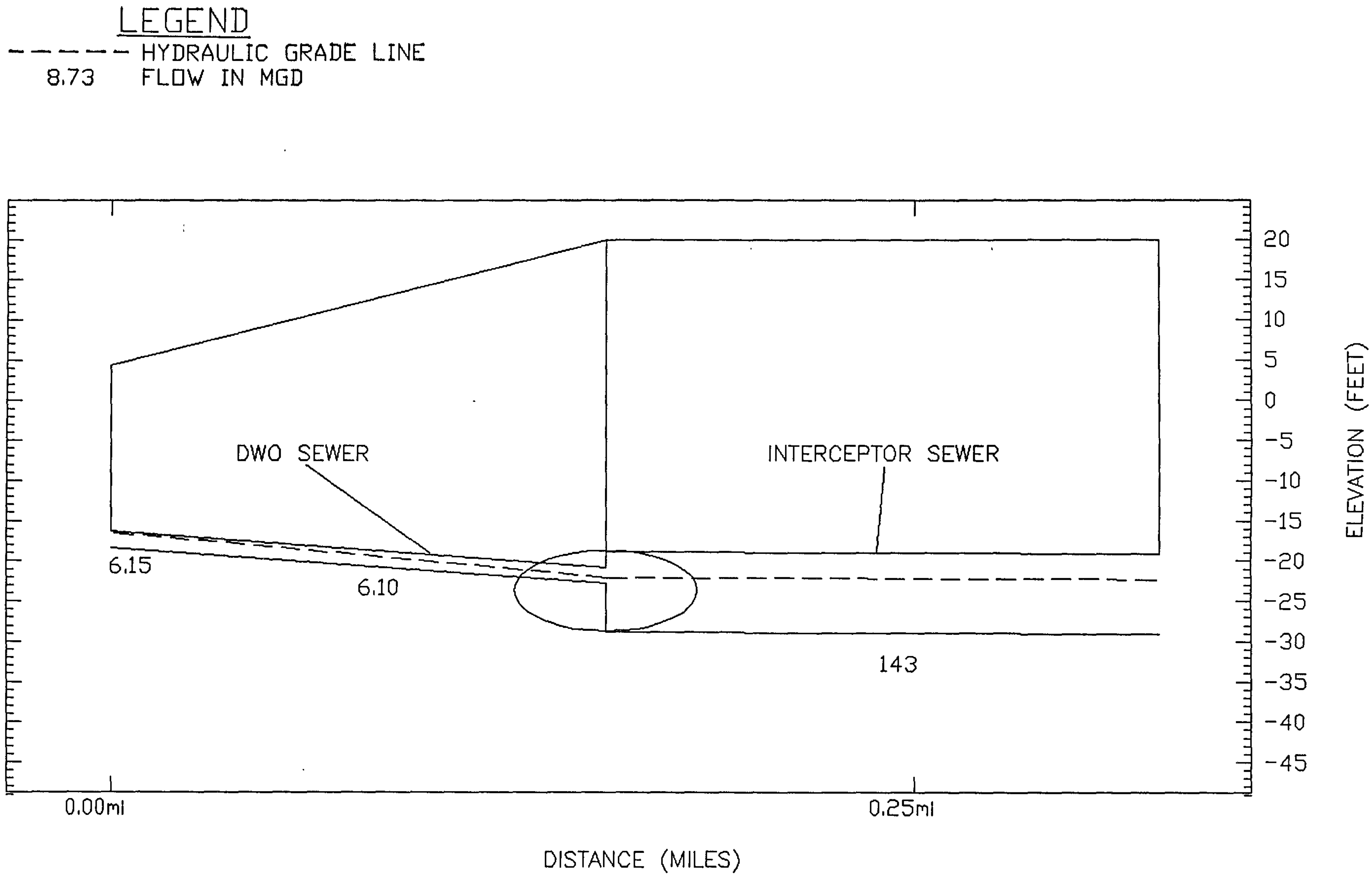
An additional change in model representation of regulators from the SHCR includes the influence of tides on treatment rates. Where tide gates exist, the maximum allowable head on the regulator prior to an overflow was set equal to the mean tide elevation or tide gate invert whichever was higher. If the regulator is not tidally influenced, the maximum allowable head was set equal to the crest of downstream diversion structure. These changes were applied to both flow maximization scenarios.

An example of the increased hydraulic capacity provided by the modification of the Brown & Brown regulators is shown on Figures 4-2a and 4-2b. Figure4-2a shows the existing hydraulic profile at site D66 at the start of overflow, at which point 6.10 mgd is delivered to the interceptor. Figure 4-2b shows the same profile at D66 after the structure has been modified to eliminate the orifice plate at the connector pipe and the regulating gate maintained in the full open position. In this modified condition, D66 delivers 8.70 mgd (over 40% more flow) to the interceptor at the start of overflow. On a sub-system basis, regulator modifications can increase interceptor capacity utilization. An example of this is shown on Figures 4-3a and 4-3b. Figure 4-3a shows the existing hydraulic profile of the Oregon Avenue interceptor when all associated regulators are overflowing, at which point significant capacity in this interceptor is not being utilitized and only 14.3 mgd is being delivered to the main stem from the north branch. Figure 4-3b shows the same interceptor sub-system after regulator modifications have been made, with the interceptor fully utilized and 20.6 mgd being conveyed to the main stem by the north branch.

Combined sewer overflow statistics were generated in the STORM model based on individual regulator conveyance capacities (refered to as "treatment rates" in STORM). STORM performs continuous simulations to characterize CSOs using the Rational Method (modified to account for depression storage) to compute runoff, adjusts flow rate for dry weather flows in the CSO system, and routes these flows through storage and treatment at each time step (a more detailed description of the STORM model is given in Section 2.4 of the SHCR). The STORM model was applied to the PWD combined sewer system under existing conditions and both maximization scenarios to develop CSO frequency and volume statistics. The model was applied to all combined sewer areas tributary to a CSO regulator, storm relief diversion, and flow diversion structure. Overflow statistics (frequencies and volumes) were developed for each regulator which discharges to a receiving stream or to a relief sewer which conveys the overflow to a downstream outfall location.

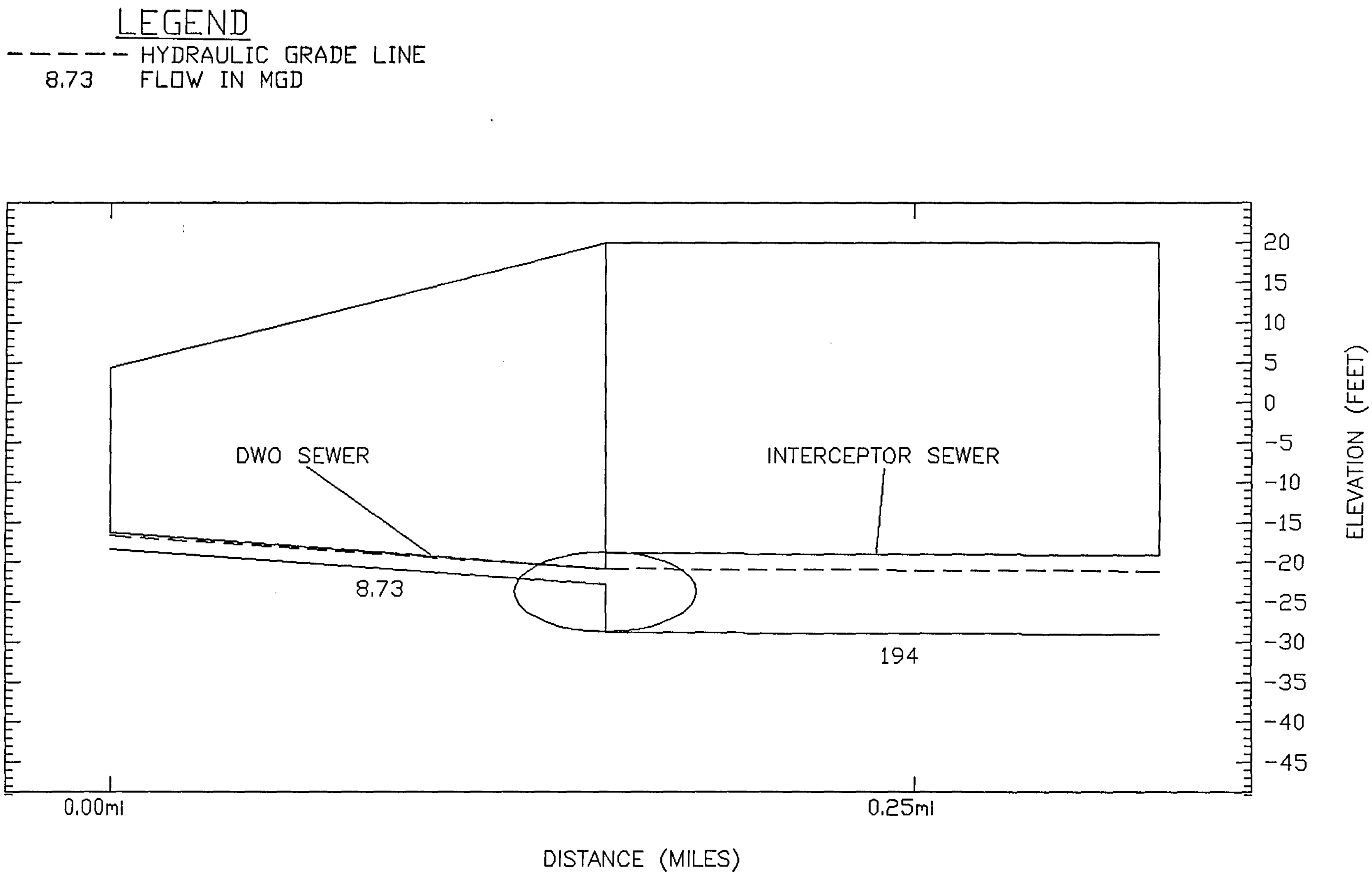
For each flow maximization scenario, four STORM runs were performed. The first computed average annual frequencies based on the low range of in-system storage and depression storage as defined in Section 3.3 of the SHCR. The second simulation computed frequencies based on the high range of in-system and depression storage. The third and fourth simulations computed volumes based on high and low ranges of in-system storage.

The STORM model was run for both flow maximization scenarios and compared with output from the existing condition scenario. Both a high and a low STORM treatment rate were obtained from the EXTRAN simulations for each regulator in the conveyance improvement scenarios. Former rate represents the maximum flow through the regulator prior to an overflow, and was used in STORM to generate overflow frequency statistics. The latter rate represents the treatment rate that can be sustained, which is often less than the maximum rate, and was used in STORM to generate volume statistics. This lower treatment rate generally occurs once interceptor capacity has been maximized, and the hydraulic grade line in the interceptor rises high



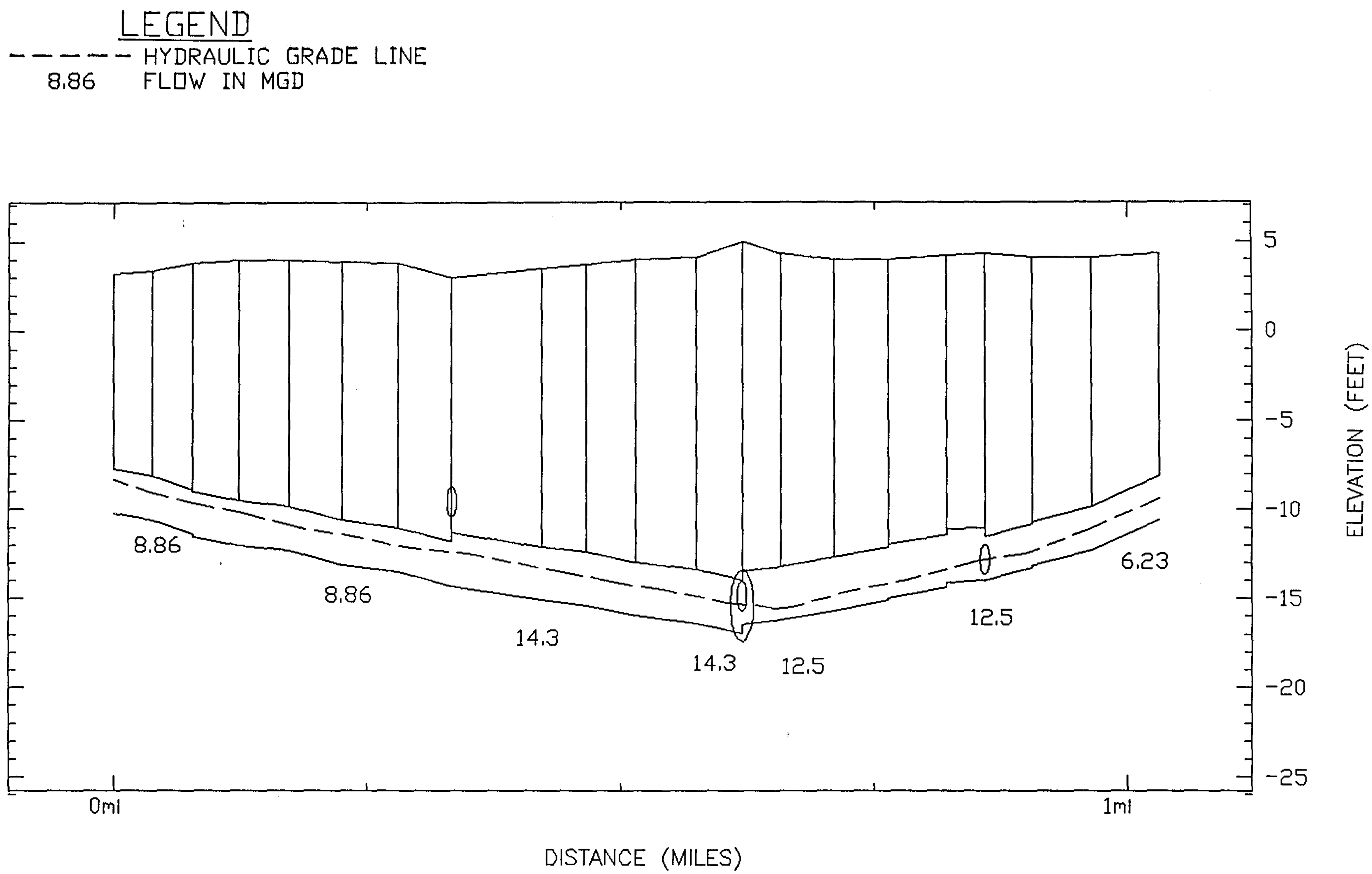
TYPICAL BROWN & BROWN REGULATOR PROFILE AT OVERFLOW, EXISTING CONDITIONS

PHILADELPHIA WATER DEPARTMENT CAMP DRESSER & MCKEE	FIGURE 4-2a	NINE MINIMUM CONTROLS REPORT SEPTEMBER 27, 1995



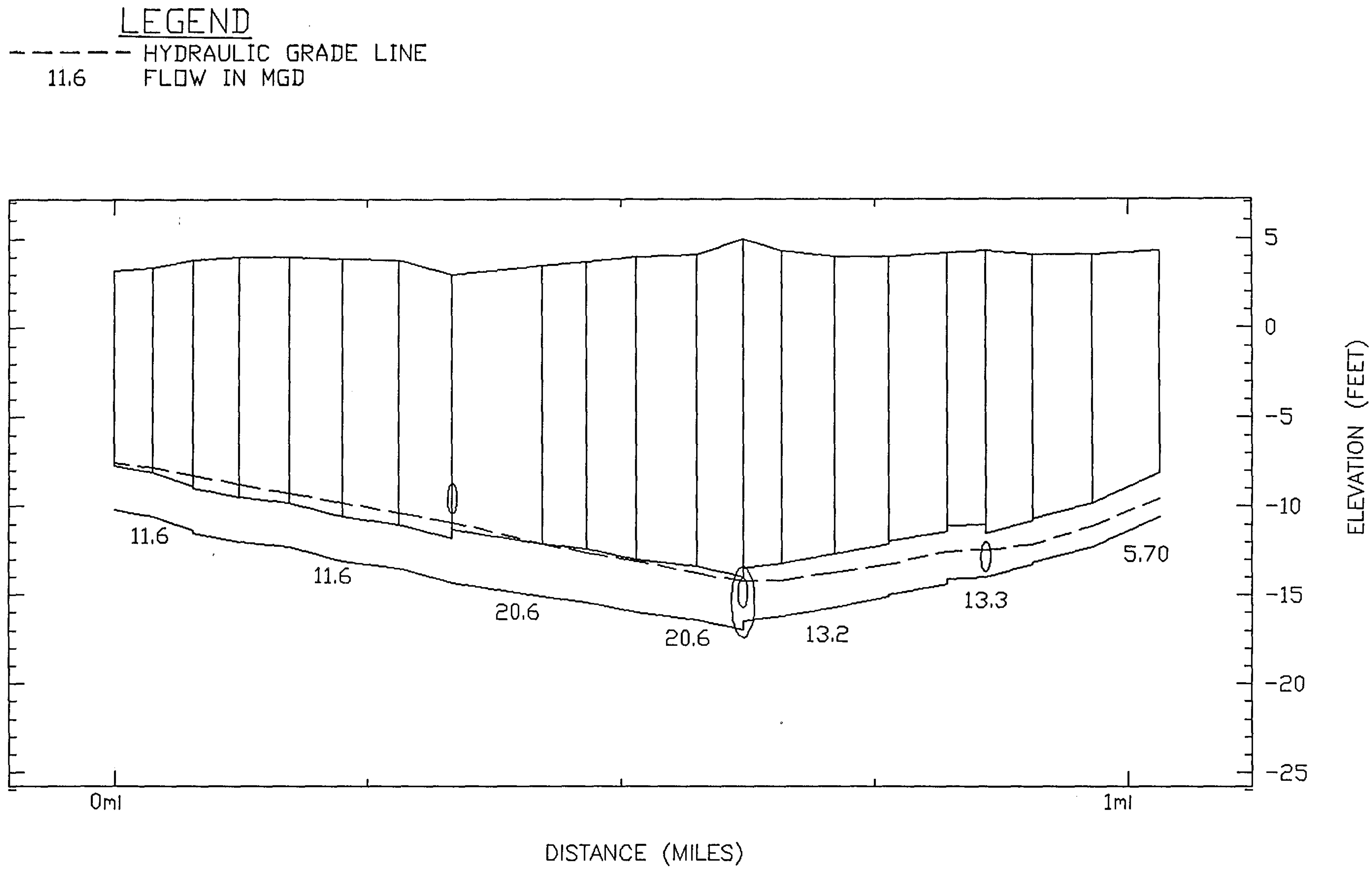
TYPICAL BROWN & BROWN REGULATOR PROFILE AT OVERFLOW, MODIFIED CONDITIONS

PHILADELPHIA WATER DEPARTMENT CAMP DRESSER & MCKEE	FIGURE 4-2b	NINE MINIMUM CONTROLS REPORT SEPTEMBER 27, 1995



OREGON AVENUE – WET WEATHER FLOW,
EXISTING CONDITIONS

PHILADELPHIA WATER DEPARTMENT CAMP DRESSER & MCKEE	FIGURE 4–3a	NINE MINIMUM CONTROLS REPORT SEPTEMBER 27, 1995



OREGON AVENUE – WET WEATHER FLOW, MODIFIED CONDITIONS

PHILADELPHIA WATER DEPARTMENT CAMP DRESSER & MCKEE	FIGURE 4–3b	NINE MINIMUM CONTROLS REPORT SEPTEMBER 27, 1995

enough to limit flow at the regulators. Figure 4-4 represents a typical regulator discharge hydrograph (the inflow hydrograph to the interceptor) under the conveyance improvement scenarios which demonstrates this phenomenon. Point A represents the high treatment rate and point B represents the low treatment rate.

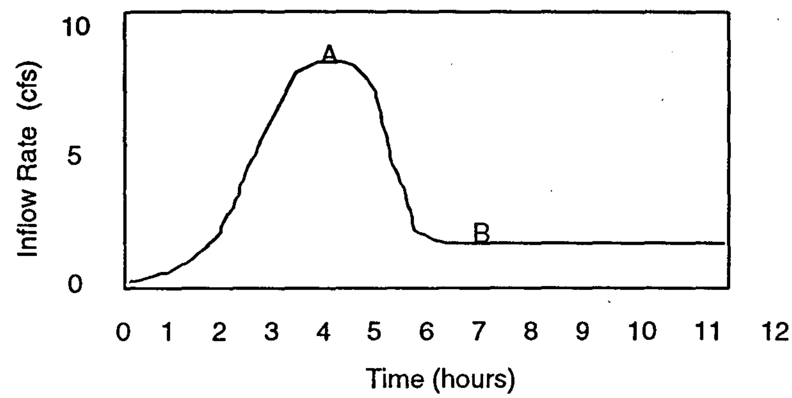


Figure 4-4
Typical Regulator Hydrograph Under Conveyance Improvement Scenarios

High and low treatment rates were found unnecessary for the existing condition scenario because the regulators generally limit flow to the interceptors to very low rates, which generally prevents the interceptors from surcharging and therefore regulators tended to reach a maximum level (at relatively lower rates) and remain at that level.

Results of the STORM analysis are presented as average annual overflow frequency and average annual total volume statistics based on the long-term precipitation record. The results tables also include the number of structures associated with each interceptor sub-system. This number includes CSO regulator structures and storm relief diversion structures. Also listed on the tables are the number of overflow structures. This number may be less than the total number of structures because, in some cases, multiple structures discharge to a common overflow point (e.g., the Main Relief Sewer).

The maximum and minimum frequency values show the range of overflow frequencies estimated for each sub-system. The minimum frequencies and volumes were obtained from the STORM scenario based on the high-end estimates for in-system and depression storage. Conversely, the maximum values were based on the low storage values. A minimum overflow frequency of 2 means that at least one structure in that subsystem is estimated to overflow 2 times per year and that no other structure overflows less frequently. A maximum overflow frequency of 81 means that at least one structure overflows during virtually every storm that is sufficiently large to produce runoff. The average annual overflow frequency is the sum of the total number of overflows from the CSO regulators and storm relief diversion structures divided by the total number of structures at which an overflow occurred. This computation is performed for both the low estimates and the high estimates. The average annual frequency per subsystem is the average of these two values. The total annual overflow volumes from CSO regulators and storm relief diversion structures are presented as a range of values for each interceptor subsystem.

The results for each drainage district also summarize the estimated percent capture of the existing interceptor system. This value represents the percentage of the average annual wet-weather combined sewer flow volume which each subsystem captures and delivers to the WPCP for treatment. The percentage was estimated based on comparison between the average annual wet-weather combined sewer flow (i.e. runoff volume plus the volume of base wastewater flow during wet-weather) and the average annual overflow volume for each subsystem.

The results for existing conditions reflect updates and refinements to the models since the SHCR. The results from the current models are generally very similar to those reported in the SHCR, however, there are differences in some sub-systems and these statistics should continue to be considered preliminary. Additional model refinement will occur over the next several months enabling more precise predictions of the overflow statistics, both by structure and system-wide. The refined model will then provide a basis for developing and evaluating various control alternatives.

4.2.1 Notheast Drainage District

The Northeast drainage district conveys flow from approximately almost one-half of the combined sewer area in the City of Philadelphia. Six interceptor systems collect combined wastewater diverted by 56 regulators in the Northeast district. Maximization scenarios increased Brown & Brown and slot regulator capacities through modifications of their physical setup as mentioned in section 4.0. All Brown & Brown and slot regulators in the Northeast district were modeled internally in EXTRAN. Additional alterations were made to the sluice gate regulators in the Northeast district interceptor system in either of the flow maximization scenarios. All sluice gate regulators (MCSG, WHSG, and CCSG) were modeled internally in EXTRAN assuming maximum opening settings.

System wide changes in hydraulic capacities are summarized in Table 4-1. As this table indicates, relatively significant changes can be made on a system-wide basis. The Tacony and Pennypack sub-systems can be modified to convey flow further downstream, although downstream overflows are shown to increase as a result. This table also indicates the effectiveness of the flow maximization strategies in shifting the hydraulic constraints in the system from the regulators to the interceptors. For example, in the Upper Delaware Low Level sub-system 10 of 12 regulators limit capacity under existing conditions, while under the regulator modification scenario only 2 regulators limit the maximum hydraulic capacity.

Combined sewer overflow statistics for the Northeast drainage district under both flow maximization scenarios are listed in Tables 4-2 and 4-3. Existing conditions CSO statistics are also listed to show improvements in volume captured and reduction in frequency of combined sewer overflow events under both maximization scenarios.

Table 4-1

Northeast WPCP Interceptor Systems

Hydraulic Capacity Analysis

			Existing System		Modified Regulators		Theoretical Limit	
Interceptor System	Combined Sewer Area (acres)	Number of Regulators	Regulator Capacity Limits	Maximum Capacity (cfs/acre)	Regulator Capacity Limits	Maximum Capacity (cfs/acre)	Regulator Capacity Limits	Maximum Capacity (cfs/acre)
Lower Frankford Low Level	2,902	6	6	0.004 - 0.012	4	0.006 - 0.015	0	0.021 - 0.033
Upper Frankford Low Level	1,098	10	10	0.013 - 0.047	2	0.016 - 0.043	0	0.006 - 0.057
Pennypack	352	5	5	0.007 - 0.088	3	0.022 - 0.127	1	0.022 - 0.105
Somerset	3,888	9	8	0.005 - 0.014	3	0.001 - 0.011	0	0.006 - 0.027
Tacony	8,657	14	14	0.001 - 0.012	8	0.008 - 0.012	5	0.010 - 0.012
Upper Delaware Low Level	3,036	12	10	0.016 - 0.053	2	0.006 - 0.063	1	0.023 - 0.032
Summary	19,934	56	53	0.001 - 0.088	22	0.001 - 0.127	7	0.006 - 0.105

Examination of detailed model results reveals the following observations that should be used to establish the specific implementation of the flow maximization improvements in the Northeast Drainage District:

- Regulator modifications provide the most significant increase in regulator capacties at T03, T04, T07, T11, T12, T13 and T15 in the High Level system. From the standpoint of both relative and absolute increases in hydraulic capacity, minor modifications to these regulators will provide the largest increases in flow delivered to the interceptors in the High Level system.

- There are two locations in the High Level system where significant increases in hydraulic capacity were simulated under the scenario where regulator constraints were eliminated. These regulators are T08 and T14. However, if only minor modifications are made, essentially no change in capacity is observed in the simulations. This suggests that regulator modifications at these locations will only be effective if more significant modifications are made.

- Regulator modifications provide the most significant increase in regulator capacties at D03, F03, F25, P02, P03, P04 and P05 in the Low Level system. From the standpoint of both relative and absolute increases in hydraulic capacity, minor modifications to these regulators will provide the largest increases in flow delivered to the interceptors in the Low Level system.

- There are two locations in the Low Level system where significant increases in hydraulic capacity were simulated under the scenario where regulator constraints were eliminated. These regulators are D05 and F21. However, if only minor modifications are made, relatively small changes in capacity are observed in the simulations. This suggests that regulator modifications at these locations may only be justified if more significant modifications are made.

There are two locations in the high level system where the hydraulic capacity of the interceptor is restricted. The most significant restriction is at Diversion Chamber B. This limits the flow delivered to the plant to approximately 120 mgd. The second restriction is at the Frankford Grit Chamber (R18). The capacity of the interceptor is approximately 145 mgd at R18 when this structure begins to overflow. STORM indicates very frequent overflows at this location.

4.2.2 Southeast Drainage District

The Southeast drainage district conveys flow from approximately one-sixth of the combined sewer area in the City of Philadelphia. Two interceptor systems utilizing thirty two regulators exist in the Southeast district. Maximization scenarios increased Brown & Brown and slot regulator capacities through modifications of their physical setup as mentioned in section 4.0. All Brown & Brown and slot regulators in the Southeast district were modeled internally in EXTRAN. No additional alterations were made to the Southeast district interceptor system in either of the flow maximization scenarios.

Table 4-2
Estimated Average Annual CSO Frequency Statistics
(Based on 45-year model simulations of hourly rainfall/runoff/overflow volumes)
Northeast Drainage District

			Existing		Modified Regulators		Theoretical Limit	
Philadelphia Interceptor System	Number of Point Sources	Number of Structures (1)	Overflow Range per subsystem per year	Frequency Average per subsystem per Year	Overflow Range per subsystem per year	Frequency Average per subsystem per Year	Overflow Range per subsystem per year	Frequency Average per subsystem per Year
Lower Frankford Low Level	7	8	5 - 70	37	5 - 72	35	5 - 69	32
Upper Frankford Low Level	10	10	1 - 53	32	2 - 54	32	3 - 45	29
Pennypack	5	5	42 - 58	50	13 - 60	39	18 - 53	34
Somerset	8	9	21 - 61	42	23 - 62	42	27 - 60	42
Tacony High Level	16	16	6 - 75	40	3 - 74	32	3 - 95	33
Upper Delaware Low Level	13	13	7 - 54	28	10 - 53	26	14 - 47	25

(1) - Number of structures includes overflows from CSO diversion chambers and storm relief diversion chambers within the combined sewer system. In some cases, multiple structures discharge to a common overflow point.

Table 4-3
Estimated Average Annual CSO Capture Statistics
(Based on 45-year model simulations of hourly rainfall/runoff/overflow volumes)
Northeast Drainage District

			Existing		Modified Regulators		Theoretical Limit	
Philadelphia Interceptor System	Number of Point Sources	Number of Structures (1)	Overflow Volume Range per subsystem per year	Annual CSO Capture (%)	Overflow Volume Range per subsystem per year	Annual CSO Capture (%)	Overflow Volume Range per subsystem per year	Annual CSO Capture (%)
Lower Frankford Low Level	7	8	1,300 - 1,800	27 - 46	1,170 - 1,580	31 - 48	870 - 1,180	40 - 56
Upper Frankford Low Level	10	10	240 - 340	58 - 72	230 - 340	58 - 74	200 - 310	63 - 77
Pennypack	5	5	130 - 180	36 - 54	90 - 120	59 - 68	70 - 100	66 - 75
Somerset	8	9	1,500 - 2,200	45 - 63	1,600 - 2,300	44 - 60	1,300 - 2,000	51 - 68
Tacony High Level	16	16	3,100 - 4,600	34 - 55	3,000 - 4,300	40 - 57	2,400 - 3,600	50 - 66
Upper Delaware Low Level	13	13	860 - 1,200	56 - 67	850 - 1,200	55 - 67	600 - 800	70 - 77

(1) - Number of structures includes overflow system. In some cases, multiple struct

System wide changes in hydraulic capacities are summarized in Table 4-4. As this table indicates, relatively minor changes in system-wide capacity will result from the regulator modifications. This condition occurs because the maximum system-wide capacity is largely controlled by the WPCP. Table 4-4 indicates the effectiveness of the flow maximization strategies in shifting the hydraulic constraints in the system from the regulators to the interceptors. For example, in the Lower Delaware sub-system all 27 regulators limit capacity under existing conditions, while under the regulator modification scenario only 5 of 27 regulators limit the maximum hydraulic capacity.

Table 4-4
Southeast WPCP Interceptor Systems
Hydraulic Capacity Analysis

			Existing System		Modified Regulators		Theoretical Limit	
Interceptor System	Combined Sewer Area (acres)	No. of Regulators	Regulator Capacity Limits	Maximum Capacity (cfs/acre)	Regulator Capacity Limits	Maximum Capacity (cfs/acre)	Regulator Capacity Limits	Maximum Capacity (cfs/acre)
Lower Delaware	7,222	27	27	0.002 - 0.020	5	0.003 - 0.021	1	0.003 - 0.019
Oregon Avenue	1,409	5	5	0.016 - 0.027	0	0.019 - 0.023	0	0.026 - 0.034
Total	8,631	32	32	0.002 - 0.027	5	0.003 - 0.023	1	0.003 - 0.034

Combined sewer overflow statistics for the Southeast drainage district under both flow maximization scenarios are listed in Tables 4-5 and 4-6. Existing conditions CSO statistics are also listed to show improvements in volume captured and reduction in frequency of combined sewer overflow events under both maximization scenarios. It should be noted that the existing system capacities reported on Table 4-4 are significantly lower than those reported on Table 4.2-1 in the SHCR. Although some difference is the result of model refinements made since the SHCR, the difference is primarily attributed to an error in the reporting of the hydraulic capacity results on Table 4.2-1. This reporting error did not influence the computation of CSO statistics reported on Table 5-2 in the SHCR, or any other results.

Examination of detailed model results reveals the following observations that should be used to establish the specific implementation of the flow maximization improvements in the Southeast Drainage District:

- Regulator modifications provide the most significant increase in regulator capacties at D49, D53, D54, D62 and D63. From the standpoint of both relative and absolute increases in hydraulic capacity, minor modifications to these regulators will provide the largest increases in flow delivered to the interceptors in the Southeast district.

- There are four locations in the Southeast district where significant increases in hydraulic capacity were simulated under the scenario where regulator constraints were eliminated. These regulators are D39, D45, D70 and D73. However, if only minor are made, relatively smaller changes in capacity are observed in the simulations. This suggests that regulator modifications at these locations may only be justified if more significant modifications are made.

Relatively little overflow reduction can be achieved in the Southeast district with The most significant influence of modifications in the Southeast district that can be achieved is a relatively small reduction in overflows along the Oregon Avenue sub-system, with a commensurate increase along the Lower Delaware Low Level.

4.2.3 Southwest Drainage District

The Southwest drainage district conveys flow from approximately one-third of the combined sewer area in the City of Philadelphia. A total of seven interceptor systems utilizing eighty regulators exist in the Southwest district. Flow maximization of all Brown & Brown and slot regulators in the Southwest district was modeled internally in EXTRAN except for slot regulators on the Cobbs Creek High and Low Level interceptors, which were modeled as orifices based on field verified invert elevations and DWO pipe dimensions.

In addition to the alterations of Brown & Brown and slot regulators for flow maximizing scenarios mentioned in section 4.0, specific changes were made to the Southwest drainage district. These changes include: Full utilization of the Southwest Main Gravity (SWMG) interceptor, and modification of the Cobb's Creek control pipes. Under existing conditions a sluice gate prevents flow from entering the middle barrel of the triple barrel SWMG interceptor at the 70th Street and Dicks Avenue Dispersion Chamber. Full utilization of the SWMG was achieved by setting the sluice gate in the full open position. The Cobb's Creek control pipes constrict flow at two locations in the Cobb's Creek Low Level Interceptor (CCLL). Both constrictions were modified to increase conveyance in the CCLL. The upstream constriction in the Cobb's Creek control pipes was enlarged from 18 to 30 inches. The downstream constriction, a 12 by 18 inch gate opening, was completely removed from the CCLL, leaving the existing 30 inch interceptor as the downstream control. These changes were applied to both flow maximizing scenarios in the Southwest.

System wide changes in hydraulic capacities are summarized in Table 4-7. As this table indicates, relatively more significant changes can be realized in hydraulic capacities (e.g. as compared to the Southeast district). This table indicates that the regulator capacities will still control system-wide capacities after modifications are made, i.e. these changes are less effective in shifting the hydraulic constraints in the system from the regulators to the interceptors than in the Southeast district, but (more importantly) greater capacity increases are possible. For example, in the entire Southwest system 74 of 80 regulators limit capacity under existing conditions, while under the regulator modification scenario only five fewer (69) regulators limit the maximum hydraulic capacity.

Combined sewer overflow statistics for the Southwest drainage district under both flow maximization scenarios are listed in Tables 4-8 and 4-9. Existing conditions CSO statistics are also listed to show improvements in volume captured and reduction in frequency of combined sewer overflow events under both maximization scenarios.

Table 4-6
Estimated Average Annual CSO Capture Statistics
(Based on 45-year model simulations of hourly rainfall/runoff/overflow volumes)
Southeast Drainage District

Philadelphia Interceptor System	Number of Point Sources	Number of Structures (1)	Existing: Overflow Volume Range per subsystem per year	Existing: Annual CSO Capture (%)	Modified Regulators: Overflow Volume Range per subsystem per year	Modified Regulators: Annual CSO Capture (%)	Theoretical Limit: Overflow Volume Range per subsystem per year	Theoretical Limit: Annual CSO Capture (%)
Lower Delaware Low Level	27	27	2,600 - 3,500	57 - 65	2,500 - 3,400	59 - 66	2,100 - 2,800	65 - 72
Oregon Avenue	6	6	530 - 720	52 - 60	470 - 640	57 - 65	420 - 570	62 - 69

(1) - Number of structures includes overflows from CSO diversion chambers and storm relief diversion chambers within the combined sewer system. In some cases, multiple structures discharge to a common overflow point.

Table 4-5
Estimated Average Annual CSO Frequency Statistics
(Based on 45-year model simulations of hourly rainfall/runoff/overflow volumes)
Southeast Drainage District

Philadelphia Interceptor System	Number of Point Sources	Number of Structures (1)	Existing: Overflow Range per subsystem per year	Existing: Frequency Average per subsystem per Year	Modified Regulators: Overflow Range per subsystem per year	Modified Regulators: Frequency Average per subsystem per Year	Theoretical Limit: Overflow Range per subsystem per year	Theoretical Limit: Frequency Average per subsystem per Year
Lower Delaware Low Level	27	27	5 - 64	37	5 - 62	32	5 - 58	33
Oregon Avenue	6	6	2 - 60	40	2 - 56	35	2 - 47	32

(1) - Number of structures includes overflows from CSO diversion chambers and storm relief diversion chambers within the combined sewer system. In some cases, multiple structures discharge to a common overflow point.

Table 4.7
Southwest WPCP Interceptor Systems
Hydraulic Capacity Analysis

			Existing System		Modified Regulators		Theoretical Limit	
Interceptor System	Combined Sewer Area (acres)	No. of Regulators	Regulator Capacity Limits	Maximum Capacity (cfs/acre)	Regulator Capacity Limits	Maximum Capacity (cfs/acre)	Regulator Capacity Limits	Maximum Capacity (cfs/acre)
Cobbs Creek HL	2,452	24	21	0.003 - 0.033	22	0.016 - 0.055	22	0.012 - 0.018
Cobbs Creek LL	386	12	9	0.003 - 0.019	9	0.015 - 0.024	9	0.012 - 0.018
CSES	2,186	18	18	0.010 - 0.048	16	0.005 - 0.060	0	0.038 - 0.058
CSWS	1,120	10	10	0.013 - 0.033	9	0.008 - 0.041	1	0.008 - 0.050
LSES	1,956	9	9	<.001 - 0.026	7	0.004 - 0.026	0	0.014 - 0.026
LSWS	746	4	4	<.001 - 0.020	4	0.005 - 0.020	1	0.057 - 0.079
SWMG	4,116	3	3	0.005 - 0.047	2	0.007 - 0.058	1	0.037 - 0.092
Total	12,956	80	74	<.001 - 0.048	69	0.004 - 0.060	34	0.008 - 0.092

Examination of detailed model results reveals the following observations that should be used to establish the specific implementation of the flow maximization improvements in the Southwest Drainage District:

- Regulator modifications provide the most significant increase in regulator capacties at C01, C02, C04, C04A, C05, C06, C07, C09, C10, C12, C16, C18, C32, C34, C36, and C37 in the Cobbs Creek High Level system; at S12, S12A, S13, S17, S28, S35, S38, S50 and S51 in the Southwest Main Gravity and tributary sub-systems. From the standpoint of both relative and absolute increases in hydraulic capacity, minor modifications to these regulators will provide the largest increases in flow delivered to the interceptors.

- There are no locations in the Cobbs Creek High Level system where significant increases in hydraulic capacity were simulated under the scenario where regulator constraints were eliminated versus that where minor modifications are made. However, there are fourteen locations in the Southwest Main Gravity and tributary sub-systems where this was simulated. These regulators are S05, S06, S18, S20, S24, S25, S26, S27, S34, S36A, S37, S42, S43 and S46. However, if only minor modifications are made, essentially no change in capacity is observed in the simulations. This suggests that regulator modifications at these locations will only be effective if more significant modifications are made. It should be noted, however, that increases in the hydraulic grade line in the Southwest Main Gravity caused by modifications to the regulators and hydraulic control points in that vicinity (S-27, S-28, S-30, S-34, S-39, S-40, S-43, S-47) were observed in the simulations to increase the occurrence of overflows into Cobbs Creek from the Cobbs Creek High Level sub-system, as the available hydraulic gradient across the Cobbs Creek High Level Cutoff is reduced. It is therefore recommended that no modifications be made to the structures along the Southwest Main Gravity identified above.

- Regulator modifications provide the most significant increase in regulator capacties at C21, C29 and C30 in the Cobbs Creek Low Level system; and at S38 in the Lower Schuylkill West Side sub-system. From the standpoint of both relative and absolute increases in hydraulic capacity, minor modifications to these regulators will provide the largest increases in flow delivered to the interceptors in the Low Level systems.

- There are no locations in the Cobbs Creek Low Level system where significant increases in hydraulic capacity were simulated under the scenario where regulator constraints were eliminated versus that where minor modifications are made. However, there are two locations in the Lower Schuylkill West Side system where significant increases in hydraulic capacity were simulated under the scenario where regulator constraints were eliminated. These regulators are S33 and S45. However, if only minor modifications are made, relatively small changes in capacity are observed in the simulations. This suggests that regulator modifications at these locations may only be justified if more significant modifications are made.

Table 4-8
Estimated Average Annual CSO Frequency Statistics
(Based on 45-year model simulations of hourly rainfall/runoff/overflow volumes)
Southwest Drainage District

Philadelphia Interceptor System	Number of Point Sources	Number of Structures (1)	Existing: Overflow Range per subsystem per year	Existing: Frequency Average per subsystem per Year	Modified Regulators: Overflow Range per subsystem per year	Modified Regulators: Frequency Average per subsystem per Year	Theoretical Limit: Overflow Range per subsystem per year	Theoretical Limit: Frequency Average per subsystem per Year
Central Schuylkill East Side	22 (2)	27	3 - 65	32	7 - 65	29	< 1 - 55	21
Central Schuylkill West Side	9	9	< 1 - 58	35	< 1 - 56	37	< 1 - 54	27
Cobbs Creek High Level	27	31	< 1 - 77	30	< 1 - 77	18	< 1 - 77	18
Cobbs Creek Low Level	12	12	< 1 - 58	38	< 1 - 52	26	< 1 - 52	26
Lower Schuylkill East Side	9	9	< 1 - 57	34	< 1 - 57	33	< 1 - 49	21
Lower Schuylkill West Side	4	4	14 - 58	36	10 - 58	39	10 - 40	24
Southwest Main Gravity	3	3	3 - 58	23	< 1 - 63	20	< 1 - 48	16

(1) - Number of structures includes overflows from CSO diversion chambers and storm relief diversion chambers within the combined sewer system. In some cases, multiple structures discharge to a common overflow point.
(2) - The Main Relief is assigned to the Central Shuykill East Side system as a single overflow point source.

Table 4-9
Estimated Average Annual CSO Capture Statistics
(Based on 45-year model simulations of hourly rainfall/runoff/overflow volumes)
Southwest Drainage District

Philadelphia Interceptor System	Number of Point Sources	Number of Structures (1)	Existing: Overflow Volume Range per subsystem per year	Existing: Annual CSO Capture (%)	Modified Regulators: Overflow Volume Range per subsystem per year	Modified Regulators: Annual CSO Capture (%)	Theoretical Limit: Overflow Volume Range per subsystem per year	Theoretical Limit: Annual CSO Capture (%)
Central Schuylkill East Side	22 (2)	27	570 - 770	54 - 62	550 - 740	56 - 63	370 - 500	66 - 72
Central Schuylkill West Side	9	9	370 - 500	60 - 67	320 - 440	65 - 72	220 - 300	77 - 82
Cobbs Creek High Level	27	31	810 - 1,200	48 - 56	1,080 - 1,620	51 - 61	1,480 - 2,220	43 - 46
Cobbs Creek Low Level	12	12	130 - 190	63 - 72	120 - 180	66 - 75	120 - 180	66 - 75
Lower Schuylkill East Side	9	9	750 - 1,000	46 - 54	640 - 860	54 - 61	420 - 560	69 - 74
Lower Schuylkill West Side	4	4	580 - 780	26 - 33	500 - 670	36 - 44	200 - 270	69 - 75
Southwest Main Gravity	3	3	1,300 - 1,700	56 - 65	1,200 - 1,700	61 - 72	800 - 1,100	65 - 78

(1) - Number of structures includes overflows from CSO diversion chambers and storm relief diversion chambers within the combined sewer system. In some cases, multiple structures discharge to a common overflow point.
(2) - The Main Relief is assigned to the Central Shuykill East Side system as a single overflow point source.

The most significant improvements in the Southwest district can be realized at the Cobbs Creek sub-systems. Regulator modifications can realize relatively significant improvements in these systems. In addition, the structure C-17 and those in that vicinity have a significant influence on system-wide CSO occurences and therefore warrant further investigation during implementation of NMC4.

4.3 PROPOSED FLOW CONVEYANCE IMPROVEMENT STRATEGIES

The results of the hydraulic modeling of the interceptor sewers and regulators documented in the System Hydraulic Characterization Report (PWD; June 27, 1995) clearly demonstrate that the regulator structures "starve" the interceptors and WPCPs during wet-weather; i.e. they restrict flow from entering the system to the extent that CSOs occur before the WPCPs have reached capacity, and in most cases before the interceptor sewers have reached capacity. This is an intentional result of the prevailing regulator design philosophy at the time that these structures were designed and built. Although an appropriate approach when protection of the WPCPs from hydraulic overloading was the principal concern, this approach is now obsolete in the current situation where the primary objective is maximizing the capture and treatment of wet-weather flows. The current philosophy of flow maximization would change the system operation so that the WPCPs, and generally the interceptors, are operating at full capacity before CSOs occur.

Simply stated, the basic strategy of flow maximization is to deliver more flow to the WPCPs more frequently, to enable greater pollutant removals. The results of the hydraulic modeling of the interceptor sewers under the flow maximization scenarios indicate that significantly higher rates of flow can be deliverd to the WPCPs more frequently than under current conditions.

An expected result of the flow maximization strategy is that the WPCPs will need to be throttled more frequently to prevent hydraulic overloading. This will occur because the interceptors can deliver significantly more flow to the WPCPs than the plants can process. By modifying the regulators to increase their conveyance of flow to the interceptors, the relatively high interceptor capacities will allow the conveyance of much more flow to the WPCPs much more frequently. The STORM model was used to quantify these increases in flow in terms of frequency distributions of plant inflow rates. These distributions are presented later in this section (Section 4.8 - Summary).

The simulations of the system modification scenarios described in section 4.2 clearly demonstrate that significant increases in flow capture can be achieved in the interceptor sewers. However, increased pollutant removal at the WPCPs under current permit limitations will require careful WPCP operation and evaluation of the response of the various processes to the increased flows. For this reason, the implementation of flow maximization improvements will be staged to allow WPCP operational experience under incrementally increasing flow conditions to be gained and this experience used to define the next stages of improvements.

Based on financial and operational considerations (discussed further in Section 4.8), incremental increases in flow capture will be determined first, then specific regulator modifications will be selected for implementation to achieve the desired flow increase. This staging of regulator improvements will be guided by the following six criteria to define the priority for specific regulator improvements:

1. **Potential for relatively higher industrial process loads**. While NMC3 (Industrial Pretreatment) addresses the reduction in industrial pollutant discharges from CSOs at the source, NMC4 can address industrial pollutant discharges at the outfall. CSO outfalls which drain areas with the potential for relatively higher industrial loads have been identified. Table 4-10a, 4-10b and 4-10c lists the CSO sites ranked highest to lowest for average loading of metals, BOD, and oil and grease, respectively (only sites with non-zero loadings are listed). These loadings are based only on industrial pretreatment limits for these parameters (i.e. does not include surface runoff loads), for the industries currently discharging to PWD's combined sewer system. Based

Table 4-10a
Ranking of Industrial Dischargers to PWD Combined Sewer System
AVERAGE METALS LOADING (LBS / DAY)

SITE ID	DISCHARGER	METALS Individual	METALS Total per CSO
D_07	JANBRIDGE INC	1.107	1.107
T_14	VIZ MANUFACTURING	0.689	
T_14	MAX LEVY AUTOGRAPH,	0.047	0.735
F_11	GLOBE DYE WORKS	0.390	
F_11	ARWAY APRON AND UNIF	0.170	
F_11	LUSTRIK, INC	0.045	0.605
D_22	ABBOTTS	0.413	
D_22	PHILA. RUST PROOF CO	0.031	0.444
D_53	U.S. MINT	0.442	0.442
R_07	HENSHELL DIV. OF GRO	0.332	0.332
D_17	FRANKLIN SMELTING &	0.260	0.260
D_08	HILLOCK ANODIZING	0.252	0.252
T_04	CARDONE INDUSTRIES	0.162	0.162
D_25	GROSS METALS	0.101	0.101
D_21	PHILA. RUST PROOF CO	0.057	0.057
D_02	MARTIN'S METAL SPECI	0.035	0.035
D_20	ABACO	0.015	0.015
D_19	ABACO	0.015	0.015
D_44	WOLF	0.014	0.014
D_38	ANZON INC	0.010	0.010

Table 4-10b

Ranking of Industrial Dischargers to PWD Combined Sewer System

AVERAGE BIOCHEMICAL OXYGEN DEMAND (BOD) LOADING (LBS / DAY)

SITE ID	DISCHARGER	BOD Individual	BOD Total per CSO
F_24	ROHM & HAAS	24,125.72	24,125.72
D_07	NEWMAN PAPER CO.	6,123.18	6,123.18
F_25	ALLIED CHEMICAL	5,265.03	5,265.03
S_50	BREYERS ICE CREAM DI	3,489.85	3,489.85
D_69	INOLEX CHEMICAL CO.	2,352.79	2,352.79
D_21	DEL VAL WOOL SCOURIN	1,318.97	
	PHILA COCA COLA BOTT	109.81	1,428.78
D_41	JEROME FOODS	557.52	557.52
T_04	MICHELES FAMILY BAKE	387.01	387.01
D_65	FREDA SAUSAGE CO.	364.18	364.18
D_44	MRS. RESSLER'S FOOD	268.31	268.31
D_17	PHILA COCA COLA BOTT	233.30	233.30
P_05	STONE CONT	180.03	180.03
D_20	NEATSFOOT OIL CORP.	155.26	155.26
D_11	DIETZ AND WATSON	148.29	148.29
D_39	JWS DELAVAU	68.45	68.45
D_22	PHILA COCA COLA BOTT	59.13	
	PARA CHEM SOUTHERN I	0.73	59.86
D_25	CUTLER	52.33	
	KELLYS COOPERAGE	3.84	56.17
F_04	MUTUAL	48.79	48.79
F_11	GLOBE DYE WORKS	48.03	48.03
D_02	MC WHORTER RESINS, I	18.95	18.95
D_45	COOPER'S COOPERAGE	10.15	10.15
F_12	GENERAL FELT	0.57	0.57
S_45	TANK CLEANING	0.13	0.13

Table 4-10c
Ranking of Industrial Dischargers to PWD Combined Sewer System
AVERAGE OIL & GREASE LOADING (LBS / DAY)

SITE ID	DISCHARGER	OIL & GREASE	OIL & GREASE
		Individual	Total per CSO
F_11	ARWAY APRON AND UNIF	1,255.22	
	GLOBE DYE WORKS	6.47	1261.69
D_21	PHILA COCA COLA BOTT	4.62	
	GENERAL ELECTRIC	0.33	
	DEL VAL WOOL SCOURIN	636.77	641.72
T_04	MICHELES FAMILY BAKE	61.31	
	CARDONE INDUSTRIES	13.82	75.13
S_50	BREYERS ICE CREAM DI	61.10	61.10
D_22	ACME UNIFORM RENTAL	38.45	
	PHILA COCA COLA BOTT	2.49	
	GENERAL ELECTRIC	0.18	
	PARA CHEM SOUTHERN I	0.14	41.25
S_27	LAUREL LINEN	25.02	25.02
D_11	DIETZ AND WATSON	18.74	18.74
D_44	MRS. RESSLER'S FOOD	13.94	13.94
D_17	GENERAL ELECTRIC	0.70	
	PHILA COCA COLA BOTT	9.81	10.51
D_45	COOPER'S COOPERAGE	4.05	4.05
D_25	CUTLER	1.80	1.80
D_65	FREDA SAUSAGE CO.	1.04	1.04
D_20	NEATSFOOT OIL CORP.	0.51	0.51
S_45	TANK CLEANING	0.07	0.07
F_12	GENERAL FELT	0.05	0.05

on these rankings, D07, D21, D22, D69, F11, F24, F25, S50, and T14 emerge as outfalls with the highest potential industrial pollutant discharges.

2. **Population density**. Although there are no local outfall quality data yet available to substantiate the assumption, it is often observed and generally expected that there is a tendency for CSO loads to correlate positively to population density in the combined sewersheds, i.e. higher population densities will generally produce greater wastewater-derived pollutant loads per unit area (e.g. BOD, solids, bacteria, litter/floatables, etc.), and higher population densities may be associated with land-use characteristics that produce greater stormwater-derived pollutant loads for several stormwater constituents (e.g. litter/floatables, BOD, solids, metals, etc.). Table 4-11 lists the CSO sites in PWD's system ranked highest to lowest by population density. This information is useful in indicating outfall locations at which sanitary wastewater pollutant concentrations can be expected to be generally higher than average. Table 4-12 lists the CSO sites in PWD' system ranked highest to lowest by population. This information is useful in indicating the outfalls at which sanitary wastewater pollutant loads can be expected to be generally higher than average.

3. **Outfall location relative to more sensitive receiving stream reaches**. There are CSO locations on Pennypack Creek upstream of Pennypack Park, on Frankford Creek upstream of Tacony Creek Park and on the Schuylkill River upstream of Bartram Gardens Park. These represent potential priority CSO locations due to their potential impact on streams above associated recreational areas. As a more general prioritization strategy, CSOs along the tributary streams will be prioritized above those that discharge directly to the larger Delaware River. Also, the more upstream a CSO location, the higher the priority, since location dictates the extent (length) of stream reach impacted by CSOs. Table 4-13a lists each of the parks within the PWD combined sewer service area impacted by CSOs and indicates the specific CSO sites upstream of each park facility.

Table 4-11
Ranking of CSO Sites by Population Density

Rank	Site ID	Population	Acreage	Population Density (Pop/Acre)
1	S15	1,232	14	90.94
2	S13	2,315	27	86.89
3	R05	676	10	69.95
4	S12	1,141	16	69.76
5	S16	1,936	29	67.20
6	S42A42	5,346	80	66.43
7	R21	1,537	24	63.26
8	S18	10,266	168	61.21
9	R03	268	4	60.79
10	R04	1,697	29	58.15
11	S42A	19,724	347	56.86
12	R06	11,453	204	56.05
13	R11	4,349	78	55.88
14	S17	1,678	30	55.44
15	R01	1,843	33	55.11
16	C18	5,202	99	52.47
17	C17	30,277	577	52.45
18	T03	4,755	91	51.97
19	D68	21,225	433	49.02
20	D66	11,586	237	48.95
21	R02	232	5	48.12
22	S34	11,992	253	47.41
23	T13	5,217	110	47.26
24	R24	13,012	279	46.69
25	S50	13,948	300	46.51
26	C12	3,131	69	45.54
27	C19	2,661	59	45.41
28	R08	30,051	662	45.38
29	R01	10,152	224	45.33
30	D22	16,775	371	45.21
31	R12	24,421	543	44.96
32	C05	1,202	27	44.95
33	C33	1,395	31	44.51
34	T09	1,455	33	43.77
35	T01	6,626	153	43.42
36	D70	12,923	299	43.27
37	F07	3,517	82	42.68
38	S43	5,876	138	42.52
39	S04	2,739	65	42.11
40	R18	2,525	60	41.89
41	D3944	27,335	653	41.87
42	S28	1,123	27	41.80
43	S06	5,763	139	41.53
44	T07	930	22	41.44
45	R10	1,785	43	41.09
46	C11	3,208	78	41.09
47	D69	9,504	234	40.59
48	D61	1,217	30	40.48
49	D4547	2,706	69	39.44
50	D65	10,058	258	38.96
51	C20	999	26	38.61
52	D63	15,725	413	38.05
53	R09	1,416	37	37.95
54	S08	361	10	37.46
55	D3738	25,114	675	37.19
56	D54	16,064	437	36.80
57	C34	1,143	31	36.48
58	T11	1,434	40	35.97
59	S25	2,714	75	35.95
60	D67	4,288	120	35.76
61	R14	12,138	345	35.23
62	C06	3,745	107	34.96
63	D25	60,920	1,766	34.50
64	C14	2,964	86	34.41
65	D62	448	13	34.39
66	D23	727	21	34.26
67	D2122	4,267	126	33.95
68	C26	224	7	33.95

Table 4- Continued

Ranking of CSO Sites by Population Density

Rank	Site ID	Population	Acreage	Population Density (Pop/Acre)
69	T08	34,296	1,017	33.73
70	S02	988	29	33.62
71	C25	1,564	47	33.52
72	S19	459	14	32.97
73	D39	11,347	352	32.21
74	R15	31,421	980	32.05
75	S42	10,190	318	32.05
76	S05	2,759	86	32.02
77	C29	1,055	33	31.92
78	C32	1,919	60	31.88
79	S31	4,996	159	31.42
80	S26	11,292	359	31.42
81	D1920	3,456	110	31.39
82	C04	751	25	30.59
83	D58	1,048	35	29.95
84	S36	5,168	174	29.77
85	R07	15,977	538	29.71
86	S39	2,558	88	29.08
87	C07	1,343	46	28.95
88	D02	12,445	431	28.89
89	S27	87,753	3,066	28.62
90	S01	13,764	488	28.19
91	D40	1,216	44	27.44
92	P02	3,151	115	27.30
93	D05	20,141	740	27.23
94	C13	1,689	62	27.16
95	C22	1,527	57	27.00
96	C09	2,286	85	27.00
97	S20	7,976	300	26.63
98	S22	2,995	113	26.60
99	T14	144,018	5,418	26.58
100	C21	916	35	26.52
101	D07	10,691	405	26.39
102	P05	1,579	60	26.22
103	C30	620	24	26.05
104	D41	1,731	67	25.93
105	D47	3,443	134	25.67
106	D0507	12,304	479	25.67
107	F21	23,044	902	25.56
108	F11	8,943	351	25.51
109	S21	267	11	25.36
110	R13	31,710	1,270	24.96
111	D44	6,389	265	24.13
112	D38	5,109	212	24.10
113	F06	1,116	46	24.08
114	D21	2,098	89	23.51
115	D45	21,371	920	23.24
116	S47	2,618	113	23.13
117	F04	6,055	263	23.02
118	T06	8,022	350	22.93
119	T10	1,371	60	22.84
120	T05	1,133	51	22.29
121	C01	572	27	21.55
122	S45	10,447	491	21.30
123	S51	126	6	20.81
124	C27	570	28	20.54
125	F25	4,954	242	20.51
126	F24	490	24	20.50
127	D03	2,511	123	20.48
128	P04	910	44	20.48
129	P03	776	38	20.27
130	C24	714	36	19.64
131	S09	4,027	208	19.40
132	C15	322	17	18.92
133	C31	716	38	18.70
134	D11	4,104	221	18.56
135	F08	1,054	57	18.49
136	F05	448	24	18.46

Table 4-. Continued
Ranking of CSO Sites by Population Density

Rank	Site ID	Population	Acreage	Population Density (Pop/Acre)
137	S37	2,048	112	18.34
138	T12	163	9	18.09
139	S40	1,436	81	17.83
140	F14	443	25	17.62
141	S44	5,363	316	16.97
142	S23	634	38	16.51
143	C37	228	14	15.74
144	S38	2,253	147	15.28
145	D18	3,173	210	15.09
146	D52	287	19	15.09
147	S10	1,056	70	15.08
148	S46	3,269	224	14.62
149	D15	1,497	103	14.53
150	D09	562	39	14.33
151	D1722	2,202	160	13.73
152	D48	6,485	500	12.96
153	T15	2,492	194	12.84
154	D51	1,072	87	12.36
155	D20	1,160	94	12.35
156	F13	533	44	12.18
157	S07	887	74	12.03
158	D42	190	16	11.69
159	D71	2,420	214	11.33
160	C28A	336	30	11.09
161	F10	750	68	10.98
162	D53	1,995	182	10.96
163	D13	440	41	10.81
164	R19	343	33	10.50
165	D43	132	13	10.17
166	S33	1,028	106	9.66
167	S30	192	20	9.62
168	D4445	22	2	9.10
169	C16	73	8	8.81
170	C23	38	4	8.71

Rank	Site ID	Population	Acreage	Population Density (Pop/Acre)
171	C10	33	4	8.55
172	P01	801	94	8.51
173	T04	567	68	8.34
174	D06	415	54	7.62
175	F23	374	51	7.32
176	D17	1,959	285	6.88
177	C36	101	15	6.70
178	D12	111	17	6.63
179	D64	60	10	5.95
180	F03	923	155	5.94
181	S03	82	15	5.44
182	C04A	682	128	5.32
183	D08	122	24	5.12
184	C35	72	14	5.08
185	D19	464	94	4.93
186	C02	13	5	2.46
187	D46	70	31	2.28
188	F12	97	47	2.07
189	S32	41	24	1.74
190	D24	18	11	1.70
191	D72	287	191	1.50
192	D50	13	15	0.89
193	D49	6	8	0.72
194	S11	14	24	0.59
195	D7273	80	157	0.51
196	D04	14	28	0.51
197	S14	11	44	0.25
198	F09	1	4	0.24
199	S24	7	42	0.17
200	D73	16	363	0.04
201	S12	0	4	0.00
202	S35	0	12	0.00
203	S36	0	8	0.00
	Totals	1,204,151	40,644	29.63

Tal 12

Ranking of CSO Sites by Population

Rank	Site ID	Population	Rank	Site ID	Population	Rank	Site ID	Population
1	T14	144,018	35	S18	10,266	69	D18	3,173
2	S27	87,753	36	S42	10,190	70	P02	3,151
3	D25	60,920	37	R01	10,152	71	C12	3,131
4	T08	34,296	38	D65	10,058	72	S22	2,995
5	R13	31,710	39	D69	9,504	73	C14	2,964
6	R15	31,421	40	F11	8,943	74	S05	2,759
7	C17	30,277	41	T06	8,022	75	S04	2,739
8	R08	30,051	42	S20	7,976	76	S25	2,714
9	D3944	27,335	43	T01	6,626	77	D4547	2,706
10	D3738	25,114	44	D48	6,485	78	C19	2,661
11	R12	24,421	45	D44	6,389	79	S47	2,618
12	F21	23,044	46	F04	6,055	80	S39	2,558
13	D45	21,371	47	S43	5,876	81	R18	2,525
14	D68	21,225	48	S06	5,763	82	D03	2,511
15	D05	20,141	49	S44	5,363	83	T15	2,492
16	S42A	19,724	50	S42A42	5,346	84	D71	2,420
17	D22	16,775	51	T13	5,217	85	S13	2,315
18	D54	16,064	52	C18	5,202	86	C09	2,286
19	R07	15,977	53	S36	5,168	87	S38	2,253
20	D63	15,725	54	D38	5,109	88	D1722	2,202
21	S50	13,948	55	S31	4,996	89	D21	2,098
22	S01	13,764	56	F25	4,954	90	S37	2,048
23	R24	13,012	57	T03	4,755	91	D53	1,995
24	D70	12,923	58	R11	4,349	92	D17	1,959
25	D02	12,445	59	D67	4,288	93	S16	1,936
26	D0507	12,304	60	D2122	4,267	94	C32	1,919
27	R14	12,138	61	D11	4,104	95	R01	1,843
28	S34	11,992	62	S09	4,027	96	R10	1,785
29	D66	11,586	63	C06	3,745	97	D41	1,731
30	R06	11,453	64	F07	3,517	98	R04	1,697
31	D39	11,347	65	D1920	3,456	99	C13	1,689
32	S26	11,292	66	D47	3,443	100	S17	1,678
33	D07	10,691	67	S46	3,269	101	P05	1,579

Table 4- ontinued
Ranking of CSO Sites by Population

Rank	Site ID	Population
34	S45	10,447
103	R21	1,537
104	C22	1,527
105	D15	1,497
106	T09	1,455
107	S40	1,436
108	T11	1,434
109	R09	1,416
110	C33	1,395
111	T10	1,371
112	C07	1,343
113	S15	1,232
114	D61	1,217
115	D40	1,216
116	C05	1,202
117	D20	1,160
121	S28	1,123
122	F06	1,116
123	D51	1,072
124	S10	1,056
125	C29	1,055
126	F08	1,054
127	D58	1,048
128	S33	1,028
129	C20	999
130	S02	988
131	T07	930
132	F03	923
133	C21	916
134	P04	910
135	S07	887
136	P01	801

Rank	Site ID	Population
68	C11	3,208
137	P03	776
138	C04	751
139	F10	750
140	D23	727
141	C31	716
142	C24	714
143	C04A	682
144	R05	676
145	S23	634
146	C30	620
147	C01	572
148	C27	570
149	T04	567
150	D09	562
151	F13	533
155	D62	448
156	F05	448
157	F14	443
158	D13	440
159	D06	415
160	F23	374
161	S08	361
162	R19	343
163	C28A	336
164	C15	322
165	D52	287
166	D72	287
167	R03	268
168	S21	267
169	R02	232
170	C37	228

Rank	Site ID	Population
102	C25	1,564
171	C26	224
172	S30	192
173	D42	190
174	T12	163
175	D43	132
176	S51	126
177	D08	122
178	D12	111
179	C36	101
180	F12	97
181	S03	82
182	D7273	80
183	C16	73
184	C35	72
185	D46	70
189	C10	33
190	D4445	22
191	D24	18
192	D73	16
193	D04	14
194	S11	14
195	C02	13
196	D50	13
197	S14	11
198	S24	7
199	D49	6
200	F09	1
201	S12	0
202	S35	0
203	S36	0

Total Population	1,204,151

Table 4-13a

Listing of CSOs Upstream of Parks

H. John Heinz National Wildlife Refuge
C_01, C_02, C_04, C_04A, C_05, C_06, C_07, C_09, C_10, C_11, C_12, C_13, C_14, C_15, C_16, C_17, C_18, C_19, C_20, C_21, C_22, C_23, C_24, C_25, C_26, C_27, C_28A, C_29, C_30, C_31, C_32, C_33, C_34, C_35, C_36, C_37
Cobbs Creek Park
C_01, C_02, C_04, C_04A, C_05, C_06, C_07, C_09, C_10, C_11, C_12, C_13, C_14, C_15, C_16, C_17, C_18, C_19, C_20, C_21, C_22, C_31, C_32, C_33, C_34, C_35, C_36, C_37
Morris Park
C_01, C_02, C_04, C_04A, C_05, C_06, C_34, C_35, C_36
Pennypack Park
P_01, P_02, P_03, P_04, P_05
Fairmount Park
S_01, S_01T, S_02, S_03
Juniata Park
T_03, T_04, T_05, T_06, T_07, T_08, T_09, T_10, T_11, T_12, T_13, T_14, T_15
Tacony Creek Park
T_03, T_04, T_05, T_06, T_07, T_08, T_09, T_10, T_11, T_12, T_13

4. **Hydraulic efficacy**. The regulators for which modifications will produce the most significant increases in hydraulic capacity were identified in Section 4.1, and are summarized in Table 4-13b.

5. **Satisfaction of multiple objectives**. It is expected that integrating operational considerations for regulator improvements (*e.g.* locations particularly subject to debris clogging, etc.) with hydraulic conveyance considerations will enable regulator locations to be identified which should be modified to accomodate both requirements.

Table 4-13b

Regulator Sites with Highest Potential Flow Increases

Drainage District	Minor Modifications	Significant Modifications
Northeast	T03, T04, T07, T11, T12, T13, T15, D03, F03, F25, P02, P03, P04 , P05	T08, T14, D05, F21
Southeast	D49, D53, D54, D62, D63	D39, D45, D70, D73
Southwest	C01, C02, C04, C04A, C05, C06, C07, C09, C10, C12, C16, C18, C32, C34, C36, C37 S12, S12A, S13, S17, S28, S35, S38, S50, S51	S05, S06, S18, S20, S24, S25, S26, S27, S34, S36A, S37, S42, S43, S46, S33, S45, C21, C29, C30, S38

6. **Physical modification requirements**. A number of factors including the configuration of the regulator, the condition of the mechanisms, the location and accessibility of the structure will determine which regulators can be more or less easily modified. Although a less important criterion than the other three described above, generally those regulators that can be most easily adjusted/modified will be addressed first. These locations will be determined by PWD operations staff.

The six criteria described above will be used to establish the specific staged implementation of regulator modifications. As specific CSO locations are identified for potential modification, and other improvements (e.g. modification of hydraulic control points) are identified, the proposed modifications will be represented in the EXTRAN model of the interceptor sewers and regulators and the hydraulic response of this system to the specific improvements will be simulated to establish the impacts on the collection and treatment facilities. STORM simulations using the improved hydraulic flow conveyance capacities will be developed to quantify the benefits of the flow maximization improvements in terms of reductions in CSO frequencies and volumes. The integration of flow conveyance improvements with WPCP operational impacts, and the specific approach to staging of NMC4, is described later in Section 4.8 (Summary).

4.4 EVALUATION OF WPCPs

Plant tours were conducted on Tuesday, May 23, 1995 (Southwest), Wednesday, May 24, 1995 (Southeast), and Thursday, May 25, 1995 (Northeast). The site tours concentrated on the condition, status, and operation (normal and wet weather) of the WPCP's, particularly on the headwork facilities (pumping, screening, grit removal), secondary system operation, and solids handling and disposal. Subsequent to the site tours, meetings were held with each plant's management personnel to further discuss plant status and operations, the CSO program as a whole, and NMC4 considerations as they relate to each WPCP.

Generally, the topics of discussion during the site tours and meetings included:

- Methods currently employed to maximize wet weather flow to the WPCP's.
- Discussions on potential operating procedures which can/may be employed to allow more flow to be treated (without capital improvements).
- Identification of real or potential headloss conditions within the WPCP's, including unit processes, conduits, channels, etc.
- Discussion on existing Standard Operating Procedures (SOP) currently employed at the WPCP's during wet weather operation.
- Discussion on Long Term Control Planning measure and requirements which must be considered by each respective WPCP.

- Detailed discussions on influent/pumping operation, and control.

- Unit process operation.

- Potential needs for stress testing.

- Discussion on Nine Minimum Controls Schedule; Final report to PaDEP Sept. 27, 1995; Long Term Plan by Sept., 1996.

Copies of available wet weather SOPs were obtained from each plant and are included in the appendix of this report.

The following sections provide an evaluation of each WPCP unit process as they relate to the items identified above and NMC4.

4.4.1 Southwest WPCP (SWWPCP) Evaluation

The SWWPCP has a permitted design flow of 200 mgd; 300 mgd peak daily limit; and 400 mgd instantaneous limit. Plant staff indicated that the plant can successfully handle 400 mgd with all equipment available, and have experienced upwards of 418 mgd while still meeting effluent permit compliance.

Wastewater treatment at the SWWPCP consists of preliminary treatment, primary treatment, pure oxygen activated sludge process, sludge treatment and disinfection.

SWWPCP receives wastewater from a triple-barrel high level sewer, a low level pumping station (screw pumps), and from the DELCORA interceptor. Wastewater from these conveyance systems are combined at the Preliminary Treatment Building (PTB) where the wastewater is screened and degritted.

Plant staff indicated that the low level influent facilities can flood during extreme wet weather events.

Low level influent flow is split thru two influent conduits and sluice gates. Downstream of the conduits are two manually cleaned coarse bar racks. These bar racks are raked daily and more frequently if required during wet weather events.

The low level influent facilities are designated a confined space.

The plant manager indicated that grit deposition is at times evident in the screw pump channels.

The operators responsible for the low level influent facilities reside in the PTB and are also responsible for screening and grit operations.

Influent Conduits:

There are a total of five (5) influent conduits conveying flow into the PTB; one (1) low level (discussed above), three (3) gravity (triple barrel), and one (1) DELCORA. DELCORA contributes 50-60 mgd during dry weather and 100 mgd during wet weather events. Presently only two (2) of the triple barrel conduits are in use due to concerns of solids deposition in the conduits during low flow periods when all three conduits are in use. The triple barrel conduits receive flow from the Central Schuylkill Pump Station.

It was reported that the influent sluice gates are throttled at times during extreme wet weather events. This is true particularly when downstream unit processes (i.e., primary settling tanks) are out of service for maintenance.

Flow Metering:

Each influent conduit has a venturi flow meter except for the low level which utilizes an ultrasonic flow meter. The flow meters are all functional and are calibrated twice/week.

PTB Bypass:

There is a bypass line around the PTB which can be used to bypass flow directly to the flocculation basins during an extreme emergency (i.e. screenings/grit removal failure, PTB power failure, etc). It was reported that this bypass has not been used in the past few years.

Screening:

Screening consists of six (6) 1-in spaced catenary bar screens. The screens operate automatically by timer during normal dry weather flow events. The screens are rotated to equalize time of operation.

Five (5) screens are normally available for operation. One (1) screen is presently being rebuilt and is not available. One (1) screen has recently been rebuilt and is operable.

During normal DWF three (3) screens are in operation and additional screens are added accordingly during wet weather events and operated continually if required.

Grit Removal:

Grit is removed using four (4) Detriters. Two (2) are normally in operation during DWF with the others being added accordingly during wet weather events. Plant staff have effected modifications to the grit removal screw bearings to improve performance reliability. All are available for operation.

Flocculation Tanks:

There are two (2) flocculation tanks preceding the primary settling tanks with both normally in operation. One (1) flocculation tank can handle normal DWF. These tanks do not have mechanical means to remove any solids deposits.

It was reported that heavy grit deposition has occurred in the past in these tanks (most likely due to past mechanical problems with the Detriters), however, no impact to operations was apparent.

Primary Sedimentation:

Primary sedimentation occurs in five (5) primary settling tanks and all are available for operation (chronic mechanical failures in the past have been corrected). Each tank has 7 bays and its associated sludge and scum removal equipment.

Typical operation is with all 5 tanks in service. Sludge is removed daily with the sludge removal collectors being operated for 2 hr./day. Sludge blankets are maintained at 2 - 2.5 ft.

Plant staff indicated that no operational adjustments are presently required during wet weather events.

During the months of June and July only 4 tanks are in operation when preventive maintenance is being performed on the tanks and tank components.

Secondary System (Activated Sludge):

Biological treatment is performed in ten (10) reactor tanks utilizing a pure oxygen and mechanical mixing system. Presently only eight (8) reactors are required for operation, however all 10 are available.

Secondary system SRT (solids retention time) is maintained at 1 - 1.5 days (aeration tank inventory only). RAS is maintained at 32% of influent flow and is automatically flow paced during all flow conditions. Total RAS capacity is 120 mgd (6 mgd/tank). RAS concentration averages 6,500 - 7,000 mg/L. WAS wasting rates are based on maintaining the desired SRT.

Plant staff indicated that no operational adjustments are presently required during wet weather events.

Secondary Clarification:

Biological solids separation is performed in 20 final clarifiers. Under normal conditions 19 final clarifiers are in operation (1 is out of service for preventive maintenance) except during the dry weather summer months when one (1) additional clarifier is out of service for preventive maintenance (total of 18 in service). Sludge blankets are maintained at 1 - 3 ft. with the sludge collectors operating continually.

Disinfection and Effluent Pumping:

Under normal flow and tidal conditions, plant effluent flows by gravity through a triple barrel outfall to the Delaware River. Under high tide and/or high plant flow conditions, plant effluent is pumped utilizing a combination of three variable speed and two constant speed pumps. The effluent wet well is maintained at el. 95 ft. At el. 99 ft overflows occur into Eagle Creek.

Disinfection of plant effluent is provided through the use of gaseous chlorine which is stored onsite as liquid in 90-ton rail cars. Chlorine solution is injected to the plant effluent in mixing chambers prior to the triple barrel outfall. Due to corrective maintenance which has been required on the chlorine mixers, only two effluent barrels have typically been in operation.

4.4.1.2 Wet Weather Operation

Appendix C presents the SWWPCP's established influent flow control strategies utilized during wet weather events. Based upon increasing influent flow conditions additional unit processes are put into operation accordingly to accommodate those flow increases. Appropriate plant staff have been instructed in the implementation of these wet weather operation strategies.

Appendix C also includes the plant's hydraulic profile, plant flow schematic and unit process hydraulic capacities.

Based upon historic and typical WWTP operations, equipment availability and process/equipment preventive and corrective maintenance requirements, various unit processes may not be in service at any given time. Taking this fact into consideration recommended upset hydraulic values for the various unit processes and treatment plant as a whole can be derived, as presented in Table 4-14.

The values presented in Table 4-14 are the maximum design hydraulic capacities and do not take into consideration unit process performance and effluent permit compliance requirements. Stress testing of unit processes will be required to determine unit performance and permit compliance at elevated flow values (Stress Testing is discussed in Section 4.7).

From Table 4-14 it appears that the grit removal system presently limits the maximum flow to 430 mgd.

As discussed previously, plant staff indicated that the SWWPCP has successfully treated flows upwards of 418 mgd without impacts to overall plant performance (permit requirements were met). Again, stress testing of the various unit processes is required to determine actual unit process hydraulic capacity in comparison to performance.

Since only 8 of the 10 biological reactors are operated (under most situations) the 2 additional reactors may be available for primary effluent flow equalization or storage during wet weather events. This is further discussed in subsection 4.2.5, Long Term Plan Considerations.

4.4.1.3 Maintenance and Equipment Availability

Plant staff indicated 85% equipment availability for wet train unit processes, which is consistent with industry standards (and consistent with the other 2 PWD WPCP's).

The unit processes associated with the headworks (grit and screenings) typically require more frequent maintenance (PM and CM) and O & M attention. Plant staff indicated that spare parts and supplies are available and appropriate staff dedicated to this area as required to repair malfunctions or breakdowns.

Table 4-14

SWWPCP

REALISTIC UNIT PROCESS AVAILABILITY

Unit Process	Total No. of Units	Units Available for Operation	Hydraulic* Capacity
Low Level Screw Pumps	3	2	60 mgd
Influent Bar Screens	6	5	475 mgd
Grit Removal Tanks	4	3	430 mgd
Flocculation Channels	2	2	570 mgd
Primary Settling Tanks	5	4	460 mgd
Aeration Tanks	10	8	450 mgd
Final Sedimentation Tanks	20	18	510 mgd
Effluent Pumping	5	4	460 mgd

*"Flow-through" capacity, without regard to process performance and permit compliance.

The primary settling tanks which in the past have impacted plant performance (due to mechanical failures) have recently been rehabilitated and are operating properly.

4.4.1.4 Bottlenecks

The following were reported as "bottlenecks" or real or potential headloss conditions within the SWWPCP and that which will require further evaluation as part of the long term control plan (LTCP):

- low level influent facilities (flooding)
- final effluent conveyance when only 2 barrels are available
- flocculation tanks when more than one primary tank is out of service
- effluent pumping system

4.4.2 Southeast WPCP (SEWPCP) Evaluation

4.4.2.1 General

The SEWPCP has a permitted design flow of 112 mgd daily; daily maximum flow of 168 mgd; and a 224 mgd maximum instantaneous flow. Presently the plant experiences a 110 mgd average DWF from the Lower Delaware Low Level Interceptor. The plant essentially receives 100% of the design flow but only 45-50% of the design influent loading for BODs and TSS which at times causes difficulty in always meeting the percent removal requirements of the discharge permit.

It was reported that approximately six times per year the plant experiences high flows where wet weather SOPs have to be implemented and where impacts to the plant can be expected.

Facilities at the SEWPCP include: preliminary, primary and biological secondary treatment (oxygen activated sludge process) followed by disinfection. Sludge from the SEWPCP is pumped to the Southwest Water Pollution Control Plant (SWWPCP) for treatment.

Wastewater enters the SEWPCP through an 11-foot diameter influent sewer. Two mechanically cleaned bar racks located in the east and west influent channels of the Influent Pumping Station provide coarse screening.

After coarse screening the wastewater enters either of two suction bays, which are connected to three influent pumps (total of 6). The pumps lift the wastewater to a common diversion chamber. From the diversion chamber, wastewater flows through any of six channels to the Screen and Grit Building. Mechanically-cleaned catenary bar screens (6) located in the channel remove rags and debris. Grit and other materials settle to the bottom of the grit channels and are collected and removed by chain and flight grit collectors and an inclined dewatering screw conveyor. Grit and screening are loaded into trucks and delivered to a permitted landfill for disposal.

From the grit channels, wastewater is aerated in Flocculation Channels (2) before entering the Primary Sedimentation Tanks (4).

Wastewater enters four Primary Sedimentation Tanks over inlet weirs and through submerged inlet sluice gates. Settled sludge is collected and pumped directly to a sludge wet well in the Sludge Pumping Station.

Secondary treatment is provided by the activated sludge process using pure oxygen, in covered plug flow reactors (6). Pure oxygen is generated on site by two cryogenic oxygen generation plants. Each plant is rated at 50 tons per day of gaseous oxygen. The aeration system (6 reactors) consists of two batteries of three 4-stage covered aeration tanks. An influent control structure distributes the primary effluent to each tank. Wastewater passes through the four stages of the tank in a serpentine pattern to an outlet weir.

The Final Sedimentation Tanks (12) are arranged in two batteries of six. Mixed liquor (aeration tank effluent) enters the FSTs through baffled inlets. Effluent from the FSTs is discharged over V-notched weirs. Activated sludge is pumped from the FSTs to each battery of aeration tanks through return sludge headers.

The effluent is mixed with a chlorine solution as it enters the effluent conduit. The effluent conduit provides the necessary contact time for the chlorine to react with the effluent to provide disinfection before the treated effluent is released to the Delaware River.

4.4.2.2 Unit Process Status and Operation

Coarse Bar Screens

Consists of coarse automatic bar racks (2) upstream of influent pumping. Plant staff reports average reliability and that both are usually available for operation. The screens operate on timers or differential pressure.

Influent Pumping Station (IPS):

There are a total of six (6) constant speed (Nos. 1,2,6) and variable speed (Nos. 3,4,5) influent pumps connected to two (2) wet wells. All pumps are operated manually. The original design included automatic control, however, it was reported that the system has never been implemented/debugged. Each pump has a rated pumping capacity of 70 mgd.

The influent pump system can comfortably pump 280 mgd with four (4) pumps. It was reported that five (5) pumps are always available.

During DWF the wet well elevation is maintained between 8-10 ft (el 78 ft) and at 16 ft (el 84 ft) during wet weather events. The wet well elevation is measured in a manhole upstream of the plant.

The minimum operating wet well elevation was reported at el. 71 ft. 9 in (invert of inf. pipe= 68 ft). Wet well levels are monitored or recorded at the IPS and on the computer. At an elevation above 23 ft, CSOs occur in the collection system. The plant is obligated to treat 224 mgd before the "action level" of 23 ft is reached.

The plant has in the past, experienced flow increases from 100 mgd to 276 mgd within a 30 minute time period during a severe wet weather event which necessitated the operation of five (5) influent pumps.

The influent sluice gates to the IPS are manually operated and positioned (85% open) just above the flow to minimize sewer gas entry into the IPS. During wet weather conditions the gates are adjusted to 100% open.

Screening:

Consists of 6 catenary fine screens which are operated on timers or by pressure differential. They are operated continually, if required, during wet weather events. Manual sorting of screenings into buckets (no screenings conveyance to disposal) is required.

Grit Removal

Consists of 6 grit removal channels with mechanical rakes, and grit removal screws which deposits the grit onto a discharge belt conveyor. A pneumatic ejector conveys the grit to truck loading facilities. Operation of grit facilities is completely manual. The channels are rated at 55 mgd/channel.

It was reported that the grit removal conveyor can overflow during times of wet weather events. Additionally, grit tends to lay in the ejector discharge pipe and tends to freeze during cold temperatures.

During wet weather events, if required, additional manpower is stationed in the headworks facilities (overtime).

The screens and grit channels are designed in series (i.e. if either is down they both are down).

Flocculation Tanks

There are two (2) aerated flocculation tanks preceding the primary tanks. Both are normally in operation.

Primary Sedimentation

There are four (4) primary settling tanks each with 7 bays and its associated sludge and scum removal equipment.

Normal operation is with all 4 tanks in service. Typically, the sludge removed has a TSS concentration of 4 percent. When the Queen Lane WTP discharges into the plant the sludge TSS concentration increases to 5.5 percent. Primary effluent BODS and TSS average 45 mg/L.

Secondary System (Activated Sludge)

Biological treatment is performed in eight (8) reactor tanks utilizing high purity oxygen and mechanical mixing system. Presently only four (4) to six (6) tanks are required for operation, however all eight (8) are available. Each reactor has four bays configured in a serpentine flow pattern. Presently one battery is being operated using high purity oxygen and the other just using air.

Secondary system SRT is maintained between 1.3 - 3.5 days. The MLSS concentration in the "oxygen" train is maintained at 1,200 - 2,000 mg/L with an RAS concentration of 6,000 mg/L and the MLSS concentration in the "air" battery is maintained at 1,200 - 2,000 mg/L with a RAS concentration of 4,000 - 6,000 mg/L. RAS flowrate is maintained at 32-40% of influent flow for all flow conditions.

During high wet weather events (above 130 mgd) the additional 2 aeration tanks are put in operation to increase the hydraulic capacity through the plant. Four (4) reactors can handle up to 130 mgd; eight (8) reactors are required for flows above 240 mgd. At high flows without enough reactors in operation it was reported that the weirs in the primary tanks become submerged.

Secondary Clarification

Biological solids separation is performed in 12 final clarifiers. Under normal flow conditions all clarifiers are in operation, however twice per year (spring and fall) only 10 clarifiers are available as preventive maintenance is being performed on two (1/battery) of the final clarifiers.

Sludge withdrawal is accomplished by the use of a telescoping value (1/final clarifier). There are a total of 8 RAS pumps (4/battery) with only 1-2 per battery typically in operation. Sludge blanket depths are maintained at 1-2 ft.

Disinfection and Effluent Pumping

Under normal flow and tidal conditions, plant effluent flows by gravity through a double barrel outfall. Under high tide and/or high plant flow conditions, plant effluent is pumped utilizing five effluent pumps. It was reported that the effluent pumps are only required about 6-8 times per year (usually 3 pumps).

Disinfection of plant effluent is provided through the use of gaseous chlorine which is stored onsite as liquid in 90-ton rail cars. Chlorine is injected in mixing chambers at the head of the effluent conduits for disinfection.

Sludge Transfer

No problems were reported with the conveyance of sludge to SWWPCP. However SWWPCP has reported past hydraulic overload problems at the DAF system due to the volume of sludge being discharged by SEWPCP. Typically, the sludge concentration discharged to SWWPCP is on the order of 0.5%, however, the design was based on a 2% sludge concentration.

4.4.2.3 Wet Weather Operation

Appendix C presents the SEWPCP's established influent flow control strategies utilized during wet weather events. Based upon increasing influent flow conditions additional unit processes are placed into operation accordingly to accommodate those flow increases. Appropriate plant staff have been instructed in the implementation of these wet weather operation strategies.

Based upon historic and typical WWTP operations, equipment availability and process/ equipment preventive and corrective maintenance requirements various unit processes are not in service at any give time. Taking this fact into consideration, recommended upset hydraulic values for the various unit processes and treatment plant as a whole can be derived, as presented in Table 4-15.

The values presented in Table 4-15 are the maximum design hydraulic capacities and do not take into consideration unit process performance and effluent permit compliance requirements. Stress testing of unit processes will be required to determine unit performance and permit compliance at elevated flow values (stress testing is discussed in Section 4.7).

Table 4-15

SEWPCP

REALISTIC UNIT PROCESS AVAILABILITY

Unit Process	Total No. of Units	Units Available for Operation	Hydraulic* Capacity
Influent Pumping (IPS)	6	5	350 mgd
Influent Bar Screens	6	5	350 mgd
Grit Removal Channels	6	5	285 mgd
Flocculation Channels	2	2	420 mgd
Primary Settling Tanks	4	3	285 mgd
Aeration Tanks	8	7	300 mgd
Final Sedimentation Tanks	12	10	300 mgd
Effluent Pumping	5	4	280 mgd

*"Flow-through" capacity, without regard to process performance and permit compliance.

From Table 4-15 it appears that the effluent pumping station limits the maximum flow to 280 mgd and the grit removal channels and the primary settling tanks to 285 mgd. Plant staff indicated that the SEWPCP has successfully treated flows upwards of 270 mgd without impacts to overall plant performance (permit requirements were met). Again, stress testing of the various unit processes is required to determine actual unit process hydraulic capacity in comparison to performance.

Presently two aeration tanks are used for flow equalization and storage during wet weather events.

4.4.2.4 Maintenance and Equipment Availability

Plant staff report an 85% equipment availability for all equipment and processes within the SEWPCP. Sufficient spare parts and supplies are maintained on-site to effect the majority of expected repairs.

Various major equipment systems are undergoing upgrade and refurbishment as follows:

- Primary settling tanks (mechanical equipment replacement, repairs to expansion joints and concrete)
- Final Settling Tanks (mechanical equipment replacement, repairs to expansion joints and concrete)
- Influent Pumps (new impellers and internal components)

The rehabilitation of the influent pumps is scheduled for completion by January 1996. The primary and final settling tanks are scheduled for completion by the end of summer, 1995. At any given time only one influent pump, one primary settling tank and two final settling tanks are out of service for rehabilitation.

The grit removal system is reported to be maintenance intensive, particularly the grit conveyor and ejector system. Appropriate plant personnel are dedicated to this area as required to repair malfunctions or breakdowns.

4.4.2.5 Bottlenecks

The following were reported as "bottlenecks" or real or potential headloss conditions within the SEWPCP and that which will require further evaluation as part of the LTCP:

- Grit removal conveyor (overflows during wet flow events)

- Grit ejector discharge pipe (grit lays in ejector pipe and freezes during cold weather)

- Primary tank effluent weirs (when insufficient aeration tanks are in service)

4.4.3 Northeast Wpcp (Newpcp) Evaluation

4.4.3.1 General

The NEWPCP has a permitted design flow of 210 mgd, 350 mgd maximum daily flow, and a 420 mgd maximum instantaneous flow.

The NEWPCP includes preliminary, primary, and biological secondary treatment followed by disinfection. On-site sludge treatment includes thickening and anaerobic digestion prior to off-site transport by barge.

NEWPCP receives wastewater from the Delaware Low Level, Somerset Low Level, Frankford Low Level, and Frankford High Level Sewers. Once within the plant site, the wastewater is combined at the Preliminary Treatment Building. In the Preliminary Treatment Building, wastewater is screened, pumped (except for the Frankford High Level flows) and degritted. Collected screenings and grit trucked off-site for disposal at a permitted sanitary landfill.

After preliminary treatment, wastewater flows to the Primary Sedimentation Tanks (2 sets; total of 12 tanks), where heavy settleable solids, as well as scum are collected and removed. Primary sludge is pumped to the Sludge Thickener Building and scum is pumped to the Scum Disposal Facility.

After primary sedimentation, wastewater flows to the Aeration Tanks (7 reactors), where it is biologically treated by the SURFACT system which is a combination of suspended and attached growth biomass technologies.

From biological treatment, wastewater flows to the Final Sedimentation Tanks (2 sets; total of 16 tanks), where secondary sludge and scum are collected and removed. Most of the secondary sludge is returned to the Aeration Tanks; the remainder, excess secondary sludge, is wasted to the Sludge Thickener Building. Secondary scum is pumped to the Scum Disposal Facility.

After final sedimentation, the treated and clarified wastewater flows to Chlorine Contact Tanks, where it is disinfected prior to release into the Delaware River.

Primary sludge and excess secondary sludge are combined in the Sludge Thickener Building. Excess secondary sludge is thickened by the dissolved air flotation (DAF) process, then mixed with primary sludge. Primary and thickened excess secondary sludge are pumped as a mixture or can be separately pumped to the Sludge Digestion Facilities, where the sludge is anaerobically digested. Digested sludge is transported off-site by barge for further processing at the BRC.

4.4.3.2 Unit Process Status and Operation

Diversion Chamber "B"

Receives flow from the Frankford High level Interceptor (gravity). DWF averages 50 mgd and upwards of 100 mgd during wet weather events.

Meter Vault "A"

Contains venturi flow meters for the Frankford High Level and the Frankford/Somerset high level interceptors. The Frankford/Somerset high level interceptor averages 40-50 mgd DWF and 100 mgd wet weather flow.

Diversion Chamber "A"

Low level flows comingle in Diversion Chamber "A" prior to the PTB. The Delaware low level interceptor averages 70 - 80 mgd DWF and 200 mgd wet weather flow. The Delaware low level is not metered but is calculated.

The level in Diversion Chamber is maintained at 6 - 9 ft. (maximum 12 ft). There is an action of level of 18.5 ft. (measured in the collection system) where above this overflows occur.

Screening

Consists of a total of eight (8) rope screens; six (6) for low level flows and two (2) for high level flows. Normally during DWF one (1) high level screen and 2 - 3 low level screens are in operation. Both high level screens and 4 - 5 low level screens are operated during wet weather events. During wet weather events the screens are operated continually.

It was reported that one (1) high level screen can handle wet weather flows if the screen does not blind.

The low level screens have a 6-minute cycle time which is considered too slow during severe wet weather events and first flush periods.

The influent screens are I/C interlocked with each screens influent sluice gate and influent pump.

Blinding of the screens, particularly during the first flush was reported as a major problem and flooding of the basement area occurs.

Influent Pump Stations (IPS)

Includes six (6) variable speed pumps each rated for 85 mgd. Each pump is in series with an influent screen.

The IPS is presently operated "somewhere between manual and computer mode". Interlocks require 15 minutes between pump starts. The wet well level is typically maintained 5-7 ft above the pump suction. Redundancy has been designed into the control system (i.e. multiple pump controls). In manual control the wet well is maintained between 6 - 9 ft; in the automatic/computer mode between 4.5 ft - 10 ft. Each pump has a vibration monitoring and alarm system.

It was reported that a total of five (5) pumps can operate at one time. All low level flows are pumped. High level flows are not pumped.

The IPS operator is also responsible for the operation of the screenings and grit removal facilities. Additional staff is added during wet weather events if required.

Grit Removal

Grit removal is accomplished using four (4) Detriters. Two (2) are normally in operation during DWF. The other two (2) are added as required during wet weather events. Each Detriter is rated for 125 mgd. It was reported that the Detriter influent sluice gates act as emergency overflow weirs during extreme wet weather events where overflows can occur into the Detriters.

Primary Sedimentation

There are two (2) sets of primary settling tanks (set 1; 8 tanks, set 2; 4 tanks). Flow is metered into each set by venturi meters (2 meters for set 1 and 1 meter for set 2).

Sludge collector mechanisms are operated 1 - 2 hours per day; sludge is removed daily (15 - 20 min./tank); and sludge blankets are maintained at 2 - 2.5 ft.

Secondary System (SURFACT)

Usual operation is with six (6) reactors in operation, however during the months of January, February and March all seven (7) reactors are in service (with 80% of the RBC's turning).

RAS is flow paced from the computer system and maintained at 30 - 33% of the influent flow. Maximum RAS capacity is 150 mgd.

Recent and more frequent RBC shaft and media failures are becoming a serious concern. This issue is presently being addressed by PWD.

Secondary Clarification

Biological solids separation is accomplished in 16 final settling tanks (2 sets). Sludge blankets are maintained at 4 - 5 in. Secondary effluent is metered downstream of the tanks.

It was reported that during construction of set 1 final settling tanks when influent flow exceeded 170 mgd, set 2 effluent weirs became submerged and solids losses occurred.

Disinfection

Disinfection of plant effluent is accomplished through the use of gaseous chlorine which is stored on-site as liquid in 90-ton rail cars. Chlorine is injected in mixing chambers at the head of two (2) parallel chlorine contact tanks. Final effluent is conveyed through a triple barrel outfall into the Delaware River.

4.4.3.3 Wet Weather Operation

Appendix C presents the NEWPCP's established procedures for both dry and wet weather events. Based upon increasing influent flow conditions additional unit processes are placed into operation accordingly to accommodate the flow increases. Appropriate plant staff have been instructed in the implementation of the wet weather operation procedures.

Based upon historic and typical WWTP operations, equipment availability and process/equipment preventive and corrective maintenance requirements various unit process are not in service at any given time. Taking this fact into consideration, recommended upset hydraulic values for the various unit processes and treatment plant as a whole can be derived, as presented in Table 4-16.

The values presented in Table 4-16 are the maximum design hydraulic capacities and do not take into consideration unit process performance and effluent permit compliance requirements. Stress testing of unit processes will be required to determine unit performance and permit compliance at elevated flow values (stress testing is discussed in Section 4.7).

Table 4-16

REALISTIC UNIT PROCESS AVAILABILITY

Unit Process	Total No. of Units	Units Available for Operation	Hydraulic (1) Capacity
Influent Pumping (IPS)	6	4	340 mgd
Influent Bar Screens	8	6 (2)	460 mgd (3)
Grit Removal	4	3	375 mgd
Primary Settling Tanks	8	7	440 mgd
AS/RBC	7	6	360 mgd
Final Sedimentation Tanks	16	14	370 mgd
Chlorine Contact Tank	2	2	420 mgd
Effluent Conduit	3	3	400-510 mgd

(1) "Flow-through" capacity, without regard to process performance and permit compliance.

(2) 1 low level and 1 high level unit out of service.

(3) Hydraulic capacity with 4 low level = 340 mgd;
Hydraulic capacity with 2 high level = 120 mgd;
Total PTB capacity with 6 bar screens = 460 mgd.

From Table 4-16 it appears that the aeration system presently limits the maximum flow to 360 mgd. However, the permitted maximum instantaneous flow required to be treated is 420 mgd, which is significantly higher than the realistic 360 mgd flow. Additionally, all four (4) Detriters and all 16 final settling tanks are required to be in operation to hydraulically pass the 420 mgd flow.

Plant staff indicated that on December 5, 1993 the plant received and successfully treated 414 mgd. However, plant staff noted that this flow rate is questionable and may be a high estimate. It was reported that flooding of the aeration tank platforms occurred during this event. This gives credence to limiting the hydraulic capacity to 360 mgd through the aeration system. This must be reconciled in the long term control plan. Again, stress testing of the various unit process is required to determine actual unit process hydraulic capacity in comparison to performance.

It was reported that the plant experiences the 420 mgd instantaneous maximum flow about twice/year for a 2 hour duration.

4.4.3.4 Maintenance and Equipment Availability

Plant staff indicated 85-90% equipment availability for the entire plant.

The plant manager indicated that the influent screens require substantial maintenance efforts. Spare parts and supplies are available and appropriate staff dedicated to this area as required to repair malfunctions or breakdowns.

Set 2 of the primary settling tanks have recently been completely rehabilitated.

The SURFACT RBCs are exhibiting more frequent shaft and media failures which will limit the secondary system removal capacity. PWD is presently evaluating this problem to determine the long term ramifications and impact to overall plant performance.

4.4.3.5 Bottlenecks

The following were reported as "bottlenecks" or real or potential headloss conditions within the NEWPCP and that which will require further evaluation as part of the long term control plan:

- Frankford High Level Interceptor Venturi Meter (2-3 ft headloss across meter)

- Influent Bar Screens (blinding during first flush)
- Detriter influent sluice gates and potentially the effluent channel

- Aeration tank platforms (above 400 mgd)
- Final settling tank channel at the confluence of Set 1 and Set 2 discharges
- PWD installed bar racks at aeration tank discharge (to capture RBC media)

4.5 Septage Evaluation

NMC4 requires an evaluation to determine the effect of septage discharges the collection system and/or treatment facility during periods when wet weather flows are being processed and if required, to assess the feasibility of prohibiting septage discharges during wet weather periods.

NEWPCP and SEWPCP do not receive septage. SWWPCP receives approximately 10,000 - 20,000 gpd which is minimal with respect to the average DWF and indeed is only 0.01% of the DWF treated. The septage discharges at SWWPCP have no impact on plant operations and performance and no further evaluation is required.

4.6 Stress Testing

NMC4 also requires a determination of the ability of a POTW to operate acceptably at incremental increases in wet weather flows and to estimate the effect on POTW's compliance with its permit requirements. The most effective way to accomplish the requirements of this task is to perform stress testing of the plant and plant's unit processes.

The objectives of plant stress testing would be to establish:

- Maximum and average flows that should be treated in various unit processes for current and future operations;

- Ranges of hydraulic loadings, and solids and BOD_5 loadings that could be applied to the various unit processes and yet obtain maximum removal efficiencies in each unit process;

- Changes in plant processes and operations (such as increased loads, MLSS levels, changes in sludge wasting, return activated sludge (RAS) ratios, detention times, etc.) that would increase removal efficiencies; and

- Magnitudes of excess capacity, if any, in each unit operation of the plant (increased flow through plant process units) that could be achieved and still meet the discharge permit requirements for each plant.

Plant stress testing and optimization is usually carried out in two stages. During the first stage, current plant operations are observed, the treatment system and process operation and performance is assessed and a stress test and sampling and analysis protocol developed. In the second stage, actual stress testing of the plant and plant unit processes is performed.

During stress testing selected treatment trains or unit processes would be isolated for conducting the process optimization and stress testing. Flows through these treatment trains would either be increased or decreased and the resulting impacts on treatment and removal efficiencies would be established from sampling and analysis. Field measurements would be conducted during the observation period to make sure that the plant hydraulics could be changed as desired without causing operational upsets. Field surveys of weir elevations at various locations in the processes are usually performed during the first stage to assure that appropriate flows are treated in selected process units.

It will be necessary to conduct stress testing with minimal changes and disruptions to the existing plant operations. To achieve the desired flows through the various process units to demonstrate their respective treatment capacities and ensure that the stress testing of the unit processes would not degrade treatment plant effluent quality, operational adjustments to the various unit operations would be made slowly.

The results of stress testing will allow a determination of existing and future optimum flows, loads, and operations of the various unit processes.

It can be expected that the actual field stress testing would take about eight to twelve weeks before conclusive results could be obtained from changed/adjusted operations.

4.7 Other Related Issues

Two related issues which must be considered within the overall context of the CSO program initiative are: 1) PWD's plan to convert each plant's disinfection system from chlorine to sodium hypochlorite, and 2) WTP residuals discharge effects on the SEWPCP, NEWPCP and SWWPCP.

Conversion to hypochlorite for disinfection must take into consideration future capacity requirements and potential additional application locations (i.e. primary effluent). Sufficient expansion and flexibility capabilities should be designed into the hypochlorite system(s).

The SEWPCP is benefited by the WTP discharges from the Queen Lane WTP since it increases the plants' loading and aids in meeting the BOD_5 and TSS percent removal requirements. Results of the Residuals Management Project may potentially eliminate these WTP discharges to SEWPCP. If the discharges are to be eliminated PWD may need to negotiate with PaDEP/EPA to eliminate the percent removal requirements in the SEWPCP's discharge permit.

4.8 Summary

It appears that all reasonable methods are presently being employed by each respective WPCP to treat existing maximum wet weather flows within the requirements of their discharge permits. Each plant has established operating procedures for wet weather conditions. However, as wet weather flows can be expected to increase in the future, and the plants will be obligated to treat these flows, actual plant and unit process capabilities must be determined.

Increases in the wet-weather flows at each of the three WPCPs was analyzed using the STORM models of the combined sewer systems. This analysis was performed using STORM to compute the flows captured by the interceptor sewer system under existing conditions and under each of the two flow maximization scenarios (modified regulators and the theoretical limit). The long-term precipitation record used to simulate the occurrence of overflows (1948 - 1992) was appended to include the full period from 1948 through July 1995. This updated precipitation record was used to perform the WPCP flow analysis and was compiled for the National Weather Service rain gauge at the Philadelphia International Airport. The long-term precipitation data used in this study are decribed in greater detail in the System Hydraulic Characterization Report (PWD; June 27, 1995). Simulation of flow capture using this precipitation record enabled the computation of cumulative probability distributions of plant flows which indicate the probability of exceedence over the range of flow values. Changes (increases) in the frequency of the occurrence of higher flows at the WPCPs has significant implications for WPCP operations, thus the plots are useful in assessing potential plant impacts associated with conveyance improvements.

Seven flow frequency plots have been produced for each of the three WPCPs. Figures 4-5a, 4-5b and 4-5c provide background on existing WPCP flow characteristics for each of the three plants. These plots show the distribution of daily plant inflow frequencies as simple histogram plots prepared using the plant flow data for the period from July 1991 to December 1994.

Figures 4-6a, 4-6b and 4-6c indicate the expected increases in flow for each of the three plants simulated using the entire precipitation record for the period from 1948 to 1995, which therefore represent average conditions. For example, Figure 4-6a shows that under existing conditions, 360 mgd is exceeded on average 125 hours per year in the current storm simulations, but this rate would be exceeded 310 hours per year with full implementation of the regulator modifications and 460 hours per year under the theoretical limit scenario for conveyance improvements. This information is useful in assessing the impacts on the WPCPs that can be expected as the conveyance improvements are implemented. As these plots indicate, significant increases in high flows can potentially be experienced.

Figures 4-7a, 4-7b and 4-7c show the influence of extreme climatological conditions on the flow distributions which would be experienced under full implementation of the regulator modifications. These plots were produced using the precipitation data for only the fiscal year shown in the simulations to produce the highest volume of flow at the WPCPs, (July 1, 1979 - June 30, 1980 at the NEWPCP and SEWPCP and July 1, 1994 - June 30, 1995 at the SWWPCP), representing the extreme annual conditions in terms of flow volume treated. Each figure shows the cumulative frequency distribution of plant inflow with full implementation of the regulator modifications under average conditions (from Figures 4-6a-c) and under the extreme year conditions described above. For example, Figure 4-7a shows that 360 mgd at the NEWPCP would be exceeded 400 hours per year under the extreme precipitiation conditions of FY 1979-80 (with full implementation of the regulator modifications), an increase of almost 30% above the 310 hours per year that this rate would be exceeded under average precipitation conditions and an increase of 220% above the 125 hours per year on average that this rate is currently exceeded. This information is useful in assessing potential extent of the impacts on the WPCPs that can be expected as the conveyance improvements are implemented under reasonable "worst case" precipitation conditions.

The increases in flow at the WPCPs should occur incrementally, to enable plant operations to adjust to the increased flows, and to enable the actual hydraulic changes in the system of regulators, interceptors and treatment processes to be evaluated before further increases occur. The incremental increases in flow at the WPCPs will be staged with incremental implementation of the conveyance improvements, as described in Section 4.3. Staging of improvements will be on an annual basis, with full implementation in a multi-year period. PWD intends to meet with PaDEP in the near future to discuss the information currently being developed to better quantify the impacts of the increased wet-weather flow rates and volumes that will be delivered to the WPCPs. This information will be used to define in greater detail the implementation plan for the conveyance improvement program.

Each year during the implementation period the specific conveyance improvements and associated WPCP operational requirements will be defined on a schedule that enables the potential fiscal impacts to be factored into PWD's annual operating budgets. The specific goals for conveyance improvements to be implemented each year will then be included in the annual CSO status report submitted to PaDEP under the Chapter 94 reporting requirements.

The WPCP responses to the increased flows that will be delivered to the plants as the conveyance improvements are implemented will be guided by the determination of process-specific treatment capabilities. Although useful information for wet-weather operation of the WPCPs is provided in the "CSO Mitigation Through Rating Analysis for Northeast WPCP, Southeast WPCP, Southwest WPCP" report prepared by Greeley and Hansen, comprehensive process-specific determinations of treatment capabilities are above and beyond the results presented in the report. Stress testing of each plant's unit processes is required to accomplish this, and stress testing will be addressed in the Long Term Control Plan.

Observations during our evaluation indicate adequate emphasis in the area of routine and corrective maintenance to sustain a satisfactory level of system reliability for existing DWF and wet weather flow conditions.

PWD is actively seeking to increase the available wet-weather treatment capacity at the SWWPCP through reduction in the wet-weather flow handled by this facility from the DELCORA service area. PWD has required DELCORA to develop a plan for eliminating wet-weather induced exceedences of the flow limits specified in their service agreement. DELCORA has developed a plan which includes diversion of flow from one of the three major drainage basins in DELCORA's Eastern Service Area currently handled at the SWWPCP to DELCORA's Western Regional Treatment Plant. The elimination of this flow, together with inflow reductions in the service communities to be determined in follow-up planning studies, will reduce the wet-weather flow rates delivered to the SWWPCP from the DELCORA system, effectively increasing the available wet-weather capacity for treatment of combined sewer flows at this facility by at least 23 mgd. The improvements required to enable this flow reduction from DELCORA are currently expected to be operational in roughly four years.

The related issues of conversion from chlorine to sodium hypochlorite for all plants and the impacts from the potential elimination of Queen Lane WTP discharges to SEWPCP on the BOD_5 and TSS percent removal requirements must also be considered in the overall CSO program initiatives.

Figure 4-5a
Frequency Distribution
Average Daily Flows at the Northeast WPCP
July 1991 - December 1994

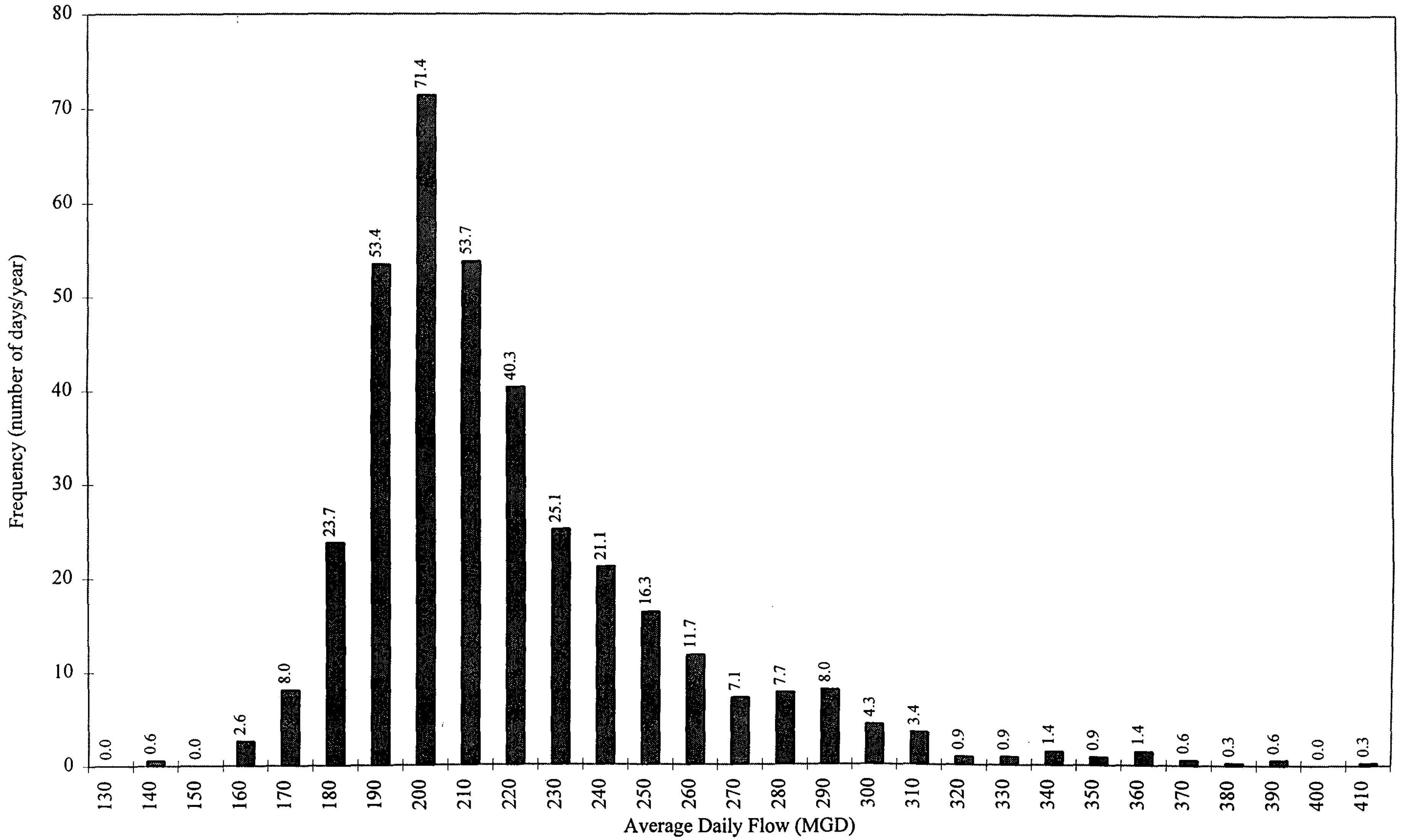
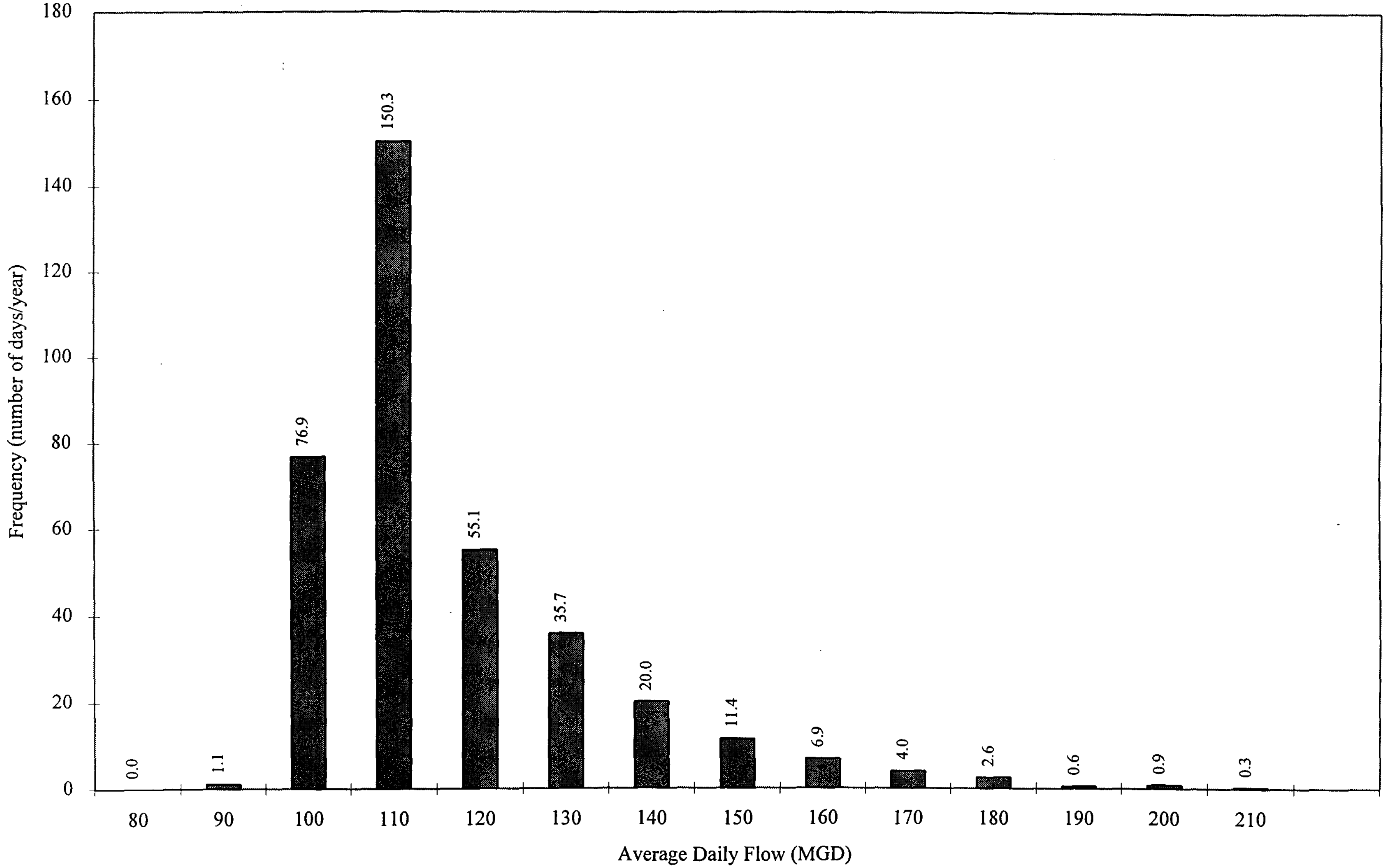
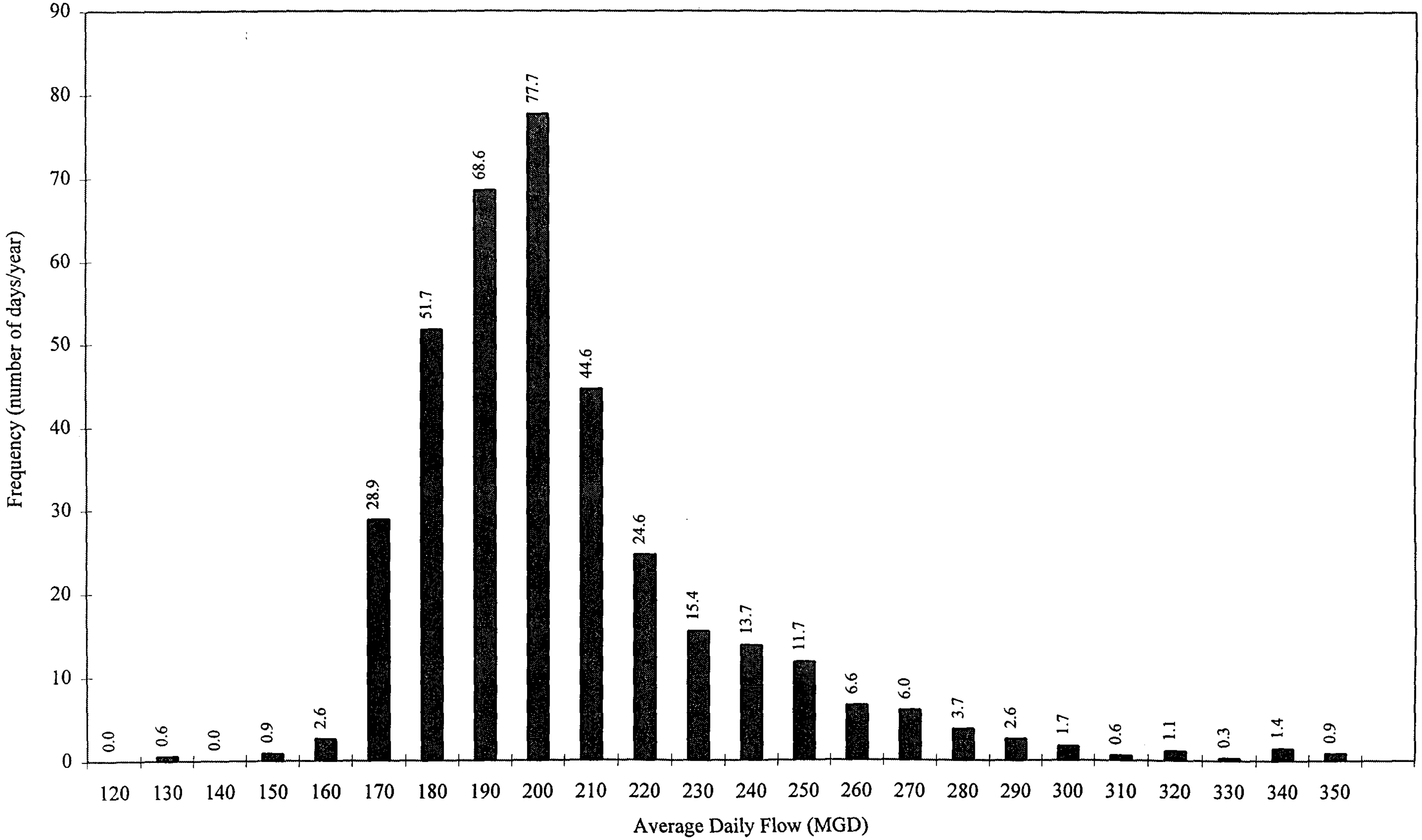


Figure 4-5b
Frequency Distribution
Average Daily Flows at the Southeast WPCP
July 1991 - December 1994



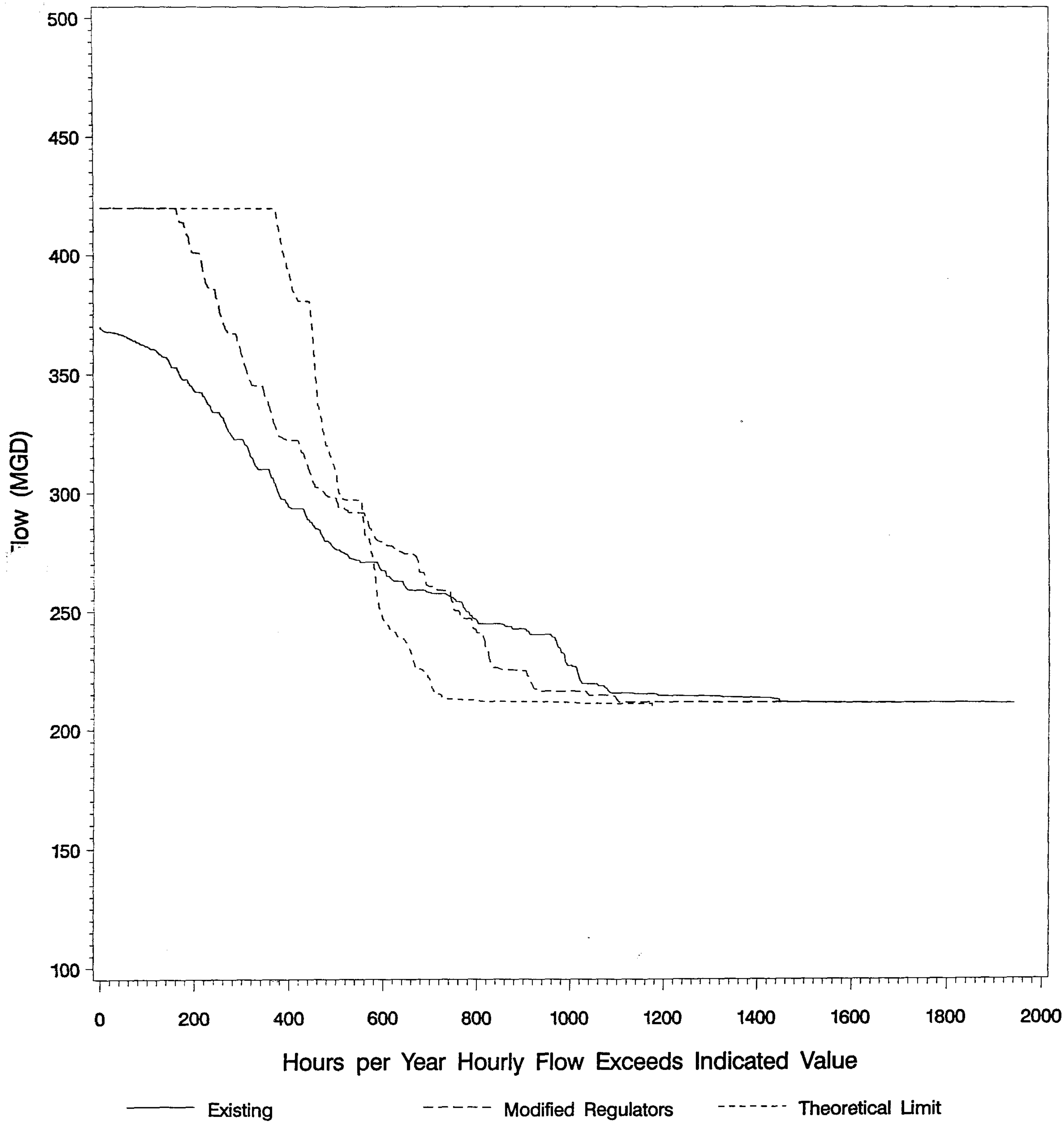
8/16/95

Figure 4-5c
Frequency Distribution
Average Daily Flows at the SW WPCP
July 1991 - December 1994



8/16/95

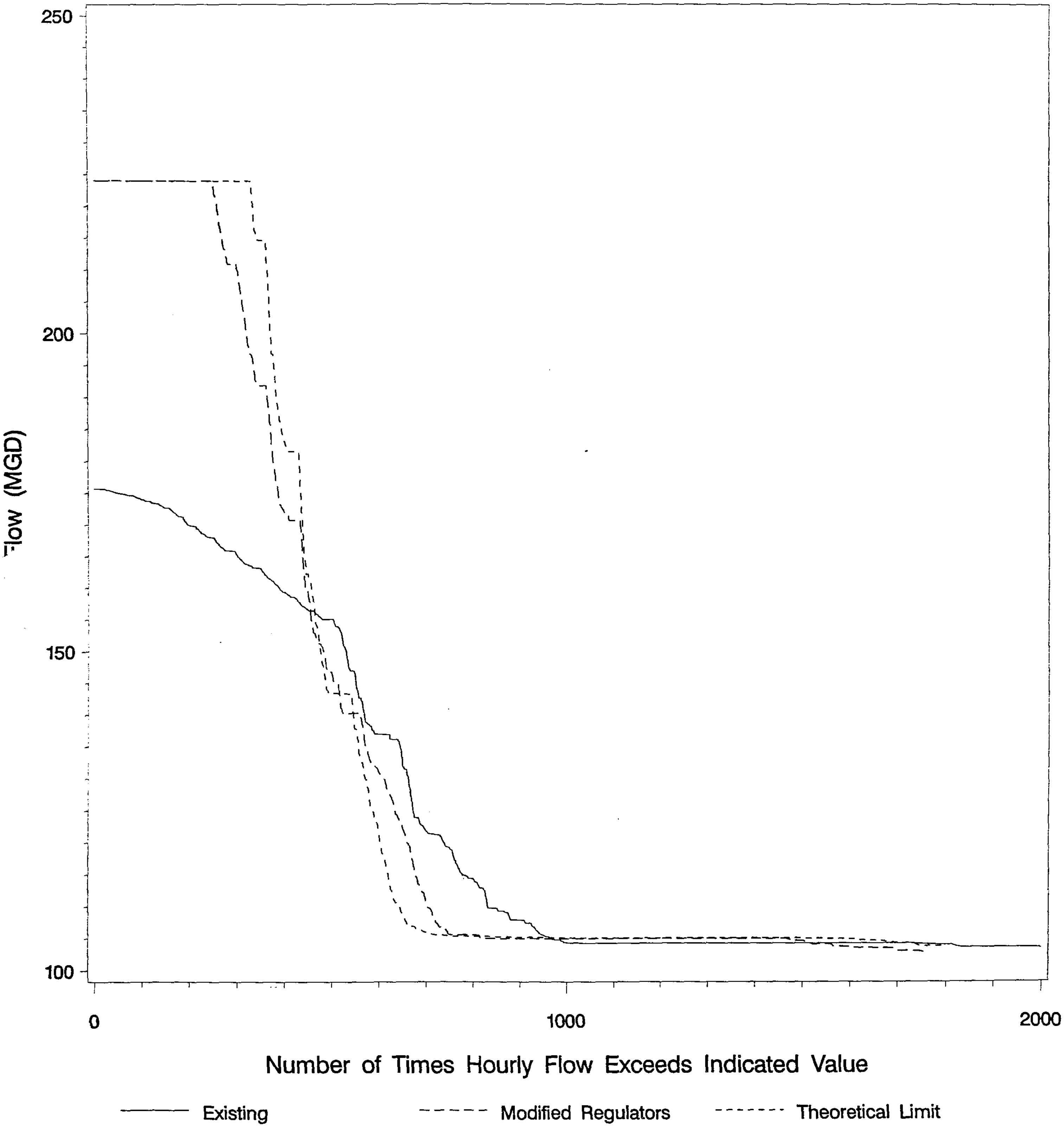
Figure 4-6a. Cumulative Distribution Function for Hourly Flows Northeast Water Pollution Control Plant



Average Year Based on Period of Record (January 1948 through July 1995)

CDM PWD Combined Sewer Overflow Project
NMCD September 1995

Figure 4-6b. Cumulative Distribution Function for Hourly Flows Southeast Water Pollution Control Plant

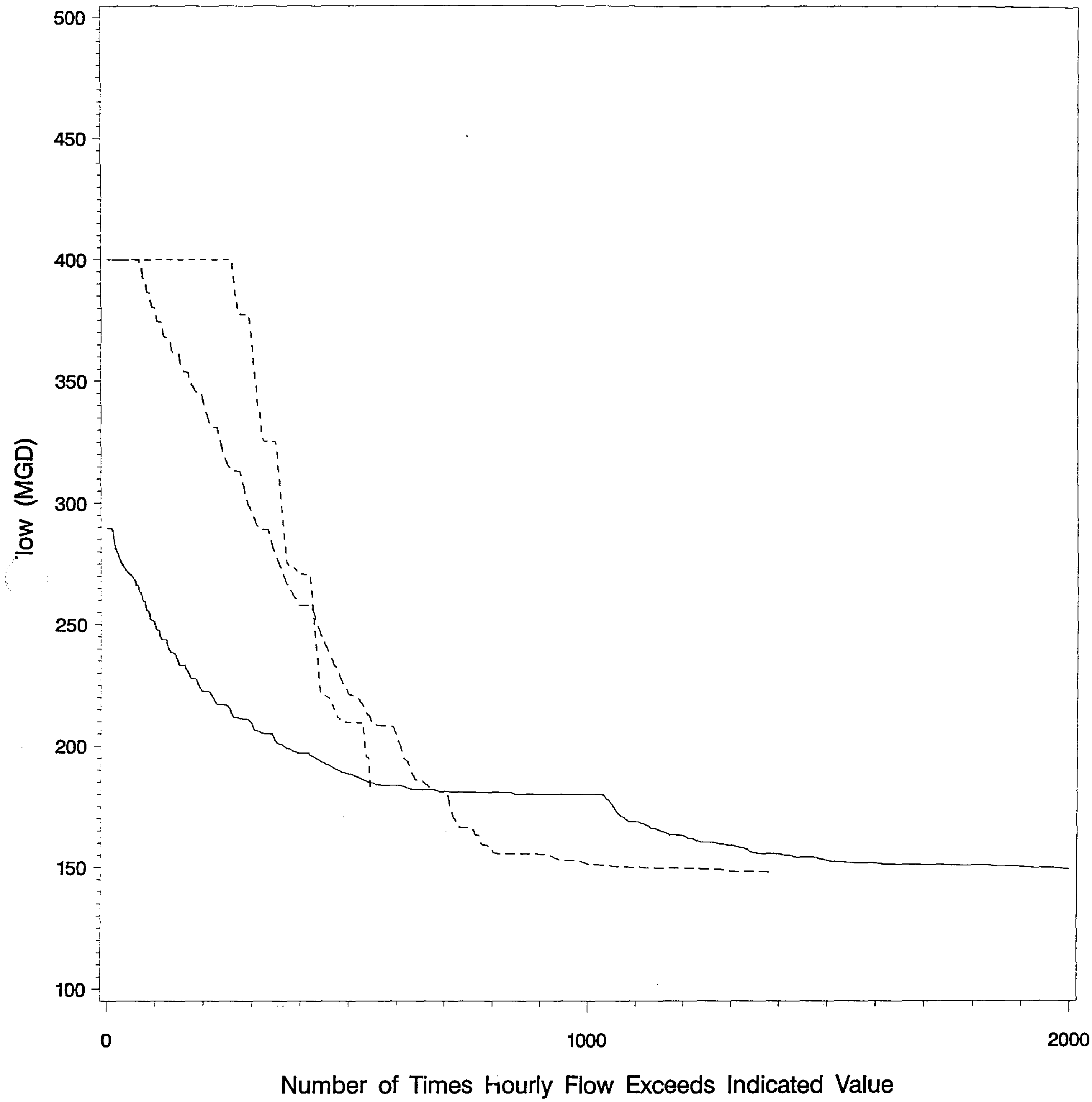


Average Year Based on Period of Record (January 1948 through July 1995)

CDM PWD Combined Sewer Overflow Project

NMCD September 1995

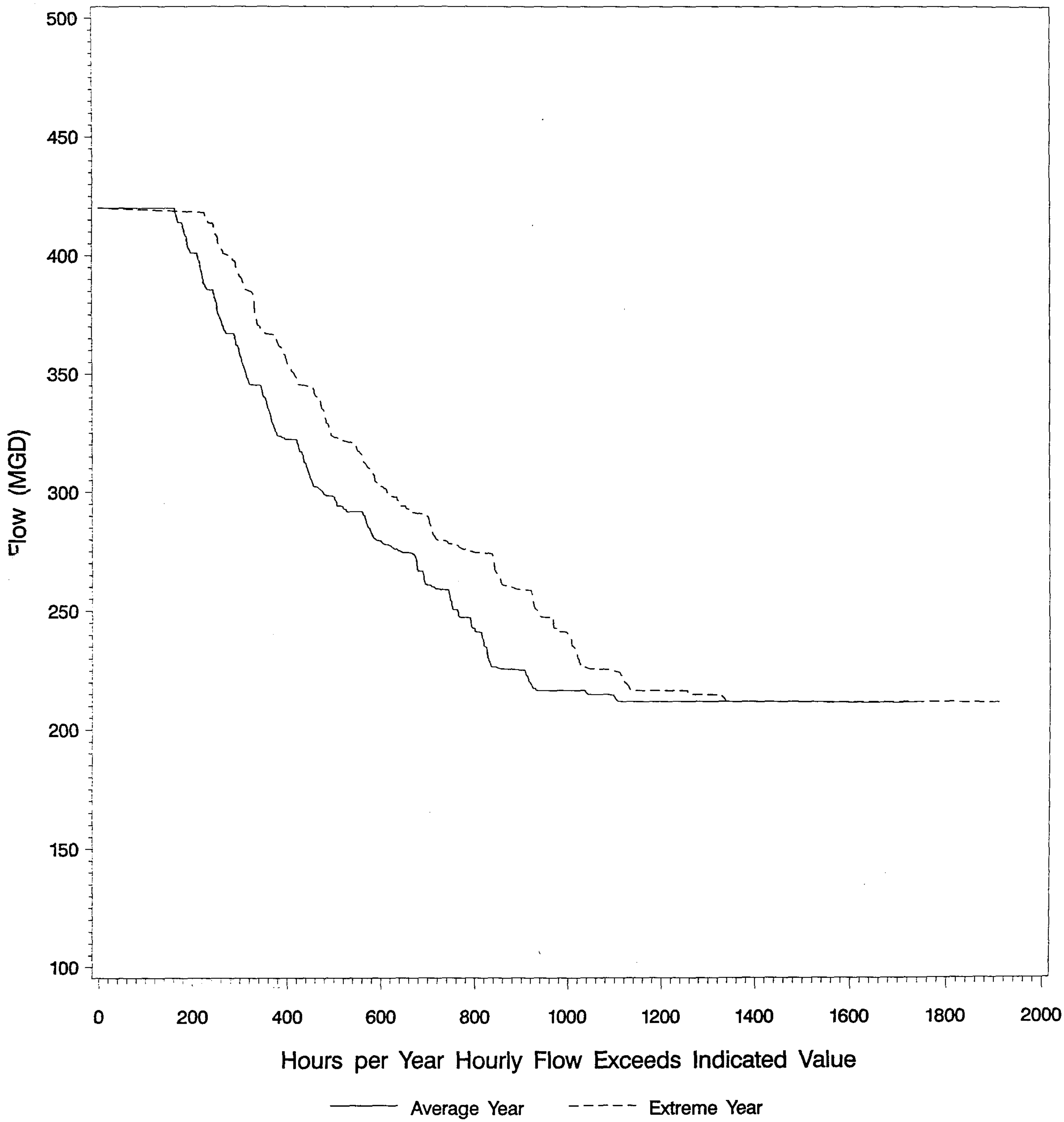
Figure 4–6c. Cumulative Distribution Function for Hourly Flows Southwest Water Pollution Control Plant Less DELCORA Flows



Average Year Based on Period of Record (January 1948 through July 1995)

CDM PWD Combined Sewer Overflow Project
NMCD September 1995

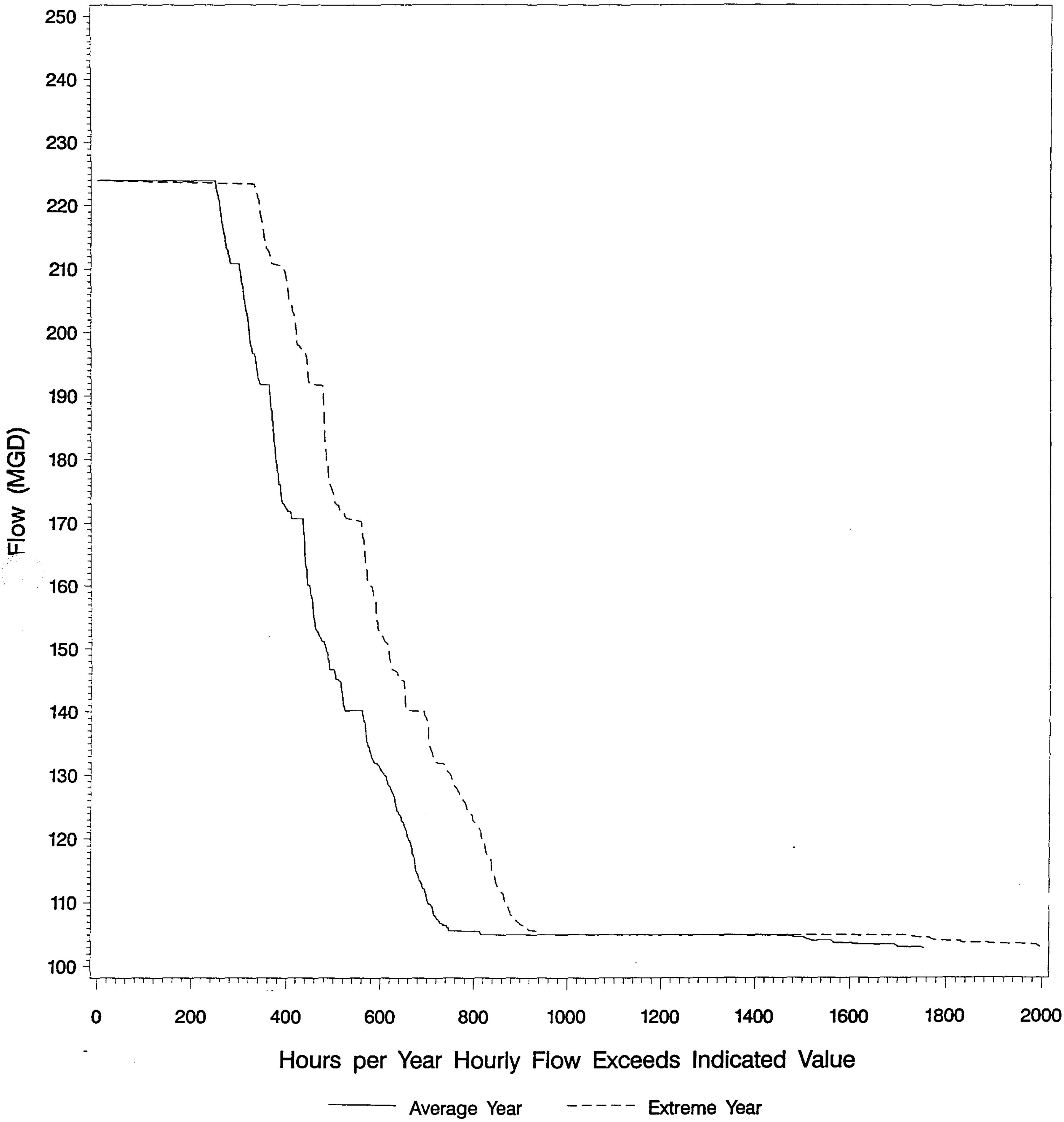
Figure 4-7a. Cumulative Distribution Function for Hourly Flows Comparison of Average Year versus Extreme Year for the Northeast WPCP



Northeast WPCP with Modified Regulators

CDM PWD Combined Sewer Overflow Project
NMCD September 1995

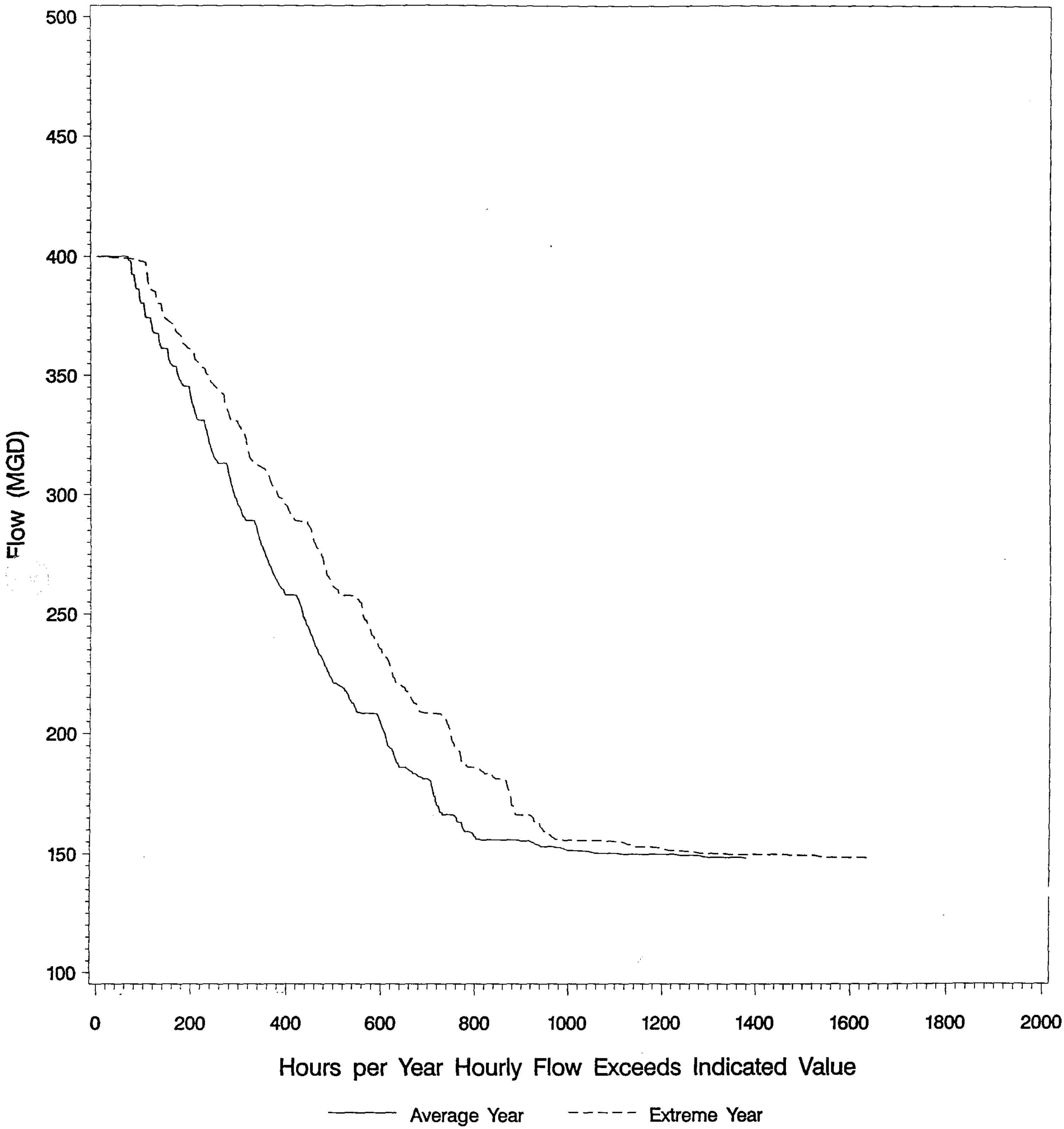
Figure 4–7b. Cumulative Distribution Function for Hourly Flows
Comparison of Average Year versus Extreme Year for the Southeast WPCP



Southeast WPCP with Modified Regulators

CDM PWD Combined Sewer Overflow Project
NMCD September 1995

Figure 4-7c. Cumulative Distribution Function for Hourly Flows Comparison of Average Year versus Extreme Year for the Southwest WPCP



Southwest WPCP with Modified Regulators

CDM PWD Combined Sewer Overflow Project
NMCD September 1995

Section 5
Minimum Control No. 5
Prohibiting CSO Discharges During Dry Weather

Dry weather discharges at CSO outfalls can occur in any combined sewer system on either a chronic (i.e., regular or even frequent) basis or on a random basis (i.e., as a result of unusual conditions). Dry weather discharges can occur as a result of numerous site-specific conditions. Random dry weather discharges can occur at virtually any CSO outfall following sudden clogging by unusual debris in the sewer, structural failure of the regulator, or hydraulic overloading by an unusual discharge of flow to the combined sewer system. Chronic dry weather discharges can and should be prevented from occurring at all CSO outfalls. Random discharges cannot be prevented, but can and must be promptly eliminated by cleaning repair, and/or identification and elimination of any excessive flow and/or debris sources.

As documented in Section 1, the PWD performs regular inspections and maintenance of the CSO regulators throughout the City. These programs ensure that sediment accumulations and/or blockages are identified and corrected immediately to avoid dry weather overflows. The results of these efforts are reflected in the Department's Monthly CSO Status Report submitted to PaDEP and EPA Region III. These monthly reports include listings and information pertaining to occurrences of blockages or any dry weather overflows that are detected by PWD's staff. Figure 5-1 shows a comparison of the number of CSO chamber inspections and the number of blockages observed for the last three fiscal years. The PWD's emphasis on frequent site visits aimed at clearing minor blockages before they develop into discharges is shown to have resulted in the number of dry weather discharges declining over the years. In addition, between 1977 and 1994, the Department expended over 2.1 million

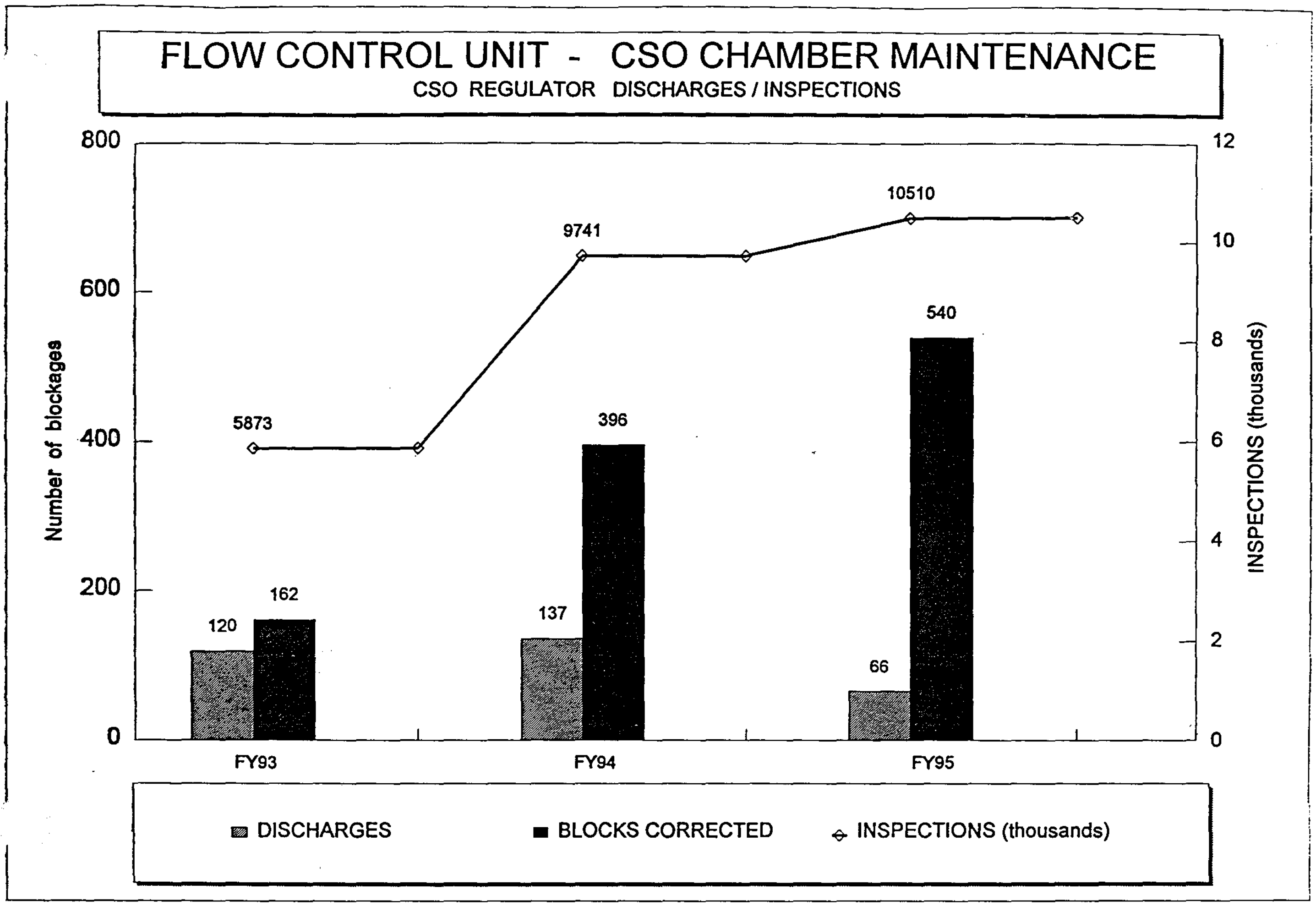


Figure 5-1 CSO chamber maintenance records of inspections and observed discharges: FY 1993-1995

dollars on contractor-performed regulator rehabilitation and major maintenance, ensuring that the regulators operate as they were designed and minimizing the potential for dry weather overflows to be caused by equipment failure.

Since the completion of the initial CSO monitoring contract in 1990, a maintenance dispatch program has been in place in the Northeast drainage district employing electronic surveillance to assist in the detection of blockage conditions that could lead to dry weather discharges. Over the next few years, as the PWD's automated sewer flow and stage monitoring system is expanded to include City-wide coverage, immediate identification of any conditions resulting in changes of sewage flow depth and/or rate anywhere in the City will be possible on the Fox Street facility's computers. The expansion project represents a 6.5 million-dollar investment on the part of the City, aimed at helping the PWD to better operate and maintain the sewer system. This system will be employed on a daily or more frequent basis to schedule the dispatch of maintenance crews to problem areas City-wide.

Periodic dry weather overflows at the D_25 (Somerset) and D_39 (Susquehanna) CSO regulators were experienced in the past and those regulators have been investigated recently. No dry weather overflows have been observed at Somerset since a major pipe cleaning effort was completed in 1994. A sediment trap has been installed, and PWD staff regularly monitor sediment accumulation in the trap and in the downstream pipe to determine when pipe clean-out should occur next.

In the past, aperiodic overflows have been observed at D_39 when certain filter backwash operations were conducted at the Queen Lane Water Treatment Plant; however, these overflows were not chronic or continuous. The overflow dam at D_39 recently was raised six inches. Records indicate that since that time the aperiodic overflows have not recurred. Further corrective source control flow reduction measures at D_39 are being studied within the context of the Department's Water Treatment Plant Residuals Management Study. The Department is investigating these and other locations as part of the ongoing CSO permit compliance program.

Hydraulic modeling analyses conducted during the compilation of the recently completed System Hydraulic Characterization report (PWD June 1995) required detailed scrutiny of regulator hydraulics, including simulations of the dry weather operating characteristics at all diversion structures. The modeling of the regulators revealed no instances of inadequate carrying capacities for domestic and non-domestic waste flows under dry weather conditions.

Section 6
Minimum Control No. 6
Control of the Discharge of
Solids and Floatables in CSOs

6.1 GENERAL

The control of floatables and solids in CSO discharges addresses aesthetic quality concerns of the receiving waters. The ultimate goal of NMC No. 6 is, where feasible, to reduce, if not eliminate, by relatively simple means, the discharge of floatables and coarse solids from combined sewer overflows to the receiving waters. The initial phase of the NMC process is focused on the implementation of, at a minimum, technology-based, non-capital intensive control measures. The effectiveness of the minimum controls and the evaluation of the potential need for other methods to more effectively control the discharge of solids and floatables from CSOs are intended to be addressed in the Long Term Control Plan, and in the continuing planning process as documented each year in the Annual CSO Status Report. That is, the need to control the discharge of solids and floatables, the degrees of control that will be necessary, and the determination of the controls that may be required, are intended to be an ongoing process throughout the development stage and the early implementation phases of the Long Term Control Plan.

The NPDES permits authorizing the CSO discharges in Philadelphia require the Department to acknowledge and consider the available methods for solids and floatables control. There are various technologies that can be used to control solids and floatables entering the receiving waters from CSOs. These technologies range from simple devices that remove the material from the CSO flow stream to devices that remove the floatables from the receiving water after they are discharged. Control practices also include efforts to prevent the extraneous solids and floatables from entering the combined sewer system. A discussion of the potential available control measures is included in this Section.

The permits also require that the City implement, where feasible, appropriate controls in environmentally sensitive areas. The first step required to address this issue is the conduct of an analysis of the environmental sensitivity of the area receiving waters and their directly adjacent lands. The process for this initial step, the conduct of a sensitive area analysis, is underway and is documented in this Section. Also documented in this Section is the proposed next step in the process, a plan to monitor the volume and mass of floatables and solids found in the City's combined sewage and to project the amounts of these materials that actually may emanate from CSO discharges to Philadelphia area receiving waters.

6.2 DEFINITIONS

Floatables are waterborne waste material and debris (e.g., plastics, polystyrene, paper) that float at or below the water surface. Floatables seen in significant quantities are aesthetically undesirable and can cause beach-closings, interfere with navigation by fouling propellers and water intake systems, and impact wildlife through entanglement and ingestion.

Solids are waterborne waste material and debris consisting of sand, gravel, silts, clay, and other organic matter. Significant concentrations of solids are not only a visual nuisance, but can affect turbidity, dissolved oxygen, and carry pathogens in the receiving water. In addition, excessive amounts of solids can affect the combined sewer system by causing decreased hydraulic capacity, thus increasing the frequency of overflows. Solids can enter the system through domestic and industrial wastewater, and debris washed from streets.

6.3 SUMMARY OF ALTERNATIVES CONSIDERED

Floatables and solids control measures consist of non-structural and structural technologies. Non-structural technologies include combined sewer system maintenance procedures such as sewer flushing, street sweeping, and catch basin cleaning. Public education, land use planning and zoning, and ordinances are also considered non-structural technologies implemented to reduce solids and floatables entering the combined sewer system. These technologies are included as part of the Pollution Prevention Program Section (NMC No. 7), and therefore will not be discussed further in this Section.

Structural controls typically consist of abatement devices that would be constructed near the point of discharge. Technologies used to for removing solids and floatables from CSOs include: Baffles, Booms, Catch Basin Modifications, Netting Systems, Swirl Concentrators, Screens, and

Trash Racks. These controls and the potential for their application in Philadelphia are considered below.

Baffles

Baffles are installed at CSO regulator structures to restrict floatables from discharging over the diversion weir. The baffle is placed upstream of the weir and extends from the top of the conduit down into the flow to an elevation below the invert of the weir. As the flow rises in the conduit, floating material is retained by the baffle before it can discharge over the weir. As the flow recedes below the elevation of the weir (and the baffle), the floatable material is carried downstream to the WWTP. Baffles do not collect any solids material. Figure D-1 in Appendix D shows a typical baffle.

Baffles are a simple floatable control technology. However, the layout of a majority of the CSO regulators in Philadelphia may prohibit the practical installation of these devices, at least not without significant capital, operation, and maintenance costs. Without significant redesign and construction, baffles would restrict access to much of the regulating structures, making maintenance more difficult, if not impossible. In addition, this could affect seriously the City's maintenance procedures that have proven effective in ensuring the proper operation of the combined sewer system, as documented in Section 1. The proper installation of baffles would require significant structural alterations to regulators and outfalls in almost all conceivable applications in the City. Costs for a typical installation likely would exceed $20,000 per location. Accordingly, the use of these structures in the Philadelphia combined sewer system will not be considered further as a minimum, non-capital intensive control measure for use under the NMC process.

Booms

Booms are placed at the CSO outfall to retain floatable materials. Booms float on the surface of the water. They are attached to the shoreline by cable and to the bottom by weights. Floatables captured within the boom are removed by other methods such as skimming devices. Booms typically are used for floatables control and are not effective in collecting solids material. Figure D-2 in Appendix D is an illustration of a typical boom device.

Booms are advantageous because they float with changing river levels, are simple to implement, and can capture/absorb oils and greases floating on the water surface. However, booms do not work well in river environments where high river velocities, tides, and winds may dislodge the booms, and irregular shoreline conditions make it difficult to access the booms for maintenance. In addition, booms collect the floatables after they enter the receiving water, potentially causing unsightly conditions near the regulator outfall. Considerable structural modifications in and around the outfall structure typically are required for a successful implementation of this control under these conditions.

Clean-up of the floatables after a storm also presents a problem. Floatables typically are removed by hand, skimmer vessels, or trucks. Access to most of the outfall locations in Philadelphia is restricted by shoreline conditions, especially for vacuum trucks and/or dump trucks. Because of the low water depths in many of the more protected locations, skimmer vessels are not appropriate for use along the small tributaries in Philadelphia. Only the Delaware and lower Schuylkill Rivers have sufficient draft suitable for potential application of this control, but the open water conditions make their use infeasible without significant structural modifications to protect the device. Thus, cleaning of the floatables captured by the booms may be difficult due to site conditions. As a result, booms will not be considered for implementation in Philadelphia as a minimum, non-capital intensive control measure under the NMC process.

Catch Basin Modifications

Catch basin modifications consist of devices used to prevent floatables from entering the combined sewer system. Inlet grates, as shown in Figure D-3 (Appendix D), are used on many of the City's catch basins and they effectively prevent floatables from entering the catch basin. Figure D-3 in Appendix D was copied from the PWD publication "Standard Details and Standard Specifications for Sewers." Trash buckets, as shown in Exhibit 6-4, can be used to retain floatables entering the catch basin. Other catch basin modifications alter the outlet pipe conditions. As shown in Figure D-4 (Appendix D), hoods, siphons, and submerged outlets can help to restrict floatables from being conveyed to the collection system. These devices require regular maintenance and cleaning to remove trapped floatables and other debris from the catch basin. In addition, topography of the area should be considered to avoid excessive street flooding.

Philadelphia reports that most of the City's some 84,000 inlets basins currently connected to the sewer system are trapped inlets that effectively prevent litter, debris and floatables from being carried through the sewer system either to the sewer plants or to a discharge point in a receiving water. Although the exact number of these installations in the portions of the City served by combined sewers is unknown, City personnel report that the City has had a long standing policy to incorporate this outlet design in all combined sewer system catch basins to prohibit odor releases from the sewer system. Accordingly, Philadelphia is already effectively controlling floatables using this technology. Figure D-5 in Appendix D shows a detail drawing of a trapped storm sewer inlet copied from the PWD publication "Standard Details and Standard Specifications for Sewers."

Netting Systems

End-of-pipe and in-line netting systems can be used to capture floatables before they enter the receiving waters. Currently, netting systems are available commercially, and consist of mesh nets that are suspended downstream of a CSO and capture floatable material as the CSO discharges into the receiving water. Alternatively, netting systems also have been proposed as in-line units where the nets are housed in a vault structure in the CSO discharge conduit. Figure D-6 in Appendix D illustrates a netting device for both in-line and shoreline applications.

Two end-of-pipe netting systems currently are used in Brooklyn, New York and Newark, New Jersey. Typically, each bag is designed to hold about 25 cubic feet of floatables by volume and 500 pounds by weight. The bags are removed from the frame by a hoist or crane system and disposed. Typically, these bags are designed to hold floatables for one or more storms. There are no known examples of in-line, vault installations of nets.

Factors such as the CSO discharge velocity and receiving water currents can influence the effectiveness of end-of-pipe netting systems. In Philadelphia, river bank access restrictions limit the feasibility of end-of-pipe installations (similar to booms) in most conceivable situations. In-line netting systems likely are more suitable for most locations.

Typical purchase, construction and installation costs for the commercially available netting systems are in excess of $150,000 per site. Obviously, this technology cannot be considered further as a minimum, non-capital intensive control measure under the NMC process.

Swirl Concentrators

Swirl concentrators are compact solids separation and flow throttling devices that provide solids and floatables removal for combined sewers. Flow that enters the swirl concentrator is directed around the perimeter in a long swirling flow pattern. Solids are separated by gravity along the outer flow path, inertial and shear forces between the inner and outer swirl paths, and drag forces along the walls and bottom of the unit. Solids are concentrated inward towards the center of the unit, exiting at the base through a foul sewer and carried to the treatment plant. The clarified flow is discharged through the top of the chamber into the receiving waters. Floatables are collected at the surface of the unit with a floatables trap and then discharged through the foul sewer.

Three types of swirl concentrators have been developed for high-rate CSO treatment. They are the EPA Swirl Regulator/Concentrator, the British Hydro-Dynamic Separator, and the German Vortex Separator. The devices are illustrated in Figures D-7 through D-9 of Appendix D. Although they appear different, these vortex devices operate similarly and have the same mechanisms for solids removal. Costs for a typical swirl concentrator installation in Philadelphia likely would exceed $250,000 per location.

Swirl concentrators are advantageous because they regulate both flow to the interceptor system and remove floatables and solids from the CSO discharges. However, the installation cost of swirl concentrators is significantly more expensive as compared to other floatable control technologies and they must be eliminated from consideration as a minimum, non-capital intensive control measure.

Screens

Screens can be used to capture solids and floatables from CSO discharges. They typically are designed as stationary units that collect debris which is then scraped off or may be designed as a rotating mechanism where debris is removed by spray jets. There are many types of screens available including drum screens, microstrainers, rotostrainers, disc strainers, rotary screens, and static screens. Bar screens are used for CSO treatment to retain large debris and floating material; however, they are not effective in reducing solids. The proper installation of screens would require significant structural alterations to regulators and outfalls in almost all conceivable applications in the City. Costs for a typical installation likely would range from $20,000 per location for static or bar screens to in excess of $100,000 - $200,000 for mechanical screen devices.

Static screening devices, in addition to imposing a significant capital cost for design and installation, are expensive to clean and maintain. Although the majority of mechanical type screens provide better removal efficiencies than static screens, mechanical screens are considerably more costly and require a higher level of sophisticated maintenance. Because it is not known if there is a significant contribution of floatables from CSOs in Philadelphia, and the intent of the NMC is to readily implement low cost, low maintenance alternatives, mechanical screens will be eliminated from further consideration as a minimum, non-capital intensive control measure.

Figure D-10 in Appendix D shows a typical static screen installation.

Trash Racks

Trash racks are vertical bars that can remove coarse and floating debris from CSOs. Adequate outfall pipe or land space is essential. The outlet must be placed above the water level in the receiving water body to facilitate required maintenance and cleaning. A typical trash rack installation is illustrated in Figure D-11 in Appendix D.

Factors such as the CSO discharge velocity and receiving water currents can influence the effectiveness of trash racks as an end-of-pipe technology. In addition, access to maintain these structures along the river bank is limited. Overcoming these problems would require significant expenditures of funds. The proper installation of racks would require significant structural alterations to regulators and outfalls in almost all conceivable applications in the City. Costs for a typical installation likely would exceed $20,000 per location. As a result, trash racks are not considered a practical minimum, non-capital intensive floatables control technology for Philadelphia.

6.4 SENSITIVE AREAS ANALYSIS

The classification of environmentally sensitive areas is a critical factor in determining where, and to what degree, CSO controls will have to be implemented in the Philadelphia area. The definition of environmentally sensitive areas for the purposes of defining CSO control strategies will be governed by a potentially wide range of concerns. These areas of concern might include the locations of:

- Public drinking water, agricultural, and industrial-use water intakes;

- Ecologically sensitive areas in the upper Delaware estuary used by finfish and shellfish as spawning and nursery areas;

- Fishing and primary and secondary contact recreation areas, likely will be important issues, especially in light of the DRBC's Use Attainability studies (USA) results, and their potential effects on new requirements on discharges to segments 2, 3, 4 and 5 of the Delaware River;

- Other high public visibility and aesthetic impact areas concerns, particularly in areas of the expanding waterfront development along the Philadelphia shores of the Delaware and Schuylkill Rivers and the park areas along the creeks within the City.

The PWD is developing a sensitive areas inventory and a set of resource interpretive maps using the CSO project GIS and available resource mapping and environmental data. While the sensitive areas analysis is being conducted under the auspices of the Long Term Control Plan, the task was begun early in the overall CSO compliance process to facilitate both the development of the System Inventory and Characterization and the Documentation of the Nine Minimum Controls. Tasks completed to-date include: the acquisition of most of the required GIS facilities; the assemblage of the base-mapping geographic information; acquisition of basic geopolitical, land use, transportation, watercourse, demographic and water utility coverages; mapping of the interceptor and CSO locations, with approximately 50% of the locations verified using a satellite-based Geo-positioning System (GPS); and acquisition of regional domestic, commercial and industrial water intakes.

The following information is being sought and still must be incorporated to complete the GIS inventory: biological resource mapping information from local research literature; the newly developed living resource inventory of the Delaware Estuary Program; NOAA marine resources maps; the National and state wetlands inventory; DRBC water intake maps and data; state and local agency recreational resource maps; and other sources as available.

Once the data acquisition and assimilation is complete, quantitative and qualitative geo-analyses will be employed to propose the assignation of "sensitive area" status to various regions of the receiving waters and near-adjacent areas and will identify critical CSO discharge impact zones for use in planning the protection of these resource areas. The EPA draft CSO Guidance for Screening and Ranking will be used in conjunction with the geo-based analyses to establish CSO control priorities and to rank CSOs within the PWD combined sewer system for allocation of limited resources. The screening process will be based on fundamental information retrieved from the GIS to rank the degree of actual or potential water resource problems or impacts associated with the CSOs.   It is expected that the initial round of analyses will be completed in the spring of 1996.

6.5 RECOMMENDATIONS

As the next phase of the implementation of solids and floatable controls, it has been recommended that a monitoring program be implemented to determine the amount of solids and floatables entering and carried by the combined sewer system and the receiving waters. Results from the sampling program will be used to determine the required level of control and appropriate technology for implementation both prior-to and during the Long Term Plan process. The results of the sensitive areas analysis are expected to have prioritized areas for potential concerns regarding solids and floatables and will therefore set the priorities for the locations of the monitoring sites.

Floatables will be monitored under current operations and maintenance conditions. If significant solids and floatables are identified, more comprehensive best management practices (BMPs) or non-structural controls may need to be implemented. If additional floatables control is warranted, then structural technologies will be considered. Structural technologies that would be considered first are catch basin modifications, including further enhancement of inlet grating and submerged outlet installations, netting systems, and static screens. More structurally intensive controls would be considered only if the application of the controls mentioned above proved not to be feasible under specific site requirements.

Solids and floatables monitoring will continue throughout the CSO abatement program. Monitoring will cease after two years if reports indicate acceptable levels of solids and floatables. The control technologies implemented at this time will continue to ensure that floatables and solids are within acceptable limits.

Figure 6-1 illustrates an implementation flow schematic of the proposed monitoring program.

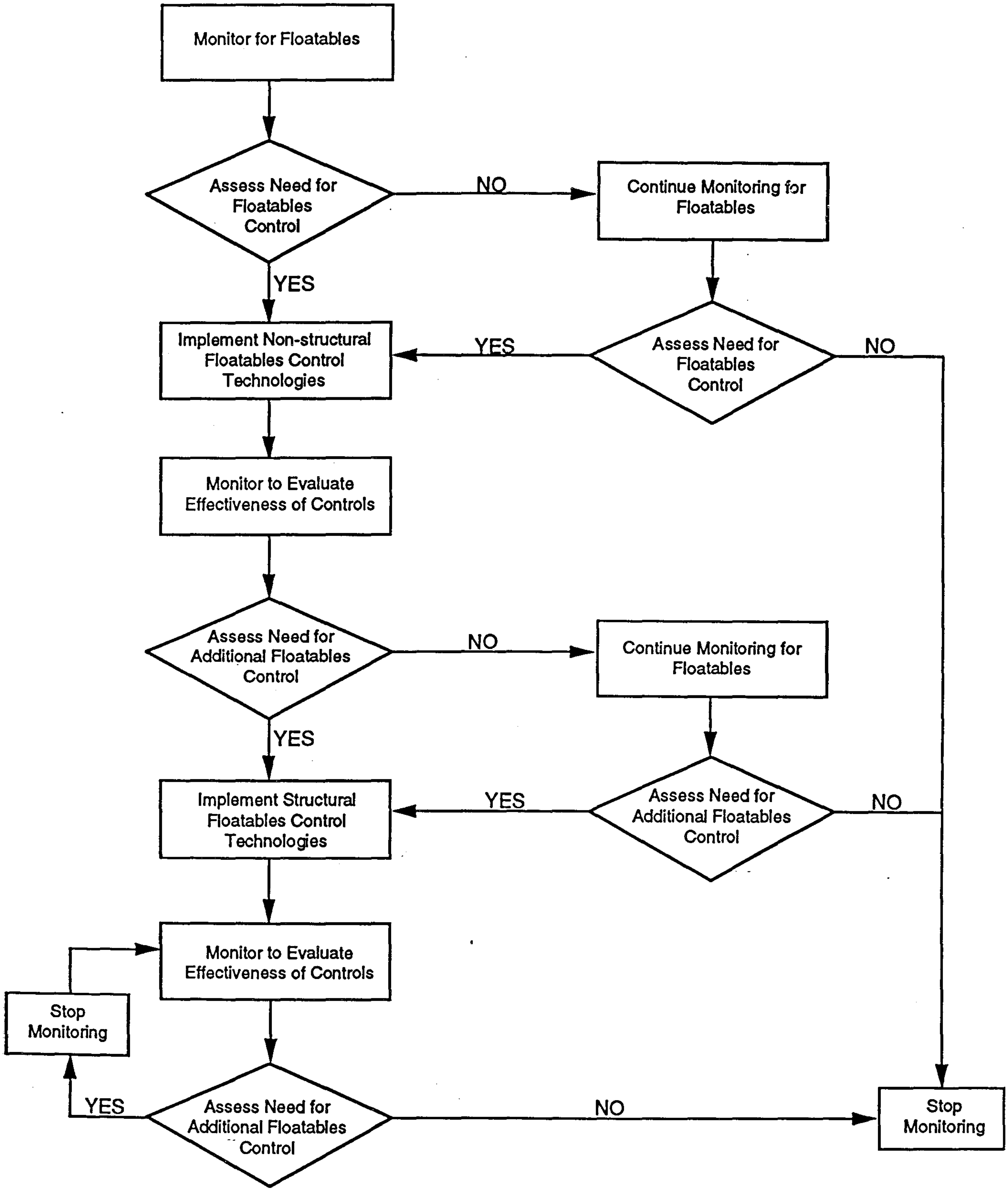


Figure 6-1
Proposed Floatables Monitoring and Control Flow Chart

Section 7
Minimum Control No. 7
Pollution Prevention Programs

7.1 GENERAL

Pollution prevention programs can help to reduce the amount of contaminants and floatables that enter the CSS. Such measures include street sweeping, catch basin cleaning, litter control, public education, etc. Philadelphia has implemented a number of pollution prevention programs and established city ordinances that address these concerns. This section presents an overview of the City's existing pollution prevention methods.

The effectiveness of these programs is demonstrated by the lack of any reported receiving water impacts related to CSO discharges. However, modifications to these programs may be considered if the DRBC or PWD's proposed Floatables Control Monitoring Program identifies any receiving water impacts in the future.

7.2 EXISTING PROGRAMS AND ORDINANCES

Most of the city ordinances related to this minimum control are housekeeping practices that help to prohibit litter and debris from actually being deposited on the streets and within the watershed area. These include litter ordinances, hazardous waste collection, illegal dumping policies and enforcement, bulk refuse disposal practices, and recycling programs. If these pollutant parameters eventually accumulate within the watershed, practices such as street sweeping and regular maintenance of catch basins can help to reduce the amount of pollutants entering the combined system and ultimately, the receiving water.

Litter Control

The City of Philadelphia has comprehensive ordinances that regulate various aspects of litter generation. These contain provisions for proper litter disposal into trash receptacles, controls on handbills and posters, vacant property cleanup, and requirements for maintenance of private property to avoid unsightly conditions.

To assist in litter control, the City places trash containers in the downtown area and at most public parks where the greatest accumulation of litter is expected.

The City has long realized that litter-free neighborhood streets are very much a function of attitude and behavior. Anti-litter campaigns, such as PhilaPride sponsored by the Greater Philadelphia First Corporation, are efforts to change the attitude of people throughout the City.

Recycling Programs

Recycling programs can help reduce the amount of floatables, especially plastic and aluminum cans and bottles, that can enter the combined sewer system through catch basins. The City of Philadelphia has a curb-side recycling program that accepts glass and metal food and beverage containers and newspapers. In addition, many other forms of recyclable materials are collected by the City at a large network of recycling igloo sites, commercial recycling centers, and community recycling centers.

Hazardous Wastes/Illegal Dumping/Bulk Disposal

Hazardous waste in the CSS can come from two sources; illegal dumping or draining of house-hold and industrial wastes and auto wastes. Philadelphia has a hazardous waste collection program that collects hazardous waste at a specified site on advertised days. Illegal dumping policies also are enforced regularly by the City agencies such as the Streets, Police, Parks, Health, and Fire Departments.

Information regarding the proper disposal of household hazardous waste and the dates and locations of the household hazardous waste events will be inserted in the September 1995 water and sewer bills in the form of a brochure. Approximately 500,000 water and sewer customers receive this information. Similar brochures will be included with bills from time-to-time in the future, with the next one scheduled for spring of 1996.

Inappropriate disposal of bulk items can also be a source of pollutants within the City. Philadelphia provides residents with the opportunity to have these items picked up by appointment. In addition, illegal dumping regulations prohibit the disposal of these items at any location except by approved methods.

Street Cleaning

Street cleaning prevents waterborne litter, debris, and sand deposited on city streets from entering catch basins and the combined sewer system. The City's regular street cleaning program consists of daily cleaning of commercial areas and annual cleaning of residential areas. Note that in residential areas, the City relies primarily on the efforts of the residents to clean their street frontages. This effort is supported by the Streets Department through the Philadelphia More Beautiful Committee and the Clean Blocks Program and by the Water Department through the Captain Sewer Club.

The Captain Sewer Club distributes educational materials and cleaning tools to block captains who "guard" the inlets on their block. Approximately 600 block captains have been recruited to-date. Weekend residential clean-ups are scheduled regularly through community organizations and block captains. Brooms, shovels, and bags are distributed to assist residents in cleaning their sidewalks and streets. Special truck pickups also are scheduled for these weekends.

Catch Basin Cleaning

As discussed in Section 6, the City of Philadelphia is fortunate to have a system of trapped storm sewer inlets. Trapped stormwater inlets must be maintained in order to prevent flooding and pollution. Catch basin cleaning is performed year round unless frozen conditions occur, which prohibit the cleaning of the catch basin sumps. The objective of the existing Water Department inlet cleaning program is to service each of the City's some 84,000
inlets at least once annually. However, some inlets are visited more frequently in response to complaints from community residents. Clogging inlets have always been and will continue to be

a priority. The City recently has committed to increasing the current level of inlet cleaning by 20% as part of the City's stormwater NPDES permit.

7.3 POLLUTION PREVENTION PROGRAM BENEFITS

As mentioned previously, existing pollutant prevention programs appear to be adequate as no deleterious wet weather receiving water impacts have been reported as a direct effect of Philadelphia's CSOs. While the Commonwealth's 1994 Water Quality Assessment Report indicates that only about 5 miles of receiving waters are degraded in some part by CSOs in the entire lower Delaware River basin, this reporting is based on evaluated information, not from monitoring data. It is difficult to quantify the benefits achieved by each individual prevention practice, but in total the program is considered effective. It has been recommended that the City implement a monitoring program under the Floatables Control minimum control measure to establish if there is a floatables problem associated with Philadelphia CSOs. If floatables or other receiving water impacts are noted, the City could consider enhancements to these pollution programs.

7.4 EXISTING PUBLIC INFORMATION AND EDUCATION PROGRAMS

Educating the public about CSOs and the receiving water impacts can reduce pollutants and floatables entering the receiving waters from CSOs. Public education programs are a potential method of reducing the amount of litter and contaminants on the streets and ultimately the amount of floatables and pollution in the receiving water. Documents (i.e., brochures, newspaper, etc.), television, and radio can be used to educate and encourage the public to properly dispose of all municipal and hazardous wastes.

The City has developed a very proactive approach to employing public information and education as a method of reducing sources of potential contaminants in runoff waters. For instance, the City has supported and developed many public awareness campaigns to reduce litter in the past. The City Water Department, in coordination with the Streets Department and appropriate private organizations, is developing an anti-litter/anti-dumping public education program with the objective of tying together the related problems of litter and dumping to potential water pollution. Currently, as part of the City's stormwater NPDES permit process, this program is targeting specific sections of the City served by separate storm water systems.

During the term of the current CSO NPDES permits, this program will be expanded to include areas of the City served by combined sewer systems.

The City is now participating in a program in the Pennypack Park Watershed area. Together with the Friends of the Pennypack Park and the Delaware Estuary Program, the City has embarked on a program to educate local residents about litter, dumping, and stormwater contamination and related potential receiving water pollution. A turtle logo has been spray-painted on 300 of the Pennypack storm water inlets. Brochures and other materials were developed and distributed that explain the turtle, a symbol of aquatic life, and the importance of keeping trash and other potential stormwater contaminants out of the storm sewers. This program also involves presentations to local organizations and schools.

This Pennypack program is being evaluated and may serve as a model for similar education efforts in other parts of the City. The City appreciates the importance of local volunteer efforts and is seeking partnerships with watershed groups and other local organizations to improve public awareness of the litter/stormwater connection.

The City's public education programs to combat litter will be supported by continuing efforts by the Streets Department to improve trash collection by both private haulers and City personnel.

The City also has developed a public education initiative to persuade the public not to use the sewer inlets as trash receptacles. On an annual basis, the Water Department distributes water and sewer bill brochure inserts explaining the proper use of inlets. This campaign also is supplemented by the use of truck posters on PWD vehicles, public service announcements and articles in local newspapers, usually featured in the Fall when leaves are the greatest contributor to the clogging of inlets.

The City's efforts to address the misuse of sewer inlets for the disposal of wastes also has been focused on school children. The Public Affairs Division of the Water Department has created a superhero mascot, Captain Sewer whose exploits are documented in a comic book. An educational pamphlet also has been developed. Captain Sewer himself, a costumed Water Department employee, makes school and other public appearances to educate children about the problem of litter and clogged inlets.

The City will continue to provide public information about litter and stormwater inlets as part of its implementing this minimum control.

7.5 PROPOSED PUBLIC INFORMATION AND EDUCATION EFFORTS

The Public Affairs Division of the Water Department will conduct eight new public education initiatives in direct support of this minimum control and the eighth minimum control (Public Notification). These include:

- ■Developing a comprehensive educational package to include:
    - -General information on the City's combined and separate sewer systems
    - -Maps of the sewer systems and the locations of CSOs
    - -Explanations of the EPA national CSO Policy and the Nine Minimum Controls
    - -Tips on what citizens can do
    - -A CSO/stormwater newsletter (by November-December, 1995)

- ■Develop materials for and set-up meetings with City Council members, friends groups, Environmental organizations, etc. (begin by January 1996)

- ■Media workshops focused on expected environmental improvements associated with the City's CSO program (January, 1996)

- ■Produce newsletters twice each year for sewer shed areas served by combined sewer systems (Fall and Spring editions)

- ■Set up community CSO workshops with friends groups (Spring 1996)

- ■Produce bill stuffers for stormwater (August 1995), CSOs (December 1995), Household Hazardous Waste Programs (September 1995 and March and May 1996)

- Work with local newspapers to develop articles to discuss general awareness of CSOs and their potential impacts on receiving waters and the potential impact within the regional receiving waters

- Expand the mission of the City's existing Stormwater Advisory Committee to integrate CSO issues and work with the Committee to set CSO education priorities and objectives.

Section 8
Minimum Control No. 8
Public Notification

8.1 GENERAL

Public notification programs are intended to ensure that the public receives adequate information about combined sewer overflows, the locations of the outfalls, the magnitude of the discharges, and potential impacts on receiving waters. The principal benefit of a notification program is to reduce the potential public health risks in affected areas and to increase public awareness of CSOs. The methods used are intended to be the most cost effective measures that provide reasonable assurance that the affected public will be informed in a timely manner.

The PWD has stenciled identification letters and numbers on each of the CSO outfalls in the City as discussed in the System Inventory and Characterization Report (PWD May 1995). This signing has occurred mostly along the shoreline, in a visible position, at each of the CSO outfalls in the combined sewer system. Other methods to notify the public about the CSO discharges are discussed herein.

8.2 DISCUSSION OF PROPOSED NOTIFICATION MEASURES

The guidance manual suggests several methods (in addition to outfall postings) to inform the public about CSOs and receiving water use restrictions due to CSO discharges. These methods include:

- Posting at Use Areas Affected
- Posting at Selected Public Places
- Notices in Newspapers or on Radio and TV
- Letter of Notification to Affected Residents
- Telephone Hot Line for Use Status Reports

These notification methods are intended to provide the public with "realtime" information on the status of the receiving waters and uses. In areas with large receiving waters like Philadelphia, when the CSO discharge stops, the flushing action of the river moves the pollutants downstream at any one location. Accordingly, the impact at a particular river use point is short lived. Experiences in attempting to provide this type of realtime notice elsewhere in Pennsylvania have proven cumbersome and ineffective at best. In addition, in Philadelphia, there are few established receiving water uses, such as beaches, which are shoreline oriented where postings are appropriate for informing the public about the risks.

Under these affected use/area conditions, it becomes difficult to properly inform the public about the current status of the receiving water impacts except from a general information/education standpoint. As discussed in Section 7, the City intends to develop a series of informational brochures and other materials about its CSO discharges and the potential receiving water impacts. The brochures will provide a telephone number where additional information can be provided by City personnel. The brochures and other proposed materials and actions also will discuss potential direct receiving water impacts (such as fish kills, floatables, etc.) and will request that the public report these incidences as part of the City's CSO documentation and NMC effectiveness monitoring program. In addition, the PWD intends to recruit and solicit the support of watershed groups, enlisting volunteers to act as the Department's "watchdogs" for specific waterways, aiding the Department in getting out targeted CSO information specific to those watersheds.

8.3 SUMMARY

The City's Public Notification Program, to meet the NMC, will consist primarily of public education about CSO discharges and their impacts. As mentioned above, "real-time" notification of the receiving water impacts or use restriction during the activation of the CSO discharges is not feasible (due to its transient and intermittent occurrences). Accordingly, the City will rely on a general education program to keep the public aware of any potential public health risks and will concentrate its energies and resources on the pollution prevention aspects of CSO remediation through education and the requisite changes in lifestyle. The eight-point public information and education program detailed in Section 7 will be used to carry the message of this issue to the public.

Section 9
Minimum Control No. 9
Inspection/Monitoring/Reporting

Monitoring and characterization of CSO impacts from a combined wastewater collection and treatment system are necessary to document existing conditions and to identify any water quality benefits achievable by CSO mitigation measures. This NMC measure requires the development and implementation of an acceptable program for characterization, monitoring and reporting of CSS conditions and CSOs. Elements considered under this measure include:

- Identification of CSO locations in the combined sewer system (CSS)
- Characterization of overflow events including the locations, frequencies and volumes
- Summary of receiving water quality data
- Identification of receiving water impacts directly relatable to CSOs
- Assessments of the relative effectiveness of implementation of the minimum control measures
- Development of the long term monitoring plan for the Long Term Control Plan (LTCP)

The City of Philadelphia has addressed directly and adequately all of these issues. The issues related to water quality, at least for the present time and the near future, are addressed cooperatively with the DRBC as part of the basin-wide water quality strategy.

The PWD's Monthly CSO Status Reports provide information regarding rainfall, inspections and maintenance, dry weather discharges, wet weather overflows, and chronic or continuous discharges. The PWD System Inventory and Characterization Report (PWD May 1995) completely described the CSS and the locations of the CSOs. The PWD Hydraulic

Characterization Report (PWD June 1995) provided a detailed assessment of the natures, causes, location, number, frequency and volume of CSO discharges in the Philadelphia CSS.

This report has supplied the methods and basis for assessing the relative effectiveness of implementation of a number of the NMCs. The City's excellent computerized O&M tracking system described in Section 1 and the sophisticated and expanding flow monitoring systems referenced in Section 5 (and documented in the System Inventory and Characterization Report) provide the basis to track, document and quantify the performance of the City's O&M activities (NMC No. 1) and the compliance with the prohibition of dry weather overflows (NMC No. 5). The hydraulic and hydrologic models of the City's CSS were used to characterize and quantify the relative effectiveness of implementation of NMC No. 2 and NMC No. 4 in Sections 2 and 4 of this report. Analyses performed for and presented in Section 3 of this report supplied a basis for assessing the potential for modifications to the City's pretreatment program to reduce industry-related impacts on CSO discharges.

Section 6 of this report suggests that a floatables monitoring program should be put in place to provide the basis for judging the need for solids and floatables control devices, and if required and installed in sensitive areas, the effectiveness of such devices.

These same tools and measures will be employed each year in the preparation of the Annual CSO Status Report. The progress of the NMC measures will be tracked using these methods, and others that no doubt will evolve over time, and will be reported in the Status Report. Tactical changes and adjustments in the NMC implementation process also will be proposed in the Annual CSO Status Reports.

Appendix A

Sewer System Operation and Maintenance Documents

Appendix A-1

Summary of Training Programs and Materials

1. Programs Offered by Training and Development
2. Video Tape Offerings
3. Audio Tape Offerings
4. Manuals

Professional Development Programs for All Employees

Professional Development Programs for Supervisors

Professional Development Programs for Managers

Total Quality Training

Facilities Operator Training

Trades Training

Automotive Courses

Software Systems Training

DOS SOFTWARE

MAC SOFTWARE

Specialized Development Programs

Special Offerings

Audio/Video Tape Library Offerings

The Training and Development Unit has an extensive library of audio and video tapes available for use by the employees of this department. To borrow a tape or to get more information about a title please contact Lucille Selby at 685-6125.

Video Tape Offerings

AUTO CAD
Drafting
Modeling
LISP Basic

HVAC
HVAC Training
Hydraulic Pumps and Motors
Hydraulic Cylinders
Pressure & Flow Control Valves
Line Diagrams & Electric Symbols
Interpret Complex Line Diagrams
Reduced Voltage Starters
Part Winding & Wye-Delta Starters
Jogging, Braking & Plugging
Hydraulic & Pneumatic Symbols
Hydraulic & Pneumatic Diagrams
Ball Bearing Maint. & Failure Analysis
Anti-Friction Bearing Lubrication
Electric Motors
AC Variable Speed Drives
Basic Air Conditioning - Intro. to Fundamentals
Basic Air Conditioning - Cooling Equipment Operation

Basic Air Conditioning - Electrical Controls
Basic Air Conditioning - Troubleshooting

HVAC - Basic AC Electricity for HVAC
Alternative Current: What it is and Where Used
Alternating Current, Voltage and Power
Magnetism & Electromagnetism
Inductors & Inductive Reactance - I
Inductors & Inductive Reactance - II
Inductors in Series & Parallel
Transformers - I
Transformers - II
Capacitors
Capacitive Reactance
Capacitors & Capacitive Reactance
Capacitors in Series & Parallel

HVAC-Basic Air Conditioning
Measurement of Heat
Pressure and Heat Transfer
The Air Conditioning Cycle
Operation of an Air Conditioner

HVAC-Basic DC Electricity for HVAC
Circuit Symbols & Diagrams
Meter Reading & Ohm's Law
Series Circuits
Parallel Circuits
Resistors & Rheostats
The Electron Theory

Maintenance Management
Computer Maintenance Management Systems Seminar - 2/28/92

Mathematics
College Algebra & Trigonometry
Basic Geometry
Basic Math - Ratio and Proportion

Pumps
Pump Packing
Centrifugal Pump Maintenance

Rigging
Wire Rope Slings

Safety
Haz-Mat Ground Transportation
Radiation Seminar
Effective Management of Underground Petroleum Storage Systems
Chlorine Safety
Microtox- the Fast Toxicity Test

Supervisory Training
Gaining Acceptance as A New Supervisor
Enforcement - Drugs in the Work Place
Humor, Risk & Change
Handling Classroom Situations
Managing Stress
The Sid Story
Skill Practice Instructions
Concepts and Key Principles
Positive Model of Instructor Competencies
Personal Problems in the Work Place
Discussing Unsatisfactory Performance with an Employee
Maintaining Improved Performance
Taking Immediate Corrective Action
How to Get Results With People
Enforcement - Drugs in the Work Place II - What Every Manager and Supervisor Must Know

VIDEO TAPE OFFERINGS (CONT'D)

Supervisory Training
Management Adjustment Bureau
Working Together for Safe Water
Cross Connections "The Unseen Hazards"
Cross Connections - Anyone Can Do It
Imposter - Field Video Footage
Progress- Video Overview
Dick and Jane: A Story on Drug Abuse
Jack Cade's Nightmare
Substance Abuse, Awareness & Intervention
Creating a Drug-Free Workplace: Back on Track
Staying on the Safe Side of the Street
Recognition - Everything Looks so Normal: Drugs in the Work Place
Education - Cold Turkey: Drugs in the Work Place III
Intent Vs. Impact (Sexual Harassment)
Progressive Discipline: You be the Judge
Management Support Reinforcing
Handling Employee Complaints
Management Support Coaching
Utilizing Effective Disciplinary Action
Everyone's Here - It Must Be Payday
Key Principles Exercise
Utilizing Effective Follow-up Action
Improving Work Habits
Role Playing Interviewing
The Effective Manager's Meetings That Get Results
Matching Leadership Style to the Situation
Correctional Supervision: Interpersonal Communication (Part 1)
Correctional Supervision: Performance Interview (Part 2)
Correctional Supervision: Coaching Interview (Part 3)
Delegating Responsibility
Improving Employee Performance
Developing Strategies for Teamwork
Learning to Think Like a Manager
How to Lead Effectively
Leadership Challenge
Coaching and Counseling
Are You Really Listening?
Early Intervention: Helping the Troubled Employee
Feedback: What and Why?
Improving Employee Performance
The Effective Manager - Motivating People Toward Peak Performance
The Effective Manager - How to Hire, How to Fire.
The Effective Manager - Executive Time Management
The Effective Manager - Managers Meetings That Get Results
Role of the Supervisor
Twelve Angry Men
Instructor Facilitation Skills
Progressive Discipline - You Be The Judge
What They Never Told You About Supervising
Body Language "The Silent Communicator"
Abilene Paradox
Water Company of America
Water Revenue - Meter Reading

Audio Tape Offerings

Pumps (Audio with Slides)
Back Pullout Pump
Introduction to Pumps
Vertical Pumps
Piping Calculations, Part 1
Valves

Self-help
How to be a No-Limit Person (Parts 1, 2, 3)

Stress Management
Water Shut Off

Supervisory Training
Creating Teamwork
Leadership Training
The One Minute Manager
The Effective Manager - Motivating People Toward Peak Performance
The Effective Manager - How to Hire, How to Fire
The Effective Manager - Executive Time Management
The Effective Manager - Managers Meetings That Get Results
How to Manage Your Boss
The Best of CareerTrack

Manuals

Customer Service
Quality Customer Service

HVAC
Basic Air Conditioning - Intro. to Fundamentals
Basic Air Conditioning - Cooling Equipment Operation
Basic Air Conditioning - Electrical Controls
Basic Air Conditioning - Troubleshooting

Organizational Development
Jungle Escape Kit

Supervisory Training
Enforcement - Drugs in the Work Place
Humor, Risk & Change
Enforcement - Drugs in the Work Place II - What Every Manager and Supervisor Must Know
The Effective Manager - Motivating People Toward Peak Performance
The Effective Manager - How to Hire, How to Fire.
The Effective Manager - Executive Time Management
The Effective Manager - Managers Meetings That Get Results
Body Language "The Silent Communicator"
How to Manage Your Boss

Appendix A-2

Summary of Field Report Forms & Managerial Reports

I. Field Report Forms:

A. Flow Control Unit, CSO Maintenance Group
1. Somerset Grit Chamber Debris Removal
2. Brown and Brown Regulator PM\Inspection
3. Tide Gate Preventative Maintenance Report
4. Outfall connection Inspection Record
5. CSO Dry Weather Discharge Report
6. Flow Control Daily Work Report
7. Daily Work Sheet DataBase Entry Listing (Interceptor Maint)

B. Flow Control Unit, Pumping Station Maintenance Group
1. Station Outage\Discharge Report
2. Wastewater Pumping Maintenance Request
3. Instrumentation Monthly Preventative Maintenance Report
4. Vibration History Report
5. Pump Flow Timings Record
6. Pump Overhaul Report
7. Motor Overhaul Report
8. Pump Station Monthly Mechanical PM Report
9. Pump Station Monthly Electrical PM Report
10. Central Schuylkill PS Daily Station Record
11. Flow Control Daily Work Report
12. Daily Work Sheet DataBase Entry Listing (WW Pumping Unit)

C. Flow Control Unit, CSO Instrumentation Group
1. ADS Ultrasonic Level Monitor Site Calibration Report
2. Pressure Sensor Level Monitor Site Calibration Report
3. Computer Control Chamber PM Report
4. Township Metering chamber Equipment PM Report
5. Metering Chamber Calibration Record
6. Computer Control Chamber Calibration Record
7. Flow Control Daily Work Report
8. Daily Work Sheet DataBase Entry Listing (Instrument Maint)

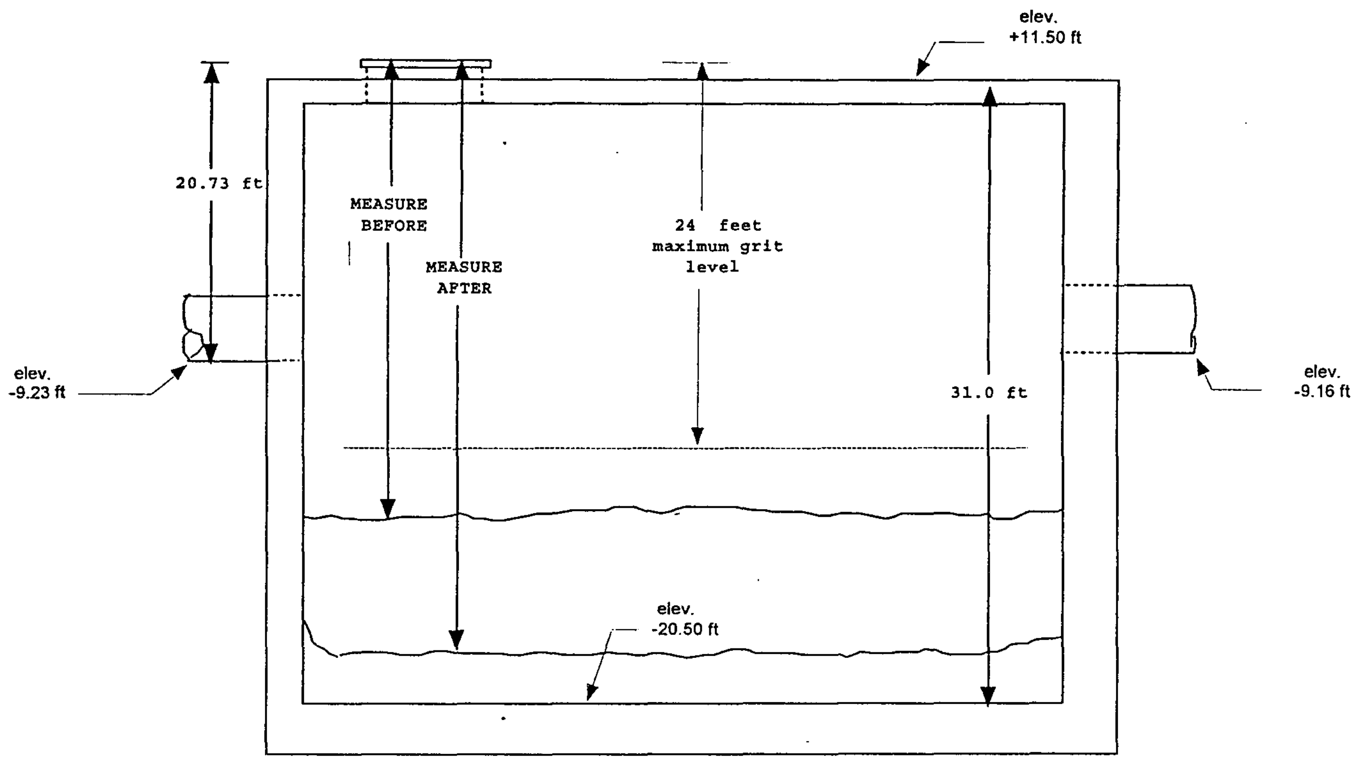
D. Sewer Maintenance Unit
1. Sewer Maintenance Work Order Ticket

E. Inlet Cleaning Unit
1. Inlet Maintenance Work Order Ticket

SOMERSET GRIT CHAMBER DEBRIS REMOVAL

I A-1

NAME George Beach   DATE 4/27/95



Date(s) grit removed from chamber : 4/27/95

Measurement to grit level before : 21.75 FT

Measurement to grit level after : 30.75 FT

Amount of grit removed : 80 cu yrds BY

Comments : HAWThorN Crane Co. AND

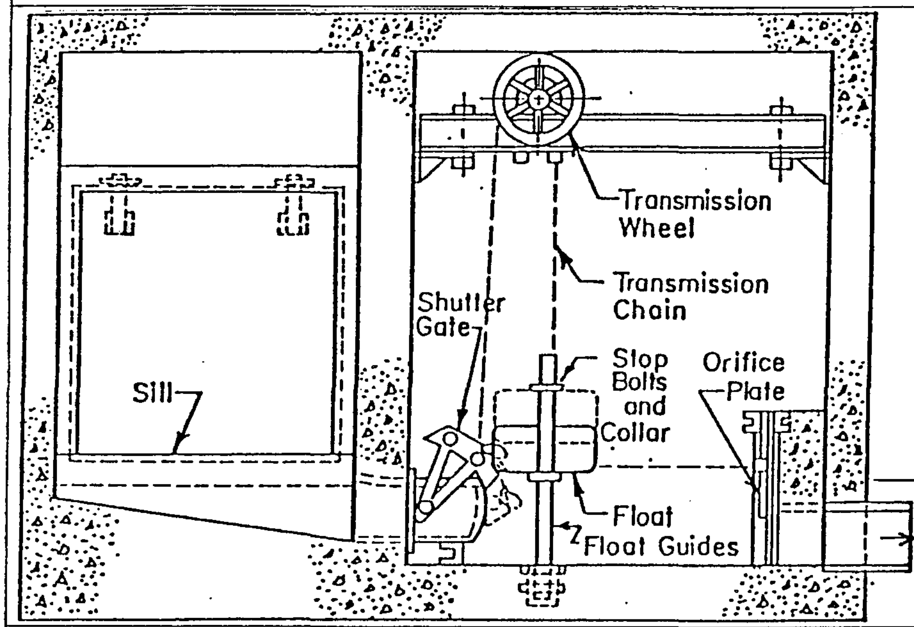
Bio-solids Dump Trucks

PREVIOUS MONTH'S GRIT MEASUREMENTS

DATE	2/15/95	MEASUREMENT	29.50'
DATE	3/6/95	MEASUREMENT	27.50'
DATE	3/27/95	MEASUREMENT	23.58'

BROWN & BROWN REGULATOR PM / INSPECTION REPORT I A-2

LOCATION	D-38 Dyott St @ Del. Ave	DATE	Aug 22, 1995
ISW II	V. McCloskey	HRS AT SITE	4 hrs 70 min
ISW I	S. McKeown - J. Newell	WEATHER	Clear



WEIGHTS

SHUTTER GATE COUNTERWEIGHTS

QUANTITY 1 SIZE # 6"x6"

FLOAT COUNTERWEIGHTS

QUANTITY 10 SIZE # 1"x9"
1 3"x9"

SHUTTER WEIGHTS

QUANTITY 6 5"x6"

CONDITIONS AS FOUND :

DEPTH OF FLOW - PRIOR TO MOVING FLOAT / GATE MEASURE WATER LEVEL FROM FLOOR 18" "

REGULATOR IS :

[✓] FULL OPEN [ ] PARTIAL OPEN [ ] STUCK IF PARTIAL ESTIMATE AMOUNT OPEN ______ %

DEBRIS ACCUMULATION S = SUBSTANTIAL M = MINOR N = NONE

[N] IN CHAMBER [M] AT FLOAT [M] AT OFIFICE PLATE [M] AT SHUTTER GATE

GENERAL CONDITION OF REGULATOR EQUIPMENT:

[ ] GOOD [✓] FAIR [ ] POOR [ ] MAINTENANCE SERVICE REQUIRED

VISUALLY CHECK THE REGULATOR AND OPERATE EQUIPMENT FOR ANY NOTICABLE DEFECTS.

[Y] IS SHUTTER GATE SEATING PROPERLY.
[Y] ARE SHUTTER AND FLOAT WEIGHTS IN PLACE.
[Y] ARE GATE FACES CLEAN.
[Y] ARE THE TRUNNIONS WELL GREASED.
[Y] ARE THE FLOAT GUIDES STRAIGHT PARALLEL AND SECURE.
[Y] LUBRICATE ALL GREASE FITTINGS AND EXERCISE ALL EQUIPMENT.
[X] FLUSH AND CLEAN CHAMBER AND EQUIPMENT. REMOVE ALL DEBRIS.
[X] NOTE ANY OTHER CONDITIONS WHICH REQUIRE ATTENTION:
[Y] ARE TRANSMISSION WHEELS SECURE.
[X] ARE PILLOW BLOCK BEARINGS WELL LUBRICATED.
[Y] WIRE BRUSH, SCRAPE AND OTHERWISE CLEAN: GATE SEATS AND BODY, CHAIN AND WHEEL, FLOAT AND GUIDES

I, G Foster (SUPERVISOR'S SIGNATURE), have visually checked the chamber and confirm that this work has been completed and is accurate.

Additional comments:

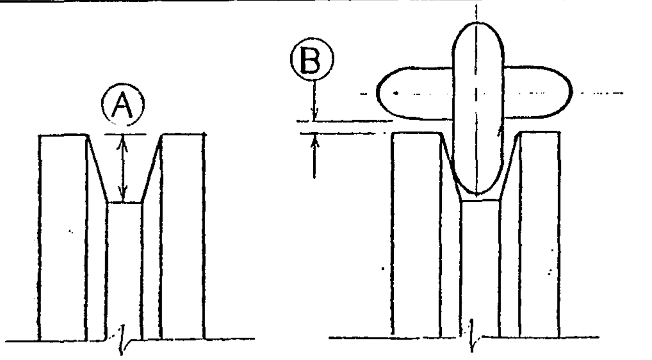
I A-2

BROWN & BROWN INSPECTION REPORT

	COMPONENT CONDITION	G	A	P	R	N	WORK DONE
SHUTTER GATE	GREASE FITTINGS		✓				All Fittings Accepted grease
	GATE BODY FACE		✓				
	SHUTTER SEAL FACE		✓				
	FREE MOVEMENT UP & DOWN	✓					
	CHAIN & CONNECTORS		✓				
	ADJUSTING BUCKLE & CONNECTOR		✓				
	TIGHTNESS OF ARM BEARINGS		✓				
	BOTTOM SUPPORT / STOP		✓				
	GATE END PILLOW BLOCK BEARING		✓				
FLOAT . SEMBLY	FLOAT GUIDE SECURE					✓	Has A 1" x 11" gash in Guide - Should Be Replaced
	TOP FLOAT STOPS		✓				
	BOTTOM FLOAT STOPS		✓				
	CHAIN & CONNECTORS		✓				
	ADJUSTING BUCKLE & CONNECTOR		✓				Connector rod Bent Slightly (usable)
	FLOAT CONDITION		✓				
	FLOAT PULLEY		✓				
	FREE MOVEMENT UP & DOWN	✓					
	FLOAT END PILLOW BLOCK BEARING			✓			Heavy Corrosion - Cleaned
SUPPORT	SHAFT CONDITION			✓			Minor Corrosion
	MOUNTING HARDWARE			✓			2 Beam Brackets Bent, But Secure
	I - BEAMS		✓				
	WALL MOUNTS			✓			Heavy Corrosion, Replacement not Needed
S. JCTURE	LADDERS		✓				
	GRATING					✓	None
	MANHOLE COVER & FRAME	✓					
	NEARBY SEWER	✓					Window opening 9"H x 74"W over Both Tide Gates

G = GOOD A = ACCEPTABLE P = POOR R = REPLACEMENT NEEDED N = NONE

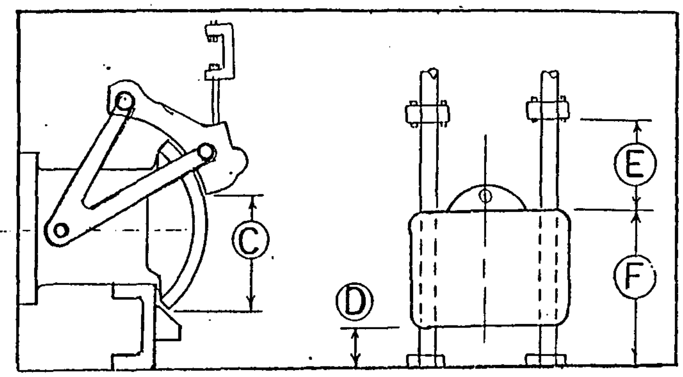
FLOAT PULLEY	GATE PULLEY
A = 3/8"	A = 3/8"
B = 0"	B = 0"



FULL OPEN GATE POSITION I A-2

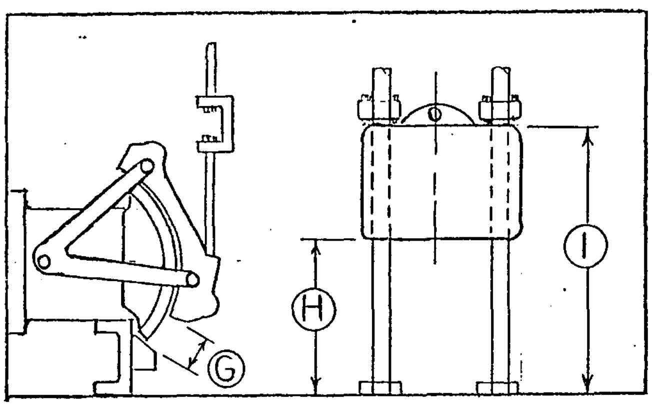
C = 18"   E = 9"

D = 22"   F = 34"



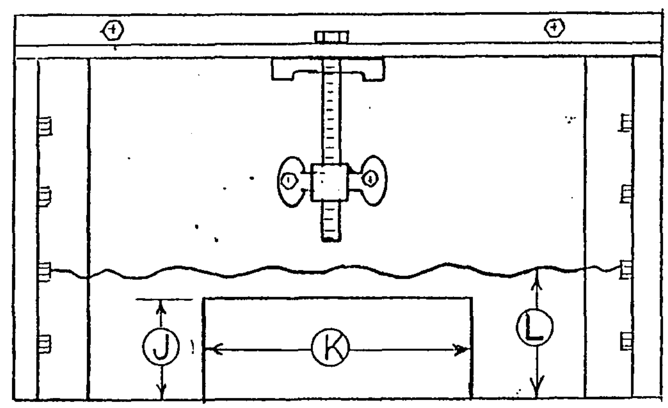
FULL CLOSED GATE POSITION

G = 8 1/3"   H = 31"   I = 43"



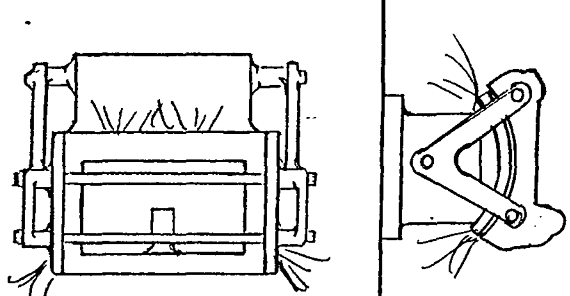
ORIFICE PLATE OPENING

J = 14"   K = 36"   L = 18"



SHUTTER GATE LEAKAGE

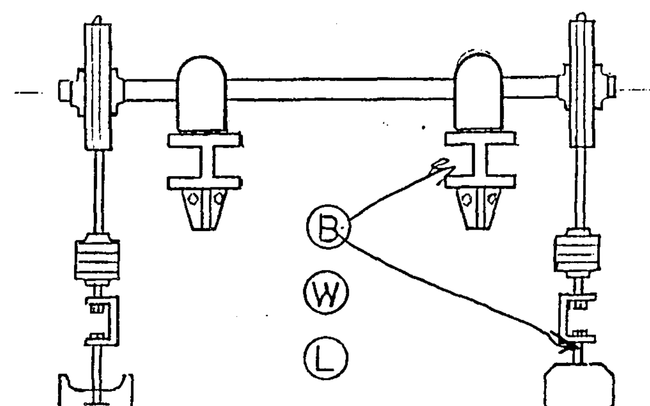
DRAW SPRAY AT FULL SHUT-OFF



☐ NONE   ☐ LITTLE   ☑ SPRAY

TRANSMISSION CONDITION

B=BENT   W=WORN   L=LOOSE



☐ GOOD   ☑ FAIR   ☐ POOR

B&B INSPECTION REPORT

G. Collier
12-11-94

TIDE GATE PREVENTATIVE MAINTENANCE REPORT

I A-3

LOCATION D-38

ISW II U. McClosky

ISW I J. Neuele

S. McKeown

DATE Aug 29th 95

TOTAL HRS 9 Hr

TYPE UNIT Cast Iron

NO. OF GATES 2

Upon entering check entire structure for wear or potential problems. Note the condition of:

Manhole cover and frame Cordeton Good

Ladder rungs Good, missing 3 rung on river side Entry

Loose or broken concrete NO

Nearby sewer Good No debrie

Other Pulled out 4"x6"x 6' boards, Tree Logs, Floatable out River Side

Visually check the tide gate equipment for defects. Note the condition of:

Gate alignment Good   Chains & shackles Good

Hinge assembly Good   Frame Good

Is the tide gate seated properly. Yes; Pulled gat and checked Seating

Other

Exercise gate to full open position. Is gate free to travel. Yes

Is the hinge secure to the structure. Yes

Inspect the gasket and seating surface. Note condition: Gasket in good Condition

Clean all debris from the gate area. Several piece of Lumber & Tree Lims

Scrape clean the entire face of the seat. Yes

Scrape clean the hinge assembly. Yes

Lubricate all grease fittings and exercise all equipment. all fittings took grease

Flush and clean chamber and equipment. Remove all debris. Yes

Note any other conditions which require attention:

I, G Foster, have visually checked the chamber and confirm that this work has been
(SUPERVISOR'S SIGNATURE)
completed as stated. Additional comments: Crew pulled a lot of wood, tree Lims, Floatable, 4"x6"x6' Lumber out on river Side.

1 or 2

08/28/95

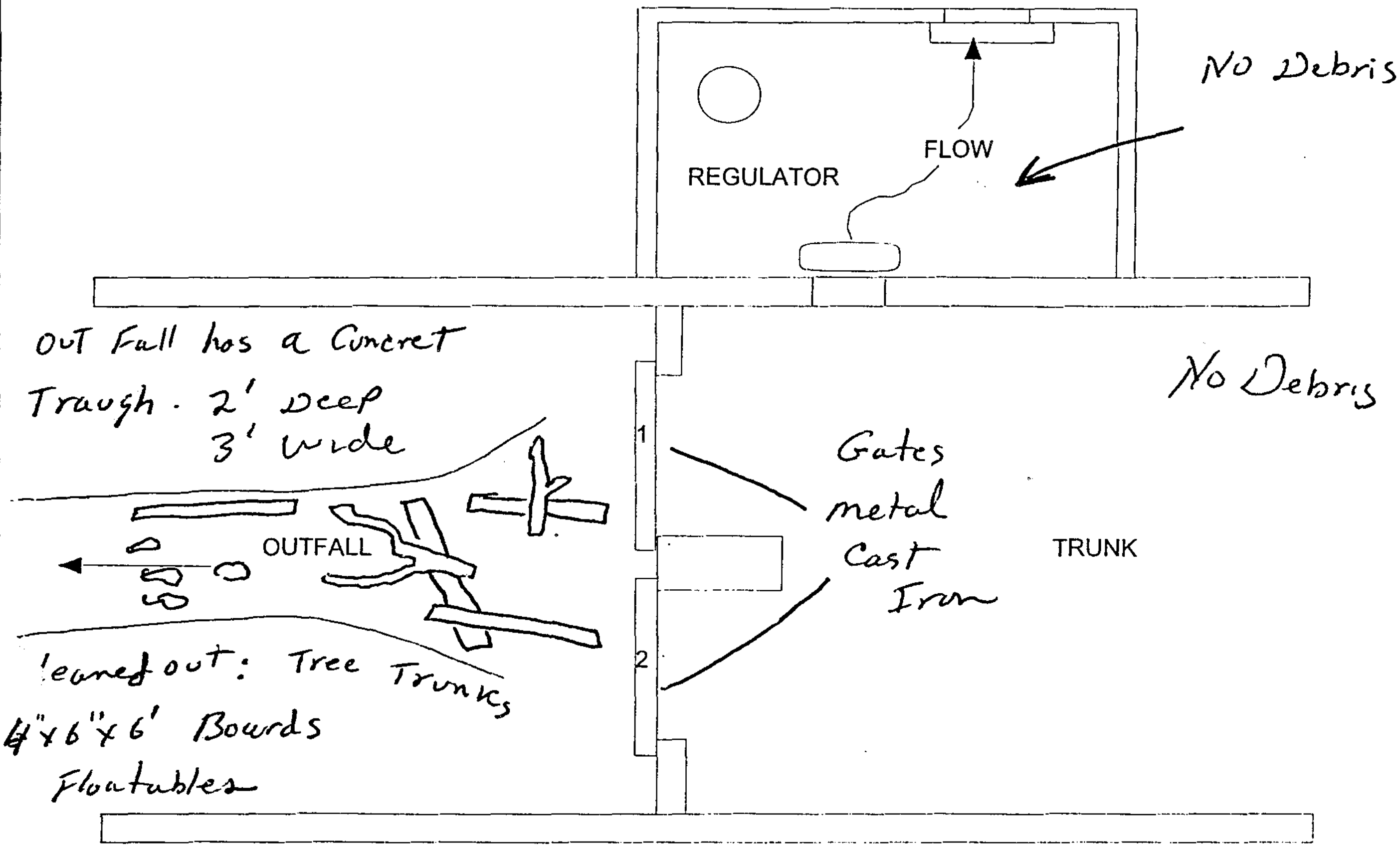
TIDE GATE PREVENTATIVE MAINTENANCE REPORT

DATE *Aug. 29, 1995* *I A-3*

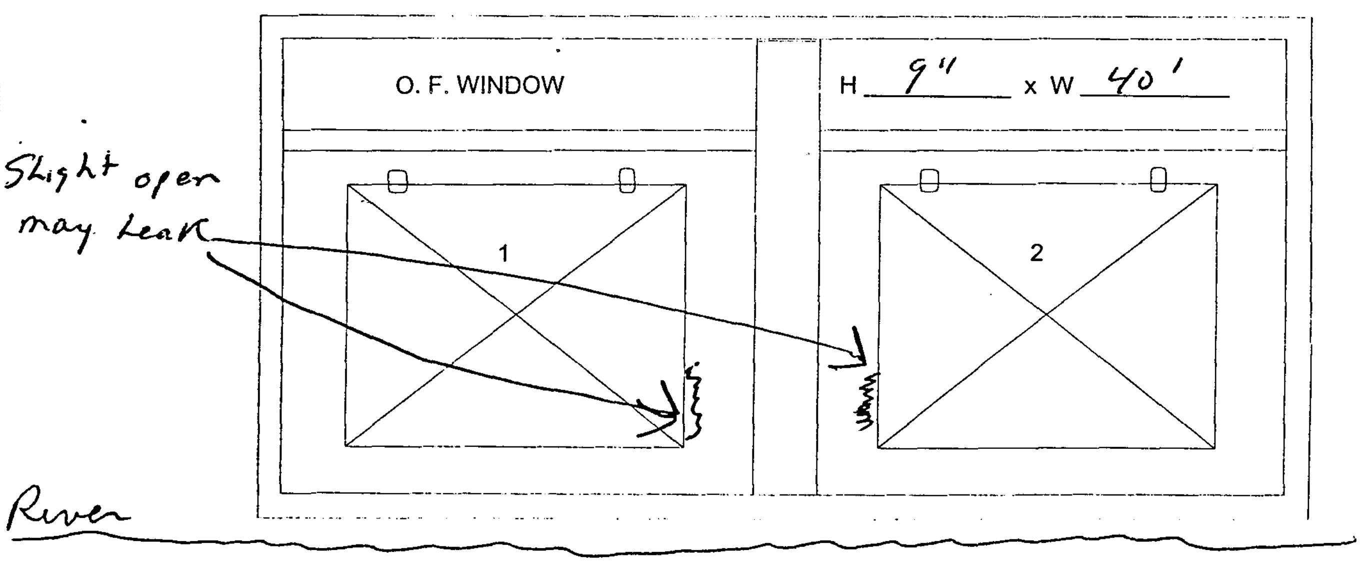
LOCATION *D-38* ISW II *V. McCloskey* TIME *10:43 AM*

UMBER OF GATES *2* DEBRIS SCREEN PRESENT YES ☐ NO ☑

PLAN VIEW - SHOW ANY DEBRIS BUILDUP IN ALL CHAMBERS. NOTE AMOUNT AND DISTANCES.
NOTE ANY GATE LEAKAGE OR POOR EQUIPMENT CONDITIONS.



PROFILE VIEW - SHOW ANY SEAL DAMAGE, WORN EQUIPMENT OR POOR CONDITIONS. DRAW HEIGHT OF RIVER OR TRUNK WHILE OBSERVING FOR LEAKAGE. IF SITE IS A SINGLE GATE SITE JUST MARK ONE SIDE.



TG_PM.WK4 8/28/95

Page (2)

CSO OUTFALL CONNECTION INSPECTION R D

T-1 Williams & Sedgwick

SITE ID	DATE	OUTFALL SIZE	NO. OF CONNECTIONS	ACTIVE YES - NO OR ? = UNKNOWN	DISTANCE FROM ~~T.G~~ Dam	CONNECTION SIZE	LOCATION FROM ~~T.G.~~ Dam T - R - L	DEBRIS SCREEN	MISC
T-1	9-2-95	6'	1	NO	1,226'	1'	R	NO	
			1	NO	1,362'	3'1"	L		
			1	NO	1,382'	1'6"	R		
			1	yes	1,403'	3'1"	R		
			1	yes	1,431'	2'1"	L		
			1	NO	1,496'	6"	R		
			1	NO	1,512'	6"	R		
			1	NO	1,527'	6"	R		
			1	NO	1,536'	2'	L		
			1	NO	1,544'	1'1"	L		
			1	NO	1,544'	6"	R		
			1	NO	1,561'	6"	R		
			1	NO	1,577'	6"	R		
			1	NO	1,593'	6"	R		
			1	NO	1,602'	6"	R		
			1	yes	1,609'	6"	R		
			1	NO	1,618'	6"	L		
			1	NO	1,625'	6"	R		
			1	NO	1,632'	6"	L		
			1	NO	1,637'	6"	R		
			1	NO	1,645'	6"	R		
			1	NO	1,650'	6"	L		
			1	NO	1,665'	6"	L		
			1	yes	1,675'	2'	R		
			1	NO	1,682'	6"	L		
			1	yes	1,697'	6"	L		
			1	NO	1,712'	6"	L		
			1	NO	1,727'	6"	L		
			2	yes - NO	1,743'	6"	L + R		
			2	yes - NO	1,758'	6"	L + R		
			2	NO NO	1,774'	6"	L + R		
			2	NO NO	1,789'	6"	L + R		
			2	yes - NO	1,803'	6"	L + R		
			2	yes - yes	1,819'	6"	L + R		
			2	NO NO	1,834'	6"	L + R		
			2	NO NO	1,850'	6"	L + R		
			2	NO NO	1,866'	6"	L + R		

I A-4

R-10 **FLOW CONTROL CSO DRY WEATHER DISCHARGE REPORT** I A-5

LOCATION 22ND ST + MONTGOMERY # R-10 DATE 7-25-95

PERSON WHO INVESTIGATED DISCHARGE : TIME STARTED 9:30 AM

PAUL MURPHY TIME STOPPED PRESENT

ESTIMATE QUANTITY OF DISCHARGE :

- [ ] TRICKLE OVER DAM
- [ ] FULL FLOW OVER DAM
- [x] UNKNOWN QUANTITY
- [x] STEADY SLOW FLOW
- [ ] FAST FLOW OVER DAM

WIDTH 10" DEPTH 1/2"

WHAT LED TO THIS INVESTIGATION :

- [ ] COMPUTER CHART PICK
- [ ] ROUTINE INSPECTION
- [ ] ONGOING PROBLEM
- [x] REFERRED TO LOCATION

DESCRIBE THE EXACT CAUSE OF THIS DISCHARGE :

Discharge maybe due To dumping of EXCESS FRESH WATER INTO STORM RELIEF SEWER FROM THE MARTIN L. KING RECREATION Swimming Pool AT 22ND ST + C. B. MOORE ST. CLOSE INSPECTION Shows That WATER IS CONSTANCELY being pump into pool.

WAS REGULATOR OPERATING PROPERLY :

- [ ] YES
- [x] NO
- [x] STILL UNDER INVESTIGATION

CAUSE OF DISCHARGE :

- [ ] UNIT BLOCKED
- [x] HIGH FLOWS
- [ ] UNKNOWN
- [ ] OTHER

COULD THIS DISCHARGE HAVE BEEN PREVENTED :

- [x] YES
- [ ] NO

IF YES, HOW COULD THIS DISCHARGE HAVE BEEN PREVENTED (be specific) :

RECREATION DEPT REGULATING THE AMOUNT OF WATER THAT OVERFLOWS INTO STORM RELIEF SYSTEM.

SUPERVISOR'S RECOMMENDATION FOR PREVENTION OF SIMILAR OCCURRENCES :

I will check into this problem ASAP. 7-26-95.

DATE 7-26-95 SIGNATURE R. Ryan.

SUPERINTENDENT'S COMMENTS :

NOTIFICATION TO RECREATION DEPT. IS NEEDED FOR SEVERAL SITES. WE NEED TO TELL THEM TO CORRECT ALL POOL PROBLEMS BEFORE 6/96 G Collier

DWD/FORM/5/95

FLOW CONTROL INTERCEPTOR MAINTENANCE DAILY WORK REPORT	NAMES: A- Staley J- Thompson	YY-MM-DD 95-5-19	SUPERVISOR: G- Foster

SITE ID	GROUP	TIME START	A/P	TIME FINISH	A/P	PAY CODE	EMPLOYEE NUMBER	RAIN	TYPE INSP	REG FOUND	REG LEFT	REG WORK	TG FOUND	TG LEFT	TG WORK	OTHER WORK
T15	FR	700	A	800	A	R	193622 215091	Y	V	WK	OK	IO	NA	NA	NA	DS
T14	FR	800	A	830	A	R		Y	V	WK	OK	IO	WK	OK	IO	DS
406	FR	100	P	130	P	R		N	V	WK	OK	IO	NA	NA	NA	DS
408	FR	130	P	200	P	R		N	V	WK	OK	IO	NA	NA	NA	DS
T10	FR	200	P	300	P	R		N	V	WK	OK	IO	NA	NA	NA	DS

Each entry above is followed on the form by:

DURATION OF DISCHARGE — FROM / TO

CAUSE OF DISCHARGE OR OTHER COMMENTS:

5/94

I A-6

INTERCEPTOR MAINTENANCE

DATABASE ENTRY LISTING

DATE	SITE_ID	GROUP	START	FINISH	PAY	EMP_NO	RAIN	TYP_INSP
YY-MM-DD	MISC *	FR =regulator crews	HH:MM A/P	HH:MM A/P	C =call in	62652	N =no	F =full
	C01				L =leave	94593	Y =yes	V =visual
	C02				O =overtime	117849		O =other
	C04				R =regular	123611		
	C04A					167522		
	C05					173037		
	C06					180820		
	C07					193622		
	C09					203231		
	C10					205839		
	C11					206203		
	C12					214863		
	C13					215051		
	C14					215091		
	C15					215439		
	C16					215440		
	C17					215482		
	C18							
	C19							
	C20							

REG_FOUND	REG_LEFT	REG_WORK
DB =discharge / block *	BC =block cleared	CO =cleaned only
DH =disc high flows *	CP =corrected problem	GO =greased & operated
DU =disc unknown *	HF =high flows	IO =inspect only
NA =no inspection	NA =no inspection	NA =no work on reg.
OP =other problem	NW =needs work *	OM =other maintenance
WK =working normal	OK =no work needed	OW =other work
	OW =other work	PM =full prevent. maint.
	SD =still discharging *	

* MUST ENTER EXPLINATION IN COMMENT SECTION

TG_LEFT	TG_WORK	OTHER_WORK
CP =corrected problem	CG =clean TG gasket	CS =clean sewer
HF =high flows	CO =cleaned debris only	DS =dam inspection
NA =no inspection	GO =greased & operated	OM =other maintenance
NW =needs work *	NO =none	IO =inspect outfall
OK =no work needed	OO =operated only	OO =other other
SL =still leaking	OW =other work	VA =vactor work
	PM =full prevent. maint.	
	RG =repairs to gate	
	NA =no work on T.G.	

I B-1

STATION OUTAGE / DISCHARGE REPORT

STATION: Belfry Dr.
NAME: CARNEGLIA
WEATHER: Clear - Hot

DATE: 8-12-95
DAY: Saturday
ALARM TIME: 11:00/Am
Alarm condition - Power Failure

DISCHARGE STARTED: 11:30/Am
DISCHARGE STOPPED: 12:50/Pm
DURATION OF DISCHARGE: 1 HR. 20 mins.

TIME STATION OUT: 11:00/Am
TIME STATION IN: 12:45/Pm
DURATION OF OUTAGE: 1 HR. 45 mins.

REASON FOR STATION FAILURE: PECO Power Failure A ϕ & B ϕ Fuse blown on pole. - Squirrel To blame

Called PECO 11:05/Am

PECO Arrived 12:30/Pm

Power restored 12:45/Pm

Level 9.3'

Over-flow 8.8'

[signature]

I B-2

WASTE WATER PUMPING
MAINTENANCE REQUEST

STATION: HOG Island

JOB NO: 883

DATE SUBMITTED: 9-5-95

GROUP: INST

DATE COMPLETED:

ISSUED TO: MD

ISSUED BY: FC

DESCRIPTION OF PROBLEM:

Low level shut off seems To be off A Tiny Bit. should be 2.0' is 1.8'

WORK ASSIGNED:

DATE ISSUED: 9-5-95

NAME: C. Hakins

Check and Re-cal as necessary.

WORK PERFORMED: Recalibrated Analog Input Board in Chatterbox to compare with P.C.U. + C.C.

I 6-3

INSTRUMENTATION MONTHLY STATION PM

STATION 42nd St.

DATE 05, Sep. '95

TECHNICIAN C. Hankins

J. Gallagher

LEVEL CALIBRATION AS FOUND:

Chart level 3.1

Chatterbox level 3.1

Gauge level 3.1

Taylor level

AS LEFT:	ZERO	LLA	OFF	ON	HLA	MAX
GAUGE	0	24.0"	36.0"	60.0"	144.0"	160.0"
CHART	0	2.0'	3.0'	5.0'	12.0'	15.0'
CHATTERBOX	0	2.0'	3.0'	5.0'	12.0'	15.0'
PCU	0	2.0'	3.0'	5.0'	12.0'	14.9'
CALIBRATOR	0	24.3"	36.4"	60.8"	145.1"	181.3"
% ERROR MAX						

	LLA	OFF	LEAD	LAG	2ND LAG	HLA
CONTROLS SET AT:						

Operation of relays and/or mercury switches: OK.

Adjusted / lubricated : None

BUBBLER SYSTEM

Check bubbler system for air leaks (with pumps off and system sealed)

______ " elev. loss per 15 sec. ______ " per 60 sec.

Compressor cycle ______ frequent ✓ normal

Primary air press. Min 22 PSI Max 40 PSI

Regulated air press. 10 PSI Air flow 1.5 SCFH

Other work done: Adjust; Compressor from 37 PSI to 40 PSI

D.P. Cell from 3.987-19.83 ma. to 4-20 ma DC

Chart Recorder from 14.8' to 15.0'

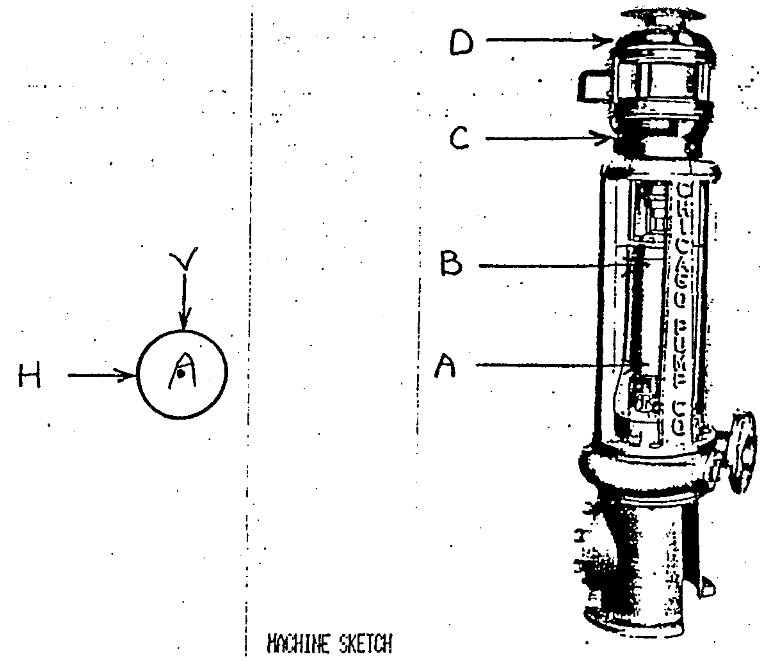
I B-4

VIBRATION HISTORY

Location: Ford Road
Machine: Pump #1
RPM: 1770
H.P.: 40

LEGEND

SYM	IDENTIFIES
→	Pick up point
X	Plain bearing
O	Ball bearing
⊣⊢	Coupling



MACHINE SKETCH

Pick up Position		1 Date 5-7-87 By C.M. Mils	in/sec	G's	Brg. Test	2 Date 6-23-88 By C.M. Mils	in/sec	G's	Brg. Test	3 Date 5/4/90 By MF Mils	in/sec	G's	Brg. Test
A	H	1.32	0.12	0.91	0.83	2.34	0.28	1.30	1.21	.81	.11	1.05	1.00
	V	1.35	0.15	1.51	1.45	2.31	0.29	1.26	1.14	.98	.13	1.15	1.02
B	H	1.05	0.19	0.98	0.94	2.04	0.24	1.28	1.17	.95	.26	.97	.89
	V	1.06	0.19	1.56	1.49	1.80	0.25	0.98	0.84	.83	.20	1.09	.99
C	H	0.48	0.10	0.56	0.56	0.97	0.17	0.40	0.33	.63	.08	.35	.30
	V	0.43	0.04	0.35	0.50	0.80	0.13	0.27	0.23	.68	.06	.17	.14
D	H	0.59	0.01	0.57	0.50	1.31	0.11	0.46	0.45	.98	.14	.47	.44
	V	0.35	0.38	0.15	0.59	1.15	0.16	0.42	0.37	.96	.13	.30	.40
	A	0.43	0.24	0.37	0.32	0.83	0.10	0.46	0.39				

Pick up Position		4 Date 10/25/91 By MF Mils	in/sec	G's	Brg. Test	5 Date 2-22-95 By Cole Mils	in/sec	G's	Brg. Test	6 Date 7-31-95 By Cole Mils	in/sec	G's	Brg. Test
A	H	1.13	.27	2.60	2.49	2.69	0.26	1.70	1.65	1.21	0.06	1.34	1.27
	V	1.18	.22	1.49	1.19	0.60	0.17	1.93	1.95	0.71	0.17	1.06	0.94
B	H	1.09	.33	1.46	1.40	3.75	0.41	1.72	1.77	1.27	0.24	1.30	1.26
	V	1.10	.26	1.32	1.22	0.57	0.16	1.63	1.51	1.21	0.23	1.07	0.93
C	H	.80	.30	.40	.37	0.81	0.09	0.50	0.48	0.85	0.24	0.96	0.85
	V	.70	.22	.23	.33	1.02	0.09	0.49	0.46	0.98	0.23	0.53	0.50
D	H	.97	.25	.43	.39	1.23	0.13	0.31	0.28	1.20	0.12	0.35	0.34
	V	.84	.23	.41	.60	1.29	0.14	0.96	1.29	1.34	0.13	0.90	0.86
	A												

WASTEWATER PUMPING	PUMP FLOW TIMINGS			TWICE / YEAR		I B-5
STATION	**UNIT**	**PUMPED TIME**	**FILL TIME**	**PUMPED SPAN**	**DATE**	**TIME OF DAY**
NK ST.	PUMP #1	1:32	32:21	1.0'	4-3-95	10:30am
	PUMP #2	1:46	31:51	1.0'	4-3-95	10:30am
BELFRY DR.	PUMP #1	4:16	24:18	2.0'	4-10-95	11:25pm
	PUMP #2	3:58	22:54	2.0'.	4-7-95	10:15am
FORD RD.	PUMP #1	5:12	19:23	3.0'	4-10-95	9:10am
	PUMP #2	5:58	18:51	3.0'	4-10-95	9:10am
FORT MIFFLIN	PUMP #1	6:14	1440.0	Manual Fill	4-10-95	12:45pm
	PUMP #2	8:34	1440.0	" "	4-10-95	"
	PUMP #3	5:31	1440.0	" "	4-10-95	"
	PUMP #4	O.O.S	1440.0	" "	4-10-95	"
HOG ISL. RD.	PUMP #1	2:32	26:07	2.0'	3-29-95	10:00am
	PUMP #2	2:29	35:29	2.0'	"	"
LINDEN AVE.	PUMP #1	2:06	17:02	2.0'	4-4-95	8:30'
	PUMP #2	2:00	16:47	2.0'	"	"
LOCKART ST.	PUMP #1	5:12	19:44	3.0'	4-4-95	11:00am
	PUMP #2	3:58	18:56	3.0'	"	"
MILNOR ST.	PUMP #1	2:46	2:11:26	1.0'	4-4-95	10:30am
	PUMP #2	2:50	2:21:14	"	"	7:50am
	PUMP #3	3:16	1:56:31	"	"	8:00am
NEILL DR.	PUMP #1	12:41	3:06	2.0'	4-5-95	9:00am
	PUMP #2	13:46	3:49	"	"	"
	PUMP #3	56:47	4:09	"	"	"
POLICE ACA.	PUMP #1	13:13	15:27	1.0'	4-3-95	8:00am
	PUMP #2	14:55	15:49	1.0'	"	"
RENNARD ST.	PUMP #1	6:22	29:56	2.0'	4-3-95	1:00pm
	PUMP #2	5:30	30:31	2.0'	"	"
42ND ST	PUMP #1					
	PUMP #2					
	PUMP #3					
BROAD & BLVD	PUMP #1	O.O.S.	180.0	—	—	—
	PUMP #2	1:35	180.0	~~Manual 3.0'~~	~~4-21-95~~ ~~3-0~~	
	PUMP #3	:43	180.0	1.0'	5-2-95	
	PUMP #4	:42	180.0	1.0'	5-2-95	
MINGO CREEK	PUMP #1		1440.0			
	PUMP #2		1440.0			
	PUMP #3		1440.0			
	PUMP #4		1440.0			
	PUMP #5		1440.0			
	PUMP #6		1440.0			
26TH & VARE	PUMP #1	1:12	1440.0	1.0'	3-27-95	1:00pm
	PUMP #2	1:14	1440.0	1.0'	3-27-95	"

I-B-6

PUMP OVERHAUL REPORT

LOCATION: 42nd st MFG: Chicago
UNIT #: 2 TYPE: Non-Clog Cent.
~~DATE OF OVERHAUL~~: 7/7 SIZE: 10"
DATE COMPLETED: 7/17 YEAR: 1984
TYPE: MODEL: VPM OSC-10
POSITION: Vert RPM: 880 SUCTION: 10"
DISCHARGE: 10" IMPELLER DIA.: 15"
BEARINGS: PIB POB

****

INSPECTION	BEFORE: GOOD	POOR	COMMENTS	AFTER: NEW	USED	PART #
CASING		✓		✓		1105
SUCTION ~~ELBOW~~			Pedestal		✓	
IMPELLER LOCK NUT		✓	from bolt Stock	✓		
IMPELLER	✓				✓	
FRONT HEAD	NA					
BACK HEAD	NA					
SUCTION PLATE		✓	CASING Cover	✓		1307
LANTERN RING		✓		✓		?
VOLUTE	✓				✓	
RADIAL BEARING Upper		✓		✓		6409
THRUST BEARING Lower		✓		✓		62131
INBOARD SEAL		✓	Felt/Washer	✓		P000017 31
OUTBOARD SEAL		✓		✓		P0000172 16054
PACKING GLAND		✓		✓		?
BEARING CAP (thrust)	✓				✓	
O RINGS	N/A					
PUMP COUPLING	✓			✓		
MOTOR COUPLING	✓			✓		
SHAFT RUNOUT			0.00			
MOTOR SHAFT RUNOUT			0.00			
SHAFT SLEEVE	N/A					
IMPELLER WEAR RING	N/A		open impeller			
SUCTION CASTING RING	N/A					
SHAFT THREADS	N/A		New shaft			
SHAFT KEYWAYS	✓			✓		
GREASE PLUG	✓					
PIPE PLUG	NA					
~~ADJUSTING SCREW~~	✓		Hex Nut			P00001104
RETAINING RING			Lock Nut			"
GASKETS	✓			✓		

Note: Replaced with new unit. all of above for rebuild of pump to be stand by

OVER:

I B-7

MOTOR OVERHAUL REPORT

STATION: Belfry Drive **UNIT #:** 1 **HP:** 15 **VOLTS:** 230 **AMPS:** 38
ELECTRICIAN: CARNEGLIA - Vinnie

Date Disconnected: 12-9-93 **Date Overhaul completed:** 12-14-93
Date Overhaul Started: 12-11-93 **Date Connected:** 12-16-93

Last Amp Reading: (9/24/93) **T1:** 20 **T2:** 21 **T3:** 21
DC AMPS: n/a

Amp Reading After O.V.: **T1:** 28 **T2:** 29 **T3:** 28
DC AMPS: n/a

Megger Reading (Before O.V.): **T1:** ∞ **T2:** ∞ **T3:** ∞
VOLTAGE: 250 **TIME:** 30 Seconds

Megger Reading (After O.V.): **T1:** ∞ **T2:** ∞ **T3:** ∞
VOLTAGE: 250 **TIME:** 30 Seconds

Bearing #'s: (MOB) 6209 Sealed **(MIB)** 6309 Sealed

Replaced bearing? (MOB) yes[X] no[ ] **(MIB)** yes[X] no[ ]

Stator Condition? GOOD [X] FAIR [ ] POOR [ ]

Comments?
Steamed cleaned - Bake 15 Hours at 225°F
Sprayed 3 light coats clear insulating varnish on windings

Rotor Condition? GOOD [X] FAIR [ ] POOR [ ]

Comments?
Steamed cleaned - Bake 15 Hours at 225°F

Painted Motor? yes [X] no [ ] **Color?** GRAY

Additional Work or Comments?

WASTEWATER PUMPING STATION P.M. REPORT — DATE 6-14-?

NEIL DR PUMPING STATION — MECHANICS Tom / Moon IB-8

ITAL MAN HOURS 2 HRS

UM IN SERVICE 1, 2, 3 — PUMPS OUT OF SERVICE NONE

NIT		#1	#2	#3	#4	#5	#6
MOTOR OIL SAMPLE	UPPER						
	LOWER	oK	oK	oK			
PUMP BEARINGS GREASED	UPPER						
	LOWER						
PACKING		OK	OK	oK			
VIBRATION OR NOISE	*	N R	NR	NONE			
SEAL WATER		oK	oK	oK			
DRAINS		Drip PAN Needs To be cleaned on all 3 pumps					
PRIMING VALVE		NONE					
MAIN VALVES	DISC.	NR	NR	oK			
	SUCT.	NR	NR	oK			
	CONE	NONE					

OTHER COMMENTS ON PUMP UNITS: * Not Running

1 of 2

PUMPING STATION MONTHLY PM CHECK LIST

1 - Adjust packing on valve glands if necessary.
2 - Adjust packing & seal water flow on pumps. Make note of pumps that need repacking.
3 - Check building and grounds. Note conditions or repairs needed.
4 - Check comminutor for proper operation. Grease bearings.
5 - Check control room chart. Report any abnormalities with pump cycle at once.
6 - Check oil level and belt tension on air compressors.
7 - Check that the discharge & suction valves are fully open on pumps in service.
8 - Clean all station drains - flush with water until clear.
9 - Clean any oil or grease spills.
10 - Clean grease accumulation from fittings, bearing caps.
11 - Drain Neill Dr. pump bearing oil reservoir & fill with new oil.
12 - Flush sump pump sump with fresh water until clean (remove debris).
13 - Grease ball bearings.(pump & motor when instructed to do so)
14 - Grease sump pump fittings, test run pumps.
15 - Make a note of any safety hazards.
16 - Observe pumps running - note excessive vibration, noise, etc.
17 - Open priming valves to check that pumps are primed.
18 - Remove any debris from pump floor - wash down w/ hose.
19 - Run bar screen rakes. Lubricate & make adjustments as necessary.
20 - Run service & booster pumps, adj. packing, note in service or out.
21 - Run ventilator - check for loose belts, noisey bearings, etc..
22 - Take oil sample from bearing reservoirs - note any abnormalities.

The following work is not required at the station as listed.

BANK ST.	OMIT #	4	6	11	12	14		19	20	22
BELFRY DR.	OMIT #	4		11				19	20	22
CENT. SCH.	OMIT #	4		11						
FORD RD.	OMIT #	4	6	11				19	20	22
FORT MIFF	OMIT #	4		11	12	14	17	19	20	22
HOG ISLAND	OMIT #	4	6	11				19	20	22
LINDEN AVE.	OMIT #	4	6	11				19	20	22
LOCKHART ST.	OMIT #		6	11				19	20	22
MILNOR ST.	OMIT #	4	6	11				19	20	22
NEILL DR.	OMIT #		6					19	20	
POLICE ACA.	OMIT #	4	6	11	12	14	17	19	20	22
RENNARD ST.	OMIT #	4	6	11				19	20	22
42ND ST.	OMIT #		6	11				19	20	22
BROAD & BLVD.	OMIT #	4	6	11	12	14	17	19	20	
MINGO CREEK	OMIT #	4		11	12	14	17	19	20	
10TH & VINE	OMIT #	4	6	11	12	14	17	19	20	22
22ND & VINE	OMIT #	4	6	11	12	14	17	19	20	
26TH & VARE	OMIT #	4	6	11				19	20	22

PUMPING STATION MONTHLY PM CHECK LIST

1 - Adjust packing on valve glands if necessary.
2 - Adjust packing & seal water flow on pumps. Make note of pumps that need repacking.
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BELFRY DR.	OMIT #	4		11				19	20	22
CENT. SCH.	OMIT #	4		11						
FORD RD.	OMIT #	4	6	11				19	20	22
FORT MIFF	OMIT #	4		11	12	14	17	19	20	22
HOG ISLAND	OMIT #	4	6	11				19	20	22
LINDEN AVE.	OMIT #	4	6	11				19	20	22
LOCKHART ST.	OMIT #		6	11				19	20	22
MILNOR ST.	OMIT #	4	6	11				19	20	22
NEILL DR.	OMIT #		6					19	20	
POLICE ACA.	OMIT #	4	6	11	12	14	17	19	20	22
RENNARD ST.	OMIT #	4	6	11				19	20	22
42ND ST.	OMIT #		6	11				19	20	22
BROAD & BLVD.	OMIT #	4	6	11	12	14	17	19	20	
MINGO CREEK	OMIT #	4		11	12	14	17	19	20	
10TH & VINE	OMIT #	4	6	11	12	14	17	19	20	22
22ND & VINE	OMIT #	4	6	11	12	14	17	19	20	
26TH & VARE	OMIT #	4	6	11				19	20	22

CHECK LIST FOR STATION P.M. -- ELECTRICAL

1. Inspect All Lighting and Indicating Lights --

   Replace if necessary

2. Inspect All Motor Starters & Controls --

   Check for noisy starters

   Clean & tighten

   Take AMP readings

   Take Infrared Readings

3. Inspect Operation of Battery Charger --

   Record Volts & Amps on daily worksheet

* 4. Inspect Ventilation & Heating --

   Adjust accordingly (summer/winter)

5. Inspect Switchgear, Transformers & Meters

6. Ensure that Control Room & Switchgear Room are Kept Clean and Free of Debris

7. Report Any Unusual Conditions or Materials Used on the PM Worksheet

8. ANYTHING YOU THINK MIGHT REQUIRE IMMEDIATE ATTENTION --

   CONTACT YOUR FOREMAN

DAILY WORK SHEET WILL READ :

STATION NAME/ST/OE/ON PM/C/PM

Amp Readings of Station Equipment

Station: Neill Drive **Date:** 8 / 1 / 95
Electrician: Broughan - Whitfield

EQUIPMENT:		(T1)	(T2)	(T3)
Pump # 1		123	123	118
Pump # 2		123	120	115
Pump # 3		118	117	111
Sump Pump 1	1ϕ	9	–	–
Service Pump 1	Seal water	3	3	3
Control - Pump Room Vent		4	4	4
Wet Well Vent	1ϕ	9	–	–
Transformer Room Vent		1	1	1
Comminutor		1	1	1

COMMENTS:

Replaced (1) outside flood light - 100W

Amp Readings of Station Equipment

Station: Neill Drive **Date:** 8 / 1 / 95
Electrician: Broughan - Whitfield

EQUIPMENT:		(T1)	(T2)	(T3)
Pump # 1		123	123	118
Pump # 2		123	120	115
Pump # 3		118	117	111
Sump Pump 1	1φ	9	—	—
Service Pump 1	Seal water	3	3	3
Control - Pump Room Vent		4	4	4
Wet Well Vent	1φ	9	—	—
Transformer Room Vent		1	1	1
Comminutor		1	1	1

COMMENTS:

Replaced (1) outside flood light - 100W

WASTEWATER PUMPING'S BATTERY INSPECTION AND SERVICE REPORT

DATE: 7 / 6 / 95
STATION: Neill Drive
ELECTRICIAN: Broughan-Whitfield

VOLTAGE: 128.7 D.C. **WATER LEVEL:** High - O.K.
CURRENT: .5 **WATER TEMP:** 78° F

(+) 0.2 **(-)**

COMMENTS: Wiped down battery bank

CELL NO.	SPECIFIC GRAVITY	VOLTS	CELL NO.	SPECIFIC GRAVITY	VOLTS	CELL NO.	SPECIFIC GRAVITY	VOLTS	CELL NO.	SPECIFIC GRAVITY	VOLTS
1	1200	2.1	16	1205	2.1	31	1200	2.1	46	1200	2.1
2	1200	2.1	17	1205	2.1	32	1205	2.1	47	1200	2.1
3	1205	2.1	18	1205	2.1	33	1200	2.1	48	1200	2.1
4	1205	2.1	19	1205	2.1	34	1200	2.1	49	1200	2.1
5	1205	2.1	20	1205	2.1	35	1200	2.1	50	1200	2.1
6	1210	2.1	21	1200	2.1	36	1200	2.1	51	1200	2.1
7	1210	2.1	22	1205	2.1	37	1200	2.1	52	1210	2.1
8	1210	2.1	23	1205	2.1	38	1205	2.1	53	1205	2.1
9	1215	2.1	24	1210	2.1	39	1200	2.1	54	1200	2.1
10	1210	2.1	25	1200	2.1	40	1190	2.1	55	1195	2.1
11	1210	2.1	26	1200	2.1	41	1200	2.1	56	1195	2.1
12	1205	2.1	27	1200	2.1	42	1200	2.1	57	1200	2.1
13	1205	2.1	28	1210	2.1	43	1200	2.1	58	1195	2.1
14	1205	2.1	29	1200	2.1	44	1200	2.1	59	1195	2.1
15	1205	2.1	30	1200	2.1	45	1205	2.1	60	1195	2.1

CURRENT / INFRARED READINGS OF WASTEWATER PUMPING STATION EQUIPMENT

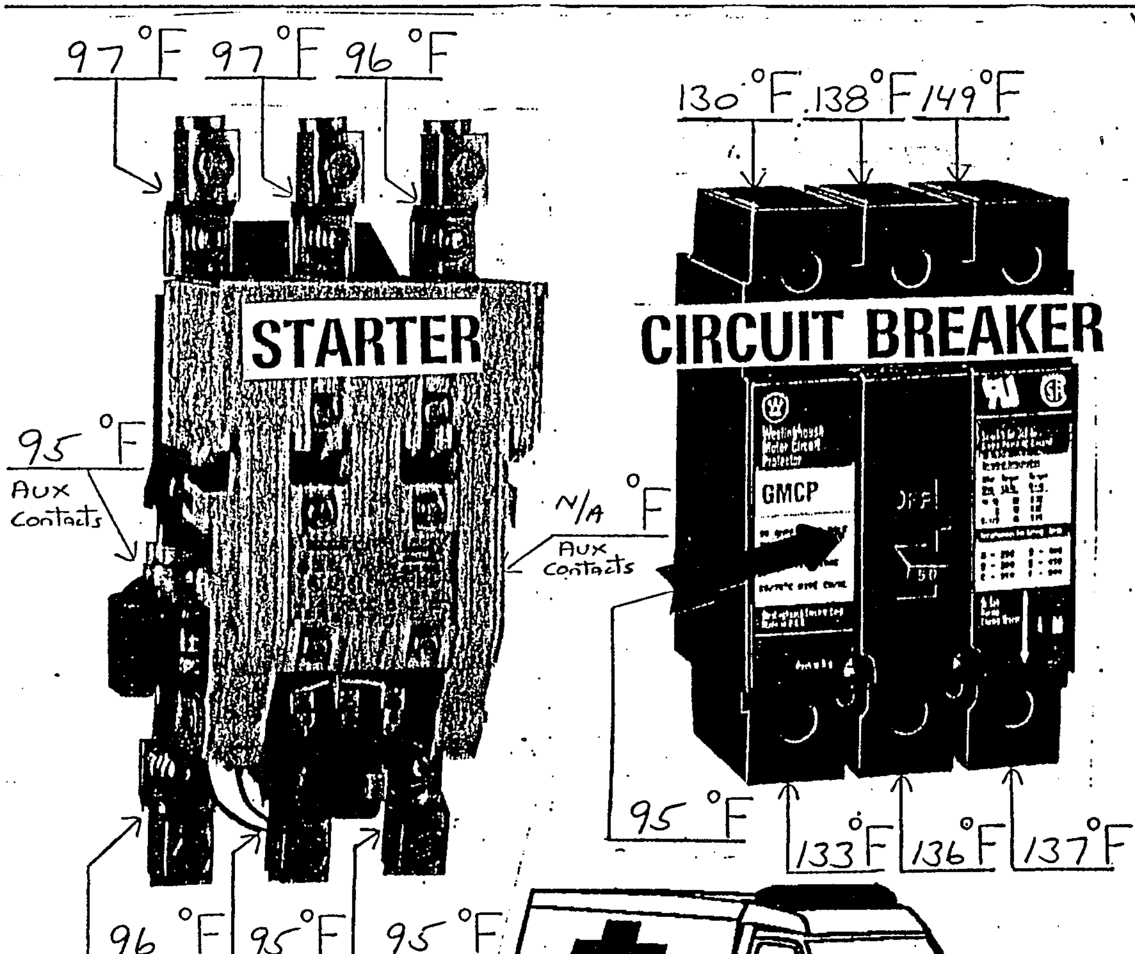
DATE: 8 / 1 / 95
STATION: Neill Drive
ELECTRICIAN: Broughan - Whitfield

EQUIPMENT: Pump # 1 **AMPS: (T1)-** 123 **(T2)-** 123 **(T3)-** 118

COMMENTS:

Emissivity Settings
STEEL = 0.80
ALUMINUM = 0.20
PLASTIC = 0.95

"Don't Forget a visual of entire Unit"



WATCH OUT FOR THE LIGHTNING!!!!!

CITY OF PHILADELPHIA
WATER DEPARTMENT
SEWPCP

DAILY STATION RECORD

DATE: 8/6/95

CENTRAL SCHULKILL PUMPING STATION

TIME	PHILA. ELECTRIC FEEDER 378	371	INCOMING LINE AC AMPS A	B	PUMPS IN SERVICE 1	2	3	4	5	6	TOTAL W.W 72.1	INFLUENT GATE % OPEN N	S	WET WELL ELEVATION N	S	SEWER ELEVATION N	S
7 AM	IN	IN	OUT	OUT	IN	OFF	OFF	OFF	IN	OFF	56	100	100	8.0	8.2	.2	.2
8	IN	IN	OUT	OUT	IN	OFF	[illegible]	[illegible]	[illegible]	OFF	77	100	100	9.8	10.2	3.0	3.4
9	[illegible]	[illegible]	OUT	OUT	IN	OFF	OFF	OFF	IN	IN	113	100	100	7.0	7.2	.2	.2
10	IN	IN	OUT	OUT	IN	IN	OFF	OFF	IN	IN	141	100	100	8.0	8.2	1.4	1.6
11	IN	IN	OUT	OUT	IN	IN	OFF	OFF	IN	IN	140	100	100	10.4	11.0	3.0	3.4
12	IN	IN	OUT	OUT	IN	IN	IN	OFF	IN	IN	151	100	100	7.8	8.6	.2	.4
1 PM	IN	IN	OUT	OUT	IN	IN	IN	OFF	IN	IN	143	100	100	7.0	7.2	.2	.2
2	IN	IN	OUT	OUT	IN	IN	OFF	OFF	IN	IN	134	100	100	6.6	8.0	.2	.4
3					IN	IN			IN	IN	148			5.2	5.0	.2	.2
4					IN	OFF			IN	IN	128			7.0	6.4	.2	.2
5					IN				IN	OFF	112			8.0	8.2	.4	.4
6					IN				IN		112			8.0	8.0	.4	.4
7					IN				IN		76			7.8	7.8	.4	.4
8					IN				IN		69			7.6	7.8	.4	.4
9					IN				IN		69			8.4	8.6	.4	.4
10					IN				IN		69			8.6	8.8	.4	.4
11					IN	OFF	OFF	OFF	IN	OFF	68			8.8	9.0	1.0	1.0
12					IN	OFF	OFF	OFF	IN	OFF	68			9.0	9.0	1.0	1.2
1 AM					IN	OFF	OFF	OFF	IN	OFF	71			8.8	9.0	1.0	1.2
2					IN	OFF	OFF	OFF	IN	OFF	73			8.8	9.2	.6	.8
3					IN	OFF	OFF	OFF	IN	OFF	60			8.0	8.0	.2	.2
4					IN	OFF	OFF	OFF	OFF	OFF	57			9.6	10.2	1.6	2.0
5					IN	OFF	OFF	OFF	OFF	OFF	57			7.6	8.4	.2	.2
6					OFF	IN	OFF	OFF	IN	OFF	20			7.6	7.6	.2	.2

REMARKS
Due 8/27

GAS METER 2.7V

6–2	NB
2–10	BJ
10–6	NB

	VOLTS	AMPS	INT.
6–2	126	8	NB
2–10	126	8	BJ
10–6	126	8	NB

#5 leak.

REVIEWED BY: [illegible] TOTAL .W.W.= 91,997,000 TOTAL KWH =

OPERATOR	6–2	2–10	10–6
	Beasley	Farrell	Beasley

1 of 3

H B-10

CITY OF PHILADELPHIA

WATER DEPARTMENT

SEWPCP

PUMPIMG STATION RECORD - CSPS

DATE: 8/6/95

RAW WASTE WATER PUMP NO. 1

TIME	IA AMPS <588	IB AMPS <588	IC AMPS <588	WINDING TEMPERATURE WT1 <338F	WT2 <338F	WT3 <338F	WT4 <338F	WT5 <338F	WT6 <338F	BEARING TEMPERATURE MBT1 <200F	MBT2 <200F	LBT1 <200F	LBT2 <200F	FLOW mgd	REMARKS
7 AM														48	
8	544	534	541	190	190	188	188	188	197	105	93	166	107	56	
9														56	
10														56	
11														56	
12	569	562	566	195	195	192	192	192	201	107	93	166	111	56	
1 PM														56	
2														56	open 100%
3														56	
4	538	533	557	195	195	192	190	192	197	105	93	163	107	56	
5														56	
6														56	
7														56	
8	549	544	573	195	195	192	190	192	201	102	89	159	105	56	
9														56	
10														56	
11														56	
12	[illegible]	[illegible]	590	192	192	190	188	190	197	102	89	159	102	56	
1 AM														56	
2														56	
3														44	
4	558	555	557	184	188	184	184	184	192	102	85	163	105	57	
5														57	Stop 5:20
6															

OPERATOR	
6-2	[illegible]
2-10	Farren
10-6	Beasley

FLOW: TOTALIZER = 52,9[illegible]

TOTAL HOURS PUMP OPERATED = 23

2 of 3

IB-10

CSPS AUTOMATIC CONTROL - DAILY LOG

DATE: 8/6/95

AUTOMATIC CONTROL — If for the duration of your shift the station ran in full automatic control, check this block.
MANUAL CONTROL — If for any reason you switched to manual to control the station, indicate the reason the exact time and any other pertinent information.

OPERATOR INTERVENTION — If you performed any function required to run the station check the yes box. Typical examples would include; Resetting the trash rakes, throttling valves, moving gates, varying speed, tripping a pump, acknowledging an alarm, or any other function where you were required to operate equipment. If you were not required to aid in the station operation check the no box. (Use additional sheets if necessary.)

7AM to 3PM NAME: Beasley

AUTOMATIC CONTROL ☐ MANUAL CONTROL ☑ (NOTE BELOW)

Pumps 1&5 running in bypass mode at start of shift sluice gates fully open

NO OPERATOR INTERVENTION ☐ YES - OPERATOR INTERVENTION ☑ (NOTE BELOW)

Start pump #6 8:00 AM also Throttled gates To compensate
Start Pump #2 9:15 AM Fourth pump
Start Pump #3 11:50 AM Fifth pump
discharge Valves on 1356 all Fully open. pump #2 Throttled
North Bar rake Trip 10:00 Reset - Lower overtravel
South Bar rake Trip 12:00 Reset - Lower Overtravel
STOP pump #3 1:00 pm

3PM to 11PM NAME: FARRELL

AUTOMATIC CONTROL ☐ MANUAL CONTROL ☑ (NOTE BELOW)

#1,2,5,6 pumps ON. Running in bypass mode Sluice gates 100% open
3³⁰ stop #3 RSP

NO OPERATOR INTERVENTION ☐ YES - OPERATOR INTERVENTION ☑ (NOTE BELOW)

opened #1 100%
3³⁰ stop #3 RSP.
4⁴⁵ stop #6 RSP.
5⁰¹ South Rake Drive Trip, Reset.

11PM to 7AM NAME: Beasley

AUTOMATIC CONTROL ☐ MANUAL CONTROL ☑ (NOTE BELOW)

Pumps 1&5 running in bypass mode at Start of Shift

NO OPERATOR INTERVENTION ☐ YES - OPERATOR INTERVENTION ☑ (NOTE BELOW)

Stop #5 at 3:45 Am
Start #3 at 4:15 Am
Stop #3 at 4:50 Am
Start #5 at 5:20 Am ROTO Value did not open I had to open manualy
Stop #1 at 5:20 Am
Start #2 at 5:45 Am Roto value didn't open I had to open manualy

FLOW CONTROL
WW PUMPING
DAILY WORK REPORT

NAMES: 220790 187443
Broughan / Whitfield

DAY - Thursday

YY-MM-DD: 95-07-20

SUPERVISOR: CARNEGLIA

SITE ID	GROUP	START	A/P	FINISH	A/P	PAY	EMPLOYEE NUMBER	UNIT	SUB UNIT	PART	JOB	TYPE	STATUS
CSPS	PE	0700	A	1230	P	R	220790 / 187443	LI	ON	ON	TS	CM	C
COMMENTS: outside pole lights													
NEIL	PE	1230	P	0200	P	R	220790 / 187443	LI	ON	ON	PM	PM	C
COMMENTS: emerg Lighting in Switch Gear Room													
NEIL	PE	0200	P	0330	P	R	220790 / 187443	TR	VF	CN	TS	CM.	C
COMMENTS:													
	PE												C
COMMENTS:													
	PE												C
COMMENTS:													

IB-11

I B-12

WASTEWATER PUMPING UNIT

DATABASE ENTRY LISTING

DATE	SITE_ID	GROUP	START	FINISH	PAY	EMP_NO
YY-MM-DD	BANK	PE =pumping electrical	HH:MM A/P	HH:MM A/P	R =regular	158424
	BELD	PM =pumping mechanical			O =overtime	
	BLVD	P I =pumping instrument			L =leave	
	CSPS				C =call in	
	FORD					
	FORT					
	HOGI					
	LIND					
	LOCK					
	MILN					
	MING					
	NEIL					
	POLI					
	RENN					
	SHOP					
	SIPH					
	26VA					
	42ST					
	MISC					

UNIT	SUB_UNIT	PART	JOB	TYPE	STAT
01 =main pump #1	1-10 =aux equipment #	AV =air valve	AJ =adjust	CM =corrective maint.	C =completed
02 =main pump #2	AL =alarm circuit	B1 =bearing #1, motor top	AL =align	OV =overhaul	IC =incomplete
03 =main pump #3	AV =air valve	B2 =bearing #2, motor bottom	AM =attend meeting	PM =preventative maint.	
04 =main pump #4	B1 =bus #1	B3 =bearing #3, pump top	AS =assemble		
05 =main pump #5	B2 =bus #2	B4 =bearing #4, pump bottom	CA =calibrate		
06 =main pump #6	BM =bearing monitor	B5 =bearing #5, other	CB =change brush		
A1 =air blower #1	BR =breaker	BL =belt	CC =change		
A2 =air blower #2	BS =bar screen	BR =breaker	CL =clean		
B1 =booster pump #1	CC =chart recorder	CA =case	CN =connect		
B2 =booster pump #2	CH =chain	CD =conduit	CO =change oil		
BA =batteries	CO =coupling	CH =chart	CP =change packing		
BB =bubbler system	CP =compressor	CN =contactor	CU =cut		
BC =battery charger	CU =cubicle	CR =collector ring	DA =disassemble		
BR =breaker	CV =check valve	CT =current transformer	DC =disconnect		
BU =building	DV =discharge valve	CU =cutters & combs	DR =drain		
CB =chatterbox	EC =elect. controls	EX =exciter	DS =deliver supplies		
CH =control room	FM =flowmeter	GE =gauge	IF =infrared test		
CO =comminutor	FT =float	GL =gland	IN =install		
CR =crane	GM =gas meter	HE =head	IR =insulation resistance		
EH =electric heat	GR =grass	IM =impeller	IS =inspect		
GR =grounds	GV =gate valve	LE =leads	LU =lubricate		
LC =level controller	L1 =line #1	LI =linkage	OE =other elect.		
LI =lighting	L2 =line #2	LS =limit switch	OI =other inst.		
OE =other electrical	ME =meter	MO =motor	OM =other mech.		
OI =other instrumentation	MO =motor	OE =other elect.	ON =only		
OM =other mechanical	MV =misc. valves	OI =other inst.	OO =other other		
OO =other other	OE =other elect.	OM =other mech.	OP =operate		
PR =pump room	OI =other inst.	ON =only	PA =paint		
S1 =sump pump #1	OM =other mech.	OO =other other	PM =preventative maint.		
S2 =sump pump #2	ON =only	OP =operator	PO =pump out		
SO =sump pump system	OO =other other	PE =pen	RB =replace bulb		
ST =station	PI =piping	PF =potential fuse	RE =remove		
SV =station valves	PU =pump	PR =probe	RL =repair leak		
TR =transformer	RF =rectifier	PT =potential transformer	RN =replace w/ new part		
VE =ventilator	SV =suction valves	PV =priming valve	RP =repair		
W1 =seal water pump #1	TF =transformer	RC =rings, case	RR =replace w/ rebuilt part		
W2 =seal water pump #2	TL =telephone line	RE =relay	RU =replace w/ used part		
WO =seal water system	TR =trash rake system	RI =rings, impeller	SC =scrape		
WW =wet well	VF =vent. fan	RO =rotor	TC =tighten connection		
	VS =vari. speed control	SC =screenings	TG =test specific gravity		
		SE =seat	TO =test oil		
		SH =shaft	TR =take readings		
		SI =sleeve, inboard	TS =troubleshoot		
		SL =seal, lower	TV =test voltage		
		SN =sensor	VI =vibration test		
		SO =sleeve, outboard			
		ST =stator			
		SU =seal, upper			
		WI =wire			

PHILADELPHIA WATER DEPARTMENT
FLOW CONTROL
DATA ACQUISITION

A.D.S.
CALIBRATION DATA
REVISION 08/10/95

IC-1

Site I.D.: T-5 Location: Rising Sun West Date: 8-25-95

Time Arrived: 9:35 Departed: 11:15 Lead Tech: C.R.B.

Crew: L. Greene L. Ganzelli

****

BAT 1

App. % Head Rise	Head Rise Inches	Bat Reading Inches	Error Inches
0	1.5	.58	-.92
25	13	13.00	0
50	19	18.95	-.05
75	25	24.95	-.05
100	31	31.03	.03

BAT 2

App. % Head Rise	Head Rise Inches	Bat Reading Inches	Error Inches
0	0	-.60	-.60
25	13	12.71	-.29
50	19	18.65	-.35
75	25	24.78	-.22
100	31	30.18	-.82

VERIFICATION

Level 1.5 Reading .58

Level 0 Reading -.60

BAT 3

App. % Head Rise	Head Rise Inches	Bat Reading Inches	Error Inches.
0			
25			
50			
75			

VERIFICATION

Level ________ Reading ________

EQUIPMENT REQUIRED

1. All APPLICABLE SAFETY EQUIPMENT
2. Laptop & Cable
3. Current Site Parameters
4. Milk Crates

PROCEDURE

1. Use ALL APPLICABLE SAFETY PROCEDURES & EQUIPMENT

2. Verify that the Laptop has the correct DATE/TIME

3. Stack the milk crates to the approximate % of head rise
   If water level is too high, measure the water level and the bat reading. Enter the infomation it in the verification section for that bat

4. Measure the hight of the milk crates & record the hight & the bat reading in the apporiate blocks

FINAL

1. Inspect site & note any discrepancies in COMMENTS

2. Complete all paper work

3. Secure site [reconnect modem, secure box, etc. etc.]

COMMENTS

____

____

____

____

____

____

____

EQUIPMENT REQUIRED

1. All APPLICABLE SAFETY EQUIPMENT
.. Laptop & Cable
3. Current Site Parameters
4. Milk Crates

PROCEDURE

1. Use ALL APPLICABLE SAFETY PROCEDURES & EQUIPMENT
2. Verify that the Laptop has the correct DATE/TIME
3. Stack the milk crates to the approximate % of head rise
   If water level is too high, measure the water level and the bat reading. Enter the infomation it in the verificatior section for that bat
4. Measure the hight of the milk crates & record the hight & the bat reading in the apporiate blocks

FINAL

1. Inspect site & note any discrepancies in COMMENTS
2. Complete all paper work
3. Secure site [reconnect modem, secure box, etc. etc.]

COMMENTS

____

____

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____

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____

____

PHILADELPHIA WATER DEPARTMENT
FLOW CONTROL
DATA ACQUISITION

PRESSURE SENSOR
CALIBRATION DATA
REVISION 04/11/94

IC-2

Site I.D.: D-37 Location: Cumberland Date: 5-24-95

Time Arrived: 12:30 Departed: 2:30 Lead Tech: W. Advena

Crew: C. Bland

****

SENSOR 1

App. % Head Rise	Head Rise Inches	Logger Reading Inches	Error Inches
0	0	.63	.63
25	25	24.9	-.1
50	50	48.9	-1.1
75	75	77	2
100	100	101	1

SENSOR 2

App. % Head Rise	Head Rise Inches	Logger Reading Inches	Error Inches
0	0	-.43	-.43
25	25	25.9	.9
50	50	50.87	.87
75	75	75.2	.2
100	100	98.5	-1.5

VERIFICATION

Level 11 Reading 11.5 Level 41 Reading 41.8

SENSOR 3

App. % Head Rise	Head Rise Inches	Logger Reading Inches	Error Inches
0			
25			
50			
75			
100			

VERIFICATION

Level ______ Reading ______

	Slope Old	Slope New	Offset Old	Offset New
SENSOR 1	2.7541	2.754	7.00	7.00
SENSOR 2	2.7540	2.850	4.5	7.00
SENSOR 3				

EQUIPMENT REQUIRED

1. All APPLICABLE SAFETY EQUIPMENT
2. CAMPBELL KEYPAD & RIBBON CABLE
3. DRUCK CALIBRATOR [or equivilent] & all accessories
4. CAMPBELL LOGGER STANDARD PROGRAM sheet
5. LOGGER CALIBRATION WORK SHEET

PROCEDURE

1. Use **ALL APPLICABLE SAFETY PROCEDURES & EQUIPMENT**
2. Verify that the LOGGER has the correct DATE/TIME
3. Calibrate using the DRUCK CALIBRATOR or equivilent
   100% HEAD RISE for DRUCKS is 100 in. for 5 PSI & 200 in. for 10 PSI
   for BUBBLERS use 100% of the PIPE Diameter
4. Record SLOPE & OFFSET for all SENSORS

FINAL

1. Inspect site & note any discrepancies in COMMENTS
2. Complete all paper work & verify that the current SLOPE & OFFSETS recorded on the LOGGER STANDARD PROGRAM SHEET and LEFT AT THE SITE
3. Secure site [reconnect modem, secure box, etc. etc.]

COMMENTS

Tide Druck Cable Dangling (Added Anchors To Secure Cab

EQUIPMENT REQUIRED

1. All APPLICABLE SAFETY EQUIPMENT
2. CAMPBELL KEYPAD & RIBBON CABLE
3. DRUCK CALIBRATOR [or equivilent] & all accessories
4. CAMPBELL LOGGER STANDARD PROGRAM sheet
5. LOGGER CALIBRATION WORK SHEET

PROCEDURE

1. Use **ALL APPLICABLE SAFETY PROCEDURES & EQUIPMENT**
2. Verify that the LOGGER has the correct DATE/TIME
3. Calibrate using the DRUCK CALIBRATOR or equivilent
   100% HEAD RISE for DRUCKS is 100 in. for 5 PSI & 200 in. for 10 PSI
   for BUBBLERS use 100% of the PIPE Diameter
4. Record SLOPE & OFFSET for all SENSORS

FINAL

1. Inspect site & note any discrepancies in COMMENTS
2. Complete all paper work & verify that the current SLOPE & OFFSETS recorded on the LOGGER STANDARD PROGRAM SHEET and LEFT AT THE SITE
3. Secure site [reconnect modem, secure box, etc. etc.]

COMMENTS

Tide Druck Cable Dangling (Added Anchors To Secure Cab

PHILADELPHIA WATER DEPARTMENT
FLOW CONTROL
DATA ACQUISITION

CONTROL CHAMBER
P/M PROCEDURE
REVISION 06/22/95

Site I.D.: D-2   DATE: 8-8-95   Arrived: 8:35

Lead Tech: C. Bland   Crew: L. Greene   Deperted: 9:30

IC-3

EQUIPMENT REQUIRED...

1. All required safety equipment for confined space entry
2. Hydrolic fluid & water for batteries (if needed)
3. Light bulbs 150 watt, mini-lamps #757 & 24PSB
4. Tool kit
5. Shop vac (or broom)
6. Rope

SET UP ...

1. Open CONTROL CHAMBER, Defeat Intruder Alarm Switch with A Magnet, turn on LIGHTS & BLOWER and Vent for at least 5 Min.

2. Disarm VERBATIM and put ALL GATES in MANUAL

P/M...

✓ Check all lamps & replace as necessary

✓ Check Hydrolic fluid & battery water, refill as necessary [NOTE any leaks in COMMENTS]

✓ Vacumn out all cabinets & all equipment

✓ Clean floor, Sump Pump hole & channel

EQUIPMENT CHECK...

	Operational	Inoperative
Blower	✓	
Sump Pump (Control Chamber)	✓	
Sump Pump (Hydrolic Chamber)		✓
Dehumidifyer	✓	
Heater	✓	
U.P.S.	✓	
T.I. Controller Battery	✓	

Put Battery Charger on EQ, current should peak then roll off, Record Peak, Then Return Charger to FL

Peak Current 22 Amps.

Move DWO GATE to 50% Open & record manafold pressure 1050

Throw Braker 15 (A.C.Pump) Off

Move DWO GATE to 100% Open & record manafold pressure 600

Throw Braker 15 (A.C.Pump) On

Over

FINAL...

- ✓ **1.** Check for Ware,Cracks and any other Defects that indicate further attention may be required. - Make Notes in Comments -
- ✓ **2.** Return ALL GATES to Automatic and Rearm VERBATIM
- ✓ **3.** Turn off Lights & Blower as you leave Chamber
- ✓ **4.** Secure all Manholes & Chamber Door(s)**(Remember to remove Magnet)**

Comments

Hyd. Chamber Has 3" of Water

FINAL...

✓ **1.** Check for Ware,Cracks and any other Defects that indicate further attention may be required. - Make Notes in Comments -

✓ **2.** Return ALL GATES to Automatic and Rearm VERBATIM

✓ **3.** Turn off Lights & Blower as you leave Chamber

✓ **4.** Secure all Manholes & Chamber Door(s)**(Remember to remove Magnet)**

Comments

Hyd. Chamber Has 3" of Water

PHILADELPHIA WATER DEPARTMENT
FLOW CONTROL
DATA ACQUISITION

P.M.
FLOW CHAMBERS
REVISION 08/02/95

I-C-4

Lead Tech C. Bland **Crew** L. Greene **Crew** ______

EQUIPMENT REQUIRED...

1. All required safety equipment for confined space entry
2. Tool kit
3. Rope
4. 150 watt light bulbs
5. Shop vac (or broom)
6. Trash can or bag

SET UP & P/M...

1. If IN GROUND CHAMBER, turn on LIGHTS & BLOWER, vent for at least 5 min.
2. Check lights & replace as necessary
3. Clean or vacumn out cabiners & equipment

EQUIPMENT CHECK...

Blowers... Check for proper operation & clear anything prohibiting proper air flow
Sump Pumps... Clean floor, sump pump hole & channel, check for proper operation & clear anything prohibiting flow

Site	Equip.	Operational	Inoperative	Date	Arrived	Departed
MSH-1	Blower	X		8-2-95	11:10	11:25
MLM-1	Blower		X	8-4-95	11:00	11:15
MBE-5	Blower		X	8-2-95	11:50	12:15
M[illegible]-6	Blower	X		8-2-95	10:00	10:30
MBE-7	Blower		X	8-2-95		
	Sump Pump		X	8-2-95	10:35	11:00
MA-2	Blower	X		8-2-95	1:15	1:45
MC-1	Blower		X	8-2-95	2:15	2:30
MS-2	Blower		X	8-3-95	1:45	2:00
MS-3	Blower	X		8-3-95	2:05	2:30
MUD-1	Blower	X		8-3-95		
	Sump Pump	X		8-3-95	9:45	10:00
ML-1	Blower	X		8-3-95		
	Sump Pump	X		8-3-95	12:35	12:55
ML-3	Blower	X		8-3-95	10:25	10:45
ML-4	Blower	X		8-3-95		
	Sump Pump	X		8-3-95	11:20	11:45
ML-5	Blower	X		8-3-95	10:55	11:15
ML-6	Blower		X	8-3-95	1:00	1:15

Final...

1.Check for ware, cracks & any other defects that may indicate futher attention is required (**Note in Commen**
2. Turn off lights & blower
3. Secure all manholes & doors

Comments

____

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____

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Final...

IC-4

1.Check for ware, cracks & any other defects that may indicate futher attention is required (**Note in Commen**
2. Turn off lights & blower
3. Secure all manholes & doors

Comments

PHILADELPHIA WATER DEPARTMENT
FLOW CONTROL
DATA ACQUISITION

METERING CHAMBER
CALIBRATION DATA
REVISION 3/01/95

IC-5

Location Code: **ML-1** Name: **51st Street**

Date Started: 8-28-95 8:20 Date Completed: 8-28-95 9:45 Lead Tech.: C. Bland

Approval Crew Chief: [signature]

EQUIPMENT REQUIRED

All requires Safety Equipment Site Curve Spec. Data

Cal Jig with Applicable Tx Rx HEAD or Druck Calibrator

SITE INFOMATION

Channel Type	Size	Max. Capacity
Open Flow	24 Inch.	6.0 MGD

	Type	Prop.#
Primary Measuring Device	F/P	N/A
Logger	CR-10	432577
Modem	CR-10	5133

Logger Previous (Referance Only) Slope .00300 Offset -1.500

Current Date 8-28-95 Slope .00300 Offset -1.500

Amount of Grit Removed None

Date: 8-28-9

ML-1
CALIBRATION DATA

% Head Rise	Head Rise	Local Indicator	CR-10 *6 #10 Milivolts	CR-10 *6 #4 Flow	Ideal Flow	% Error
0	0	-0.000	0501	.001	0	—
10	3 9/32	.57	068	.5754	.600	-4.1
20	5 1/32	1.24	0904	1.243	1.200	3.58
30	6 3/16	1.82	1.084	1.8157	1.800	.87
40	7 1/8	2.39	1286	2.387	2.400	-.54
50	7 31/32	2.99	1445	2.991	3.000	-.30
60	8 3/4	3.63	1689	3.630	3.600	.83
70	9 17/32	4.20	1890	4.200	4.200	0
80	10 5/16	4.88	2123	4.868	4.800	1.42
90	11 3/32	5.48	2272	5.471	5.400	1.31
100	11 7/8	6.09	2484	6.076	6.000	1.27

F/P Dial Settings

Span

1	1.	8	8

Alarm/ Totalizer — Test

0	0	0	0	0
3	9	5	0	6

Zero — Flume

Max Flow Setting

0	6.	0	0

Verification

Time	Velocity	Head Rise	CR-10 *6 #4	CR-10 *6 #10	Local Ind.
9:30	N/A Ft./Sec.	8"	2.77	1548	2.77

IC-5

Date: 8-28-9

ML-1
CALIBRATION DATA

% Head Rise	Head Rise	Local Indicator	CR-10 *6 #10 Milivolts	CR-10 *6 #4 Flow	Ideal Flow	% Error
0	0	-0.000	0501	.001	0	—
10	3 9/32	.57	068	.5754	.600	-4.1
20	5 1/32	1.24	0904	1.243	1.200	3.58
30	6 3/16	1.82	1.084	1.8157	1.800	.87
40	7 1/8	2.39	1286	2.387	2.400	-.54
50	7 31/32	2.99	1445	2.991	3.000	-.30
60	8 3/4	3.63	1689	3.630	3.600	.83
70	9 17/32	4.20	1890	4.200	4.200	0
80	10 5/16	4.88	2123	4.868	4.800	1.42
90	11 3/32	5.48	2272	5.471	5.400	1.31
100	11 7/8	6.09	2484	6.076	6.000	1.27

F/P Dial Settings

Span

1	1.	8	8

Alarm/ Totalizer — Test

0	0	0	0	0
3	9	5	0	6

Zero — Flume

Max Flow Setting

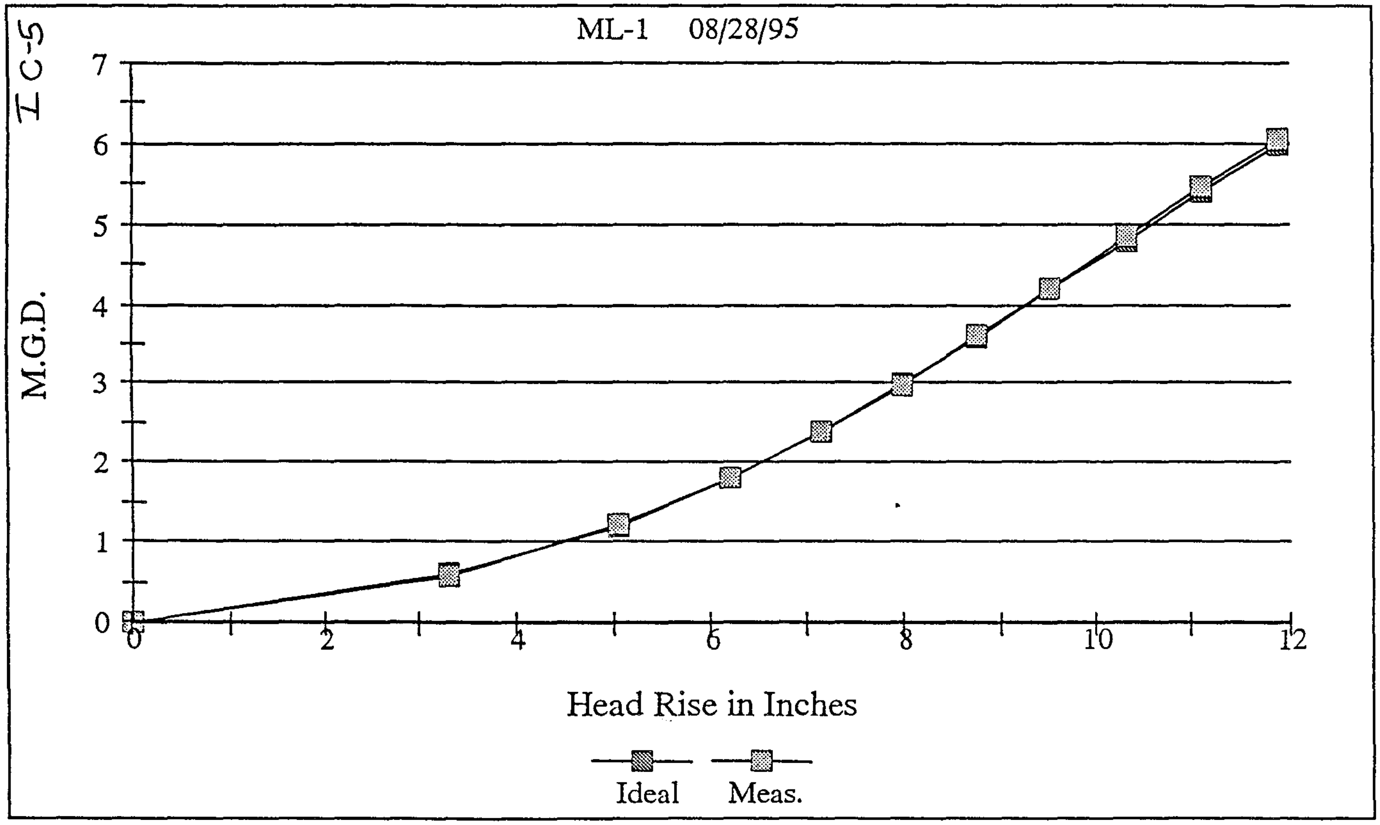
0	6.	0	0

Verification

Time	Velocity	Head Rise	CR-10 *6 #4	CR-10 *6 #10	Local Ind.
9:30	N/A Ft./Sec.	8"	2.77	1548	2.77

% Head Rise	0 %	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %
Head Rise	0.000	3.281	5.031	6.188	7.125	7.969	8.750	9.531	10.312	11.094	11.875
Ideal Flow	0.000	0.600	1.200	1.800	2.400	3.000	3.600	4.200	4.800	5.400	6.000
Measured Flow	0.000	0.575	1.243	1.816	2.387	2.991	3.630	4.200	4.868	5.471	6.076
% Error		-4.10	3.58	0.87	-0.54	-0.30	0.83	0.00	1.42	1.31	1.27

I C-5



3 of 3

CR-10

	Slope	Offset
Previous	0.003	-1.5
Current	0.003	-1.5

F/P

Flume	Span	Max Flow	Zero
6	11.88	6.00	39.50

Verification

Time	Level	Local Ind.	CR-10 *6 #4
9:30	8.00	2.77	2.77

PHILADELPHIA WATER DEPARTMENT
FLOW CONTROL
DATA ACQUISITION

CONTROL CHAMBER
CALIBRATION PROCEDURE
REVISION 06/28/95

IC-6

REQUIRED EQUIPMENT

AI QUIRED SAFETY EQUIPMENT	PANEL METER CAL CABLE
'.P.U. or C.P.U. with all cables & software	MULTI-METER
DRUCK CALIBRATOR & all accessories	BATA CAL. [or equivilent]

REQUIRED PAPER WORK

. CONTROL CHAMBER GATE CAL. WORK SHEET	3. CONTROL CHAMBER DATA SHEET
2. CONTROL CHAMBER GATE CAL PROCEDURE	4. LOGGER CALIBRATION WORK SHEET

SET UP

1. Open CONTROL CHAMBER, Defeat Intruder Alarm Switch with A Magnet, turn on LIGHTS & BLOWER & Vent for at least 5 Min.
2. DISARM VERBATIM & put ALL GATES in MANUAL

1: PANEL METER CALIBRATION

1. Unplug POWER CORD to PANEL METERS.
2. Disconnect the REAR CONNECTOR from the PANEL METER to be CALIBRATED.
3. Connect the PANEL METER CAL CABLE to the REAR CONNECTOR of the PANEL METER and to the VOLTAGE OUTPUT TERMINALS of the BATA CAL. (OBSERVE POLARITY [+] to pin 10 [-] to pin 3.)
4. Plug in POWER CORD from the PANEL METER CAL. CABLE.
5. Turn on BATA CAL & set OUTPUT to 5 VOLTS DC for a 5 PSI DRUCK OR 2.5 VOLTS DC FOR A 10 PSI DRUCK.
6. Adjust POT on rear of PANEL METER for a DISPLAY of 100.0.
7. Set BATA CAL to the VOLTAGES listed on the DATA SHEET & RECORD the METER DISPLAY.
8. Set BATA CAL to 0 VOLTS OUT & unplug POWER CORD.
9. Disconnect the PANEL METER CAL. CABLE from the PANEL METER & reconnect the PERMENENT PANEL CONNECTOR.
10. REPEAT STEPS 2 TO 9 for the remaining PANEL METER.
11. Plug in POWER CORD to PANEL METERS.

2: CONTROL GATES

1. Set GATE PANEL METER to read DWO GATE POSITION
   A. Close DWO GATE & record Readings
   B. Open DWO GATE & record Readings
2. Set GATE PANEL METER to read SWO#1 GATE POSITION
   A. Open SWO#1 GATE & record Readings
   B. Close SWO#1 GATE & record Readings
3. Set GATE PANEL METER to read SWO#2 GATE POSITION (IF APPLICIABLE)
   A. Open SWO#2 GATE & record Readings
   B. Close SWO#2 GATE & record Readings
4. If LOGGER or PANEL METER readings are not acceptable use GATE CAL & or LOGGER CAL WORK SHEETS to correct out of tollerent condition

(OVER)

3: LEVEL SENSORS

1. Use ALL CONFINED SPACE ENTRY SAFETY EQUIPMENT & PROCEDURES REQUIRED for entering the SEWER.

2. Calibrate all 3 (Trunk,Tide,DWO) SENSORS with the DRUCK CALIBRATOR.
   A. Physically loosen SENSOR & connect to DRUCK CALIBRATOR.

   B. Set DRUCK CALIBRATOR to the level settings pertaining to the PSI of the SENSOR being Calibrated & Record Readings on DATA SHEET.

   C. Reinstall SENSOR. On the DATA SHEET, Measure & Record the ACTUAL LEVEL & the TIME of DAY, for each SENSOR.

   D. While in Trunk, Tip FLOAT & Verify that the HIGH TRUNK LITE on the T.I. Panel goes OUT & back ON when FLOAT is Released. Record Results on DATA SHEET Part 4,High Trunk Circuit.

   E. While in Trunk, Inspect Tide Gates for Leaks & Record Results on DATA SHEET Part 4,Tide Gate(s) Leaking.

4: FUNCTIONAL CHECKS

1. D.C. Motor Backup System
   A. Open DWO & SWO Gates.

   B. Turn BATTERY CHARGER OFF, in MAIN AC PANEL BOX turn BRAKER #15 (HYDROLIC PUMP) OFF.

   C. Verify that the D.C. Motor Backup Batteries are able to FULLY CLOSE ALL GATES. Record on DATA SHEET.

   D. Turn BRAKER #15 & BATTERY CHARGER ON & Record the BATTERY CHARGER Current on DATA SHEET.

   E. Open DWO Gate & Verify SWO Gate(s) are Fully Closed.

2. U.P.S. Backup System
   A. Unplug U.P.S. Power Cord & Verify the U.P.S. goes into Alarm Mode & T.I. is still Operating.

   B. Plug in U.P.S. & Verify U.P.S. Returns to Normal Operation.

   C. Record results on DATA SHEET.

Complete Part #7. FINAL CHECK LIST on DATA SHEET

3: LEVEL SENSORS

1. Use ALL CONFINED SPACE ENTRY SAFETY EQUIPMENT & PROCEDURES REQUIRED for entering the SEWER.
2. Calibrate all 3 (Trunk,Tide,DWO) SENSORS with the DRUCK CALIBRATOR.
   A. Physically loosen SENSOR & connect to DRUCK CALIBRATOR.

   B. Set DRUCK CALIBRATOR to the level settings pertaining to the PSI of the SENSOR being Calibrated & Record Readings on DATA SHEET.

   C. Reinstall SENSOR. On the DATA SHEET, Measure & Record the ACTUAL LEVEL & the TIME of DAY, for each SENSOR.

   D. While in Trunk, Tip FLOAT & Verify that the HIGH TRUNK LITE on the T.I. Panel goes OUT & back ON when FLOAT is Released. Record Results on DATA SHEET Part 4,High Trunk Circuit.

   E. While in Trunk, Inspect Tide Gates for Leaks & Record Results on DATA SHEET Part 4,Tide Gate(s) Leaking.

4: FUNCTIONAL CHECKS

1. D.C. Motor Backup System
   A. Open DWO & SWO Gates.

   B. Turn BATTERY CHARGER OFF, in MAIN AC PANEL BOX turn BRAKER #15 (HYDROLIC PUMP) OFF.

   C. Verify that the D.C. Motor Backup Batteries are able to FULLY CLOSE ALL GATES. Record on DATA SHEET.

   D. Turn BRAKER #15 & BATTERY CHARGER ON & Record the BATTERY CHARGER Current on DATA SHEET.

   E. Open DWO Gate & Verify SWO Gate(s) are Fully Closed.
2. U.P.S. Backup System
   A. Unplug U.P.S. Power Cord & Verify the U.P.S. goes into Alarm Mode & T.I. is still Operating.

   B. Plug in U.P.S. & Verify U.P.S. Returns to Normal Operation.

   C. Record results on DATA SHEET.

Complete Part #7. FINAL CHECK LIST on DATA SHEET

PHILADELPHIA WATER DEPARTMENT
FLOW CONTROL
DATA ACQUISITION

CONTROL CHAMBER DATA SHEET
REVISION 06/28/95

TC-6

Site I.D.: D-2 Location: Cottman Date: 9-11-95

T Arrived: 09:00 Departed: 1:00 Lead Worker: W. Advena

Crew: ______ ______ ______ ______

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

1: PANEL METERS

Calibrator Output	Gate Meter Displays	Level Meter Displays
5.0 Vdc		
3.75 Vdc	N/A	
2.5 Vdc		
1.25 Vdc		
0.0 Vdc		

2: CONTROL GATES

	DWO T.I. V10	DWO Panel Meter	DWO Logger *6 #4	SWO#1 T.I. V11	SWO#1 Panel Meter	SWO#1 Logger *6 #5	SWO#2 T.I. V12	SWO#2 Panel Meter	SWO#2 Logger *6 #6
OPEN	96.1	95.7	99.0	96.8	96.6	97.99	N/A		
CLOSED	3.9	3.8	1.4	5.4	5.4	1.998			

3: LEVEL SENSORS

Druck Cal. Settings 5psi	10psi	TRUNK T.I. V1*	TRUNK Panel Meter	TRUNK Logger *6 #4	TIDE T.I. V2*	TIDE Panel Meter	TIDE Logger *6 #5	DWO T.I. V3*	DWO Panel Meter	DWO Logger *6 #6
0″	0″	.8	.8	.8	5.3	5.3	-.43	3.0	3.0	-.6
25″	50″	25.2	25.4	25.2	31.0	31.0	24.7	28.8	28.8	25.5
50″	100″	49.8	49.8	50.1	56.5	56.5	48.7	54.3	54.8	50.5
75″	150″	74.2	74.2	75.3	82.3	82.5	74.8	79.5	79.5	78.5
100″	200″	98.3	98.3	100.2	108.8	108.8	99.8	105.5	105.5	101.5

* If the V 0″ readings are way off go to 'Gate Cal Chart' & change V450 to the lowest 0″ Value of WX1,WX2 or WX3 Minus 25

4: TIME STAMP

	Actual Level	T.I.	Panel Meter	Logger *6	Time of Day
TRUNK	4.5	V1 .8	.8	#1 4.3	11:10
TIDE	11.5	V2 14.3	14.3	#2 11.3	11:20
DWO	13.0	V3 13.5	13.5	#3 12.32	12:50

(OVER)

5: SLOPES & OFFSETS

Levels				Gates							
Logger				Logger				T.I.			
	Slope (05)		Offset (06)		Slope (05)		Offset (06)		Gain	LDC	Offset
Trunk	.03432	(02)	-29.5	DWO	.02425	(05)	-7.2281	40	28	39	1165
Tide	.03328	(03)	-34.00	SWO1	.02246	(06)	-9.8947	42	30	41	1715
DWO	.03345	(04)	-34.11	SWO2	N/A	(07)	N/A	55	N/A	54	N/A

6: FUNCTIONAL CHECKS

High Trunk Circuit	Operational ✓	Inoperative ____
D.C. Motor Backup System	Operational ✓	Inoperative ____
U.P.S. Backup System	Operational ✓	Inoperative ____
Tide Gate(s) Leaking	No ✓	Yes ____
Battery Charger Current	10 Amps.	

7: FINAL CHECK LIST

1. Check HYDROLIC & BATTERY FLUID LEVELS & COLORATION. Note any discrepancies in COMMENTS.
2. Inspect CHAMBER (Lights burnt out, anything worn, broken, not working, etc, etc..). Note discrepancies in COMMENTS.
3. Return ALL GATES to AUTOMATIC & REARM VERBATIM.
4. Turn off CHAMBER LIGHTS & BLOWER as you leave CHAMBER.
5. Secure ALL MANHOLE COVERS & CHAMBER DOORS. (Remember to remove Magnet)

COMMENTS

Swo close Lite out

5: SLOPES & OFFSETS

Levels

Logger

	Slope (05)		Offset (06)
Trunk	.03432	(02)	-29.5
Tide	.03328	(03)	-34.00
DWO	.03345	(04)	-34.11

Gates

Logger

	Slope (05)		Offset (06)
DWO	.02425	(05)	-7.2281
SWO1	.02246	(06)	-9.8947
SWO2	N/A	(07)	N/A

T.I.

Gain LDC		Offset	
40	28	39	1165
42	30	41	1715
55	N/A	54	N/A

6: FUNCTIONAL CHECKS

High Trunk Circuit	Operational ✓	Inoperative ____
D.C. Motor Backup System	Operational ✓	Inoperative ____
U.P.S. Backup System	Operational ✓	Inoperative ____
Tide Gate(s) Leaking	No ✓	Yes ____
Battery Charger Current	10 Amps.	

7: FINAL CHECK LIST

1. Check HYDROLIC & BATTERY FLUID LEVELS & COLORATION. Note any discrepancies in COMMENTS.
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5. Secure ALL MANHOLE COVERS & CHAMBER DOORS. (Remember to remove Magnet)

COMMENTS

Swo close Lite out

PHILADELPHIA WATER DEPARTMENT
FLOW CONTROL
DATA ACQUISITION

CONTROL CHAMBER
GATE CAL. PROCEDURE
REVISION 06/27/95

Site: D-2 Date: 9-11-95

I C-6

EQUIPMENT REQUIRED...

1. A quired safety equipment for confined space entry
3. Gate Cal. Work Sheets & calculator

. C.P.U. with apporiate Soft Ware & connecting cables

===

SET UP ...

1. Open CONTROL CHAMBER, Defeat Intruder Alarm Switch with A Magnet, turn on LIGHTS & BLOWER and Vent for at least 5 Min.
2. Disarm VERBATIM and put ALL GATES in MANUAL
3. Connect C.P.U. to bottom connector of T.I. Controller card with interconnecting cable
4. Turn C.P.U. on
5. Select '**C. T.I. Chambers**'
6. Let T.I. program Load

GET DATA...

1. Press '**F-7**' (PGMS)
2. Using '**ARROW KEYS**' Highlite Site you are Calibrating & press '**RETURN**' key
3. Press '**F-4**' (ON LINE)
4. Press '**F-8**' (CHARTS)
5. Press '**F-7**' (SHO CHARTS)
6. Using '**ARROW KEYS**' Highlite 'GATE CAL' & press '**RETURN**' key
7. Fully open & close gates and record the WX4,WX5,WX6(3 Gate Site) readings in the GET DATA section of the Work Sheet
8. Return gates to their normal positions, DWO OPEN & SWO(s) CLOSED

MATH...

Do math using work sheet to find gain & offset for all gates

UPDATE MEMORY LOCATIONS...

1. Press '**F-1**' (EXIT)
2. Press '**F-3**' (FIND)
3. Type '**LDC 40**' & Press '**RETURN**' key
4. Using '**ARROW KEYS**' move CURSER to top left hand side of Box LDC 40
5. Press '**F-2**' (EDIT)
6. Press '**F-6**' (BOX)
7. Using '**ARROW KEYS**' move Highlite to 'N='
8. Typy in calculated value from Work Sheet & Press '**ENTER**' key
9. Press '**F-8**' (ENTER)
10. Press '**F-2**' (YES)
11. Go to Step 1 & Repeat using LDC 39,42,41 (55 & 54 if 3 gate system) & inserting the calculated values

Over

VERIFY...

1. Press 'F-1' (EXIT)
2. Press 'F-8' (CHART)
3. Verify by opening & closing the gates & recording the full open & full close values of V 10,11 & 12 (if 3 gate system)

	DWO (V10)	SWO1 (V11)	SWO2 (V12)
OPEN	96.1	96.8	N/A
CLOSE	3.9	5.4	N/A

SAVING NEW VALUES...

1. Press 'F-1' (EXIT)
2. Press 'F-6' (AUX)
3. Using 'ARROW KEYS' move highliter to 'SAVE PLC'
4. Type '60' (SAVE ALL) & Press 'RETURN' key
5. Wait for process to complete

FINAL...

1. 'F-1' your way out of the T.I. program
2. Remove cable from Controller Card
3. Turn off C.P.U. & PACK IT UP
4. Return all Gates to Automatic & Rearm VERBATIM
5. Turn off Lights & Blower as you leave the Chamber
6. Secure all Manhole Covers & Chamber Door before leaving (Remember to remove Magnet)

COMMENTS

____

____

____

____

____

VERIFY...

1. Press 'F-1' (EXIT)
2. Press 'F-8' (CHART)
3. Verify by opening & closing the gates & recording the full open & full close values of V 10,11 & 12 (if 3 gate system)

	DWO (V10)	SWO1 (V11)	SWO2 (V12)
OPEN	96.1	96.8	N/A
CLOSE	3.9	5.4	N/A

SAVING NEW VALUES...

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4. Return all Gates to Automatic & Rearm VERBATIM
5. Turn off Lights & Blower as you leave the Chamber
6. Secure all Manhole Covers & Chamber Door before leaving (Remember to remove Magnet)

COMMENTS

FLOW CONTROL INSTRUMENT / ELECTRONIC DAILY WORK REPORT	NAMES:	YY-MM-DD	SUPERVISOR:
	BEURY	94.08.16	ADAMS

SITE ID	GROUP	START	A/P	FINISH	A/P	PAY	EMPLOYEE NUMBER	UNIT	SUB UNIT	PART	JOB	TYPE	STATUS
S40P	FE	0700	A	0900	A	R	208117				.	CO	C
COMMENTS: Call sites.													
T1	FE	0900	A	1000	A	R	214805 / 208117	RM	LM	CB	RU	CM	C
COMMENTS:													
P5	FE	1000	A	1100	A	R	"	DL	00	BA	RU	CM	C
COMMENTS:													
D4	FE	1100	A	1200	P	R	"	RM	LM	CB	RU	CM	C
COMMENTS:													
S40P	FE	1230	P	0330	P	R	208117	00	00	00	00	00	1C
COMMENTS: Port [illegible] to Toshiba. Attempt to get it running with DOS 6.0													

IC-7

I C-8

FLOW CONTROL INSTRUMENT MAINTENANCE

DATABASE ENTRY LISTING

DATE	SITE_ID	GROUP	START	FINISH	PAY	EMP_NO
YY-MM-DD	OTHR	FE =fox electronic rep	HH:MM A/P	HH:MM A/P	C =call in	158424
	SHOP	FI = fox instrumentation			L =leave	
	A01				O =overtime	
	C01				R =regular	
	C02					
	C04					
	C04A					
	C05					
	C06					
	C07					
	C09					
	C10					
	C11					
	C12					

UNIT	SUB_UNIT	PART	JOB	TYPE	STAT
AM =all monitors	AL =alarm circuit	BA =batteries	AJ =adjust	CA =calibration	C =completed
BA =batteries	BB =bubbler system	BB =bubbler system	AL =align	CD =collect data	IC =incomplete
BB =bubbler system	BC =battery charger	BC =battery charger	AS =assemble	CM =corrective maint.	
BC =battery charger	CA =camera	BR =breaker	CA =calibrate	PM =prevent. maint.	
BU =building	CP =camera peripherals	CA =case	CC =change		
CB =chatterbox	DH =dehumidifiers	CB =circuit board	CD =collect data		
CM =collector monitor	DL =data line	CD =conduit	CL =clean		
CR =control room	EC =electronic controls	CH =chart	CN =connect		
CS =comp. control sys	EH =elec. heat	CN =contactor	CO =change oil		
CT =camera truck	FM =flow monitor	FU =fuse	DA =disassemble		
DL =data logger	LI =lighting	GE =gauge	DC =disconnect		
EC =electronic controls	LM =level monitor	GL =gland	DR =drain		
GM =gas meter	MO =motor	LE =leads	DS =deliver supplies		
HS =hydraulic system	MV =misc. valves	LI =linkage	HP =hold for part		
MC =metering chamber	OE =other electric	LS =limit switch	IN =install		
MO =modem	OI =other instrument	MO =motor	IS =inspect		
OE =other electronic	OO =other	OE =other elect.	LU =lubricate		
OI =other instrument	PI = piping	OI =other inst.	OE =other electronic work		
OM =outfall monitor	PT =pressure transducer	OM =other mech.	OI =other instrument work		
OO =other	PU =pump	ON =only	ON =only		
RG =rain gauge	SP =sump pump	OO =other	OO =other		
RM =regulator monitor	TL =telephone line	OP =operator	OP =operate		
TE =temporary monitor	UT =ultrasonic transduce	PI =piping	PA =paint		
TM =trunk monitor	VE =ventilator (blowers)	PR =probe	PO =pump out		
UP =ups system		RE =relay	PR =program		
VM =verbatum monitor		SH =shaft	RB =replace bulb		
		SN =sensor	RE =remove		
		SW =switch	RL =repair leak		
		WI =wire	RN =replace w/ new part		
			RP =repair		
			RS =reset		
			RU =replace w/ used part		
			RV =remote verification		
			TC =tighten connection		
			TR =take readings		
			TS =troubleshoot		
			TV =test voltage		

Sewer Maintenance SEWER Ticket

Location: REQUIRED COMPLAINT #: [-] CREW#: [ ]

Complaint: ____________________

DATE WRITTEN: ________ TIME: ______

Complainant: ____________ Cust. Info #: ____________ District: ______

Comments:

Crew Chief II Comments:

Actions Taken: (Circle those that apply)

AB	Adjust Street - Manhole	BC	Examine Sewer - Internal	CG	Relieve Inlet Pipe
DL	Backfill	BE	Examine Vent/Trap	CH	Relieve Lateral
AF	Bait Sewer	BF	Excavate	CN	Repair Curb Trap
AG	Bucket Sewer	BG	Fire Stand-by	CP	Repair Fresh Air Inlet
AJ	Clean Inlet - Manual	BH	Flush Sewer/Lateral	DB	Repair Inlet Pipe
AK	Clean Manhole	BI	Inspect - Post Construction	CT	Repair Lateral
AL	Clean Manhole - Manual	BK	Inspect Special Structure	CU	Repair Manhole
AN	Construct Sewer	BO	Locate Lateral	DM	Repair Sewer
AP	Dye-test	BP	Locate Manhole	CZ	Replace Manhole Cover
AQ	Evaluate Job	BT	Pick up Dirt	DA	Replace Manhole Frame
AR	Examine Branch	BU	Police Search	DE	Reset Manhole Frame
AS	Examine Main	BV	Pump Basement	DF	SRE - Branch
AT	Examine - TV	BW	Pump Concrete/grout	DG	SRE - Main
AW	Examine Inlet	BY	Raise/Lower Manhole Frame	DI	Smoke Test
AY	Examine Lateral	CB	Reconstruct Manhole	DJ	String Cable
AZ	Examine Lateral - TV	CC	Reconstruct Sewer	ZZ	Other:
BA	Examine Manhole	CE	Relieve Choked Sewer		

If no action, circle reason:

- A Location not found
- B Location OK, no facility found
- C No problem with facility found
- D Problem referred to others to solve
- Z Other:

Time on Site:	Day 1	Day 2	Day 3	Day 4
Dates:	/	/	/	/
Time arrvd:				
Time left:				

Excavation: ______' x ______' x ______'
length x width x depth

Length of Activity: ______ feet

Sign Ticket when complete: Crew Ch I: Crew Ch II:

1 of 2

I D-1

Referrals: (Circle as required):

Within Sewer Maint:

AB	Bucket	AL	Dye test, from lateral	AZ	Pavement Adjust - inlet	BQ	Rodents
AD	Clean DR/W	AM	Exam - TV	BB	Pick up dirt	BG	S & L
AF	Clean Manhole	BR	Exam - Inlet	BC	Remove debris - bridge	BH	SRE - branch
AG	Concrete in Inlet	AN	Excavation	BS	Repair walls - Inlet	BI	SRE - main
AH	Cracked Footway - inlet	AQ	Flusher	BD	Reset/Repair inlet	BJ	Smoke test
AI	Depression - Highway	AS	Inlet Reconst by SM	BE	Reset/Repair Manhole	BP	Vactor
AK	Dye test, from curb trap	AY	Pavement Adj - MH	BF	Rodder		

To Inlet Cleaning:

AE	Clean Inlet	BK	Takes water slowly	BL	Won't take water

To Others:

AA	Bell Manhole	AP	FAI full of debris	AU	Lateral Drop Slant	BA	Permit Required
AC	Choked curb trap	AR	Identify Manhole	AV	Locate facilities	BU	Sewer Recon - Design
AJ	Distribution Manhole	BT	Inlet Recon - Design	AW	PECO Manhole	ZZ	Other:
AO	FAI feeding dirt	AT	Internal Plumbing	AX	PGW Manhole		

If Referral already given to new crew, place that crew number next to code.

Referral Comments:

2 of 2

Materials: (circle codes used AND indicate count and size)

		ct	sz			ct	sz			ct	sz
AA	Angle Bend	[ ]	[ ]	AK	Inlet Grate	[ ]	[ ]	AV	Nose Plate	[ ]	
AB	Angle Iron	[ ]		AL	Inlet Trap - Alum.	[ ]		AW	Octoplug (buckets)	[ ]	
AC	Bricks	[ ]		AM	Inlet Trap - C.I.	[ ]		AX	Pipe, corrug, strt	[ ]	[ ]
AD	Cement (bags)	[ ]		AN	Inlet Trap - Plast	[ ]		AY	Pipe, TC, strt	[ ]	[ ]
AE	Concrete (yards)	[ ]		AO	Inlet Box, precast	[ ]	[ ]	AZ	Pipe, conc., strt	[ ]	[ ]
AF	Concrete Slab	[ ]	[ ]	AP	Ladder bars	[ ]		BA	Sand (shovels)	[ ]	
AG	Curb trap	[ ]	[ ]	AR	Manhole Frame	[ ]		BB	Y-connection	[ ]	[ ]
AH	Dripstone	[ ]		AS	Manhole cover, San	[ ]		BC	Z-bar	[ ]	
AI	Gravel (shovels)	[ ]		AT	Manhole cover, Stm	[ ]		ZZ	Other (use comments)		
AJ	Inlet Frame	[ ]	[ ]	AU	Manhole, precast	[ ]					

Lumber: [ ] ___ x ___ [ ] ___ x ___ [ ] ___ x ___

Exam Results:

Size: Cond: Crown: Sides: Invert: Joints: MH: Debris: Inlets:

Distances Roadway: Curb: Ftwy:

Additional Job Comments: (use Crew Chief I Comment area on other side first)

ID-1

E-1

Sewer Maintenance INLET Ticket

Location: N.W.C. N 4TH ST AND W NORRIS ST, VBF   Plat: 42   Complaint # 6-3588 Crew: 639
Inlet # 78023
Ticket Printed 95/ 7/26

Complaint: INLET FLOODING by INLET CLEANING 95/01/25 9:48A, Initial Ticket for Complaint
WTW

** REPRINT # 1
District: 3

Inlet Type: B - #4 GRATE

Comments: Crew Chief I
Comments:

Actions Taken: (Circle those that apply)

AA	Adjust Street - Inlet	BG	Fire Stand-by	CL	Remove Frame/Slab
AC	Adjust/Feather Footway	BI	Inspect - Post Construction	CM	Remove Snow/Ice
DL	Backfill	BK	Inspect Special Structure	CO	Repair Footway/Blocks
AE	Bait Inlet	BL	Install Inlet, type: ________	CR	Repair Inlet Pipe
AH	Clean Grate	BM	Install Noseplate	CS	Repair Inlet Wall
AI	Clean Inlet	BN	Install Z-bar	CW	Repair Trap Wall
AP	Dye-test	BR	Modify Inlet	CX	Replace Frame
AQ	Evaluate Job	BU	Police Search	CY	Replace Grate
AU	Examine Box and Trap	BX	Pumping	DB	Replace Slab
AW	Examine Inlet	BZ	Reconstruct Inlet Pipe	DC	Replace/Reset Dripstone
AX	Examine Inlet Pipe - TV	CA	Reconstruct Inlet, Type: ________	DD	Reset Frame/Slab
BB	Examine Pipe - Internal	CD	Relieve Choked Pipe	DH	Seal/Close Trap Door
BD	Examine Surface	CF	Relieve Inlet	DK	Water-check
BF	Excavate	CJ	Remove Concrete	ZZ	Other:

1 of 2

If no action, circle reason:
A Location not found
B Location OK, no inlet found
C No problem with inlet found
D Problem referred to others to solve
Z Other:

Time on Site:	Day 1	Day 2	Day 3	Day 4
Dates:	/	/	/	/
Time arrvd:				
Time left:				

Excavation:

_____' x _____' x _____'
length width depth

Sign Ticket when complete: Crew Ch I: Crew Ch II:

E-1

Referrals: (Circle as required):

Within Sewer Maint:

AB	Bucket	AL	Dye test, from lateral	AZ	Pavement Adjust - inlet	BQ	Rodents
AD	Clean DR/W	AM	Exam - TV	BB	Pick up dirt	BG	S & L
AF	Clean Manhole	BR	Exam - Inlet	BC	Remove debris - bridge	BH	SRE - branch
AG	Concrete in Inlet	AN	Excavation	BS	Repair walls - Inlet	BI	SRE - main
AH	Cracked Footway - inlet	AQ	Flusher	BD	Reset/Repair inlet	BJ	Smoke test
AI	Depression - Highway	AS	Inlet Reconst by SM	BE	Reset/Repair Manhole	BP	Vactor
AK	Dye test, from curb trap	AY	Pavement Adj - MH	BF	Rodder		

To Inlet Cleaning:

AE	Clean Inlet	BK	Takes water slowly	BL	Won't take water

To Others:

AA	Bell Manhole	AP	FAI full of debris	AU	Lateral Drop Slant	BA	Permit Required
AC	Choked curb trap	AR	Identify Manhole	AV	Locate facilities	BU	Sewer Recon - Design
AJ	Distribution Manhole	BT	Inlet Recon - Design	AW	PECO Manhole	ZZ	Other:
AO	FAI feeding dirt	AT	Internal Plumbing	AX	PGW Manhole		

If Referral already given to new crew, place that crew number next to code.

2 of 2

Referral Comments:

Materials: (circle codes used AND indicate count and size)

		ct	sz			ct	sz			ct	sz
AA	Angle Bend	[ ]	[ ]	AK	Inlet Grate	[ ]	[ ]	AV	Nose Plate	[ ]	
AB	Angle Iron	[ ]		AL	Inlet Trap - Alum.	[ ]		AW	Octoplug (buckets)	[ ]	
AC	Bricks	[ ]		AM	Inlet Trap - C.I.	[ ]		AX	Pipe, corrug, strt	[ ]	[ ]
AD	Cement (bags)	[ ]		AN	Inlet Trap - Plast	[ ]		AY	Pipe, TC, strt	[ ]	[ ]
AE	Concrete (yards)	[ ]		AO	Inlet Box, precast	[ ]	[ ]	AZ	Pipe, conc., strt	[ ]	[ ]
AF	Concrete Slab	[ ]	[ ]	AP	Ladder bars	[ ]		BA	Sand (shovels)	[ ]	
AG	Curb trap	[ ]	[ ]	AR	Manhole Frame	[ ]		BB	Y-connection	[ ]	[ ]
AH	Dripstone	[ ]		AS	Manhole cover, San	[ ]		BC	Z-bar	[ ]	
AI	Gravel (shovels)	[ ]		AT	Manhole cover, Stm	[ ]		ZZ	Other (use comments)		
AJ	Inlet Frame	[ ]	[ ]	AU	Manhole, precast	[ ]					

Lumber: [ ] ___ x ___ [ ] ___ x ___ [ ] ___ x ___

Exam Results:

Size: Cond: Crown: Sides: Invert: Joints: MH: Debris: Inlets:

Distances Roadway: Curb: Ftwy:

Additional Job Comments: (use Crew Chief I Comment area on other side first)

IE-I

Appendix A-2 (continued)

Summary of Field Report Forms & Managerial Reports

II. Managerial Reports:

A. Flow Control Unit, CSO Maintenance Group
1. CSO Monthly Inspection\Discharge\PM Report
2. Regulating chamber Monthly Inspection Totals
3. CSO Inspections 1989 to 1995 Totals
4. Annual Report Blockages\Inspection Trend Report
5. Collector System CSO Alterations Record
6. Monthly CSO Status Report *

B. Flow Control Unit, Pumping Station Maintenance Group
1. Dry Weather Discharge Report (Pumping Stations)
2. Station Outage & Dry weather Discharge Record
3. Pump Station Control Level Settings
4. Monthly Pump Run Time Readings
5. Year-To-Date Run Time Report
6. Main Pump Flow Capacity Test Report
7. Pump Performance Report
8. Monthly Flow Report
9. Record of Pump Performance Test
10. Main Pump Unit Out of Service Hours
11. Main Pump Availability History Report
12. Wastewater Pumping Fiscal Year Overhaul Schedule
13. Flow Control Database (Pump Station Maintenance)

C. Flow Control Unit, CSO Instrumentation Group
1. Temporary Site Meter Request
2. Temporary Level/Flow Monitor Site Record
3. Flow Control Database (CSO Instrumentation)

D. Sewer Maintenance Unit
1. Sewer Maintenance Work Order Ticket (SMOIS)

E. Inlet Cleaning Unit
1. Inlet Maintenance Work Order Ticket (SMOIS)

*Note: Due to its length, a copy of this report is not included in this appendix. Copies are submitted monthly to PA-DEP and US-EPA Region III.

II A-1

FY95 CSO MONTHLY INSPECTION / DISCHARGE / PM REPORT NORTH DISTRICT FOR : JUNE 95 ~~05/06/95~~

SITE	REG PM DATE	TG PM DATE	NUMBER INSPECTIONS	NUMBER BLOCKS
	UPPER PENNYPACK			
P01			5	
P02			5	
P03			4	
P04			3	
P05			4	
	UPPER DELAWARE LOW LEVEL			
D02			7	
D03			7	
D04	03/15/95		8	
D05			7	
D06			4	
D07			6	
D08			2	
D09			2	
D11			7	
D12			3	
D13			2	
D15			3	
	LOWER FRANKFORD CREEK			
F13	03/13/95		5	
F14			5	
F21			4	
		6-13-95	7	
		6-13-95	6	
F25			4	
	LOWER FRANKFORD LOW LEVEL			
F03			7	
F04			7	
F05			7	
F06			9	
F07			9	
F08			10	
F09			10	
F10			11	
F11			5	
F12			4	
	FRANKFORD HIGH LEVEL			
T01			6	
T03			5	
T04			5	
T05			6	
T06			9	
T07			4	
T08			6	
T09			6	
T10			11	2
			9	
			9	
T13			9	
T14			9	
T15			9	

SITE ID	REG PM DATE	TG PM DATE	NO. INSP.	NO. BLOCKS
	SOMERSET LOW LEVEL			
D17		11/05/94	6	
D18	12/14/94		6	
D19	03/08/95		6	
D20	02/27/95	02/27/95	7	
D21	03/15/95		5	
D22		11/19/94	6	
D23			5	
D24		10/24/94	7	
D25	06/06/94	05/17/95	7	
	LOWER DELAWARE LOW LEVEL			
D37	10/07/94	6-6-95	11	
D38	02/27/95	02/27/95	6	
D39	05/08/95	05/08/95	8	
D40		05/08/95	6	
D41	04/06/95		7	
D42			7	
D43			7	
D44	03/15/95		7	
D45			9	
D46			7	
D47	04/06/95		7	
D48	04/07/95		7	
D49			8	
D50	03/13/95		9	
D51			7	1
D52	04/07/95		7	
D53			6	
D54			5	
D58	03/14/95		6	
D61			7	
D62	03/16/95	03/16/95	7	
D63	11/19/94		6	
D64			4	
D65			4	
D66			6	
D67			4	
D68	05/09/95		7	
D69	01/21/95		3	
D70	6-9-95		7	
D71			5	
D72			3	
D73			3	

	REG PM	TG PM
UNITS	39	3 62
TOTAL	21	9
TO GO	18	53
AVER	1.5	0.6

FY95 CSO MONTHLY INSPECTION / DISCHARGE / PM REPORT **SOUTH DISTRICT** **FOR :** ~~06/05/95~~ June 95

SITE	REG PM DATE	TG PM DATE	NUMBER INSPECTIONS	NUMBER BLOCKS
	CENTRAL SCHUYLKILL EAST SIDE			
S05	06/20/94	06/30/94	4	
S06	06/21/94		5	
S07		12/20/94	5	
S08	08/24/94	08/24/94	5	
S09	10/06/94	05/03/95	5	
S10			5	
S12			5	
S12A			5	
S13			5	
S15	01/17/95	01/17/95	5	
S16	06/09/94	12/30/94	5	
S17			5	
S18	11/04/94		6	
S19	01/21/95	01/27/95	5	
S21			5	
S23	6-20-95		6	
S25	01/28/95		5	
S26	01/27/95	04/17/95	4	
	LOWER SCHUYLKILL EAST SIDE			
S31	03/16/95	03/23/95	5	
S35			5	
S36			5	
S36A	01/25/95		5	
	6-20-95		6	
	6-20-95		7	
S42A		07/11/94	6	
S44	6-20-95		6	
S46	04/11/95	05/04/95	4	
	CENTRAL SCHUYLKILL WEST			
S01	10/15/94		6	
S02	10/15/94	08/06/94	6	
S03			6	
S04	11/04/94	05/03/95	6	
S11			5	
S14	08/26/94	05/04/95	5	
S20	12/22/94		5	
S22	09/21/94	09/21/94	7	
S24	09/21/94	10/05/94	7	
	SOUTHWEST MAIN GRAVITY			
S27			6	
S28			6	
S30			7	
S34	06/02/94		8	1
S39			7	
S40			7	
S43	11/12/94		9	1
S47	05/09/95		9	
S50	04/26/95	6-20-95	12	
			8	
	LOWER SCHUYLKILL WEST SIDE			
S32		12/20/94	8	
S33	10/06/94	09/13/94	8	
S38	10/06/94	03/22/95	8	
S45	06/18/94	06/13/94	8	

SITE ID	REG PM DATE	TG PM DATE	NUMBER INSPECTIONS	NUMBER BLOCKS
	COBBS CREEK HIGH LEVEL			
C01			0	
C02			0	
C04			1	
C04A			1	
C05			4	
C06			0	
C07			0	
C09			1	
C10			0	
C11			0	
C12			1	
C13			1	1
C14			2	
C15			2	
C16			2	
C17			2	
C31			3	1
C32			2	
C33			1	
C34			2	
C35			2	
C36			5	
C37			1	
	COBBS CREEK LOW LEVEL			
C18			2	
C19			4	
C20			4	1
C21			3	
C22			3	
C23			6	1
C24			3	
C25			4	
C26			3	1
C27			3	1
C28A			3	
C29			3	
C30			3	

	REG PM	TG PM
UNITS	4 35	1 27
TOTAL	27	20
TO GO	8	7
AVER	1.9	1.4

FY95 RELIEF CHAMBER MONTHLY INSPECTION / DISCHARGE REPORT

June 95

SITE	NUMBER INSPECTIONS	NUMBER BLOCKS	SITE	NUMBER INSPECTIONS	NUMBER BLOCKS
	THOMAS RUN RELIEF SEWER			OREGON AVE RELIEF SEWER	
R1	1		R16	1	
R2	1		R17	1	
R3	1			FRANKFORD HIGH LEVEL RELIEF SEWER	
R4	1		R18	1	
R5	1			32ND ST RELIEF SEWER	
R6	1		R19	1	
	MAIN RELIEF SEWER			MAIN STREET RELIEF SEWER	
R7	1		R20	1	
R8	1			SOMERSET SYSTEM DIVERSION CHAMBER	
R9	1		R21	1	
R10	1			TEMPORARY REGULATOR CHAMBER	
R11	1		R22	1	
R12	1		R23	1	
	WAKLING RELIEF SEWER			ARCH ST RELIEF SEWER	
R13	1		R24	1	
R14	1			GRANT & STATE RD.	
	ROCK RUN STORM FLOOD RELIEF SEWER		R26	1	
R15	1		TOTALS	31	

PHILADELPHIA WATER DEPARTMENT
WASTE AND STORM WATER COLLECTION
FLOW CONTROL UNIT

PRECIPITATION ON THE FOLLOWING DATES:

1	9	17	25 .04
2 .11	10	18	26 .25
3 .07	11 .01	19	27 .02
4	12 .24	20 .01	28
5	13 .01	21	29
6	14 .11	22	30
7 .03	15	23 .15	31
8	16	24 .07	

TOTAL 1.12 INCHES (includes traces)

FORM CSO_MONT.6/20/95

FY95 REGULATING CHAMBER MONTHLY INSPECTION TOTALS

NEWPC & SEWPC PLANT REGULATORS

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
UPPER PENNYPACK								5 UNITS							
TOTAL	30	38	19	15	35	24	14	10	29	22	32	21	289	4.8	6.3
P01	6	8	3	3	7	5	3	2	7	5	6	5	60	5.0	6.1
P02	6	8	3	3	7	4	2	2	4	5	6	5	55	4.6	6.6
P03	6	8	5	3	7	5	3	2	5	4	6	4	58	4.8	6.3
P04	6	7	3	3	7	4	2	1	7	4	6	3	53	4.4	6.9
P05	6	7	5	3	7	6	4	3	6	4	8	4	63	5.3	5.8
UPPER DELAWARE LOW LEVEL								12 UNITS							
TOTAL	63	64	34	38	73	54	47	46	47	29	80	53	628	4.4	7.3
D02	4	5	3	5	7	6	5	4	5	5	7	7	63	5.3	5.8
D03	8	7	3	5	8	5	6	3	6	3	9	7	70	5.8	5.2
D04	10	8	3	6	6	5	5	4	7	2	10	8	74	6.2	4.9
D05	9	5	2	5	6	5	5	4	6	2	6	7	62	5.2	5.9
D06	6	6	2	2	6	5	4	2	5	2	7	4	51	4.3	7.2
D07	7	5	2	2	5	4	4	7	2	2	7	6	53	4.4	6.9
D08	5	5	2	3	6	4	4	3	3	3	9	2	49	4.1	7.4
D09	4	4	2	2	7	4	4	3	3	2	5	2	42	3.5	8.7
D11	4	5	3	2	5	4	4	4	2	2	6	2	43	3.6	8.5
D12	2	4	4	3	8	4	2	5	3	2	5	3	45	3.8	8.1
D13	2	3	4	2	3	3	2	3	2	2	6	2	34	2.8	10.7
D15	2	7	4	1	6	5	2	4	3	2	3	3	42	3.5	8.7
LOWER FRANKFORD CREEK								6 UNITS							
TOTAL	12	21	24	20	31	15	15	22	18	10	31	31	250	3.5	9.0
F13	4	4	5	3	5	3	3	3	4	2	5	5	46	3.8	7.9
F14	1	3	4	4	5	2	3	3	2	2	5	5	39	3.3	9.4
F21	1	3	3	3	5	2	3	3	1	1	5	4	34	2.8	10.7
F23	4	5	4	4	4	3	2	5	7	2	7	7	54	4.5	6.8
F24	1	3	4	3	4	3	2	5	3	2	5	6	41	3.4	8.9
F25	1	3	4	3	8	2	2	3	1	1	4	4	36	3.0	10.1
LOWER FRANKFORD LOW LEVEL								10 UNITS							
TOTAL	29	47	37	32	44	26	42	29	20	27	53	79	465	3.9	7.9
F03	2	6	4	3	6	2	3	3	1	3	5	7	45	3.8	8.1
F04	2	4	4	3	4	2	3	3	0	3	5	7	40	3.3	9.1
F05	2	4	3	3	4	2	5	7	1	3	5	7	46	3.8	7.9
F06	2	4	3	3	4	3	6	4	2	3	6	9	49	4.1	7.4
F07	2	4	3	3	4	3	4	5	3	2	5	9	47	3.9	7.8
F08	2	6	3	3	4	2	4	1	1	2	5	10	43	3.6	8.5
F09	6	6	4	3	5	3	5	1	5	3	7	10	58	4.8	6.3
F10	5	4	4	3	5	3	4	1	2	3	5	11	50	4.2	7.3
F11	0	4	5	3	4	3	5	1	2	2	4	5	38	3.2	9.6
F12	6	5	4	5	4	3	3	3	3	3	6	4	49	4.1	7.4
FRANKFORD HIGH LEVEL								14 UNITS							
TOTAL	35	69	59	44	82	56	51	50	42	26	86	103	703	4.2	7.5
T01	0	4	4	5	4	3	3	4	3	3	6	6	45	3.8	8.1
T03	1	6	4	3	5	5	4	4	4	3	6	5	50	4.2	7.3
T04	3	6	4	3	5	5	5	5	4	2	6	5	53	4.4	6.9
T05	3	6	4	2	5	5	4	4	2	3	5	6	49	4.1	7.4
T06	2	6	3	4	5	5	4	4	3	1	6	9	52	4.3	7.0
T07	1	6	3	3	5	5	4	4	2	1	5	4	43	3.6	8.5
T08	3	5	4	3	6	4	4	4	4	1	6	6	50	4.2	7.3
T09	4	5	3	3	6	5	4	3	2	1	6	6	48	4.0	7.6
T10	8	8	7	6	8	5	5	5	2	4	11	11	80	6.7	4.6
T11	4	6	4	4	7	4	3	3	2	2	7	9	55	4.6	6.6
T12	1	3	4	2	7	3	3	3	6	1	6	9	48	4.0	7.6
T13	3	3	5	4	6	2	2	3	3	2	6	9	48	4.0	7.6
T14	1	2	5	1	7	2	2	2	3	1	5	9	40	3.3	9.1
T15	1	3	5	1	6	3	4	2	2	1	5	9	42	3.5	8.7

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
SOMERSET LOW LEVEL									9 UNITS						
TOTAL	39	34	40	29	52	34	30	32	38	19	33	55	435	4.0	7.7
D17	5	4	6	5	7	3	3	3	6	4	4	6	56	4.7	6.5
D18	4	4	5	4	6	3	3	3	5	3	4	6	50	4.2	7.3
D19	4	4	5	3	6	4	3	3	6	2	4	6	50	4.2	7.3
D20	4	4	5	3	8	5	3	6	4	1	3	7	53	4.4	6.9
D21	4	3	5	4	4	4	3	5	6	1	4	5	48	4.0	7.6
D22	4	3	3	2	4	4	3	3	5	1	3	6	41	3.4	8.9
D23	4	3	4	2	4	4	3	3	2	1	3	5	38	3.2	9.6
D24	3	3	3	2	4	4	3	3	2	2	4	7	40	3.3	9.1
D25	7	6	4	4	9	3	6	3	2	4	4	7	59	4.9	6.2
LOWER DELAWARE LOW LEVEL									32 UNITS						
TOTAL	89	117	91	100	185	146	92	95	104	110	161	203	1493	3.9	8.2
D37	7	7	3	7	5	6	5	5	4	5	8	11	73	6.1	5.0
D38	5	4	3	5	5	5	4	6	4	5	5	6	57	4.8	6.4
D39	11	12	14	8	7	4	4	6	5	5	8	8	92	7.7	4.0
D40	4	4	3	3	6	5	4	5	4	5	7	6	56	4.7	6.5
D41	3	3	5	3	5	5	4	3	4	5	5	7	52	4.3	7.0
D42	4	3	4	3	5	5	3	3	5	5	5	7	52	4.3	7.0
D43	4	3	4	3	5	5	3	3	5	5	5	7	52	4.3	7.0
D44	4	3	5	3	5	5	4	3	5	4	5	7	53	4.4	6.9
D45	3	4	3	4	6	5	10	5	6	7	6	9	68	5.7	5.4
D46	3	3	3	3	6	5	1	2	4	3	5	7	45	3.8	8.1
D47	3	3	2	3	6	3	2	2	3	4	5	7	43	3.6	8.5
D48	3	3	2	3	6	3	2	2	2	3	5	7	41	3.4	8.9
D49	3	2	2	3	6	3	2	3	2	3	6	8	43	3.6	8.5
D50	2	2	2	3	6	4	2	2	3	3	6	9	44	3.7	8.3
D51	2	2	2	3	6	3	2	3	3	3	5	7	41	3.4	8.9
D52	2	2	2	3	6	4	2	2	1	3	5	7	39	3.3	9.4
D53	1	2	1	3	5	5	3	2	1	2	4	6	35	2.9	10.4
D54	1	2	1	3	6	5	2	1	1	2	5	5	34	2.8	10.7
D58	4	4	4	3	5	4	3	4	2	2	4	6	45	3.8	8.1
D61	2	4	2	3	5	4	3	4	1	3	5	7	43	3.6	8.5
D62	2	4	2	3	5	5	3	2	3	3	5	7	44	3.7	8.3
D63	2	3	2	3	8	4	3	2	3	3	4	6	43	3.6	8.5
D64	3	2	2	3	5	5	3	1	3	2	4	4	37	3.1	9.9
D65	2	2	2	2	6	7	2	2	3	3	4	4	39	3.3	9.4
D66	1	2	2	3	6	6	3	2	3	3	4	6	41	3.4	8.9
D67	1	3	2	3	6	4	2	2	3	3	4	4	37	3.1	9.9
D68	2	11	2	2	6	4	2	2	3	2	6	7	49	4.1	7.4
D69	1	3	2	2	6	4	3	2	3	2	4	3	35	2.9	10.4
D70	1	6	2	2	6	6	1	3	4	2	4	7	44	3.7	8.3
D71	1	3	2	1	7	4	2	3	3	5	5	5	41	3.4	8.9
D72	1	3	2	2	6	5	2	4	5	3	4	3	40	3.3	9.1
D73	1	3	2	2	6	4	1	4	3	2	4	3	35	2.9	10.4
TOTAL	297	390	304	278	502	355	291	284	298	243	476	545	4263		
I/D/C	3.3	4.3	3.3	3.0	5.5	3.9	3.2	3.1	3.3	2.7	5.2	6.0			

22 TOTAL DISCHARGES TO DATE

1.8 AVERAGE DISCHARGES PER MONTH

11.4 AVER. DAYS BEFORE RETURNING TO SITE

3.9 AVER. INSPECTIONS PER DAY PER CREW

I/D/C = INSPECTIONS PER DAY PER CREW DTR = DAYS TO RETURN TO SITE

FY95 **REGULATING CHAMBER YEARLY DISCHARGE TOTALS** **NEWPC & SEWPC PLANT REGULATORS**

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
UPPER PENNYPACK									**5 UNITS**				
TOTAL	0	0	0	0	0	0	0	0	0	0	1	0	1
P01													0
P02											1		1
P03													0
P04													0
P05													0
UPPER DELAWARE LOW LEVEL									**12 UNITS**				
TOTAL	1	0	0	0	2	0	0	0	0	0	1	0	4
D02											1		1
D03					2								2
D04													0
D05	1												1
D06													0
D07													0
D08													0
D09													0
D11													0
D12													0
D13													0
D15													0
LOWER FRANKFORD CREEK									**6 UNITS**				
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
F13													0
F14													0
F21													0
F23													0
F24													0
F25													0
LOWER FRANKFORD LOW LEVEL									**10 UNITS**				
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
F03													0
F04													0
F05													0
F06													0
F07													0
F08													0
F09													0
F10													0
F11													0
F12													0
FRANKFORD HIGH LEVEL									**14 UNITS**				
TOTAL	0	1	0	0	0	0	4	1	0	0	3	2	11
T01							1						1
T03													0
T04													0
T05													0
T06													0
T07													0
T08													0
T09													0
T10							1	1			3	2	7
T11							1						1
T12							1						1
T13		1											1
T14													0
T15													0

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
SOMERSET LOW LEVEL										**9 UNITS**			
TOTAL	0	0	0	0	0	0	0	1	0	0	1	0	2
D17													0
D18													0
D19													0
D20													0
D21								1			1		2
D22													0
D23													0
D24													0
D25													0
LOWER DELAWARE LOW LEVEL										**32 UNITS**			
TOTAL	0	1	0	0	0	0	2	0	0	0	0	1	4
D37													0
D38													0
D39													0
D40							1						1
D41													0
D42													0
D43													0
D44													0
D45							1						1
D46													0
D47													0
D48													0
D49													0
D50													0
D51												1	1
D52													0
D53													0
D54													0
D58		1											1
D61													0
D62													0
D63													0
D64													0
D65													0
D66													0
D67													0
D68													0
D69													0
D70													0
D71													0
D72													0
D73													0
TOTAL	1	2	0	0	2	0	6	2	0	0	6	3	22

NO OF UNITS IN DISTRICT BLOCKED	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
UP	0	0	0	0	0	0	0	0	0	0	1	0	1
UDLL	1	0	0	0	1	0	0	0	0	0	1	0	3
LFC	0	0	0	0	0	0	0	0	0	0	0	0	0
LFLL	0	0	0	0	0	0	0	0	0	0	0	0	0
FHL	0	1	0	0	0	0	4	1	0	0	1	1	8
SLL	0	0	0	0	0	0	0	1	0	0	1	0	2
LDLL	0	1	0	0	0	0	2	0	0	0	0	1	4

FY95 REGULATING CHAMBER MONTHLY INSPECTION TOTALS

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
CENTRAL SCHUYLKILL EAST SIDE									18 UNITS						
TOTAL	87	147	94	118	168	109	123	122	110	117	149	90	1434	6.6	4.6
S05	6	9	8	7	10	6	9	8	11	13	8	4	99	8.3	3.7
S06	6	9	7	7	10	5	8	7	7	7	8	5	86	7.2	4.2
S07	6	9	8	7	9	8	8	7	7	7	9	5	90	7.5	4.1
S08	6	8	6	7	9	7	8	6	7	6	8	5	83	6.9	4.4
S09	6	10	5	7	9	7	8	6	7	5	9	5	84	7.0	4.3
S10	5	7	4	7	8	7	8	7	7	6	8	5	79	6.6	4.6
S12	5	7	4	6	8	8	7	6	6	6	8	5	76	6.3	4.8
S12A	5	7	4	6	8	8	7	6	5	6	8	5	75	6.3	4.9
S13	4	6	4	7	7	7	5	5	5	6	8	5	69	5.8	5.3
S15	4	9	6	7	8	7	7	7	6	6	8	5	80	6.7	4.6
S16	4	8	6	7	8	7	6	7	5	6	8	5	77	6.4	4.7
S17	4	8	4	7	9	8	6	7	5	6	8	5	77	6.4	4.7
S18	4	8	5	7	11	5	6	8	5	7	9	6	81	6.8	4.5
S19	5	10	4	6	10	4	7	7	6	7	9	5	80	6.7	4.6
S21	5	7	4	6	11	4	5	7	6	6	8	5	74	6.2	4.9
S23	5	8	5	6	12	3	6	7	5	6	9	6	78	6.5	4.7
S25	4	8	5	6	11	4	6	7	5	6	8	5	75	6.3	4.9
S26	3	9	5	5	10	4	6	7	5	5	8	4	71	5.9	5.1
LOWER SCHUYLKILL EAST SIDE									9 UNITS						
TOTAL	40	64	40	45	61	46	52	55	59	60	60	49	631	5.8	5.2
S31	3	8	4	6	8	7	6	6	9	8	8	5	78	6.5	4.7
S35	4	7	4	6	8	6	6	7	6	7	7	5	73	6.1	5.0
S36	4	7	4	5	8	6	6	5	6	6	7	5	69	5.8	5.3
S36A	4	8	4	4	7	6	9	6	6	7	7	5	73	6.1	5.0
S37	4	6	4	4	5	3	5	6	6	7	6	6	62	5.2	5.9
S42	5	7	5	7	7	5	6	6	7	6	7	7	75	6.3	4.9
S42A	6	7	5	5	6	5	4	7	6	7	7	6	71	5.9	5.1
S44	4	7	5	2	6	3	5	6	6	6	5	6	61	5.1	6.0
S46	6	7	5	6	6	5	5	6	7	6	6	4	69	5.8	5.3
CENTRAL SCHUYLKILL WEST									9 UNITS						
TOTAL	54	45	63	62	67	40	63	41	70	60	63	53	681	6.3	4.9
S01	6	6	7	7	8	5	7	5	6	4	6	6	73	6.1	5.0
S02	6	6	7	6	6	4	7	4	7	4	5	6	68	5.7	5.4
S03	6	3	6	6	6	4	7	4	5	4	5	6	62	5.2	5.9
S04	6	3	7	8	7	4	7	3	7	8	8	6	74	6.2	4.9
S11	6	4	6	8	7	3	7	4	7	7	6	5	70	5.8	5.2
S14	6	5	8	8	10	5	7	5	8	9	8	5	84	7.0	4.3
S20	6	6	6	4	8	5	7	4	9	6	7	5	73	6.1	5.0
S22	6	6	8	7	8	5	7	6	11	10	9	7	90	7.5	4.1
S24	6	6	8	8	7	5	7	6	10	8	9	7	87	7.3	4.2
SOUTHWEST MAIN GRAVITY									10 UNITS						
TOTAL	68	68	87	78	92	64	83	89	76	87	93	79	964	8.0	3.9
S27	5	3	6	9	7	6	6	7	6	8	10	6	79	6.6	4.6
S28	5	3	8	6	8	5	6	8	6	8	9	6	78	6.5	4.7
S30	5	5	8	7	8	4	5	9	6	8	10	7	82	6.8	4.4
S34	5	9	10	8	8	5	6	7	6	9	10	8	91	7.6	4.0
S39	4	5	10	7	8	4	7	9	7	7	9	7	84	7.0	4.3
S40	4	7	8	7	8	5	7	9	8	8	8	7	86	7.2	4.2
S43	5	9	9	7	10	5	8	9	9	10	7	9	97	8.1	3.8
S47	5	8	9	5	10	6	8	9	10	10	8	9	97	8.1	3.8
S50	17	10	10	11	13	13	16	11	11	10	12	12	146	12.2	2.5
S51	13	9	9	11	12	11	14	11	7	9	10	8	124	10.3	2.9
LOWER SCHUYLKILL WEST SIDE									4 UNITS						
TOTAL	35	33	36	30	33	27	31	29	33	25	31	32	375	7.8	3.9
S32	8	8	8	8	8	7	9	7	8	6	8	8	93	7.8	3.9
S33	8	11	9	7	9	8	9	7	8	6	8	8	98	8.2	3.7
S38	8	7	9	7	8	6	5	7	8	6	8	8	87	7.3	4.2
S45	11	7	10	8	8	6	8	8	9	7	7	8	97	8.1	3.8

SWWPC PLANT REGULATORS

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
COBBS CREEK HIGH LEVEL									23 UNITS						
TOTAL	105	99	140	97	107	123	76	96	95	83	103	33	1157	4.2	7.3
C01	5	5	6	4	5	6	4	5	4	3	4	0	51	4.3	7.2
C02	5	4	6	4	4	6	4	5	4	2	4	0	48	4.0	7.6
C04	5	3	7	5	3	6	2	5	3	4	4	1	48	4.0	7.6
C04A	5	3	6	3	4	6	4	4	3	4	4	1	47	3.9	7.8
C05	5	4	4	3	4	6	4	5	3	4	4	4	50	4.2	7.3
C06	5	4	5	3	4	5	3	4	3	3	4	0	43	3.6	8.5
C07	4	4	6	3	5	5	2	4	4	4	5	0	46	3.8	7.9
C09	6	6	7	3	4	6	4	4	5	4	4	1	54	4.5	6.8
C10	5	4	6	4	4	4	3	4	4	4	5	0	47	3.9	7.8
C11	5	5	7	4	4	5	3	4	4	4	5	0	50	4.2	7.3
C12	5	5	7	4	5	5	3	4	4	4	5	1	52	4.3	7.0
C13	5	5	7	5	4	4	3	4	4	4	6	1	52	4.3	7.0
C14	6	2	5	7	5	4	3	5	6	5	5	2	55	4.6	6.6
C15	5	2	5	6	5	5	3	5	6	4	5	2	53	4.4	6.9
C16	5	2	5	5	6	5	4	5	6	4	5	2	54	4.5	6.8
C17	5	3	5	5	7	5	4	5	6	4	5	2	56	4.7	6.5
C31	3	5	7	4	5	6	4	3	4	3	4	3	51	4.3	7.2
C32	4	6	7	5	4	6	3	5	3	3	5	2	53	4.4	6.9
C33	3	5	7	4	5	6	4	3	4	3	4	1	49	4.1	7.4
C34	3	6	7	4	5	6	3	3	4	3	4	2	50	4.2	7.3
C35	3	6	6	4	5	6	3	3	4	3	4	2	49	4.1	7.4
C36	4	5	6	4	5	5	3	3	4	3	4	5	51	4.3	7.2
C37	4	5	6	4	5	5	3	4	3	4	4	1	48	4.0	7.6
COBBS CREEK LOW LEVEL									13 UNITS						
TOTAL	72	47	63	59	52	58	51	42	74	53	58	44	673	4.3	7.1
C18	5	3	6	5	7	5	4	3	6	4	5	2	55	4.6	6.6
C19	6	3	5	5	5	5	4	3	7	4	5	4	56	4.7	6.5
C20	6	4	6	4	6	5	4	3	7	6	5	4	60	5.0	6.1
C21	6	3	5	4	3	5	4	3	7	5	5	3	53	4.4	6.9
C22	5	3	6	4	3	4	4	3	7	4	5	3	51	4.3	7.2
C23	5	3	5	2	3	4	4	3	7	5	5	6	52	4.3	7.0
C24	7	4	5	6	4	6	5	3	7	5	5	3	60	5.0	6.1
C25	7	4	4	4	3	4	3	3	7	5	3	4	51	4.3	7.2
C26	5	4	3	5	3	4	3	3	5	3	4	3	45	3.8	8.1
C27	5	4	3	5	4	4	4	3	5	3	4	3	47	3.9	7.8
C28A	5	4	6	7	3	4	4	4	3	3	5	3	51	4.3	7.2
C29	5	4	5	4	4	4	4	4	3	3	4	3	47	3.9	7.8
C30	5	4	4	4	4	4	4	4	3	3	3	3	45	3.8	8.1
TOTAL	461	503	523	489	580	467	479	474	517	485	557	380	5915		
I/D/C	5.1	5.5	5.7	5.4	6.4	5.1	5.2	5.2	5.7	5.3	6.1	4.2			

41 TOTAL DISCHARGES TO DATE

3.4 AVERAGE DISCHARGES PER MONTH

6.3 AVER. DAYS BEFORE RETURNING TO SITE

5.4 AVER. INSPECTIONS PER DAY PER CREW

I/D/C = INSPECTIONS PER DAY PER CREW DTR = DAYS TO RETURN TO SITE

FY95 REGULATING CHAMBER YEARLY DISCHARGE TOTALS

SWWPC PLANT REGULATORS

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
CENTRAL SCHUYLKILL EAST SIDE 18 UNITS													
TOTAL	4	0	0	0	1	0	0	0	0	1	0	0	6
S05										1			1
S06													0
S07	1												1
S08													0
S09	1												1
S10													0
S12													0
S12A													0
S13													0
S15													0
S16													0
S17													0
S18	1												1
S19					1								1
S21													0
S23	1												1
S25													0
S26													0
LOWER SCHUYLKILL EAST SIDE 9 UNITS													
TOTAL	1	0	1	0	0	0	1	0	0	0	0	0	3
S31													0
S35													0
S36													0
S36A	1						1						2
S37													0
S42													0
S42A													0
S44			1										1
S46													0
CENTRAL SCHUYLKILL WEST 9 UNITS													
TOTAL	3	0	0	0	1	1	0	1	0	1	0	0	7
S01													0
S02													0
S03													0
S04	1												1
S11													0
S14	1				1	1		1		1			5
S20													0
S22	1												1
S24													0
SOUTHWEST MAIN GRAVITY 10 UNITS													
TOTAL	3	2	1	0	0	1	1	0	0	0	0	1	9
S27													0
S28													0
S30													0
S34	1	2											3
S39													0
S40													0
S43	1											1	2
S47						1							1
S50	1		1				1						3
S51													0
LOWER SCHUYLKILL WEST SIDE 4 UNITS													
TOTAL	0	0	0	1	0	0	0	0	0	0	0	0	1
S32													0
S33													0
S38				1									1
S45													0

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
COBBS CREEK HIGH LEVEL 23 UNITS													
TOTAL	4	0	0	0	1	0	0	0	0	0	0	2	7
C01													0
C02													0
C04													0
C04A													0
C05	1												1
C06													0
C07													0
C09	1				1								2
C10	1												1
C11													0
C12													0
C13												1	1
C14	1												1
C15													0
C16													0
C17													0
C31												1	1
C32													0
C33													0
C34													0
C35													0
C36													0
C37													0
COBBS CREEK LOW LEVEL 13 UNITS													
TOTAL	2	1	0	0	0	0	0	0	0	0	1	4	8
C18		1											1
C19	1												1
C20												1	1
C21													0
C22	1												1
C23											1	1	2
C24													0
C25													0
C26												1	1
C27												1	1
C28A													0
C29													0
C30													0
TOTAL	17	3	2	1	3	2	2	1	0	2	1	7	41

NO OF UNITS IN DISTRICT BLOCKED

CSE	4	0	0	0	1	0	0	0	0	1	0	0	6
LSE	1	0	1	0	0	0	1	0	0	0	0	0	3
CSW	3	0	0	0	1	1	0	1	0	1	0	0	7
SWG	3	1	1	0	0	1	1	0	0	0	0	1	8
LSW	0	0	0	1	0	0	0	0	0	0	0	0	1
CCHL	4	0	0	0	1	0	0	0	0	0	0	2	7
CCLL	2	1	0	0	0	0	0	0	0	0	1	4	8

FY95 RELIEF SEWER MONTHLY INSPECTION TOTALS

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
	THOMAS RUN RELIEF SEWER								6 UNITS				
R1	1	1	1	1	1	1	1	1	2	2	2	1	15
R2	1	1	1	1	1	1	1	1	2	2	2	1	15
R3	1	1	1	1	1	1	1	1	2	2	2	1	15
R4	1	1	1	1	1	1	1	1	2	2	2	1	15
R5	1	1	1	1	1	1	1	1	2	2	2	1	15
R6	1	1	1	2	1	1	1	1	2	2	2	1	16
	MAIN RELIEF SEWER								6 UNITS				
R7	1	1	1	2	1	1	1	1	2	2	2	1	16
R8	1	1	1	1	1	1	1	1	2	2	2	1	15
R9	1	1	1	1	1	1	1	1	2	2	2	1	15
R10	1	1	1	1	1	1	1	1	2	2	2	1	15
R11	1	1	1	1	1	1	1	1	2	2	2	1	15
R12	1	1	1	1	1	1	1	1	2	2	2	1	15
	WAKLING RELIEF SEWER								2 UNITS				
R13	1	1	1	1	1	1	0	1	1	1	2	1	12
R14	1	1	1	1	1	1	0	1	1	1	2	1	12
	ROCK RUN STORM FLOOD RELIEF SEWER								1 UNITS				
R15	1	1	1	1	1	1	0	1	1	1	2	1	12
	OREGON AVE RELIEF SEWER								2 UNITS				
R16	1	1	1	1	1	1	0	3	1	1	2	1	14
R17	1	1	1	1	1	1	1	1	1	1	2	1	13
	FRANKFORD HIGH LEVEL RELIEF SEWER								1 UNITS				
R18	1	1	1	1	1	1	3	1	2	1	2	1	16
	32ND ST RELIEF SEWER								1 UNITS				
R19	1	1	1	1	1	1	0	0	1	1	2	1	11
	MAIN STREET RELIEF SEWER								1 UNITS				
R20	1	1	1	1	1	1	0	0	3	1	2	1	13
	SOMERSET SYSTEM DIVERSION CHAMBE								1 UNITS				
R21	1	1	1	1	1	1	0	1	1	1	2	1	12
	TEMPORARY REGULATOR CHAMBER								2 UNITS				
R22	1	1	1	1	1	1	0	1	1	1	2	1	12
R23	1	1	1	1	1	1	0	1	1	1	2	1	12
	ARCH ST RELIEF SEWER								1 UNITS				
R24	0	0	0	2	1	1	0	0	2	2	2	1	11
	GRANT & STATE RD. RELIEF								1 UNITS				
R26	0	0	0	0	0	0	0	0	2	2	2	1	7
TOTAL	23	23	23	27	24	24	16	24	42	39	50	25	339
													-7
													332

FY95 RELIEF SEWER MONTHLY DISCHARGE TOTALS

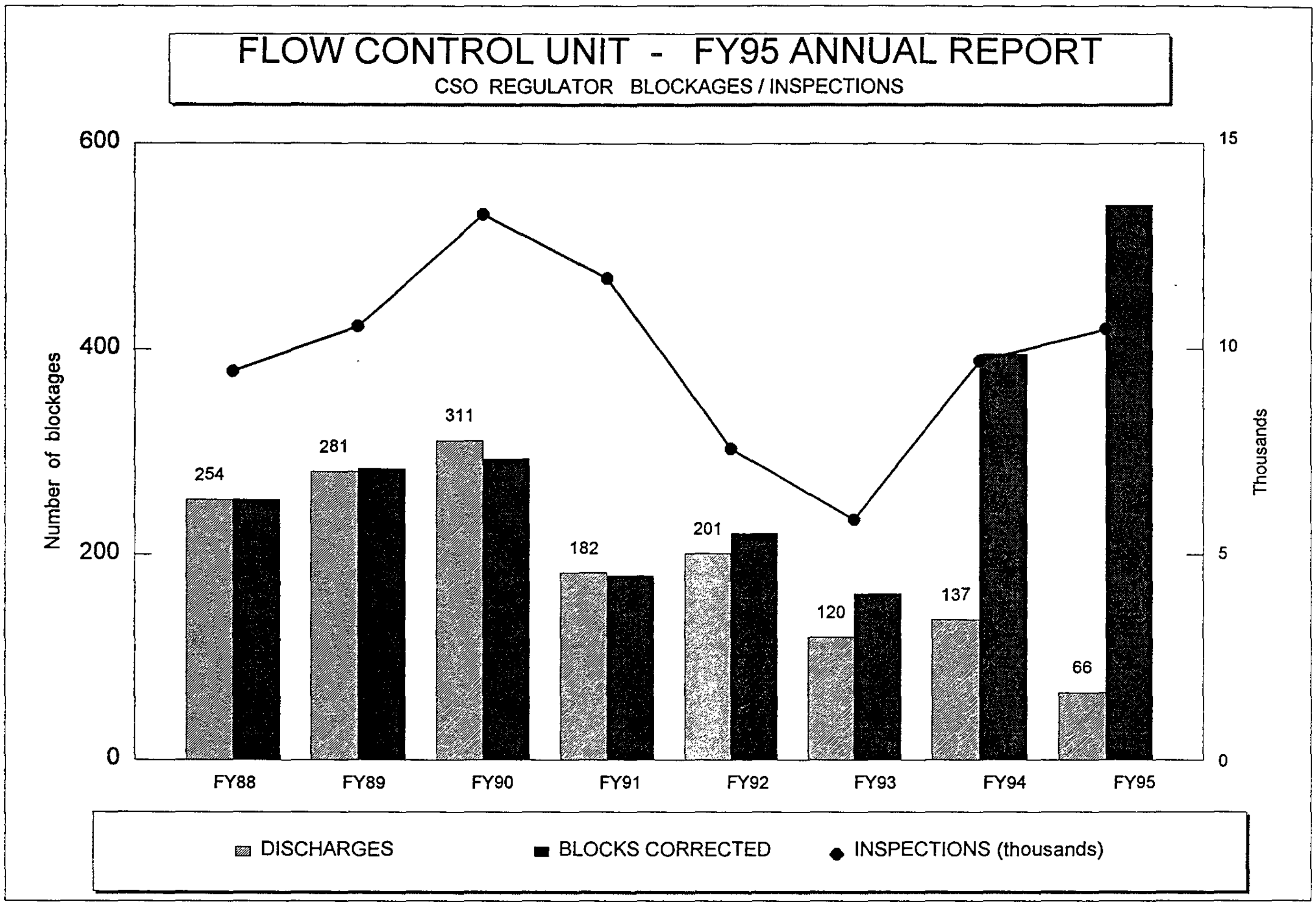
SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
	THOMAS RUN RELIEF SEWER								6 UNITS				
R1				1									1
R2													0
R3													0
R4													0
R5													0
R6													0
	MAIN RELIEF SEWER								6 UNITS				
R7													0
R8													0
R9													0
R10													0
R11													0
R12													0
	WAKLING RELIEF SEWER								2 UNITS				
R13													0
R14													0
	ROCK RUN STORM FLOOD RELIEF SEWER								1 UNITS				
R15													0
	OREGON AVE RELIEF SEWER								2 UNITS				
R16													0
R17													0
	FRANKFORD HIGH LEVEL RELIEF SEWER								1 UNITS				
R18													0
	32ND ST RELIEF SEWER								1 UNITS				
R19													0
	MAIN STREET RELIEF SEWER								1 UNITS				
R20													0
	SOMERSET SYSTEM DIVERSION CHAMBE								1 UNITS				
R21													0
	TEMPORARY REGULATOR CHAMBER								2 UNITS				
R22		1											1
R23													0
	ARCH ST RELIEF SEWER								2 UNITS				
R24													0
	GRANT & STATE RD. RELIEF								1 UNITS				
R26													0
TOTAL	0	1	0	1	0	0	0	0	0	0	0	0	2
UNITS	0	1	0	1	0	0	0	0	0	0	0	0	

FLOW CONTROL - CSO INSPECTIONS

AS OF: Sep-95

1989 TO 1995 TOTALS		1989 TO 1995 TOTALS			1989 TO 1995 YEARLY AVERAGE			FY95 TOTALS			FY94 TOTALS			FY93 TOTALS		
REGULATOR INSPECTIONS		INSP	UNITS	BLOCKS	INSP	UNITS	BLOCKS	INSP	UNITS	BLOCKS	INSP	UNITS	BLOCKS	INSP	UNITS	BLOCKS
UPPER PENNYPACK	5	2238	36	45	320	5	6	289	1	1	299	1	1	201	2	2
UPPER DELAWARE LOW LEVEL	12	4953	91	106	708	13	15	628	2	2	772	1	1	436	5	6
LOWER FRANKFORD CREEK	6	3558	65	75	508	9	11	250	0	0	415	4	4	320	2	2
LOWER FRANKFORD LOW LEVE	10	2642	40	49	377	6	7	465	0	0	427	0	0	153	3	3
FRANKFORD HIGH LEVEL	14	5906	120	165	844	17	24	703	8	11	764	16	19	470	10	13
SOMERSET LOW LEVEL	9	3734	40	49	533	6	7	435	2	2	509	1	1	298	2	2
LOWER DELAWARE LOW LEVEL	33	13967	222	274	1995	32	39	1493	5	5	1481	14	17	1068	13	17
CENTRAL SCHUYLKILL EAST	18	8923	147	179	1275	21	26	1434	6	6	1199	16	17	474	7	7
LOWER SCHUYLKILL SOUTH	9	4213	75	85	602	11	12	631	3	3	556	14	15	238	8	8
CENTRAL SCHUYLKILL WEST	9	4016	98	112	574	14	16	681	7	7	572	24	26	235	8	10
SOUTHWEST MAIN GRAVITY	10	4934	62	68	705	9	10	964	9	9	722	11	13	261	13	14
LOWER SCHUYLKILL WEST	4	2334	42	53	333	6	8	375	1	1	272	5	6	151	5	8
COBBS CREEK HIGH LEVEL	24	8545	94	120	1221	13	17	1157	8	8	1000	8	8	627	11	15
COBBS CREEK LOW LEVEL	12	5294	124	152	756	18	22	673	8	8	503	7	8	425	10	12
DIVERSION CHAMBERS	24	3503.01	19	19	500	3	3	332	2	2	250	1	1	516	1	1
	199															
TOTALS		78760	1275	1551	11251	182	222	10510	62	65	9741	123	137	5873	100	120
NORTH RUN TOTALS		36998	614	763	5285	88	109	4263	18	21	4667	37	43	2946	37	45
SOUTH RUN TOTALS		41762	661	788	5966	94	113	6247	44	44	5074	86	94	2927	63	75

		FY92 TOTALS			FY91 TOTALS			FY90 TOTALS			FY89 TOTALS			FY88 TOTALS		
REGULATOR INSPECTIONS		INSP	UNITS	BLOCKS	INSP	UNITS	BLOCKS	INSP	UNITS	BLOCKS	INSP	UNITS	BLOCKS	INSP	UNITS	BLOCKS
UPPER PENNYPACK	5	248	6	7	337	10	11	297	8	12	306	1	1	261	7	10
UPPER DELAWARE LOW LEVEL	12	444	5	5	674	13	16	738	28	36	643	15	18	618	22	22
LOWER FRANKFORD CREEK	6	419	3	3	438	8	9	745	17	21	470	14	19	501	17	17
LOWER FRANKFORD LOW LEVE	10	246	4	4	274	5	6	476	8	11	342	13	18	259	7	7
FRANKFORD HIGH LEVEL	14	629	7	7	789	12	20	1069	20	36	757	27	35	725	20	24
SOMERSET LOW LEVEL	9	347	4	4	500	13	15	526	3	5	492	3	8	627	12	12
LOWER DELAWARE LOW LEVEL	33	1486	26	41	2067	14	17	2514	41	58	2079	49	55	1779	60	64
CENTRAL SCHUYLKILL EAST	18	788	22	26	1254	8	11	1611	29	38	1154	24	35	1009	35	39
LOWER SCHUYLKILL SOUTH	9	248	6	7	767	10	15	825	13	14	578	17	19	370	4	4
CENTRAL SCHUYLKILL WEST	9	292	14	19	602	7	9	706	13	15	532	16	16	396	9	10
SOUTHWEST MAIN GRAVITY	10	365	6	6	718	4	5	735	3	3	653	11	12	516	5	6
LOWER SCHUYLKILL WEST	4	273	9	12	376	5	6	383	3	3	292	10	12	212	4	5
COBBS CREEK HIGH LEVEL	24	773	11	17	1415	6	6	1348	19	29	1114	13	16	1111	18	21
COBBS CREEK LOW LEVEL	12	524	25	39	1015	29	36	817	23	26	657	13	13	680	9	10
DIVERSION CHAMBERS	24	505	4	4	506	0	0	486	4	4	497	4	4	411	3	3
	199															
TOTALS		7587	152	201	11732	144	182	13276	232	311	10566	230	281	9475	232	254
NORTH RUN TOTALS		3819	55	71	5079	75	94	6365	125	179	5089	122	154	4770	145	156
SOUTH RUN TOTALS		3768	97	130	6653	69	88	6911	107	132	5477	108	127	4705	87	98



The above chart shows a comparison of the last 8 fiscal years CSO Maintenance. The trend shows the number of Dry Weather Discharges declining over the years. Our emphasis is placed on frequent site visits to clear the minor blockages before they develop into discharges.

FLOW CONTROL UNIT **09/06/95**

COLLECTOR SYSTEM / CSO / ALTERATIONS RECORD

DATE	LOCATION	DESCRIPTION OF WORK	REASON FOR CHANGE
11/18/94	FOC3 FKD. GRIT	DAM HEIGHT LOWERED TWO LOGS (12") ON EACH OF THE FOUR DOWN STREAM SECTIONS. THE UPSTREAM SECTIONS WERE LEFT IN PLACE.	NEWPC OVERFLOWING AT DIVERSION CHAMBER 'B'
11/23/94	D-25 SOMERSET	TWO 6" ALUM LOGS WERE REMOVED FROM BOTH TIDE GATE DAMS. THE DAM ELEV. ARE NOW SET FOR -1.00 FT ON THE SOUTH AND -1.50 FT ON THE NORTH.	LOWERED AFTER COMPLETION OF COLLECTOR GRIT REMOVAL.
02/25/95	D-39 Susquehanna Ave. E of Beach St.	RAISED BOTH DAM SECTIONS ONE LOG HIGHER (6") TO HELP REDUCE QL FILTERS DISCHARGE FREQUENCY.	QUEEN LA. BACKWASH IS DISCHARGING FREQUENTLY
02/11/95 TO 02/25/95	O - ERIE	INSTALLED STOP LOGS IN 78" COLLECTOR TO SHUT DOWN FOR SEWER MAINTENANCE WORK. REMOVED TO INSTALL STOP PLATES WITH A BETTER SHUT OFF.	SHUT DOWN FOR SEWER MAINT.
03/03/95	S-22 660' S of South St E of Penn Field	INSTALL ONE 6" DAM SECTION. HIGH FLOWS UNDER INVESTIGATION.	TEMPORARY MEASURE TO CONTAIN HIGH LEVEL
03/11/95	O - ERIE	INSTALLED STOP PLATES IN 78" COLLECTOR. STOP PLATE WILL BE INSTALLED AT NEWPC DIV. CHAMBER "B" IN THE NEXT WEEK.	SAME AS PREVIOUS
03/17/95	S-5 24th St. 155 S of Park Towne Place	INSTALLED TWO ADDITIONAL 6" ALUM. DAM LOGS. THERE ARE NOW THREE LOGS ON THE MASONARY DAM.	TEMPORARY MEASURE TO CONTAIN HIGH LEVEL.
04/18/95	S-14 Schuylkill Expressway Under Walnut Street bridge	WHILE IN THE PROCESS OF REMOVING ORIFICE PLATE FOR MODIFICATIONS, THE PLATE WAS BENT BEYOND REUSE. A NEW PLATE IS ON ORDER TO REINSTALL WITH A SLIGHTLY LARGER OPENING.	S-14 HAS THE HIGHEST NUMBER OF DISCHARGES IN FY95. WIDENING THE ORIFICE OPENING SHOULD REDUCE BLOCKS
05/08/95	D-5 Magee St. SE of Milnor St.	SWO GATE CONTROL SETTING RAISED FROM 37" TO 102.4"	RAISED LEVEL TO JUST BELOW WINDOW TO PREVENT PREMATURE DISCHARGES.
05/08/95	D-11	SWO GATE CONTROL SETTING RAISED FROM 28" TO 77.5".	RAISED LEVEL TO JUST BELOW WINDOW TO PREVENT PREMATURE DISCHARGES.

FLOW CONTROL CSO MAINTENANCE DATABASE

DATE	SITE ID	GROU	START	A/P	FINISH	A/P	PAY	EMP NO	RAIN	TYP INSP	REG FOU	REG LEF	REG WRI	TG FND	TG LEFT	TG WRK	OTR WRI
08/01/94	S5	FR	700	A	900	A	R	094593	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S6	FR	900	A	930	A	R	094593	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S12	FR	1130	A	1200	P	R	094593	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S16	FR	200	P	230	P	R	094593	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S9	FR	1030	A	1100	A	R	094593	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S19	FR	300	P	330	P	R	094593	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S8	FR	1000	A	1030	A	R	094593	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S7	FR	930	A	1000	A	R	094593	N	V	WK	OK	IO	LI	NW	NA	OO
08/01/94	S10	FR	1100	A	1130	A	R	094593	N	V	WK	NW	IO	NA	NA	NO	OO
08/01/94	S17	FR	130	P	200	P	R	094593	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S13	FR	1230	P	100	P	R	094593	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S15	FR	100	P	130	P	R	094593	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S12A	FR	1200	P	1230	P	R	094593	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S18	FR	230	P	300	P	R	094593	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	MISC	FR	700	A	330	P	L	159805	N	O	NA	NA	NA	NA	NA	NO	OO
08/01/94	C12	FR	1130	A	1200	P	R	173037	Y	V	WK	OK	IO	NA	NA	NO	OO
08/01/94	C10	FR	1230	P	200	P	R	173037	Y	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	C13	FR	1100	A	1130	A	R	173037	Y	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S45	FR	1030	A	1100	A	R	173037	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S38	FR	1000	A	1030	A	R	173037	N	V	WK	OK	IO	WK	OK	PM	OO
08/01/94	S33	FR	930	A	1000	A	R	173037	N	V	DH	HF	IO	WK	OK	NA	OO
08/01/94	S51	FR	830	A	900	A	R	173037	N	V	WK	OK	IO	NA	NA	NA	OO
08/01/94	C11	FR	1200	P	1230	P	R	173037	Y	V	WK	OK	IO	NA	NA	NA	OO
08/01/94	S32	FR	900	A	930	A	R	173037	N	V	WK	OK	IO	LI	NW	PM	OO
08/01/94	S50	FR	700	A	830	A	R	173037	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	S51	FR	830	A	900	A	R	193622	N	V	WK	OK	IO	NA	NA	NA	OO
08/01/94	S50	FR	700	A	830	A	R	193622	N	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	C13	FR	1100	A	1130	A	R	193622	Y	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	C09	FR	200	P	330	P	R	193622	Y	V	WK	OK	IO	WK	NA	NA	OO
08/01/94	S38	FR	1000	A	1030	A	R	193622	N	V	WK	OK	IO	WK	OK	PM	OO
08/01/94	C11	FR	1200	A	1230	P	R	193622	Y	V	WK	OK	IO	WK	OK	PM	OO
08/01/94	S33	FR	930	A	1000	A	R	193622	N	V	DH	HF	IO	WK	OK	NA	OO
08/01/94	C12	FR	1130	A	1200	P	R	193622	Y	V	WK	OK	IO	WK	OK	NA	OO
08/01/94	C10	FR	1230	P	200	P	R	193622	Y	V	WK	OK	IO	WK	NA	NA	OO
08/01/94	S32	FR	900	A	930	A	R	193622	N	V	WK	OK	IO	LI	NW	PM	OO
08/01/94	P02	FR	200	P	330	P	R	205839	N	F	WK	OK	CO	NA	NA	NA	OO
08/01/94	D12	FR	1030	A	1100	A	R	205839	N	F	WK	OK	IO	WK	NW	RG	OO
08/01/94	D13	FR	930	A	1030	A	R	205839	N	F	WK	OK	IO	OP	NW	OW	OO
08/01/94	P03	FR	1230	P	130	P	R	205839	N	F	WK	OK	CO	NA	NA	NA	OO
08/01/94	D15	FR	700	A	930	A	R	205839	N	F	WK	OK	CO	WK	OK	NA	OO
08/01/94	C36	FR	1100	A	1200	P	R	206203	N	F	OP	CP	CO	NA	NA	NA	OO
08/01/94	C31	FR	700	A	900	A	R	206203	N	F	WK	OK	IO	NA	NA	NA	OO
08/01/94	C35	FR	1030	A	1100	A	R	206203	N	F	WK	OK	IO	NA	NA	NA	OO
08/01/94	C34	FR	1000	A	1030	A	R	206203	N	F	WK	OK	IO	NA	NA	NA	OO
08/01/94	C32	FR	900	A	930	A	R	206203	N	V	WK	OK	IO	NA	NA	NA	OO
08/01/94	C4	FR	130	P	330	P	R	206203	N	V	WK	CP	IO	NA	NA	NA	OO
08/01/94	C2	FR	100	P	130	P	R	206203	N	F	OP	CP	CO	NA	NA	NA	OO
08/01/94	C1	FR	1230	P	100	P	R	206203	N	V	WK	CP	IO	NA	NA	NA	OO
08/01/94	C33	FR	930	A	1000	A	R	206203	N	F	WK	OK	IO	NA	NA	NA	OO
08/01/94	C37	FR	1200	P	1230	P	R	206203	N	V	WK	CP	IO	NA	NA	NA	OO

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MANAGEMENT FORMS

CITY OF PHILADELPHIA

WATER DEPARTMENT

FLOW CONTROL UNIT
5202 Pennypack Street
Philadelphia, PA 19136

August 14, 1995

Mr. David Burke
Water Quality Specialist
PA DER
Lee Park, Suite 6010
555 North Lane
Conshohocken, PA 19428

RE: DRY WEATHER DISCHARGE - BELFRY DRIVE PUMPING STATION

Dear Mr. Burke:

From approximately 11:30 a.m. to 12:50 p.m. on August 12, 1995 there was a dry weather discharge at the Belfry Drive Wastewater Pumping Station. The dry weather discharge was caused by a P.E.C.O power failure at the station.

An alarm was received at 11:00 a.m. that there was a power outage at the station and P.E.C.O. was notified immediately. Power was restored by 12:45 p.m. at which time the station operation returned to normal.

The Water Department is in the design phase to install emergency backup power generators to this and several other locations to help prevent similar wastewater discharges.

Based on average flows, the station discharged 12,606 gallons of sewage during the time it was out of service.

Sincerely,

George Collier
George Collier
Superintendent, Flow Control

cc: D. Mihocko
R. Steniac
B. Marengo

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STATION OUTAGES AND
DRY WEATHER DISCHARGES AT WASTEWATER PUMPING STATIONS

AS OF: 07/25/95

DATE	LOCATION	STATION OUT TIME OUT	STATION OUT TIME IN	DISCHARGE START	DISCHARGE STOP	DURATION HRS	INFLOW GAL/MIN	DISCHARGE TOTAL GAL	REASON
03/06/91	BELFRY	10:00 AM	12:30 PM	10:00 AM	12:30 PM	2.50	23.5	3,525	PECO FAILURE - HEAVY RAINS
06/27/91	HOG ISLAND	02:55 PM	04:00 PM	02:55 PM	04:00 PM	1.08	26.2	1,703	PECO FAILURE
07/23/91	BELFRY	06:00 PM	08:00 PM	06:00 PM	08:00 PM	2.00	23.5	2,820	PECO FAILURE
09/06/91	BELFRY	10:45 AM	11:15 AM	10:45 AM	11:15 AM	0.50	23.5	705	PECO FAILURE
09/17/91	HOG ISLAND	04:00 PM	06:00 PM	04:00 PM	06:00 PM	2.00	0	0	LOST PHASE - NO DISCHARGE
10/08/91	CSPS	03:00 PM	03:05 PM	03:00 PM	03:05 PM	0.08	46007	230,035	#4 CB JAMMED IN CLOSED POSITION (FATIGUED PARTS)
									HAD TO DEENERGIZE BUS TO RACK OUT BREAKER
10/28/91	42ND ST	01:00 PM	03:00 PM	01:00 PM	03:00 PM	2.00	4872	584,640	FORCE MAIN BROKE -OFF FOR EXCAVATION
10/29/91	42ND ST	10:00 AM	----	10:00 AM	----				" "
10/30/91	"	----	01:00 PM	----	01:00 PM	13.00	4872	3,800,160	DISTRUBUTION MADE REPAIRS
11/26/91	BELFRY	12:10 PM	01:20 PM	12:10 PM	01:20 PM	1.17	23.5	1,645	PECO FAILURE
12/20/91	RENNARD	05:30 AM	08:30 AM	05:30 AM	08:30 AM	3.00	27.6	4,968	PECO FAILURE
1991	TOTALS					27.33		4,630,201	7 PECO OUTAGES
1991	AVERAGES					2.73		463,020	3 STATION EQUIP PROBLEMS
01/04/92	MILNOR	04:00 AM	10:00 AM	04:00 AM	10:00 AM	6.00	17	6,120	PECO FAILURE
08/29/92	LINDEN	09:30 AM	01:30 PM	NONE		0.00	0	0	PECO FAILURE - FIRE IN AREA - NO EVIDENCE OF DISCHARGE
09/01/92	FORD RD	06:30 PM	08:00 PM	06:30 PM	08:00 PM	1.50	199	17,910	GRIT AND STONES 5' HIGH BLOCKED SUCTION
09/11/92	LINDEN	08:30 AM	10:00 AM	NONE		0.00	0	0	GFI ON INSTRUMENT AIR COMPRESSOR TRIPPED
11/16/92	RENNARD	05:00 AM	09:00 AM	08:00 AM	09:00 AM	1.00	27.6	1,656	PECO FAILURE
12/05/92	FORD RD	09:00 AM	10:30 AM	09:00 AM	10:30 AM	1.50	198.8	17,889	PECO FAILURE
12/08/92	RENNARD	07:00 PM	08:00 PM	NONE					PECO FAILURE
12/10/92	RENNARD	11:00 PM	02:00 AM	11:00 PM	02:00 AM	3.00	27.6	4,976	PECO FAILURE
12/11/92	FORT MIFFLIN	12:00 PM		NONE				0	RECREATION OVER-FUSED TRANSFORMER BLEW
06/03/93	" "		01:00 PM						NEW TRANSFORMER INSTALLED BY OTHERS
12/28/92	LINDEN	08:30 AM	09:50 AM	NONE					PECO FAILURE
1992	TOTALS					13.00		48,551	7 PECO OUTAGES
1992	AVERAGES					1.86		4,855	3 STATION EQUIP PROBLEMS
01/23/93	HOG ISLAND	12:01 AM	09:30 AM	06:00 AM	09:30 AM	3.50	26.2	5,509	PECO FAILURE
06/09/93	LINDEN	09:30 PM	11:00 PM	09:30 PM	11:00 PM	1.50	86.7	7,801	PECO FAILURE -STORM
06/09/93	MILNOR	09:30 PM	02:00 AM	NONE				0	PECO FAILURE -LINE DOWN ON FITLER ST
06/21/93	BELFRY	02:45 PM	04:00 PM	02:45 PM	04:00 PM	1.25	23.5	1,764	PECO FAILURE -CAR CRASHED INTO PECO POLE
08/14/93	RENNARD	02:30 PM	05:30 PM	NONE				0	PECO FAILURE -ON PULASKI 131
09/26/93	FORD RD	07:00 AM	12:30 PM	07:15 AM	12:45 PM	5.50	198.8	65,595	PECO FAILURE - ON THE 13,200 V LINE
10/13/93	FORD RD	09:30 PM	01:15 AM	09:45 PM	01:30 AM	3.75	198.8	44,724	CHECK VALVES FAILED TO CLOSE
10/18/93	FORD RD	11:00 AM	12:30 PM	11:15 AM	12:40 PM	1.42	198.8	16,896	PECO FAILURE
1993	TOTALS					16.92		142,289	7 PECO OUTAGES
1993	AVERAGES					2.82		17,786	1 STATION EQUIP PROBLEMS
03/05/94	42ND STREET	05:00 PM	06:45 PM	05:00 PM	06:45 PM	1.75	4,872.9	511,653	PECO FAILURE
03/06/94	NEILL DR	09:00 AM	12:00 PM	09:00 AM	12:00 PM	3.00	824.4	148,396	ROTOVALVE CIRCUIT FAILURE
05/16/94	FORD RD	08:15 PM	10:10 PM	08:35 PM	10:15 PM	1.67	198.8	19,877	PECO FAILURE
05/30/94	BELFRY DR	09:23 AM	10:05 AM	09:23 AM	10:25 AM	1.03	23.5	1,459	PECO BLEW X-FORMER FUSE
05/30/94	LOCKHART ST	11:00 PM	02:55 AM	11:00 PM	03:30 AM	4.50	157.6	42,552	PECO FAULT IN UNDERGROUND LINE
06/06/94	LINDEN AVE	07:00 PM	03:10 AM	07:00 PM	03:30 AM	8.50	86.7	44,207	PECO FAILURE
06/06/94	LOCKHART ST	07:00 PM	10:30 PM	07:00 PM	10:30 PM	3.50	157.6	33,091	PECO FAILURE
06/07/94	LOCKHART ST	12:01 AM	03:00 AM	12:01 AM	03:00 AM	2.98	157.6	28,206	PUMP BLOCKED W/ SCREENINGS FROM OUTAGE
06/15/94	42ND STREET	03:45 PM	06:30 PM	03:45 PM	06:30 PM	2.75	4,872.9	804,026	PECO ARIAL CABLE FAULT
06/15/94	LOCKHART ST	10:15 PM	01:30 AM	10:15 PM	01:30 AM	3.25	157.6	30,728	PECO CABLE FAULT IN MANHOLE
06/16/94	LOCKHART ST	09:30 AM	10:15 AM	09:30 AM	10:15 AM	0.75	157.6	7,091	PECO BLOWN FUSE
06/29/94	LINDEN AVE	11:50 AM	03:15 PM	11:50 AM	03:30 PM	3.67	86.7	19,070	PECO LINE OUT
06/29/94	MILNOR ST	12:05 PM	05:15 PM	12:05 PM	05:30 PM	5.42	17.0	5,523	PECO LINES OUT
07/04/94	LOCKHART ST	07:00 AM	05:50 PM	07:20 AM	06:15 PM	10.92	157.6	103,213	PECO CABLE FAULT
07/14/94	FORD RD	05:00 PM	06:45 PM	05:00 PM	06:45 PM	1.75	198.8	20,871	225 AMP BREAKER TRIP FROM ELECTRICAL STORM
11/24/94	LOCKHART ST	12:01 PM	03:30 PM	12:15 PM	03:45 PM	3.50	157.6	33,091	PECO FAILURE ON THE B PHASE OF STATION TRANSFORMER
11/26/94	RENNARD ST	09:15 AM	10:10 AM	NONE					PECO FAILURE - SQUIRREL SHORTED 13.2 B PHASE
12/31/94	FORD RD	11:15 AM	12:30 PM	11:30 AM	12:45 PM	1.25	198.8	14,908	MAIN BREAKER TRIPPED (2 PUMP START-UP)
1994	TOTALS					60.18		1,867,963	14 PECO OUTAGES
1994	AVERAGES					3.54		109,880	4 STATION EQUIP PROBLEMS
01/11/95	42ND STREET	06:00 PM	07:00 PM	06:05 PM	07:05 PM	1.00	4,872.9	292,373	PECO LINES OUT
03/08/95	MILNOR ST	02:45 PM	04:45 PM	NONE					PECO DOWNED WIRES IN SERVICE AREA
04/11/95	BANK ST	05:45 PM	06:15 PM	NONE					INST CREW FAILED TO RETURN STATION TO AUTO
06/08/95	RENNARD ST	07:00 PM	07:30 PM	NONE					PECO BYBERRY 133 LINE TRIPPED, BAD STRETCH OF CABLE
06/08/95	LOCKHART ST	07:00 PM	11:59 PM	07:45 PM	12:15 AM	4.50	157.6	42,546	PECO POWER FAILURE. UNDERGROUND CABLE FAILURE
07/16/95	HOG ISLAND	12:10 PM	03:00 AM	NONE					PECO POWER FAILURE, WEATHER RELATED 104 DEG. DAY
08/08/95	RENNARD	03:50 AM	08:00 AM	NONE					PECO POWER FAILURE
08/02/95	BELFRY DR	11:00 AM	12:45 PM	11:30 AM	12:50 PM	1.33	23.5	12,606	PECO POWER FAILURE - A&B PHASE FUSE BLOWN
1995	TOTALS					6.83		347,525	7 PECO OUTAGES
1995	AVERAGES					2.28		115,842	1 STATION EQUIP PROBLEMS

5 - YEAR	122.93 HRS	90%	PECO OUTAGES
OUTAGE HISTORY	13.70 HRS	10%	STATION EQUIP PROBLEMS

FLOW CONTROL UNIT
PUMPING STATION CONTROL LEVEL SETTINGS

UPDATED : SEPT. 6, 1995 02:50 PM

WASTEWATER STATIONS	LLA	ALL OFF	LEAD ON	1st LAG ON	2nd LAG ON	HLA	FLOOD OR OVERFLOW
BANK ST	2.50 ft.	3.00 ft.	4.00 ft.	5.00 ft.	none ft.	6.00 ft.	6.40 ft.
BELFRY DR	1.50 ft.	2.00 ft.	4.00 ft.	5.00 ft.	none ft.	6.00 ft.	8.80 ft.
CSPS	3.00 ft.	5.00	(PUMPS ON/OFF AND SPEED VARIED 5.5 TO 10.5)			12.00 ft.	11.0 ft in sewer
FORD ROAD	2.00 ft.	3.00 ft.	6.00 ft.	7.00 ft.	none ft.	8.00 ft.	9.20 ft.
FT MIFF INF	1.50 ft.	2.00 ft.	4.00 ft.	5.00 ft.	none ft.	6.00 ft.	7.80 ft.
FT MIFF EFF	1.50 ft.	2.00 ft.	4.00 ft.	5.00 ft.	none ft.	5.50 ft.	5.83 ft.
HOG ISLAND	1.00 ft.	2.00 ft.	4.00 ft.	5.00 ft.	none ft.	7.00 ft.	14.08 ft.
LINDEN AVE	1.50 ft.	2.00 ft.	4.00 ft.	5.00 ft.	none ft.	6.00 ft.	0.00 ft.
LOCKART ST	2.00 ft.	3.00 ft.	6.00 ft.	7.00 ft.	none ft.	8.00 ft.	21.58 ft.
MILNOR ST	2.50 ft.	3.00 ft.	4.00 ft.	5.00 ft.	none ft.	7.00 ft.	13.50 ft.
NEILL DR	2.50 ft.	3.00 ft.	5.00 ft.	5.50 ft.	6.00 ft.	6.50 ft.	6.90 ft.
POLICE ACA	none ft.	3.00 ft.	4.00 ft.	5.00 ft.	none ft.	5.50 ft.	6.00 ft.
RENNARD ST	2.50 ft.	3.00 ft.	5.00 ft.	5.50 ft.	none ft.	6.50 ft.	12.60 ft.
42ND STREET	2.00 ft.	3.00 ft.	5.00 ft.	5.50 ft.	6.00 ft.	12.00 ft.	12.18 ft.

STORMWATER STATIONS	LLA	ALL OFF	LEAD ON	1st LAG ON	2nd LAG ON	HLA	FLOOD LEVEL
BROAD & BLVD.	2.50 ft.	3.00 ft.	6.00 ft.	6.50 ft.	8.50 ft.	8.60 ft.	17.50 ft.
MINGO CREEK	13.50 ft.	14.00 ft.	16.00 ft.	(remote phone control)		19.00 ft.	24.00 ft.
26TH & VARE	2.00 ft.	3.00 ft.	4.00 ft.	4.50 ft.	none ft.	5.00 ft.	5.75 ft.

BROAD & BLVD. -- When level exceeds 8.50′ the small pumps shut off. After a 4 sec. delay one of the large pumps will come on until the level drops below 6.50′. There will be a 4 sec. delay, then both small pumps will come on until the well level drops to 3.00′. If the well raises above 9.50′ the 2nd large pump will come on and both will pump down to 6.50′.

Jul-95	FLOW CONTROL UNIT MONTHLY PUMP RUN TIME READINGS	READINGS TAKEN ON: 07/28/95

WASTEWATER STATIONS		PUMP #1	PUMP #2	PUMP #3	PUMP #4	PUMP #5	PUMP #6
BANK ST.	current	286.8	242.9				
	previous	273.7	229.0				
BELFRY DR.	current	7350.2	5482.8				
	previous	7290.2	5360.3				
CENT. SCH.	current						
	previous	0.0	0.0	0.0	0.0	0.0	0.0
FORD RD.	current	9661.8	112.5				
	previous	9546.8	37.5				
FORT MIFFLIN	current	222.2	214.1	5.9	5.6		
	previous	221.2	213.1	5.2	5.1		
HOG ISLAND	current	124.9	122.1				
	previous	115.4	112.2				
LINDEN AVE.	current	183.2	177.1				
	previous	148.6	144.2				
LOCKHART ST.	current	707.9	824.6				
	previous	664.4	746.8				
MILNOR ST.	current	4304.3	3870.3	3528.0			
	previous	4300.8	3866.8	3523.8			
NEILL DR.	current	29327.9	34280.4	34162.0			
	previous	29179.7	34106.1	33992.6			
POLICE ACA.	current	1970.4	1997.0				
	previous	1788.8	1687.9				
RENNARD ST.	current	4932.4	4454.0				
	previous	4891.1	4411.9				
42ND ST.	current	5736.3	41525.6	24136.3			
	previous	5546.4	41525.6	24136.1			
BROAD & BLVD.	current	625.2	661.1	24.8	9.6		
	previous	625.2	648.6	24.7	8.9		
MINGO CREEK	current	857.9	325.1	1466.1	1394.5	1213.3	1389.5
	previous	857.9	325.1	1466.1	1350.8	1213.3	1389.5
26TH & VARE	current	153.9	48.0				
	previous	153.5	47.6				

FLOW CONTROL
WASTEWATER PUMPING
YEAR TO DATE RUN TIME REPORT AS OF: JULY 1995

II B-5

STATION TOTALS		JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	YTD TOTAL	AVERAGE HRS DAY	AVERAGE HRS MONTH
BANK ST.	1	14.0	12.5	8.7	24.5	10.6	15.2	13.1	===:	0.0	0.0	0.0	0.0	98.6	0.46	14.09
	2	13.5	13.2	8.2	24.4	11.1	15.5	13.9	===:	0.0	0.0	0.0	0.0	99.8	0.47	14.26
BELFRY DR.	1	60.1	67.8	67.0	50.0	56.6	74.0	60.0	===:	0.0	0.0	0.0	0.0	435.5	2.05	62.21
	2	56.0	65.1	64.8	52.3	53.2	74.5	122.5	===:	0.0	0.0	0.0	0.0	488.4	2.30	69.77
C.S.P.S.	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00
-OUR METER	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00
READINGS	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00
	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00
FORD RD.	1	132.8	105.8	129.0	97.9	116.9	103.8	115.0	===:	0.0	0.0	0.0	0.0	801.2	3.77	114.46
	2	78.7	76.4	88.9	68.9	55.4	80.0	75.0	===:	0.0	0.0	0.0	0.0	523.3	2.46	74.76
FORT MIFFLIN	1	0.00	1.40	0.80	0.40	0.60	0.90	1.00	===:	0.00	0.00	0.00	0.00	5.1	0.024	0.73
	2	0.00	3.50	0.90	0.90	0.90	1.60	1.00	===:	0.00	0.00	0.00	0.00	8.8	0.041	1.26
	3	0.10	0.40	0.70	0.50	1.00	1.10	0.70	===:	0.00	0.00	0.00	0.00	4.5	0.021	0.64
	4	0.00	1.00	0.70	0.40	0.50	0.80	0.50	===:	0.00	0.00	0.00	0.00	3.9	0.018	0.56
HOG ISL.	1	10.5	14.0	7.7	8.9	8.0	10.7	9.5	===:	0.0	0.0	0.0	0.0	69.3	0.33	9.90
	2	9.9	13.5	7.6	8.6	8.6	10.6	9.9	===:	0.0	0.0	0.0	0.0	68.7	0.32	9.81
LINDEN AVE.	1	40.5	42.7	38.4	34.1	105.5	43.1	34.6	===:	0.0	0.0	0.0	0.0	338.9	1.59	48.41
	2	46.1	41.5	37.2	33.6	103.2	41.0	32.9	===:	0.0	0.0	0.0	0.0	335.5	1.58	47.93
LOCKHART	1	58.2	72.8	63.0	57.0	41.7	68.5	43.5	===:	0.0	0.0	0.0	0.0	404.6	1.90	57.80
	2	66.4	80.8	71.9	65.8	48.2	77.5	77.8	===:	0.0	0.0	0.0	0.0	488.4	2.30	69.77
MILNOR ST.	1	6.1	5.4	10.0	4.2	4.6	3.9	3.5	===:	0.0	0.0	0.0	0.0	37.7	0.18	5.39
	2	6.4	6.7	9.7	4.3	4.8	4.0	3.5	===:	0.0	0.0	0.0	0.0	39.4	0.19	5.63
	3	7.3	7.5	11.2	5.1	5.5	4.5	4.2	===:	0.0	0.0	0.0	0.0	45.3	0.21	6.47
NEILL DR.	1	169.9	136.3	163.3	134.3	166.8	183.4	148.2	===:	0.0	0.0	0.0	0.0	1102.2	5.18	157.46
	2	134.4	131.2	149.0	133.6	132.1	199.1	174.3	===:	0.0	0.0	0.0	0.0	1053.7	4.95	150.53
	3	144.9	293.6	268.5	188.5	107.8	200.0	169.4	===:	0.0	0.0	0.0	0.0	1372.7	6.45	196.10
POLICE ACA	1	94.0	169.5	145.9	162.1	126.4	259.0	181.6	===:	0.0	0.0	0.0	0.0	1138.5	5.35	162.64
	2	90.6	167.5	161.5	176.1	171.0	314.9	309.1	===:	0.0	0.0	0.0	0.0	1390.6	6.53	198.66
RENNARD ST.	1	41.7	48.6	49.1	38.3	39.8	48.8	41.3	===:	0.0	0.0	0.0	0.0	307.6	1.45	43.94
	2	42.4	50.2	50.4	39.6	41.1	50.4	42.1	===:	0.0	0.0	0.0	0.0	316.2	1.49	45.17
42ND ST.	1	482.2	813.3	799.4	658.1	444.6	456.1	189.9	===:	0.0	0.0	0.0	0.0	3843.6	18.06	549.09
	2	532.6	752.0	708.9	559.4	344.1	4.1	0.0	===:	0.0	0.0	0.0	0.0	2901.1	13.63	414.44
	3	0.1	0.1	0.0	0.0	0.3	0.4	0.2	===:	0.0	0.0	0.0	0.0	1.1	0.01	0.16
BROAD & BLVD	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	===:	0.0	0.0	0.0	0.0	0.0	0.000	0.00
	2	9.5	13.5	10.8	8.3	8.6	9.0	12.5	===:	0.0	0.0	0.0	0.0	72.2	0.339	10.31
	3	0.0	0.1	0.0	0.1	0.0	0.0	0.1	===:	0.0	0.0	0.0	0.0	0.3	0.001	0.04
	4	0.1	0.0	0.0	0.0	0.1	0.0	0.7	===:	0.0	0.0	0.0	0.0	0.9	0.004	0.13
MINGO CK.	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	===:	0.0	0.0	0.0	0.0	0.0	0.00	0.00
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	===:	0.0	0.0	0.0	0.0	0.0	0.00	0.00
	3	0.0	0.9	0.0	1.1	0.3	0.0	0.0	===:	0.0	0.0	0.0	0.0	2.3	0.01	0.33
	4	0.1	1.2	0.2	13.7	31.2	30.7	43.7	===:	0.0	0.0	0.0	0.0	120.8	0.57	17.26
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	===:	0.0	0.0	0.0	0.0	0.0	0.00	0.00
	6	41.5	38.7	42.5	18.7	0.2	2.1	0.0	===:	0.0	0.0	0.0	0.0	143.7	0.68	20.53
26TH & VARE	1	0.0	0.1	0.4	0.4	0.4	0.2	0.4	===:	0.0	0.0	0.0	0.0	1.9	0.01	0.27
	2	1.1	0.7	0.3	0.4	0.4	0.1	0.4	===:	0.0	0.0	0.0	0.0	3.4	0.02	0.49

WASTEWATER PUMPING - MAIN PUMP UNIT FLOW CAPACITY TEST

FORD ROAD — TEST AVER 657 GPM — WW VOL/FT
PUMP #1 900 GPM @ 83' — LAST TEST 722 GPM — 987

TEST	***** TIME ******		******** LEVEL ********			**** PUMPED ****	
DATE	TO FILL	TO EMPTY	ON	OFF	DIFF	VOLUME	GPM
02/01/87	12.25	5.50	5.50	2.33	3.17	3129	824
03/08/93	11.38	7.48	6.00	3.00	3.00	2961	656
02/14/94	13.05	6.70	6.00	3.00	3.00	2961	669
05/23/94	10.40	7.10	6.00	4.00	2.00	1974	468
11/08/94	14.25	7.52	6.00	3.00	3.00	2961	602
04/10/95	19.38	5.20	6.00	3.00	3.00	2961	722

HOG ISLAND — TEST AVER 465 GPM — WW VOL/FT
PUMP #1 500 GPM @ 51' — LAST TEST 518 GPM — 598

TEST	***** TIME ******		******** LEVEL ********			**** PUMPED ****	
DATE	TO FILL	TO EMPTY	ON	OFF	DIFF	VOLUME	GPM
04/01/89	60.00	2.53	6.58	5.58	1.00	598	246
03/08/93	60.00	1.18	6.00	5.00	1.00	598	515
02/14/94	60.00	2.53	4.00	2.00	2.00	1196	492
05/18/94	168.00	1.27	4.00	3.00	1.00	598	476
11/14/94	34.20	2.37	4.00	2.00	2.00	1196	540
03/29/95	26.12	2.53	4.00	2.00	2.00	1196	518

FORD ROAD — TEST AVER 723 GPM — WW VOL/FT
PUMP #2 900 GPM @ 83' — LAST TEST 653 GPM — 987

TEST	***** TIME ******		******** LEVEL ********			**** PUMPED ****	
DATE	TO FILL	TO EMPTY	ON	OFF	DIFF	VOLUME	GPM
02/01/87	12.25	5.17	5.50	2.33	3.17	3129	861
03/08/93	11.42	6.35	6.00	3.00	3.00	2961	726
02/14/94	13.00	4.55	6.00	3.00	3.00	2961	879
05/23/94	11.10	7.18	6.00	4.00	2.00	1974	453
11/08/94	14.16	5.30	6.00	3.00	3.00	2961	768
04/10/95	18.85	5.97	6.00	3.00	3.00	2961	653

HOG ISLAND — TEST AVER 495 GPM — WW VOL/FT
PUMP #2 500 GPM @ 51' — LAST TEST 515 GPM — 598

TEST	***** TIME ******		******** LEVEL ********			**** PUMPED ****	
DATE	TO FILL	TO EMPTY	ON	OFF	DIFF	VOLUME	GPM
03/08/93	60.00	1.37	6.00	5.00	1.00	598	448
02/14/94	60.00	2.87	4.00	2.00	2.00	1196	437
05/18/94	156.00	1.12	5.00	4.00	1.00	598	539
11/14/94	32.10	2.40	4.00	2.00	2.00	1196	536
03/29/95	35.48	2.48	4.00	2.00	2.00	1196	515

WASTEWATER PUMPING PUMP PERFORMANCE AS OF:							Sep-95
STATION	UNIT	TEST AVER/GPM	LATEST TEST	# OF TESTS	% OF RATED	RATED CAPACITY	MULTIPLIER MGD/RUN HR.
BANK ST.	PUMP #1	259	282	5	113%	250 GPM @ 30′	0.015557
	PUMP #2	237	277	4	111%	250 GPM @ 30′	0.014207
BELFRY DR.	PUMP #1	129	143	3	95%	150 GPM @ 75′	0.007713
	PUMP #2	131	162	2	108%	150 GPM @ 75′	0.007846
FORD RD.	PUMP #1	657	722	6	80%	900 GPM @ 83′	0.039406
	PUMP #2	723	653	5	73%	900 GPM @ 83′	0.043386
FORT MIFFLIN	PUMP #1	63	62	2	154%	40 GPM @ 27′	0.003750
	PUMP #2	78	78	1	195%	40 GPM @ 27′	0.004669
	PUMP #3	61	72	2	180%	40 GPM @ 22′	0.003632
	PUMP #4	66	66	1	166%	40 GPM @ 22′	0.003985
HOG ISL. RD.	PUMP #1	465	518	6	104%	500 GPM @ 150′	0.027876
	PUMP #2	495	515	5	103%	500 GPM @ 150′	0.029699
LINDEN AVE.	PUMP #1	1284	1265	7	90%	1400 GPM @ 26′	0.077069
	PUMP #2	1109	731	5	52%	1400 GPM @ 26′	0.066566
LOCKART ST.	PUMP #1	598	748	7	125%	600 GPM @ 60′	0.035879
	PUMP #2	605	845	7	141%	600 GPM @ 60′	0.036293
MILNOR ST.	PUMP #1	388	428	5	143%	300 GPM @ 24′	0.023271
	PUMP #2	432	466	3	155%	300 GPM @ 24′	0.025933
	PUMP #3	387	504	3	168%	300 GPM @ 24′	0.023229
NEILL DR.	PUMP #1	1977	1886	6	105%	1800 GPM @172′	0.118618
	PUMP #2	1885	1820	6	101%	1800 GPM @172′	0.113074
	PUMP #3	1892	1999	6	111%	1800 GPM @172′	0.113513
POLICE ACA.	PUMP #1	67	58	2	58%	100 GPM @ 24′	0.004021
	PUMP #2	65	23	2	23%	100 GPM @ 24′	0.003884
RENNARD ST.	PUMP #1	161	142	7	36%	400 GPM @ 46′	0.009658
	PUMP #2	163	158	6	40%	400 GPM @ 46′	0.009807
42ND ST	PUMP #1	2322	2322	1	116%	2000 GPM @ 60′	0.139334
	PUMP #2	1640	1649	2	82%	2000 GPM @ 60′	0.098408
	PUMP #3	0	0	1	0%	2000 GPM @ 60′	0.000000
BROAD & BLVD.	PUMP #1	3448	3117	3	104%	3000 GPM @ 54′	0.206889
	PUMP #2	3061	3202	4	107%	3000 GPM @ 54′	0.183642
	PUMP #3	5770	5285	2	53%	10000 GPM @ 47′	0.346201
	PUMP #4	6202	6078	3	61%	10000 GPM @ 47′	0.372117
MINGO CREEK	PUMP #1	ERR		0	0%	56300 GPM @ 28′	3.378000
	PUMP #2	ERR		0	0%	56300 GPM @ 28′	3.378000
	PUMP #3	ERR		0	0%	56300 GPM @ 28′	3.378000
	PUMP #4	ERR		0	0%	56300 GPM @ 28′	3.378000
	PUMP #5	ERR		0	0%	56300 GPM @ 28′	3.378000
	PUMP #6	ERR		0	0%	56300 GPM @ 28′	3.378000
26TH & VARE	PUMP #1	1119	1296	4	65%	2000 GPM @ 35′	0.067139
	PUMP #2	1220	1099	4	55%	2000 GPM @ 35′	0.073194

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FLOW CONTROL UNIT
MONTHLY FLOW REPORT

Jul-95

WASTEWATER STATIONS	PUMP #1	PUMP #2	PUMP #3	PUMP #4	PUMP #5	PUMP #6	STATION FLOW (MG)
BANK ST.	0.204	0.197					0.401
BELFRY DR.	0.463	0.961					1.424
CENT. SCH.							
FORD RD.	4.441	3.317					7.758
FORT MIFFLIN	0.004	0.005	0.003	0.002			0.005
HOG ISLAND	0.259	0.291					0.550
LINDEN AVE.	2.667	2.190					4.857
LOCKHART ST.	1.561	2.824					4.384
MILNOR ST.	0.081	0.091	0.098				0.270
NEILL DR.	17.579	19.709	19.229				56.517
POLICE ACA.	0.730	1.200					1.931
RENNARD ST.	0.399	0.413					0.812
42ND ST.	26.460	0.000	0.000				26.460
STORMWATER PUMPING STATIONS							
BROAD & BLVD.	0.000	2.296	0.035	0.260			2.591
MINGO CREEK	0.000	0.000	0.000	147.619	0.000	0.000	147.619
26TH & VARE	0.027	0.029					0.056

RECORD OF PUMP PERFORMANCE TEST

Date of test 10-18-90 Location 10th & Vine St
Unit #1 Stormwater Pump

Rated Conditions:
Capacity 3000 gpm Total Head 36 ft R.P.M. 1180
Overall eff. % .83 × .92 = 76% Range of Head

Driver:
Type Induction Motor Horsepower 40
Manufacturer US Electrical Serial no. DD-051322 Test volt. 460

Test Equipment:
Discharge Measurement Method Well Drawdown Conversion Factor 16209 GAL/FT
Level meter Taylor Calibrator Power meter Esterline Angus - PM III A
Disc. gauge 0-200" H_2O - Ashcroft Suct. gauge N/A

Pump Data:
Type Pump Vertical Turbine Size 17-HQLD No. Stages 1
Manufacturer Byron-Jackson Ser. no. 851-W-1060
Suction Size 14" Discharge Size 14"

	PUMP #1 10TH & VINE	TEST #1	TEST #2	TEST #3
HEAD	PRESSURE, P.S.I.	5.84 PSI	PSI	PSI
	HEAD, FEET	13.49 FT	FT	FT
	GAGE CL TO WATER LEVEL, FEET	15.83 FT	FT	FT
	VELOCITY HEAD, FEET	N/A	N/A	N/A
	TOTAL HEAD, FEET	29.32 FT	FT	FT
CAP	PUMP DOWN SPAN	2.17 FT	FT	FT
	PUMP DOWN TIME	10 MIN	MIN	MIN
	WELL VOL/FT	16,209 GAL	GAL	GAL
	FLOW, G.P.M.	3,517 GPM	GPM	GPM
POWER DATA	MOTOR VOLTAGE	494 VOLTS	VOLTS	VOLTS
	AMPERES	41 AMPS	AMPS	AMPS
	KILOWATTS	29.6 KW	KW	KW
	TOTAL H.P. INPUT (EHP)	39.7 HP	HP	HP
	MOTOR EFFICIENCY, %	92% EFF	EFF	EFF
	SPEED, R.P.M.	1186 RPM	RPM	RPM
	BRAKE H.P. (PUMP INPUT)	36.5 HP	HP	HP
	WATER H.P. (PUMP OUTPUT)	26.0 HP	HP	HP
	PUMP EFFICIENCY, %	71% EFF	EFF	EFF
	OVERALL EFFICIENCY, %	66% EFF	EFF	EFF

TESTED BY George Collier 1 of 2 WITNESSED BY DS

UNIT # 1 PUMP

REMARKS: Run Pump 10.0 Min

Discharge valve Throttled to 75% open
To Produce 162" head = 13.5' = 5.84 psi

Pump Ran Quiet - No Gland leakage

Shut off head 22 psi + 22.41 FT = 73.23 FT
Taylor Pneumatic Calibrator used to Measure Level
Esterline Angus Meter used for KW

TOTAL HEAD = NET. DIS. Hd - NPSH

$= (P_d + Z_1 + L_1) - (L_1)$

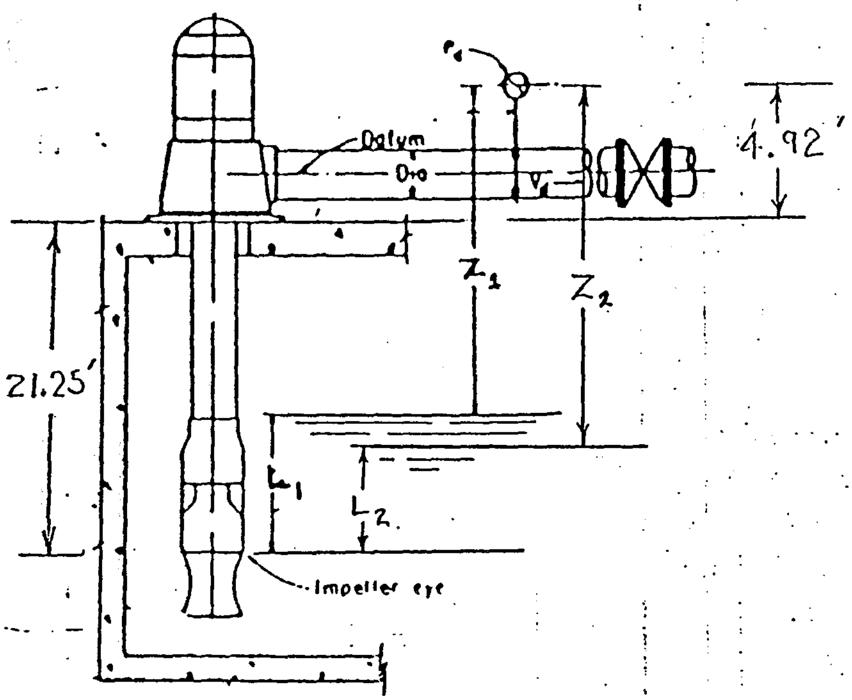
$= (13.5 + 15.83 + 10.34) - 10.34$

TDH = 29.33 FT

GPM = Vol. Pumped / Run Time

2.17' x 16209 / 10 MIN

GPM = 3517



L_1 = 10.34 FT

L_2 = 8.17 FT

P_d = 5.84 psi = 13.5 FT

Z_1 = 15.83'

Z_2 = 18.00'

Well Vol = 16,209 GAL/FT

REMARKS: RUN PUMP 10.0 MIN

Discharge VALVE Throttled TO 75% open
TO Produce 162" head = 13.5' = 5.84 PSI

PUMP RAN QUIET - NO GLAND leakage

Shut off head 22 PSI + 22.41 FT = 73.23 FT

TAYlor PNEUMATIC Calibrator used TO Measure Level

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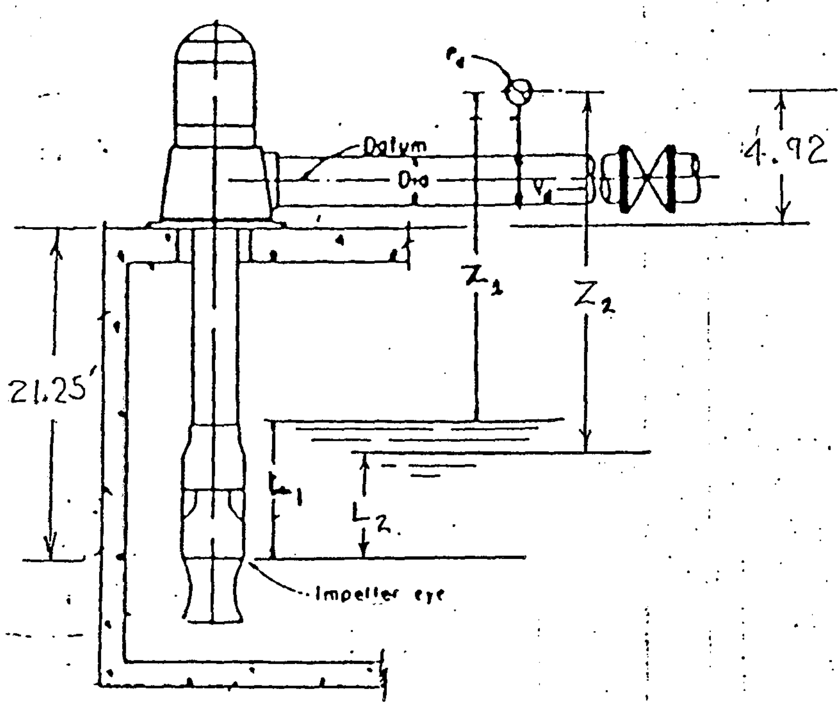


L_1 = 10.34 FT

L_2 = 8.17 FT

P_d = 5.84 PSI = 13.5 FT

Z_1 = 15.83'

Z_2 = 18.00'

WELL VOL = 16,209 GAL/FT

WW PUMPING UNIT		MAIN PUMP UNIT OOS HOURS						AVERAGE	
09/06/95 09:32 AM WEDNESDAY								66	1590
DATE OUT	TIME OUT	DATE IN	TIME IN	UN	STATION	TYPI	REASON	DAYS (	HRS OUT
								0	0
07/14/95	09:00 AM	07/15/95	03:00 PM	6	CSPS	PM	REPACK PUMP CHECK SLEEVE	1	30
07/07/95	08:00 AM	07/07/95	03:00 PM	1	FORD RD	PM	REPLACE CONTROL	0	7
06/20/95	10:00 AM	07/01/95	02:00 PM	2	42ND ST	PM	OVERHAUL	11	268
05/24/95	08:00 AM	05/25/95	01:00 PM	2	HOG ISLAND	PM	REPACK PUMP CHECK SLEEVE	1	29
03/12/95	09:00 AM			1	BROAD ST	BD	VIBRATING AGAIN	178	4263
02/16/95	08:00 AM	02/16/95	04:00 PM	2	CSPS	PM	IMPELLER INSPECTION	0	8
01/26/95	02:00 AM	01/26/95	09:00 AM	1	NEILL DR	BD	NOT PUMPING	0	7
01/26/95	02:00 AM	01/26/95	01:00 PM	3	NEILL DR	BD	HIGH VIBRATION LOOSE MOU	0	11
01/10/95	07:00 AM	01/18/95	04:00 PM	3	NEILL DR	PM	OVERHAUL	8	201
11/09/94	09:00 AM	11/10/94	12:00 PM	2	FORD RD	BD	HIGH CURRENT	1	27
10/28/94	09:00 AM	11/22/94	02:00 PM	2	BELFRY DR	PM	OVERHAUL	25	605
10/15/94	08:00 AM	10/28/94	11:00 AM	1	BANK ST	PM	NEW UNIT INSTALLED	13	323
09/26/94	10:00 AM	10/26/94	12:00 PM	6	MINGO CK	BD	MONITORS OOS	30	710
08/27/94	09:00 AM	10/11/94	02:00 PM	1	NEILL DR	BD	PUMP SEIZED	45	1085
07/23/94	10:00 PM	07/24/94	08:00 AM	5	CSPS	BD	UPPER PUMP BEARING SWITC	0	10
07/13/94	08:00 AM	09/10/94	12:00 PM	5	MINGO CK	BD	HIGH THRUST TEMP	59	1408
07/13/94	07:00 AM	09/10/94	12:00 PM	4	MINGO CK	BD	HIGH STATOR TEMP	59	1409
07/07/94	07:00 AM	08/27/94	11:00 AM	3	NEILL DR	BD	ROTOVALVE OPERATOR BROK	51	1228
07/02/94	07:00 AM	07/13/94	03:00 PM	5	MINGO CK	BD	WATER IN BOTTOM BEARING	11	272
07/02/94	07:00 AM	07/11/94	12:00 PM	4	MINGO CK	BD	DC POWER SUPPLY BLOWN FU	9	221
06/20/94	03:00 PM	06/30/94	04:00 PM	4	CSPS	PM	REPLACE W/ NEW IMPELLER	10	241
04/04/94	09:00 AM	09/20/94	10:00 AM	3	CSPS	PM	MOTOR BAD -OV PUMP	169	4057
05/05/94	08:00 AM	06/16/94	02:00 PM	2	BANK ST	PM	CONVERSION TO SUBMERSAB	42	1014
05/13/94	08:00 AM	05/26/94	08:00 AM	3	42ND ST	PM	OV- VIBRATING	13	312
04/04/94	12:00 PM	06/16/94	01:00 PM	1	BROAD ST	BD	VIBRATING	74	1765
02/02/94	09:00 AM	03/04/94	12:00 PM	3	MILNOR ST	BD	OV-MOTOR WINDING	30	720
12/11/93	09:00 AM	12/17/93	12:00 PM	1	BELFRY DR	PM	OV- SUCT PLATE WORN	6	147
10/18/93	12:00 PM	10/27/93	12:00 PM	2	BANK ST	BD	IMPELLER LOOSE	9	216

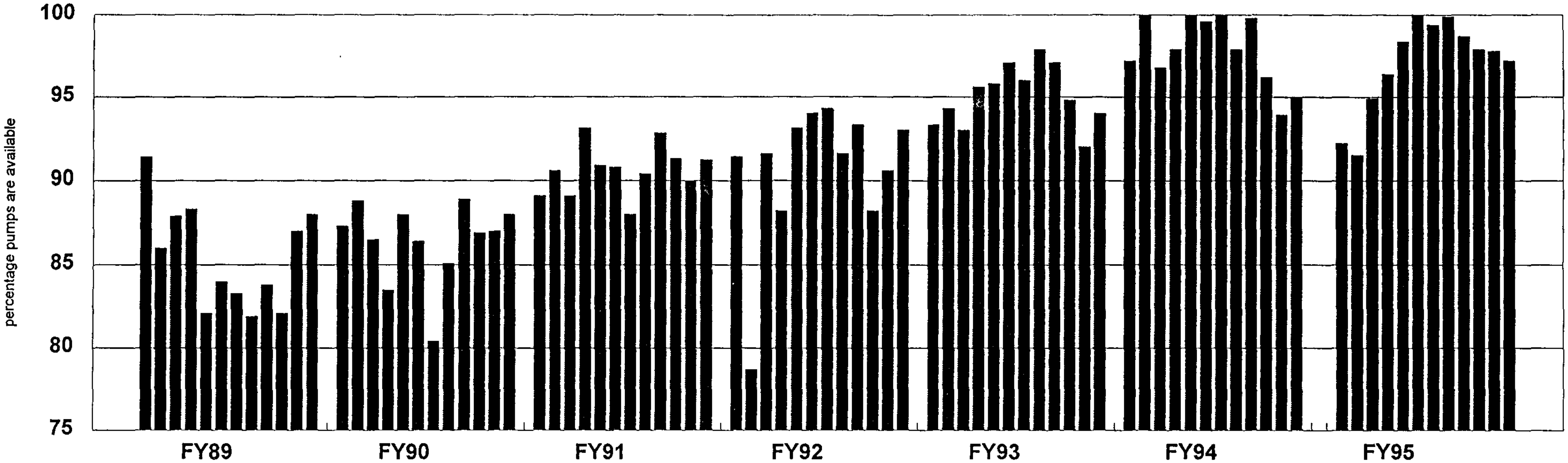
OUT OF SERVICE DATABASE GOES BACK TO MARCH 1986

IT IS USED TO MONITOR AVAILABILITY AND BREAKDOWN PERCENTAGES

WASTEWATER PUMPING - OOS & AVAILABILITY									TOTAL HOURS	32712
			OOS FOR MONTH OF:	Jun-95					PUMP OOS HOURS	926
									OVERALL AVAILABILITY	97.2%
			< = = = = = PERIOD = = = = = >						% OOS FOR BREAKDOWN	75.2%
			06/01/95	06/30/95	29 DAYS				% OOS FOR PM & OV	24.8%
BD HRS	HRS.	DAYS	DATE OUT	DATE IN	UNIT	STATION	TY	REASON	DAYS OU	HRS OUT
0	230	10	06/20/95	07/01/95	2	42ND ST	PM	OVERHAUL	11	268
696	696	29	03/12/95		1	BROAD ST	BD	VIBRATING AGAIN	128	3063

FLOW CONTROL - FY95 ANNUAL REPORT

WASTEWATER PUMP AVAILABILITY



(fig. #3)

FLOW CONTROL - MAIN PUMP AVAILABILITY HISTORY

AVAILABILITY FY89		AVAILABILITY FY90		AVAILABILITY FY91		AVAILABILITY FY92		AVAILABILITY FY93		AVAILABILITY FY94		AVAILABILITY FY95	
JUL88	91.4 %	JUL89	87.3 %	JUL90	89.1 %	JUL91	91.4 %	JUL92	93.3 %	JUL93	97.2 %	JUL94	92.2 %
AUG88	86.0 %	AUG89	88.8 %	AUG90	90.6 %	AUG91	78.7 %	AUG92	94.3 %	AUG93	100.0 %	AUG94	91.5 %
SEP88	87.9 %	SEP89	86.5 %	SEP90	89.1 %	SEP91	91.6 %	SEP92	93.0 %	SEP93	96.8 %	SEP94	94.9 %
OCT88	88.3 %	OCT89	83.5 %	OCT90	93.1 %	OCT91	88.2 %	OCT92	95.6 %	OCT93	97.9 %	OCT94	96.4 %
NOV88	82.1 %	NOV89	88.0 %	NOV90	90.9 %	NOV91	93.1 %	NOV92	95.8 %	NOV93	100.0 %	NOV94	98.4 %
DEC88	84.0 %	DEC89	86.4 %	DEC90	90.8 %	DEC91	94.0 %	DEC92	97.1 %	DEC93	99.6 %	DEC94	100.0 %
JAN89	83.3 %	JAN90	80.4 %	JAN91	88.0 %	JAN92	94.3 %	JAN93	96.0 %	JAN94	100.0 %	JAN95	99.4 %
FEB89	81.9 %	FEB90	85.1 %	FEB91	90.4 %	FEB92	91.6 %	FEB93	97.9 %	FEB94	97.9 %	FEB95	99.9 %
MAR89	83.8 %	MAR90	88.9 %	MAR91	92.8 %	MAR92	93.3 %	MAR93	97.1 %	MAR94	99.8 %	MAR95	98.7 %
APR89	82.1 %	APR90	86.9 %	APR91	91.3 %	APR92	88.2 %	APR93	94.8 %	APR94	96.2 %	APR95	97.9 %
MAY89	87.0 %	MAY90	87.0 %	MAY91	90.0 %	MAY92	90.6 %	MAY93	92.0 %	MAY94	93.9 %	MAY95	97.8 %
JUN89	88.0 %	JUN90	88.0 %	JUN91	91.2 %	JUN92	93.0 %	JUN93	94.0 %	JUN94	95.0 %	JUN95	97.2 %
	=========		=========		=========		=========		=========		=========		=========
YEAR AVE	85.5 %	YEAR AVE	86.4 %	YEAR AVE	90.6 %	YEAR AVE	90.7 %	YEAR AVE	95.1 %	YEAR AVE	97.9 %	YEAR AVE	97.0 %
FY89 AVERAGE TO JUNE:	85.5 %	FY90 AVERAGE TO JUNE:	86.4 %	FY91 AVERAGE TO JUNE:	90.6 %	FY92 AVERAGE TO JUNE:	90.7 %	FY93 AVERAGE TO JUNE:	95.1 %	FY94 AVERAGE TO JUNE:	97.9 %	FY95 AVERAGE TO JUNE:	97.0 %
MAX	91.4 %	MAX	88.9 %	MAX	93.1 %	MAX	94.3 %	MAX	97.9 %	MAX	100 %	MAX	100 %
MIN	81.9 %	MIN	80.4 %	MIN	88.0 %	MIN	78.7 %	MIN	92.0 %	MIN	93.9 %	MIN	91.5 %

WASTEWATER PUMPING
FY95 OVERHAUL SCHEDULE

REPORT FOR: Aug-95

COMPLETED 15
PROGRESSING 0

43 AVERAGE DAYS TO OVERHAUL

START	FINISH	MAIN PUMPING UNITS		STATUS	OOS DAYS
10/28/94	11/22/94	BELFRY DRIVE	# 2	COMPLETE	25 DAYS
02/10/95	04/02/95	42ND STREET	# SP	COMPLETE	51 DAYS
06/20/94	07/01/94	CSPS	# 4	COMPLETE	11 DAYS
04/04/94	09/20/94	C.S.P.S.	# 3	COMPLETE	169 DAYS
08/27/94	10/11/94	NEILL DRIVE	# 1	COMPLETE	45 DAYS
10/15/94	10/28/94	BANK ST	# 1	COMPLETE	13 DAYS
06/20/95	07/01/95	42ND STREET	# 2	COMPLETE	11 DAYS
05/16/95	08/21/95	SPDC BARGE PUMP	# 2	COMPLETE	97 DAYS
		BROAD & BLVD	# 3	______	
		26TH & VARE	# 1	______	
01/10/95	01/18/95	NEILL DRIVE	# 3	COMPLETE	8 DAYS
02/10/95	04/03/95	NEILL DRIVE	#SP	COMPLETE	52 DAYS

START	FINISH	AUXILIARY EQUIPMENT		
06/05/95	06/25/95	LINDEN P.R. VENT	COMPLETE	20 DAYS
06/06/95	06/09/95	LINDEN SUMP PUMP	COMPLETE	3 DAYS
01/17/95	04/15/95	LINDEN WW VENT	COMPLETE	88 DAYS
02/02/95	02/18/95	LOCKHART WW VENT	COMPLETE	16 DAYS
02/10/95	03/18/95	FORT PUMP RM VENT	COMPLETE	36 DAYS
04/04/95	04/05/95	26TH & VARE SUMP PUMP	COMPLETE	1 DAYS

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FLOW CONTROL PUMP MAINTENANCE DATABASE

DATE	SITE_ID	GRO	START	A/P	FINISH	A/P	PAY	EMP_NO	UNIT	SUB_UNIT	PART	JOB	TYPE	STAT
08/01/94	CSPS	PE	730	A	830	A	R	187443	ST	OE	ON	DS	PM	C
08/01/94	MING	PE	830	A	900	A	R	187443	ST	OE	ON	DS	PM	C
08/01/94	MISC	PE	900	A	1100	A	L	187443	OO	OO	OO	OO	PM	C
08/01/94	SHOP	PE	1100	A	400	P	R	187443	BU	EC	ON	RE	PM	C
08/01/94	MISC	PI	730	A	400	P	L	184697	OO	OO	OO	OO	PM	C
08/01/94	FORD	PI	730	A	130	P	R	211044	OE	EC	OE	TS	CM	C
08/01/94	MISC	PI	130	P	400	P	L	211044	OO	OO	OO	OO	PM	C
08/01/94	CSPS	PM	730	A	400	P	R	189130	05	ON	RI	RN	OV	IC
08/01/94	CSPS	PM	730	A	1130	A	R	203832	05	ON	RI	RN	OV	IC
08/01/94	NEIL	PM	1130	A	400	P	R	203832	03	DV	OM	CL	PM	C
08/01/94	MISC	PM	730	A	400	P	L	198813	OO	OO	OO	OO	PM	C
08/01/94	MISC	PM	730	A	830	A	R	194001	00	00	00	DS	PM	C
08/01/94	MISC	PM	730	A	830	A	R	184759	OO	OO	OO	DS	PM	C
08/01/94	CSPS	PM	830	A	900	A	R	194001	WW	BS	SC	CL	PM	C
08/01/94	CSPS	PM	830	A	900	A	R	184759	WW	BS	SC	CL	PM	C
08/01/94	42ST	PM	900	A	1130	A	R	194001	WW	BS	SC	CL	PM	C
08/01/94	42ST	PM	900	A	1130	A	R	184759	WW	BS	SC	CL	PM	C
08/01/94	FORD	PM	1130	A	1200	P	R	194001	WW	BS	SC	CL	PM	C
08/01/94	FORD	PM	1130	A	1200	P	R	184759	WW	BS	SC	CL	PM	C
08/01/94	NEIL	PM	1230	P	200	P	R	194001	WW	BS	SC	CL	PM	C
08/01/94	NEIL	PM	1230	P	200	P	R	184759	WW	BS	SC	CL	PM	C
08/01/94	CSPS	PM	200	P	300	P	R	194001	WW	BS	SC	CL	PM	C
08/01/94	CSPS	PM	200	P	300	P	R	184759	WW	BS	SC	CL	PM	C
08/01/94	BANK	PM	300	P	400	P	R	194001	ST	OM	OM	IS	PM	C
08/01/94	BANK	PM	300	P	400	P	R	184759	ST	OM	OM	IS	PM	C
08/01/94	42ST	PI	730	A	1000	A	R	211016	CH	OI	OI	IS	CM	IC
08/01/94	CSPS	PI	1000	A	1130	A	R	211016	BB	AL	OI	AS	CM	C
08/01/94	26VA	PI	1130	A	1200	P	R	211016	CH	CC	CH	IS	CM	C
08/01/94	LOCK	PI	1230	P	200	P	R	211016	CH	OI	OI	IS	CM	C
08/01/94	MISC	PI	200	P	400	P	R	211016	OI	CM	OI	DS	CM	C
08/02/94	FORD	PE	730	A	1000	A	R	187443	01	CV	LS	RP	CM	C
08/02/94	MING	PE	1000	A	400	P	R	187443	ST	TR	BR	IN	PM	C
08/02/94	NEIL	PI	730	A	400	P	R	211044	OI	OI	OI	IN	CM	IC
08/02/94	42ST	PI	730	A	1030	A	R	184697	LC	EC	LS	TS	CM	IC
08/02/94	42ST	PI	730	A	1030	A	R	211016	LC	EC	LS	TS	CM	IC
08/02/94	CSPS	PI	1030	A	1130	A	R	184697	WW	AL	LS	CA	PM	C
08/02/94	CSPS	PI	1030	A	1130	A	R	211016	WW	AL	LS	CA	PM	C
08/02/94	42ST	PI	1130	A	1200	P	R	184697	LC	EC	LS	TS	CM	C
08/02/94	42ST	PI	1130	A	1200	P	R	211016	LC	EC	LS	TS	CM	C
08/02/94	LOCK	PI	1230	P	400	P	R	184697	LC	CC	OI	IS	PM	C
08/02/94	LOCK	PI	1230	P	400	P	R	211016	LC	CC	OI	IS	PM	C
08/02/94	CSPS	PM	730	A	400	P	R	189130	01	PU	B4	AS	OV	IC
08/02/94	CSPS	PM	730	A	400	P	R	198813	01	PU	R1	DS	OV	IC
08/02/94	CSPS	PM	730	A	400	P	R	203832	01	PU	SH	RN	OV	IC
08/02/94	LIND	PM	730	A	900	A	R	194001	WW	BS	SC	CL	PM	C
08/02/94	LIND	PM	730	A	900	A	R	184759	WW	BS	SC	CL	PM	C
08/02/94	MILN	PM	900	A	1130	A	R	194001	WW	BS	SC	CL	PM	C
08/02/94	MILN	PM	900	A	1130	A	R	184759	WW	BS	SC	CL	PM	C

FLOW CONTROL

TEMPORARY SITE MONITOR REQUEST

II C-1

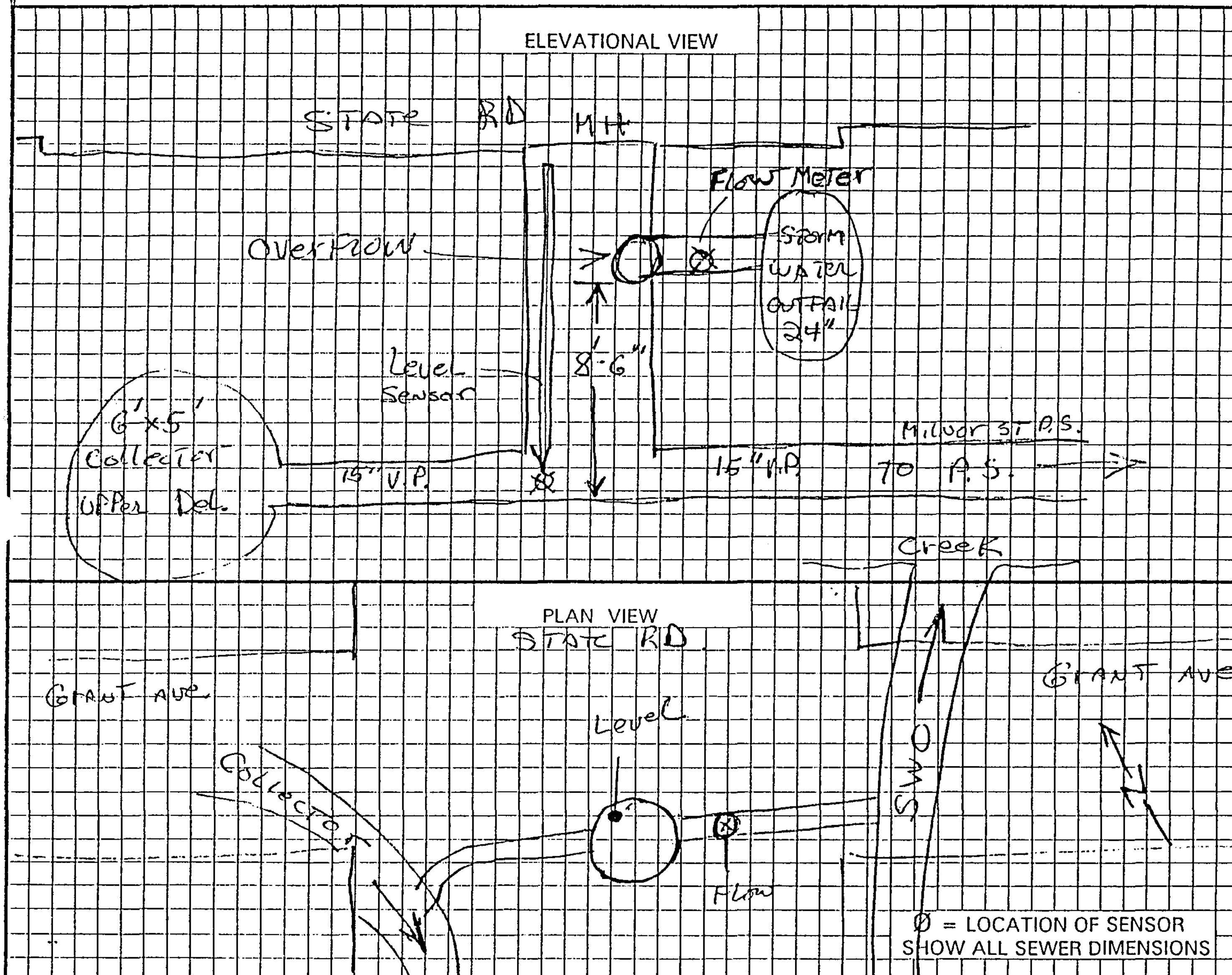
installed 5-9-95

REQUESTED BY: Drew Miltocko DATE: 4-5-95

LOCATION: Grant & State Rd. FLOW: ☑ LEVEL: ☑

DURATION: FROM ASAP TO ? INSTRUMENT: FlowTote / Druck

SKETCH LOCATION AND DESIRED POSITION OF SENSOR(s)



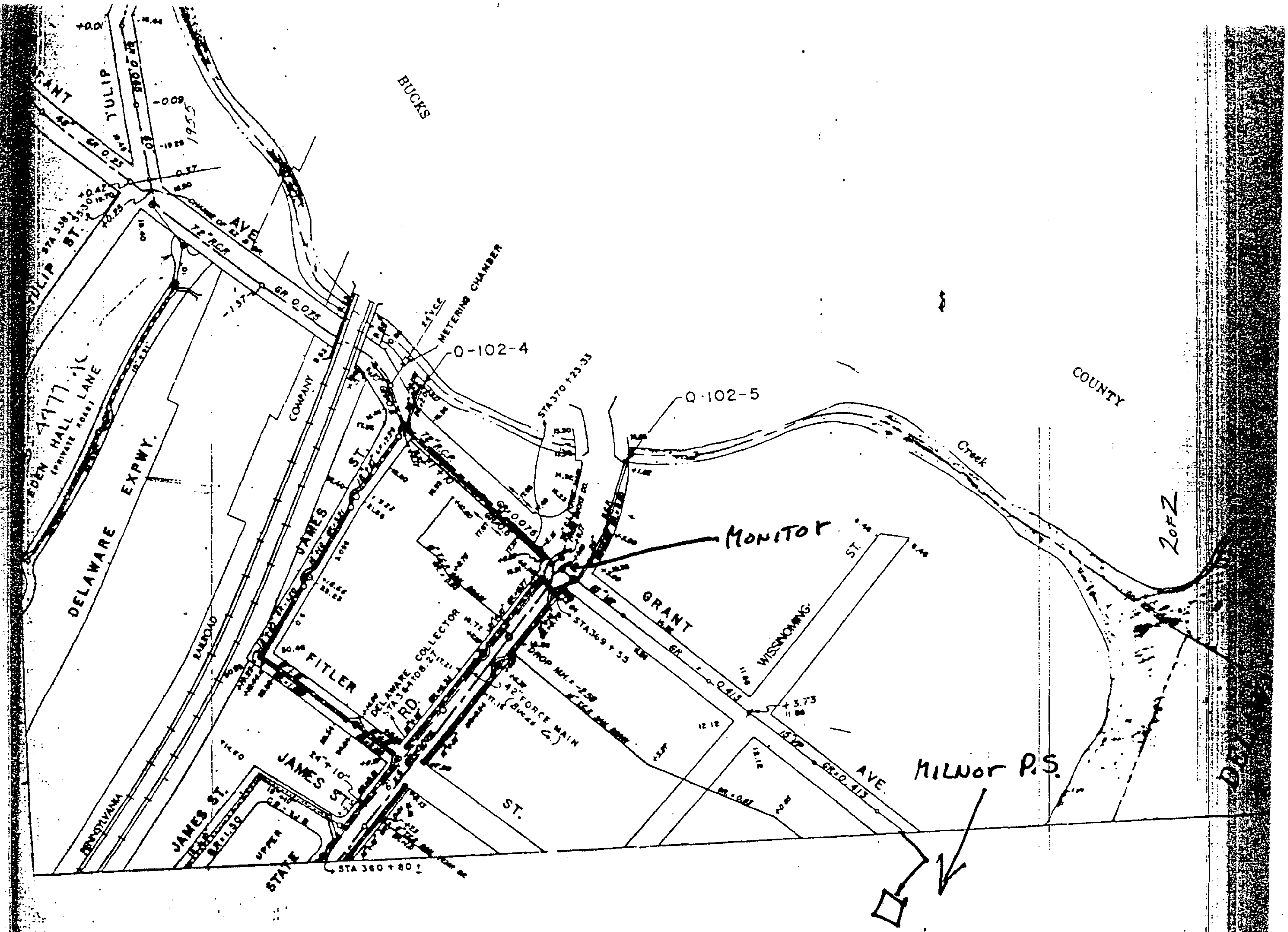
SENT DATA / GRAPH TO: G Collier DATA FORMAT: DISK ☑ GRAPH: ☐

DATA COLLECTION: WEEKLY ☐ BI-WEEKLY ☑ GRAPH: WEEKLY ☐ DAILY ☐

NOTES OR COMMENTS I'll show you site set up.

Measure invert of sewer to invert of overflow

Install telltale string in overflow to check flow direction.



NOTE: ALL SEWERS ON THIS FLAT WERE COMPLETED AF... 1949.

Temporary Level/Flow Monitoring Sites

Revisied 09/02/95

Current

Soft I.D.s #	Site/Location	Equip.	Flow/Level	Monitoring Point	Installed	Removed	Request by	Reason
0001/S50T	S-50	CR-10	(2) Level	Trunk & Tide Invert	11-23-93		G.Collier	To Determine Tidel influent & capacity of Pumping Station
0008/S50D	S-50	CD-10	Level	Regulator Invert	11-23-93			
0003/S7T	S-7	CR-10	Level	Trunk Invert	03-24-94		G.Collier	To monitor discharge from CSPS
0004/S7R	S-7	CR-10	Level	Tide Invert	03-24-94		G.Collier	(To accuratly report duration)
0005/S7D	S-7	CR-10	Level	Regulator Invert	03-24-94		G.Collier	
0006/CSPS	CSPS Syphon	21-X	Level	Syph. Invert @Rack	03-25-94		G.Collier	To determine degree of siphon blockage
MSH1	Trevose	Flo-Tote	Flow	Flume's Influent Pipe	05-16-94		C.Bradstock	
0007/D39	D-39	CR-10	(2) Level	Trunk & Tide Invert	07-30-94		G.Collier	To determine tide/discharge levels & occurrences from QL Filters
0228/QL	Queen Lane	CR-10	Flow	4-20ma Signal	09-28-94		G.Collier	Monitor filter back wash dump into sewer
009/ANNE	Anne & Melvale	CR-10	Level	Bottom of 4′ x 4′ Sewer	10-22-94		G.Collier	Monitor DWO Output of D-25
0037/ERIE	O & Erie	CR-10	Level	Bottom of 12′ x 6′	02-13-95		G.Collier	For duration of collector shut down
0010/S-5	S-5	CR-10	Level	Trunk & Tide	03-17-95		G.Collier	To monitor E.P.R. discharge
40/STAT	Grant & State	CR-10	Level	Bottom of Manhole	05-10-95		D.Mihocko	To determine discharge occurance
0011/SHUR	Shurs & Main	CR-10	Level	Bott. of Coll. & Overflow	04-22-95		D.Mihocko	To determine discharge occurance
SHUR	Shurs & Main	Flo-Tote	Flow	Bott. of Overflow	06-14-95		D.Mihocko	To determine Amount of discharge
0012/CSP	Cent. Sch. Pump.	CR-10	Level	4-20ma Signal	05-12-95		G.Collier	to Monitor Operators
0013/NE1	Northeast	CR-10	Level	Bottom of Inlet	07-27-95		B.Marengo	For C.D.M.
0014/NE2	Northeast	CR-10	Level	Bottom of Chamber	07-27-95		G.Collier	To Determine Block
32nd & Thompson		Flo-Tote	Level	Bottom of Outfall	08-12-95		D.Mihocko	Capture Overflow

II C-2

FLOW CONTROL INSTRUMENT MAINTENANCE DATABASE

DATE		SITE_ID	GR(	START	A/P	FINISH	A/P	PAY	EMP_NO	UNIT	SUB_UNIT	PART	JOB	TYPE	STAT
08/01/94		OTHR	FI	700	A	330	P	L	135842	OO	OO	OO	OO	PM	C
08/01/94		SHOP	FE	200	P	330	P	R	186617	OO	OO	OO	OO	PM	C
08/01/94		RG6	FE	700	A	930	A	R	186617	TB	OI	OO	CA	CA	C
08/01/94		D15	FE	930	A	1000	A	R	186617	OO	OT	OO	OO	PM	C
08/01/94		MBE7	FE	1000	A	200	P	R	186617	OO	OO	OO	OO	PM	C
08/01/94		SHOP	FE	200	P	330	P	R	191766	OO	OO	OO	OO	PM	C
08/01/94		RG6	FE	700	A	930	A	R	191766	TB	OI	OO	CA	CA	C
08/01/94		D15	FE	930	A	1000	A	R	191766	OO	OT	OO	OO	PM	C
08/01/94		MBE7	FE	1000	A	200	P	R	191766	OO	OO	OO	OO	PM	C
08/01/94		SHOP	FE	100	P	330	P	R	208117	AM	LM	CB	RP	CM	C
08/01/94		SHOP	FE	100	P	330	P	R	208117	OO	OO	OO	OO	PM	C
08/01/94		SHOP	FE	100	P	330	P	R	208117	AM	LM	CB	RP	CM	C
08/01/94		SHOP	FE	700	A	800	A	R	208117	OO	OO	OO	OO	PM	C
08/01/94		SHOP	FE	800	A	900	A	R	208117	OO	OO	OO	OO	CM	C
08/01/94		D5	FE	900	A	1000	A	R	208117	DL	LM	ON	RU	CM	C
08/01/94		D22	FE	1000	A	1100	A	R	208117	AM	LM	CB	RU	CM	C
08/01/94		D21	FE	1100	A	1130	A	R	208117	AM	LM	CB	RU	CM	C
08/01/94		F13	FE	1130	A	1200	P	R	208117	OO	OO	OO	RN	CM	IC
08/01/94		F14	FE	1230	P	100	P	R	208117	AM	LM	CB	RU	CM	C
08/01/94		SHOP	FE	700	A	800	A	R	214805	CS	LM	OP	IS	CD	C
08/01/94		SHOP	FE	800	A	900	A	R	214805	OO	OO	OO	CC	CM	C
08/01/94		D5	FE	900	A	1000	A	R	214805	DC	LM	ON	RU	CM	C
08/01/94		D22	FE	1000	A	1100	A	R	214805	AM	LM	CB	RU	CM	C
08/01/94		D21	FE	1100	A	1130	A	R	214805	AM	LM	CB	RU	CM	C
08/01/94		F13	FE	1130	A	1200	P	R	214805	OO	OO	OO	RN	CM	IC
08/01/94		F14	FE	1230	P	100	P	R	214805	AM	LM	CB	RU	CM	C
08/01/94		D15	FE	100	P	200	P	R	218322	RM	OE	CB	RU	CM	C
08/01/94		SHOP	FE	200	P	230	P	R	218322	GM	OE	CB	CA	CA	C
08/01/94		SHOP	FE	230	P	330	P	R	218322	CS	OE	CB	TS	CM	IC
08/01/94		SHOP	FE	700	A	800	A	R	218322	GM	OE	CB	TS	CA	C
08/01/94		SHOP	FE	800	A	830	A	R	218322	GM	OE	CB	TS	CA	C
08/01/94		SHOP	FE	830	A	900	A	R	218322	GM	OE	CB	CA	CA	C
08/01/94		SHOP	FE	900	A	1000	A	R	218322	GM	OE	CB	RU	CA	C
08/01/94		SHOP	FE	1000	A	1100	A	R	218322	GM	OE	CB	TS	CA	C
08/01/94		SHOP	FE	1100	A	1200	P	R	218322	GM	OE	CB	RU	CA	C
08/01/94		SHOP	FE	1230	P	100	P	R	218322	RN	OE	CB	VE	CM	C
08/02/94		OTHR	FI	700	A	330	P	L	135842	OO	OO	OO	OO	PM	C
08/02/94		SHOP	FI	130	P	230	P	R	186617	OO	OO	BA	CN	PM	C
08/02/94		SHOP	FI	130	P	330	P	R	186617	RG	OO	OO	CA	CA	C
08/02/94		T5	FI	700	A	930	A	R	186617	TR	OO	PI	OO	PM	C
08/02/94		T10	FI	930	A	1000	A	R	186617	OO	OO	BA	CN	PM	C
08/02/94		T13	FI	1000	A	1030	A	R	186617	OO	OO	BA	CN	PM	C
08/02/94		MBE7	FI	1030	A	130	P	R	186617	OO	OO	BA	CN	PM	C
08/02/94		SHOP	FI	130	P	230	P	R	191766	OO	OO	BA	CN	PM	C

Appendix B

Summary of SIUs and Monitored Process Flow.

Table 1: Northeast Drainage District

Table 2: Southeast Drainage District

Table 3: Southwest Drainage District

Appendix B

Table 1
Northeast Drainage District
PWD Permitted Industrial Users
Monitoring Data

				FLOW	SILVER	ARSENIC	BOD	BENZENE,TOL,ETH	CADMIUM	CHLORINE	CYANIDE, FREE	CYANIDE TOTAL
COMPANY NAME	GIS				Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value
	Id. No.	Interceptor	Subbasin	GPD	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
ABACO	2	SOM	D1920-B	4915							0.025	
ABBEY COLOR & CHEMIC	3	SOM	D25-B	17000								
ABBOTTS	4	SOM	D22-B	9499	0.0024				2.424			0.4815
ACME UNIFORM RENTAL	6	SOM	D22-B	33000						0.0867		
ACTION MANUFACTURING	7	SOM	D25-B	1600	0				0		0.005	
AECO	8	UDLL	UPD1-S	2700	0.031				0.0096			0.031
AJAX	9	UDLL	POQ4-S	3000			78					
ALLIED CHEMICAL	11	LFLL	F25-A	3.00E+05			1931					
ALLIED TUBE & CONDUI	1	UDLL	POQ4-S	3.00E+05					0.2025			
AMERICAN PACKAGING C	12	PP	PEN4-S	29400			1537					
ANCHOR DYE	13	UFLL	F05	3.00E+05								
ARWAY APRON AND UNIF	17	UFLL	F11-B	5.00E+05						0.22		
CARDONE INDUSTRIES	20	FHL	T04-A	47285	0.0043				0.0057			0.0851
CCL	22	FHL	T14-C	9600	0.005				0.016			0.0126
CHESTNUT DISPLAY SYS	24	UDLL	D05-A	1500	0				0			0.005
CINTAS CORPORATION	25	PP	PEN5-S	1.00E+05						0.7167		
CLEAN RENTAL	26	FHL	T14-A	29700								
COMPUTER COMPONENTS	28	UDLL	POQ4-S	1400	0.1035				0.0005			0.01
CONTINENTAL BAKING	30	PP	PEN4-S	35000			1711					
CUTLER	33	SOM	D25-F	2685			2337					
DEL VAL WOOL SCOURIN	34	SOM	D21	1.00E+05			1476					
DIETZ AND WATSON	35	UDLL	D11-A	20000			889					
DOMESTIC LINEN	36	UFLL	F06	90000						0.113		
DURAND	38	UDLL	POQ4-S	12600	0.002				0.0022			0.024
FRANKFORD PLATING, I	39	LFLL	F25-B	1720	0.0065				0.0029		0.0285	
FRANKLIN SMELTING &	40	SOM	D17	7500								
GARFIELD	43	FHL	T14-A	0	ZERO DISCHARGE PERMIT							
GATX CORPORATION(UNI	44	SOM	D22-A	3000								
GENERAL ELECTRIC	45	SOM	D1722-DV	4824				0.0107				
GENERAL FELT	46	UFLL	F12	312			220					
GILBERT SPRUANCE AKA GRYPHY	47	SOM	D19	0	ZERO DISCHARGE PERMIT							
GLOBE DYE WORKS	48	UFLL	F11-A	1.00E+05			43					
Gross Metal Products	50	SOM	D25-D	9.00E+03	0.0025				0.0147		0.0001	
HARVEY STERN	51	FHL	T14-R	2800	2.39				0.004		0.227	
HEINTZ	52	UDLL	POQ4-S	0	CLOSED							
HENSHELL DIV. OF GRO	53	SOM	R07-G	22000	0.0033				0.0081			0.0009174
HILLOCK ANODIZING	54	UDLL	D08	14333					0.0133		0.0094	
IMPERIAL METAL & CHE	56	UDLL	POQ4-S	2.00E+05	0.005				0.0009			0.0319
I[illegible]ATIONAL PAPER	58	UDLL	POQ4-S	29200			673					
[illegible] GE INC	59	UDLL	D07-A	47763	0.0153				0			0.0437
K[illegible] COOPERAGE	63	SOM	D25-A	561			821					
KURZ HASTING	64	UDLL	POQ4-S	2160			658					
LANNET	66	PP	PEN1-S	600							1	5
LAVELLE AIRCRAFT	68	PP	PEN5-S	11400	0.0088				0.0025			0.0022
LUSTRIK, INC	69	UFLL	F11-A	5000					0.0012			0.01
MARTIN'S METAL SPECI	70	UDLL	D02-A	3600					0.0019		0.1553	
MAX LEVY AUTOGRAPH,	71	FHL	T14-K	4880	0.0045				0.0025		0.0035	
MC WHORTER RESINS, I	72	UDLL	D02-A	1030			2206					
Merin Studios	73	PP	PEN4-S	700	1.61							
MICHELES FAMILY BAKE	74	FHL	T04-B	13600			3412					
MODEL FINISHING CO.,	75	UDLL	D02-A	1500	0.0048				0.0045		0.0098	
MUTUAL	77	UFLL	F04-B	5000			1170					
NABISCO	78	UDLL	POQ4-S	48500			1922					
NEATSFOOT OIL CORP.	80	SOM	D20	4930			3776					
NEWMAN PAPER CO.	81	UDLL	D07-A	6.00E+05			1224					0.1346
PAPER MANUFACTURERS	82	PP	PEN4-S	2.00E+05			137					
PARA CHEM SOUTHERN I	83	SOM	D22-C	500			176					
PENN MAID DAIRY	84	UDLL	POQ4-S	32500			527					
PENN VENTILATOR	86	SOM	D18	10800	0.24				0.1			
PEPSI COLA METRO BOT	87	UDLL	POQ4-S	2.00E+05			2214					
PHILA COCA COLA BOTT	91	SOM	D1722-DV	38335			1258					
PHILA GAS WORKS	92	SOM	D18	1.00E+06			15					
PHILA. RUST PROOF CO	88	SOM	D2122-DV	24540	0.0363				0			0.005
PHILADELPHIA BAKING	90	PP	PEN4-S	26613			345					
POTERO CO., INC.	61	UFLL	F06	28561					0.043			0.0315
PREMIER MEDICAL	95	pp	PEN5-S	1600	0.013				0.01			0.04
PUROLITE	96	SOM	D1722-DV	81000								0.005
READY FOODS	98	UDLL	POQ4-S	62300			3740					
REGAL INTERNATIONAL	99	UFLL	F12	2000			1634					
RICHLYN AKA GLOBAL	100	UFLL	F08	5000							1	5
ROHM & HAAS	101	LFLL	F24	2.00E+06			1848					
SANOFI	102	UDLL	POQ4-S	82000			1773					
SOABAR	104	PP	PEN3-S	8660								
SPD TECHNOLOGIES	105	UDLL	POQ4-S	20221					0.0067			0.0358
STONE CONT	106	PP	P05	26165			825					
Stone Container Corp.	107	PP	PEN4-S									
UNITED COLR	111	SOM	D19	1700	NO PROCESS DISCHARGE HAS BEEN MADE THEREFORE NO SAMPLES CAN BE COLLECTED.							
Valley Proteins, Inc.	114	SOM	D20									
VIZ MANUFACTURING	115	FHL	T14-Q	35523	0.0107	0.0047			0.0013			0.004
				6.98E+06								
				SUM								

Appendix B

Table 1
Northeast Drainage District
PWD Permitted Industrial Users
Monitoring Data

	CHROME	COPPER	HYDROCARBON OIL	FATS, OIL. GREA	OIL AND GREASE	NICKEL	LEAD	TOTAL PCB	PENTACHLOROPHEN	PH	PH
COMPANY NAME	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Maximum Value
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	POUNDS	mg/l		
ABACO		0.31				0.264					
ABBEY COLOR & CHEMIC										6.45	80.35
ABBOTTS	0.0409	2.1274				0.2954	0			7.29	8.78
ACME UNIFORM RENTAL			28.3223	111.4143						7.67	11.47
ACTION MANUFACTURING	0	0				0	0			6.25	6.5
AECO	0.09	0.688				0.19	0.009			7.77	8.1
AJAX										6.36	7.1
ALLIED CHEMICAL											
ALLIED TUBE & CONDUI	0.0417	0.0928				0.0024	0.3902			7.92	9
AMERICAN PACKAGING C			173.7778	36.0732355						7.48	8.54
ANCHOR DYE	4										
ARWAY APRON AND UNIF				220.0834	80.9214		0.0404			8.73	11
CARDONE INDUSTRIES	0.0082	0.0182	35.0356			0.0229	0.0113			8.81	10.03
CCL	0.09	0.029				0.046	0.022			9.00	11.83
CHESTNUT DISPLAY SYS	0.192	0.064				0.232	0			6.50	6.5
CINTAS CORPORATION			46.2222	89.3333			0.2833			9.62	10.62
CLEAN RENTAL			50				0.43				
COMPUTER COMPONENTS	0.4816	0.0233				0.0187	0.0008			7.63	11.04
CONTINENTAL BAKING											
CUTLER				80.55							
DEL VAL WOOL SCOURIN				712.5						7.18	7.42
DIETZ AND WATSON				112.375							
DOMESTIC LINEN			163								
DURAND	0.0028	0.016				0.008	7.9			6.90	7
FRANKFORD PLATING, I	0.0067	0.0689				0.019	0.0542			8.58	9.21
FRANKLIN SMELTING &		0.732					1.1475			6.09	6.3
GARFIELD											
GATX CORPORATION(UNI			28								
GENERAL ELECTRIC		0.16	30.1538					0.0009		7.55	8.06
GENERAL FELT			5.5322	15.9889						7.34	7.89
GILBERT SPRUANCE AKA GRYPHY											
GLOBE DYE WORKS	0.3478		5.8333							7.61	8.6
Gross Metal Products	0.0928	0.1674				0.6417	0.0706			7.80	11.5
HARVEY STERN	0.005	0.79				0.016	3			7.73	8.23
HEINTZ											
HENSHELL DIV. OF GRO	0.0983	0.1387				0.7326	0.0427			9.10	10.5
HILLOCK ANODIZING	1.5198	0.1566				0.1061	0.0636			9.25	10
IMPERIAL METAL & CHE	1.3935	0.0208				0.0156	0.008			41.16	1010
[illegible]ATIONAL PAPER			11.2333							8.49	8.75
[illegible]DGE INC	0.002	2.5177				0.0463	0.0832			8.02	8.9
K[illegible]S COOPERAGE											
KURZ HASTING											
LANNET											
LAVELLE AIRCRAFT	0.0217	0.1608				0.0113	0.0112				
LUSTRIK, INC	0.3233	0.1133				0.18	0.1468			8.07	10.32
MARTIN'S METAL SPECI	0.0207	0.5606				0.2334	0.0005			7.05	7.84
MAX LEVY AUTOGRAPH,	0.0375	0.7547				0.0212	0.0994			6.29	10.45
MC WHORTER RESINS, I										6.50	6.5
Merin Studios											
MICHELES FAMILY BAKE			105.99	434.6						5.83	8.82
MODEL FINISHING CO.,	0.0066	0.0243				0.0121	0.0131			6.81	7.86
MUTUAL											
NABISCO			3.8264	48.7416						6.62	8.1
NEATSFOOT OIL CORP.			3.5986	8.7557						6.38	7.4
NEWMAN PAPER CO.									0.029	7.09	8
PAPER MANUFACTURERS			133.27	30.68						7.74	8.76
PARA CHEM SOUTHERN I			33.65							7.82	9.47
PENN MAID DAIRY				263.11						6.91	9.49
PENN VENTILATOR	4	2.7				2.6	0.43				
PEPSI COLA METRO BOT				138.6						6.43	7.3
PHILA COCA COLA BOTT				52.8889						7.75	10.1
PHILA GAS WORKS			27								
PHILA. RUST PROOF CO	0.1207	0.1537				0	0			8.33	9
PHILADELPHIA BAKING			23.8267	45.2267						7.43	11.89
POTERO CO., INC.	0.6312	0.2339				0.4859	0.0636			9.13	10
PREMIER MEDICAL	1.31	0.55				0.24	0.12			7.00	7.2
PUROLITE							0.1				
READY FOODS											
REGAL INTERNATIONAL	12.9234						0.0675			7.75	9.7
RICHLYN AKA GLOBAL											
ROHM & HAAS											
SANOFI											
SOABAR		2.7									
SPD TECHNOLOGIES	0.0217	0.1503				0.0103	0.0345			9.07	10.5
STONE CONT											
Stone Container Corp.											
UNITED COLR											
Valley Proteins, Inc.											
VIZ MANUFACTURING	0.0137	1.3797				0.06	0.0367				

Table 1
Northeast Drainage District
PWD Permitted Industrial Users
Monitoring Data

	SS	SULFIDES	TEMP.	TEMP.	TRICHLOROPHENOL	TOTAL TOXIC ORG	ZINC
COMPANY NAME	Average Value	Average Value		Maximum Value	Average Value	Average Value	Average Value
	mg/l	POUNDS	C	C	mg/l	mg/l	mg/l
ABACO							0.1557
ABBEY COLOR & CHEMIC							
ABBOTTS						4.5585	0.3323
ACME UNIFORM RENTAL	116		28.475	34		0.116	
ACTION MANUFACTURING							0.208
AECO						0.017	0.169
AJAX	417					0.003	
ALLIED CHEMICAL	45						
ALLIED TUBE & CONDUI							0.9366
AMERICAN PACKAGING C	2973						
ANCHOR DYE							
ARWAY APRON AND UNIF	352		30.78	32.5			
CARDONE INDUSTRIES	25					0.0412	0.3295
CCL							1.2
CHESTNUT DISPLAY SYS							0.068
CINTAS CORPORATION	165		24.1	36.2		0.6133	0.8919
CLEAN RENTAL							
COMPUTER COMPONENTS						0.2027	0.5604
CONTINENTAL BAKING	860						
CUTLER	549						
DEL VAL WOOL SCOURIN	1611						
DIETZ AND WATSON	271						
DOMESTIC LINEN	354						
DURAND						0.18	0.055
FRANKFORD PLATING, I							0.1274
FRANKLIN SMELTING &	8		137.5	140			2.2324
GARFIELD							
GATX CORPORATION(UNI	22						
GENERAL ELECTRIC							
GENERAL FELT	448						
GILBERT SPRUANCE AKA GRYPHYI							
GLOBE DYE WORKS	16						
Gross Metal Products						0.32	0.3309
HARVEY STERN						0.04	0.44
HEINTZ							
HENSHELL DIV. OF GRO						0.242	0.7404
HILLOCK ANODIZING						0.038	0.2777
IMPERIAL METAL & CHE	644					0.246	0.103
INTERNATIONAL PAPER	161						
JANBRIDGE INC						0.09	0.1146
KELLYS COOPERAGE	827						
KURZ HASTING							
LANNET							
LAVELLE AIRCRAFT							0.2916
LUSTRIK, INC							0.1933
MARTIN'S METAL SPECI						0.204	0.1531
MAX LEVY AUTOGRAPH,						0.296	0.1598
MC WHORTER RESINS, I	71						
Merin Studios							
MICHELES FAMILY BAKE	852						
MODEL FINISHING CO.,						0.105	0.136
MUTUAL	263						
NABISCO	1164						
NEATSFOOT OIL CORP.	76						
NEWMAN PAPER CO.	1618		36.8333	39.5	0.039		
PAPER MANUFACTURERS	717						
PARA CHEM SOUTHERN I	707						
PENN MAID DAIRY	286						
PENN VENTILATOR							2.6
PEPSI COLA METRO BOT	99						
PHILA COCA COLA BOTT	1844						
PHILA GAS WORKS							
PHILA. RUST PROOF CO							0.136
PHILADELPHIA BAKING	61						
POTERO CO., INC.							1.0543
PREMIER MEDICAL						0.07	
PUROLITE							0.28
READY FOODS	1673						
REGAL INTERNATIONAL							
RICHLYN AKA GLOBAL							
ROHM & HAAS	2241						
SANOFI	525						
SOABAR							
SPD TECHNOLOGIES	705						0.1139
STONE CONT							
Stone Container Corp.							
UNITED COLR							
Valley Proteins, Inc.							
VIZ MANUFACTURING						0.0177	0.82

Appendix B

Table 2
Southeast Drainage District
PWD Permitted Industrial Users Monitoring Data

				FLOW	SILVER	ARSENIC	BOD	BENZENE,TOL,ETH	CADMIUM	CHLORINE	CYANIDE, FREE
COMPANY NAME	GIS				Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value
	Id. No.	Interceptor	Subbasin	GPD	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
ACME PLATING	5	LDLL	D54-D	1	NO PROCESS DISCHARGE HAS BEEN MADE THEREFORE NO SAMPLES CAN BE COLLECTED.						
ALL-BRITE METAL FINI	10	LDLL	D3738-D-DV	400		0.0004			0.011		0.0174
Anzon	15	LDLL	D38-B	' 1790		0.006					
ARBILL	16	LDLL	R08-D	18500							
CATTIE	21	LDLL	D38-B	0	ZERO DISCHARGE						
CHELSEA PLATING	23	LDLL	D54-E	980	0.07	0.0045			0.009		0.2356
COLUMBIA SILK DYEING	27	LDLL	D44-B	40000			250				
COOPER'S COOPERAGE	31	LDLL	D45-B	2500			487				
FREDA SAUSAGE CO.	41	LDLL	D65	20000			2183				
INOLEX CHEMICAL CO.	57	LDLL	D68-C	1.00E+05			2149				
JEROME FOODS	60	LDLL	D41	58486			1143				
JWS Delavau	62	LDLL	D39-C	16000			513				
Mrs. Resslers	76	LDLL	D44-B	10400			3093				
NATIONAL CHEMICAL	79	LDLL	D48-D	250			250				
Queen Lane Water Treatment Plant	97	CSES	UWHL	1.00E+07							
U.S. MINT	110	LDLL	D53-B	46000	0.0032	0.0021			0		
U.S. UNIFORM	113	LDLL	D45-E	47000						0.05	
WADE TECHNOLOGIES, I	116	LDLL	D48-D	130	0.0084	0.0033			0.0075		0.0353
WOLF	117	LDLL	D44-B	3412	0.0152				0.0208		
				1.04E+07							
				SUM							

Appendix B

Table 2
Southeast Drainage District
PWD Permitted Industrial Users Monitoring Data

	CYANIDE TOTAL	CHROME	COPPER	HYDROCARBON OIL	FATS, OIL. GREA	OIL AND GREASE	NICKEL	LEAD	TOTAL PCB	PENTACHLOROPHEN
COMPANY NAME	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	POUNDS	mg/l
ACME PLATING										
ALL-BRITE METAL FINI	0	0.0217	0.1463				0.1711	0.0206		
Anzon								0.45		
ARBILL				50				**0.43**		
CATTIE										
CHELSEA PLATING		0.0114	0.266				0.0158	0.0232		
COLUMBIA SILK DYEING	0	1.095				14				
COOPER'S COOPERAGE	0			69.74	124.7					
FREDA SAUSAGE CO.	0			2.375	3.85					
INOLEX CHEMICAL CO.	0									
JEROME FOODS										
JWS Delavau										
Mrs. Resslers				20.0538	140.6333					
NATIONAL CHEMICAL				100						
Queen Lane Water Treatment Plant										
U.S. MINT	0.0019182	0.0317	0.8281				0.1695	0.0136		
U.S. UNIFORM	0					68		0		
WADE TECHNOLOGIES, I	0	0.0286	0.0849				0.4061	0.01		
WOLF	0.003983851	0.0217	0.0458				0.0455	0.0232		

Appendix B

Table 2
Southeast Drainage District
PWD Permitted Industrial Users Monitoring Data

COMPANY NAME	PH Average Value	PH Maximum Value	SS Average Value mg/l	SULFIDES Average Value POUNDS	TEMP. DEGREES C	TEMP. Maximum Value DEGREES C	TRICHLOROPHENOL Average Value mg/l	TOTAL TOXIC ORG Average Value mg/l	ZINC Average Value mg/l
ACME PLATING									
ALL-BRITE METAL FINI	7.29	10.89						0.039	0.332
Anzon	7.39	9.5							
ARBILL									
CATTIE									
CHELSEA PLATING	7.08	8.05						0.03	0.194
COLUMBIA SILK DYEING	6.99	7.27							
COOPER'S COOPERAGE	7.29	7.51	174						
FREDA SAUSAGE CO.			560						
INOLEX CHEMICAL CO.			406						
JEROME FOODS			953						
JWS Delavau			420						
Mrs. Resslers	6.24	6.93	1525						
NATIONAL CHEMICAL									
Queen Lane Water Treatment Plant									
U.S. MINT	8.30	10						0.53	0.0682
U.S. UNIFORM	10.00	10	139						
WADE TECHNOLOGIES, I	7.04	8.4						0.0295	0.1675
WOLF	7.00	7							0.2026

Table 3
Southwest Drainage District
PWD Permitted Industrial Users
Monitoring Data

				FLOW	SILVER	ARSENIC	BOD	BENZENE,TOL,ETH	CADMIUM	CHLORINE	CYANIDE, FREE
COMPANY NAME	GIS				Average Value	Average Value	Average Value	Average Value	Average Value	Average Value	Average Value
	Id. No.	Interceptor	Subbasin	GPD	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
ANGELICA	14	LSWS	S45-C	1000						0.399	
BELMONT	18	SWMG	S27-J	3.00E+06							
BREYERS ICE CREAM DI	49	SWMG	S50-A	89708			4665				
CCA	19	CSES	UPS6-S	2.00E+06			876				
CONNELLY	29	CSES	UPS6-S	0	ZERO DISCHARGE PERMIT						
COYNE	32	SWMG	S27-G	1.00E+05						2.4	
DUPONT	37	LSES	S31	75000	0.43	0.005			0.2		
G.W. RICHARDS	42	CSES	UPS6-S	3000			1323				
HYGRADE	55	CCLL	MIN2-S	2.00E+05			965				
LAFRANCE	65	CCLL	MIN2-S	60000	0.009	0.0035			0.005		0.025
LAUREL LINEN	67	SWMG	S27-G	50000						0.05	
PENN FISHING TACKLE	85	CSES	SO1T	29882	0	0.001			0		
PHILA GAS WORKS	93	LSES	S42A-B	1.00E+06			15				
PHILA THERMAL	89	CSES	S25	3.00E+05					0.01		
PNI	94	CSES	S0607-DV	125							
SMITH, KLINE, BEECHA	103	CSES	S0607-DV	50000		0.0021	16				
TANK CLEANING	108	LSWS	S45-B	173			89	30.02			
Tasty B Baking Co.	109	CSES	SO1T	146007.1							
US BANKNOTE	112	CCHL	R01-B	60	0.24				0.1		
Yeager Industries, Inc.	118	CSES	SO1T	1000	0.0518				0.0093		
				7.11E+06							
				SUM							

Appendix B

Table 3
Southwest Drainage District
PWD Permitted Industrial Users
Monitoring Data

COMPANY NAME	CYANIDE TOTAL Average Value	CHROME Average Value	COPPER Average Value	HYDROCARBON OIL Average Value	FATS, OIL, GREA Average Value	OIL AND GREASE Average Value	NICKEL Average Value	LEAD Average Value	TOTAL PCB Average Value	PENTACHLOROPHEN Average Value
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	POUNDS	mg/l
ANGELICA				17				0.023		
BELMONT										
BREYERS ICE CREAM DI				0.9	80.7667					
CCA										
CONNELLY										
COYNE				700						
DUPONT		4	4.5				2.6	0.43		
G.W. RICHARDS										
HYGRADE				14.42	39.23					
LAFRANCE		0.24	0.49				0.32	0.002		
LAUREL LINEN						60				
PENN FISHING TACKLE	0.005	0.4695	0.222				1.0715	0		
PHILA GAS WORKS				27						
PHILA THERMAL		0.011	0.013				0.03	0.01		
PNI			0.028	0.13				0.021		
SMITH, KLINE, BEECHA	0.0045							0.0101		
TANK CLEANING				49.5						
Tasty B Baking Co.		1970	2398.867452	1970	2398.867452					
US BANKNOTE		4	2.7				2.6	0.43		
Yeager Industries, Inc.	0.0075	0.0121	0.1081				0.0453	0.0808		

Appendix B

Table 3
Southwest Drainage District
PWD Permitted Industrial Users
Monitoring Data

	PH	PH	SS	SULFIDES	TEMP.	TEMP.	TRICHLOROPHENOL	TOTAL TOXIC ORG	ZINC
COMPANY NAME	Average Value	Maximum Value	Average Value	Average Value		Maximum Value	Average Value	Average Value	Average Value
			mg/l	POUNDS	DEGREES C	DEGREES C	mg/l	mg/l	mg/l
ANGELICA	10.15	10.6	60						
BELMONT									
BREYERS ICE CREAM DI			1884						
CCA	6.69	7.72	909	13.5592					
CONNELLY									
COYNE	11.60		612					24.6	
DUPONT									4.2
G.W. RICHARDS			333						
HYGRADE	6.48	7.1	684						
LAFRANCE	9.80	10.1							0.14
LAUREL LINEN	11.00	11	132						
PENN FISHING TACKLE	8.00	10							0.1465
PHILA GAS WORKS									
PHILA THERMAL	7.52	8.51							0.21
PNI									
SMITH, KLINE, BEECHA	8.00	8.72	5						0.2004
TANK CLEANING			48		32	32			
Tasty B Baking Co.									
US BANKNOTE									2.6
Yeager Industries, Inc.	7.10	7.1							0.0652

Appendix C

Influent Flow Control Strategies

Philadelphia Water Pollution Control Plants

- Northeast Plant
- Southwest Plant
- Southeast Plant

Appendix C-1

Influent Flow Control Strategies

Philadelphia Northeast Water Water Pollution Control Plant

Memorandum *City of Philadelphia*

NORTHEAST

To:	*SEE DISTRIBUTION*
From:	*Ramesh H. Shah, Operations Manager, NEWPCP*
Date:	*01/06/1994*
Subject:	***IPS OPERATION***

PURPOSE: To comply with new regulatory permit (National Pollution Discharge Elimination System) issued on September 27, 1993 for a five year period.
As per Section N, Page 140 'o' of the Permit. (Copy attached)

WHAT IS REQUIRED?

The plant is **NOT** authorized to --
a. Throttle the influent gate and/or
b. Restrict the flow
UNLESS Influent Flow is higher than --
a. 420 MGD - Instantaneous and/or
b. 315 MGD - Average daily flow.

WHAT IT MEANS?

There are two reportable conditions where CSO Forms need to be filled out. (Copy attached)

A. FLOW RESTRICTION
Anytime influent gate is Fully open and total flow rate is less than 420 MGD and Junction Chamber A level is HIGHER than 12 feet.

B. GATE AND FLOW RESTRICTION
Anytime influent gate (Junction Chamber A) is lowered from its Fully Open (85%) position.

1. DETRITOR MAINTENANCE:
The maintenance unit request for flow and gate restriction in order to prevent flooding of detritor under maintenance must be logged in both at the IPS log book and at the O.C.C.'s register. Also, the gate must be opened fully as soon as maintenance is completed. This type of incident will not be warranted once Set 2 Primary tanks work is completed.

2. Failure of Influent Pumps:
If pump fails to operate but otherwise was available, it must be reported to your supervisor.

3. Influent Pumps and Bar Screens:
Normally four pumps can handle its rated capacity up to 340 MGD provided bar screens are not blinded.
Use of 5th pump will be necessary to maintain low level in Junction Chamber. Prior to placing fifth pump in service, all four bar screens must be running continuously. As soon as the level comes down, use pumps only as required. Also, prepare a work order for bar screens in question.

HOW CAN IT BE MINIMIZED?

GATE & FLOW RESTRICTION

4&5. Detritor Pump Room and Low level Bar Screen Room:
DO NOT lower the influent gate until level is dangerously high enough for flooding to occur.
If lowered, open the gate as soon as level decreases.

6. Flow in excess of 420 MGD or 315 MGD total daily flow.
If total plant flow rate registers 421 MGD or HIGHER for one hour duration, junction chamber 'A' gate can be throttled to permit flow in the range of 400 - 420 MGD. The gate cannot be throttled to a point where total plant flow drops under 400 MGD. (This incident is still considered as a gate and flow restriction due to flow being restricted but only in excess of permit allowance. However, it is not a permit violation.)

7. Other Reasons:
There may be other reasons such as power failure, influent sluice gate for the pump failed to open, junction chamber gate failed to open, flooding of RBC platforms, unavailability of detritor tank, PST flow restriction, return sludge pumps failure, etc. These all are considered as Flow and Gate Restriction incidents.

NOTE: Copy of Permit is on file in Computer Room.

Attachment: CSO Form
Page 14-0, NPDES Permit

cc: J. Nicolo
W. McKeon
G. Laurinaitis
S. Khojasteh
T. Skotarczak
R. Doherty
O. Tucker
L. Williams
K. Green
PTB Operators
PTB Logbook
CSO File (NE)
D. Weber (For setting low level alarm activation limits at 11' (High), 5' (Low)

PART C

OTHER REQUIREMENTS (Continued)

D. Documentation of Implementation of Nine Minimum Controls — PID + 24 months

E. Submittal of Long Term CSO plan and schedule — PID + 36 months

F. DER approval of Long Term CSO plan and schedule — PID + 48 months

Annual CSO Status Report

The annual CSO status report shall be submitted with the Chapter 94 - "Municipal Wasteload Management Report". The report shall provide a summary of the frequency, duration, and volume of the CSOs for the past calendar year, operational status of major overflow points and identification of known/potential instream water quality impacts and their causes. The annual report shall also summarize all actions taken and their effectiveness in implementing the approved Plans of action, and shall evaluate and provide necessary revisions to the plans approved by the Department.

N. The permittee shall operate the sewage treatment plant to provide treatment for the maximum design wastewater flows of 315 mgd (maximum daily average) and 420 mgd (peak) without causing treatment plant upsets. Throttling of influent flows to the plant resulting in avoidable, premature sewer system overflows is prohibited.

O. An average monthly flow in excess of 210 mgd shall not be considered to be a violation of this permit.

P. An application may be made to the Delaware River Basin Commission to establish alternate/equivalent $CBOD_5$ effluent mass and concentration limits to replace the BOD_5 effluent limits in this permit. Upon establishment of such limits by the Commission, the BOD_5 limits shall cease to be in effect and the $CBOD_5$ limits established by the Commission shall become effective.

Q. Biomonitoring

I. General Requirement.

The permittee shall conduct acceptable toxicity tests in accordance with the appropriate test protocols described in Section V. Test Conditions and Methods. The permittee must collect discharge samples and perform the toxicity tests to generate chronic Ceriodaphnia dubia and fathead minnow (Pimephales promelas) test results (NOEC's) which will also enable a determination of the acute (LC50) value at the 48 hour interval. For purpose of reporting, all NOEC's shall be converted to TUc's by the following equation:

$$TUc = \frac{100}{NOEC}$$

C.S.O. SUMMARY
NORTHEAST WPCP
MONTHLY REPORT FOR JANUARY 1995

Date of Throttling	Jct Cham "A" % Open	Start Time	End Time	Duration Hour	Max. Level Reached (ft.)	Overflow Level YES / NO	Code	Reason for Occurrence
1-6-95	85%	9:10 pm	5:50 am	8.75	17.5	No	2, 3, 7	High flows (390 to 400 MGD), along with RSP #3 failure and bar screen #6 failure caused this occurrence.
1-9-95	85%	12:00 noon	3:50 pm	3.83	15.0	No	1	Maintenance working on #3 detitor
1-10-95	85%	10:45 am	2:05 pm	3.33	15.5	No	1	Maintenance working on #2 detitor
1-20-95	85%	8:10 am	5:45 pm	9.58	18.8	Yes	3	Bar screens 2, 3, 5, and 6 malfunction
1-23-95	85%	11:30 am	1:30 pm	2.00	16.0	No	1	Maintenance working on #2 detitor
1-24-95	85%	12:00 noon	1:00 pm	1.00	14.0	No	1	Maintenance working on #2 detitor
1-25-95	85%	12:20 pm	3:20 pm	3.00	12.1	No	1	Maintenance working on #1 and#2 detitor
1-27-95	85%	11:45 am	3:15 pm	3.50	13.5	No	1	Maintenance working on #3 detitor
1-28-95	85%	1:00 pm	2:40 pm	1.67	15.4	No	4	Detritor tanks not available for use

COMMENTS:
Action level on 1-20-95, lasted from 10:00 am to 10:35 am only.

(1) Detritor No.______ Maintenance (2) Failure of Pumps No.'s________ (3) Problems with Bar Screens No.'s______
(4) Imminent Flooding of Detritor Pump Room (5) Flow Exceeded 420 MGD / 315 MGD (daily Avg.) (6) Other ______
(7) Imminent Flooding of L. L. Bar Screen Room (Inl. ch. Elev. 20')
Northeast Action Level Is 18.5'. Max. Peak Flow Is 420 MGD. Max. Daily Flow 315 MGD. Jct Cham "A" is Fully Open at 85%.

COMBINED SEWER OVERFLOW MONITORING 1994

PUMPING STATION DLL

DATE OF THROTTLING:

TYPE OF OCCURRENCE: Prior to occurence Start of Event

☐ Flow Restriction NO. of Pumps ______ NO. of Pumps ______

☐ Gate and Flow Restriction % Gate Open ______ % Gate Open ______

Event Start Time: JCT "A" Elevation ______
INF. FLOW ______

Event End Time: JCT "A" Elevation ______
INF. FLOW ______

Event Duration Time:

REASON FOR OCCURRENCE:

1 Detritor NO. _____ Maintenance

2 Failure of Pumps NO.'s ______

3 Problems with Bar Screens NO.'s ______

4 Imminent Flooding of Detritor Pump Room

5 Imminent Flooding of L. L. Bar Screen Room (Inl. ch. Elev. 20')

6 Flow Exceeded 420 MGD

7 Other ____

ACTION TAKEN TO MINIMIZE DURATION OF THE OCCURRENCE:

Action Level Reached ☐ Yes ☐ No (Action Level = 18.5')

Operator:

Crew Chief:

Operations Supervisor:

Operations Manager:

Plant Manager:

cc: Nicolo, W. McKeon

Auto. operation

PTB – NE – PUMPING ALGORITHM

in	Level	Elevation	Elev.	New Pump starts	Existing Pump drops to
		78. Junction Chamber A invert level			
1	4.5'	76.5		85% speed	
			77.375	100% "	
2	5.875'	77.875		±86%	86%
			78.75	100%	100%
3	7.25'	79.250		±86%	86%
			80.125	100%	100%
4	8.625'	80.625		±86%	86%
			81.5	100%	100%
5	9.5'	81.5		All 4 Pumps at Max-Speed (100%)	
	10'	82		High Level Alarm actuated.	

o Center line of pump el. 73 ft.

o Just Low level operation

o City Datum

o Bubbler pump control system

Northeast

provide space for such fittings, revisions in piping and supports shall be made at no additional cost to the City. The overall dimensions of the pump shall be such that it will pass through a door with an 11-foot by 11-foot 10-inch clear opening and the pump shall be provided with proper lifting hooks so it can be handled in either a horizontal or vertical position.

Working drawings, including control equipment physical drawings, schematic control diagrams, wiring diagrams, and complete description of the control system, physical drawings and characteristic curves of the pumps, and complete details of the drive units, shall be furnished in accordance with Section 3 of the General Provisions.

W-44.02 Pump Characteristics

The pumping units shall be designed for operating under the following conditions:

Rated capacity at full speed, gpm	59,000
Total dynamic head at rated capacity and full speed, ft.	45
Minimum pump efficiency at rated conditions	86
Minimum shutoff head, ft.	60
Max. total dynamic operating head, ft.	46.0
Minimum head at full speed, ft.	39.5
Capacity at minimum head at least, gpm	59,000
NPSH at minimum head and full speed, ft.	35
NPSH at rated conditions	32
Maximum rated speed, rpm	360
Minimum capacity and head at reduced speeds, gpm, from	24,500 @ 43.5 feet
to	35,000 @ 40.5 feet
Drive unit:	Motor and magnetic coupling

Motor brake horsepower shall not exceed the nameplate rating at any of the above conditions.

W-44.15 Sewage Pump Control Scheme

Controls for each pump shall be arranged so that the pump can be operated manually or automatically by a controller provided on the pump control center or by computer. When on automatic operation by controller or computer, the control shall be designed to initiate the opening of the respective sluice gate in the case of pump starting, and in the case of pump stopping shall initiate the gate closing.

Automatic control shall be as follows:

1. At an established low liquid level in the low level inlet channel, the inlet gate shall open and the first pump in the sequence shall start at minimum speed.

2. If the liquid level continues to rise, the variable speed shall increase until the pump reaches full speed.

3. If the liquid level continues to rise, the next pump in sequence shall start at reduced speed and the speed of the first pump shall decrease until both pumps are operating at the same speeds.

4. If the liquid level continues to rise, the speeds of both pumps shall increase proportionally to 100 percent speed.

5. If the liquid level continues to rise, the next pump in sequence shall start at reduced speed and the speeds of the two operating pumps shall decrease until all 3 pumps are operating at the same speeds.

6. If the liquid level continues to rise, the speeds of the three pumps shall increase proportionally to 100 percent speed.

7. If the liquid level continues to rise, the next pump in sequence shall start at reduced speed and the speeds of the three operating pumps shall decrease until all pumps are operating at the same speeds.

8. If the liquid level continues to rise, the speeds of all 4 pumps shall increase to 100 percent speeds.

9. In the event that any pump in the above sequence fails to start or operate, the entire sequence shall be advanced and the first standby pump shall be added in a similar manner after the fourth pump.

10. In the event that two pumps in the above sequence fail to start or operate, the entire sequence shall again be advanced and the second standby pump shall be added in a similar manner after the first standby pump.

11. On falling liquid levels, the operation shall be the reverse of that specified above, except that the first pump in the sequence will not stop, but its speed will continue to decrease so that the capacity will equal the incoming flow.

Local and remote alarms shall be provided for pump failure.

On manual control, the pump shall start and stop by push button control. Pump operable conditions, indications, and pump protective and alarm arrangement shall be as shown.

An emergency stop push button located near the pump and an interlock with the seal water system shall be provided.

The adjustable controlling low level inlet channel levels and pump control shall be as follows, Pump listings as first, second and so forth indicate the position of the pump in the selected sequence:

ON RISING LEVELS

Elevation	Pumping Operation
76.500	1st Pump starts at 85% speed
76.500 to 77.375	1st Pump increases to 100% speed
77.375 to 77.875	1st Pump continues at 100% speed
77.875	2nd Pump starts at reduced speed (±86%)* and 1st Pump drops to same speed
77.875 to 78.750	1st and 2nd Pumps increase to 100% speed
78.750 to 79.250	1st and 2nd Pumps continue at 100% speed
79.250	3rd Pump starts at reduced speed (±86%)* and 1st and 2nd Pumps drop to same speed
79.250 to 80.125	All 3 pumps increase to 100% speed
80.125 to 80.625	All 3 pumps continue at 100% speed
80.625	4th Pump starts at reduced speed (±86%)* and 1st, 2nd and 3rd Pumps drop to same speed
80.625 to 81.50	All 4 pumps increase to 100% speed
82.00	High level alarm actuated

* Adjustable to such speed that pumps in this step at reduced speed have slightly higher capacity than the pumps in the previous step at 100% speed.

ON FALLING LEVELS

Elevation	Pumping Operations
81.50 to 80.625	All four pumps decrease to reduced speed (86% plus or minus)
80.625 to 80.125	All four pumps continue at reduced speed (86%)
80.125	4th Pump stops, 1st, 2nd and 3rd Pumps jump to 100% speed
80.125 to 79.250	1st, 2nd and 34d Pumps decrease to reduced speed (86% plus or minus)
79.250 to 78.750	1st, 2nd and 3rd Pumps continue at reduced speed (86% plus or minus)
78.750	3rd Pump stops. 1st and 2nd Pumps jump to 100% speed.
78.750 to 77.875	1st and 2nd Pumps decrease to reduced speed (86% plus or minus)
77.875 to 77.375	1st and 2nd Pumps continue at reduced speed (86% plus or minus)
77.375	2nd Pump stops, 1st Pump jumps to 100% speed
77.375 to 76.50	1st Pump decreases to 85% speed
76.50 and below	Pump No. 1 continues to decrease in speed
76.00	Low level alarm actuated

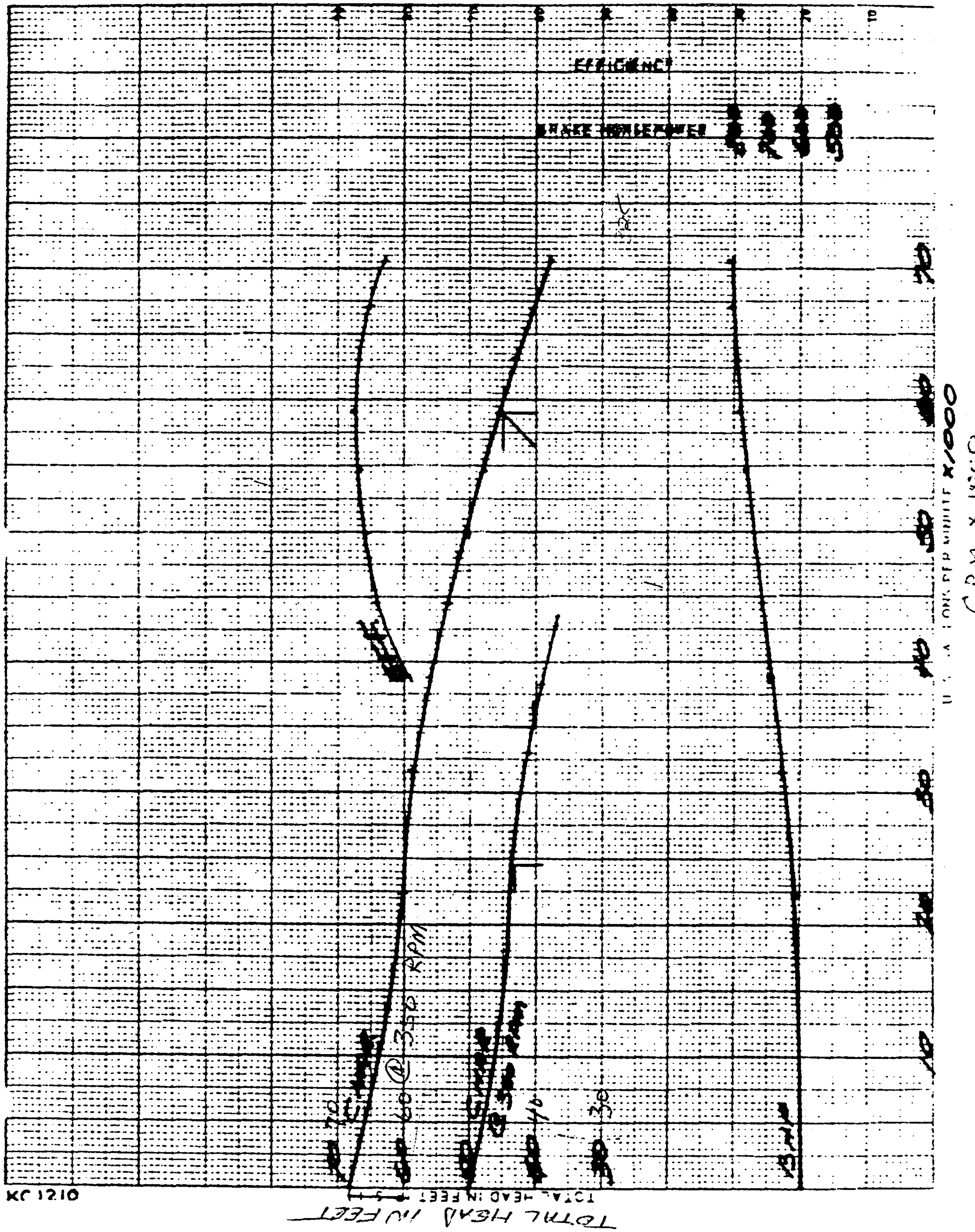
Fairbanks Morse **Pump Division**

10-C
INF. Pumps

CERTIFIED CURVE

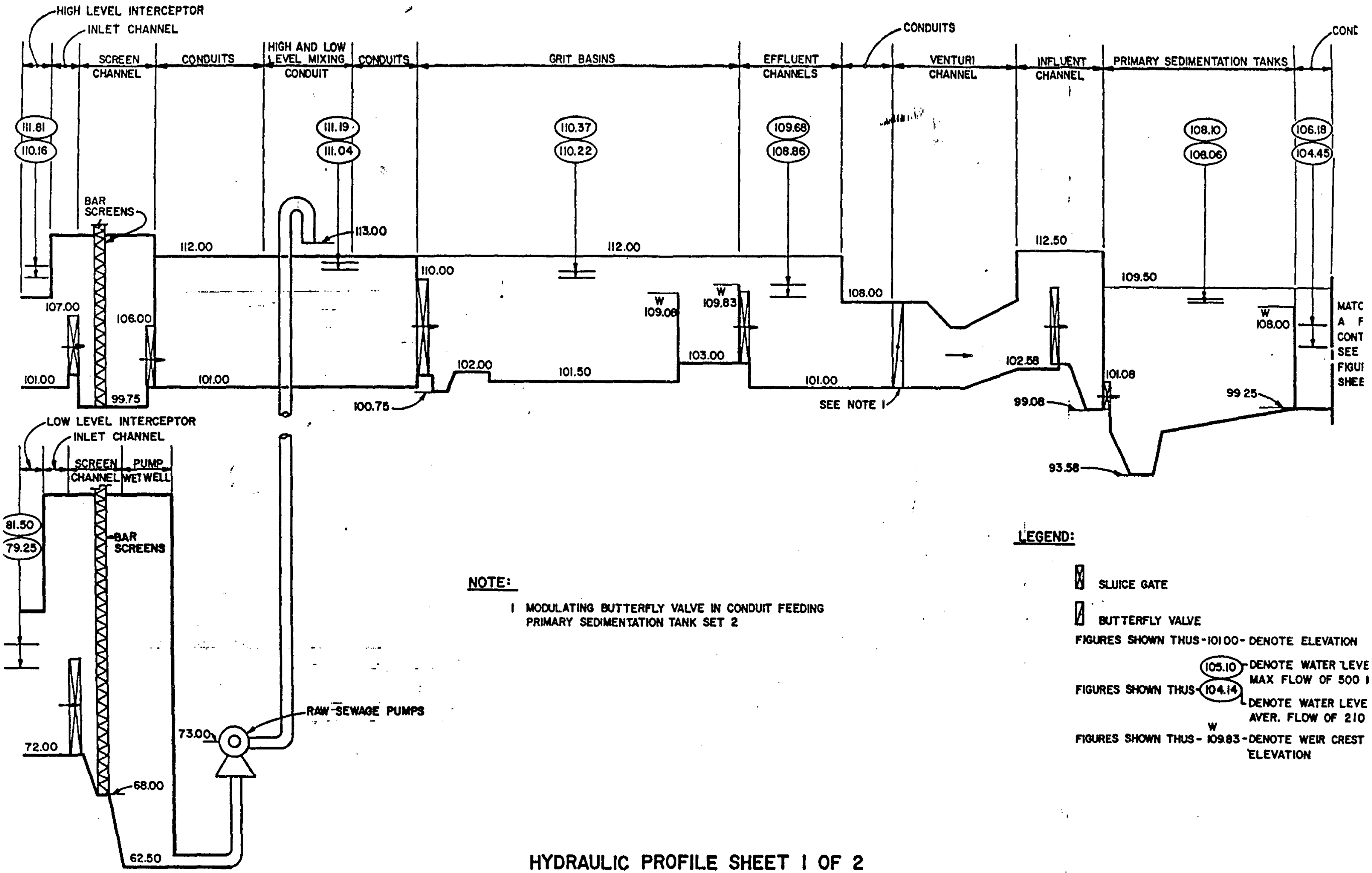
PUMP NO. L3E1-060014-4 STAGES 1 SIZE-FIGURE 42-5711
TESTED 12/12/80 DRIVER Dyno - 850HS. IMPELLER L42B1A
IMP DIA 45.0
Certified Correct by [signature] 12/80 RPM 350 & 300
ENGR. DATE

CERTIFIED PUMP PERFORMANCE CURVE



KC 1210

FIGURE 2-1-4



HYDRAULIC PROFILE SHEET 1 OF 2

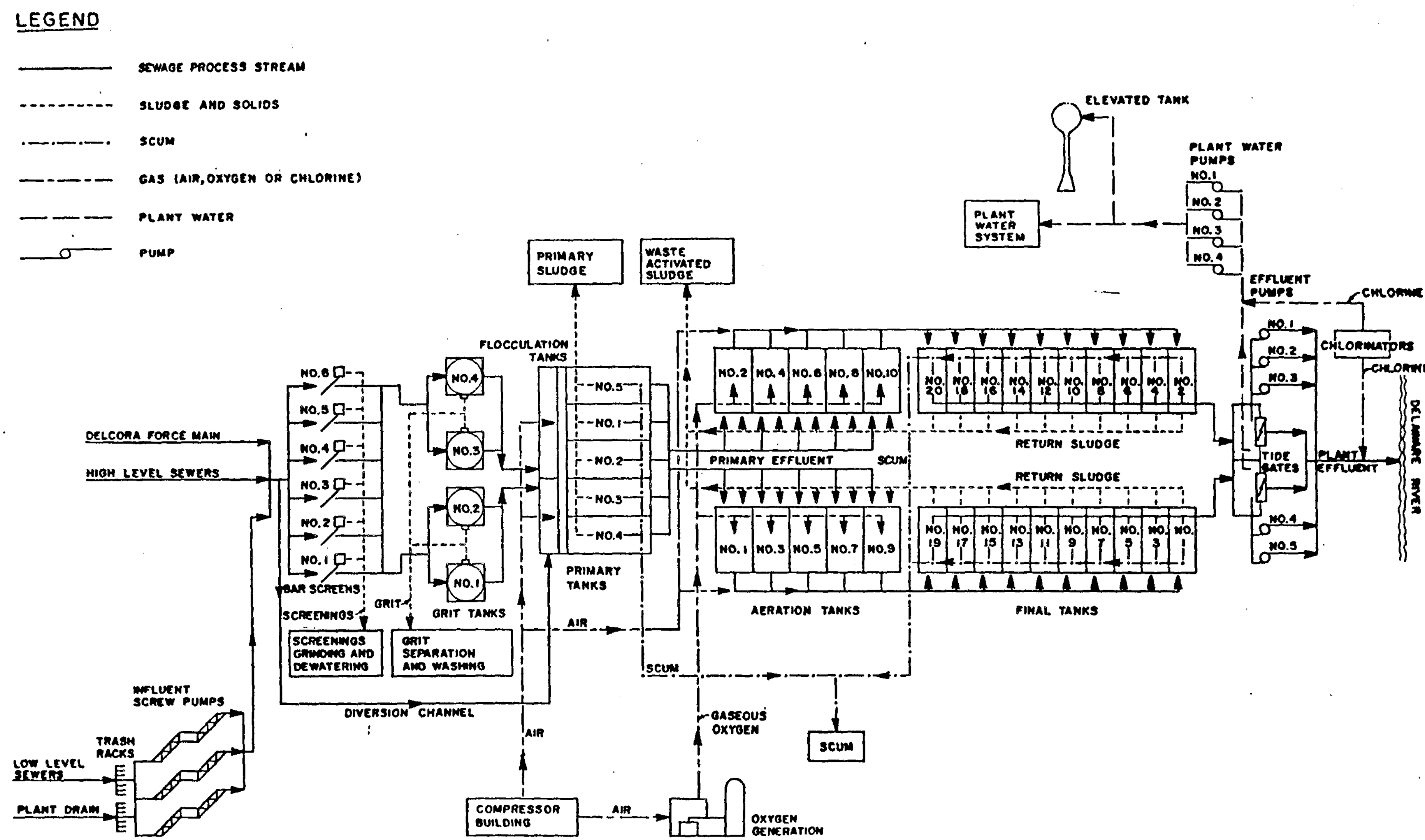
IEELEY AND HANSEN
IGINEERS

CITY OF PHILADELPHIA WATER DEPARTMEN
NORTHEAST WATER POLLUTION CONTROL PI
OPERATION AND MAINTENANCE MA

Appendix C-2

Influent Flow Control Strategies

Philadelphia Southwest Water Water Pollution Control Plant



PROCESS FLOW DIAGRAM

CITY OF PHILADELPHIA
WATER DEPARTMENT

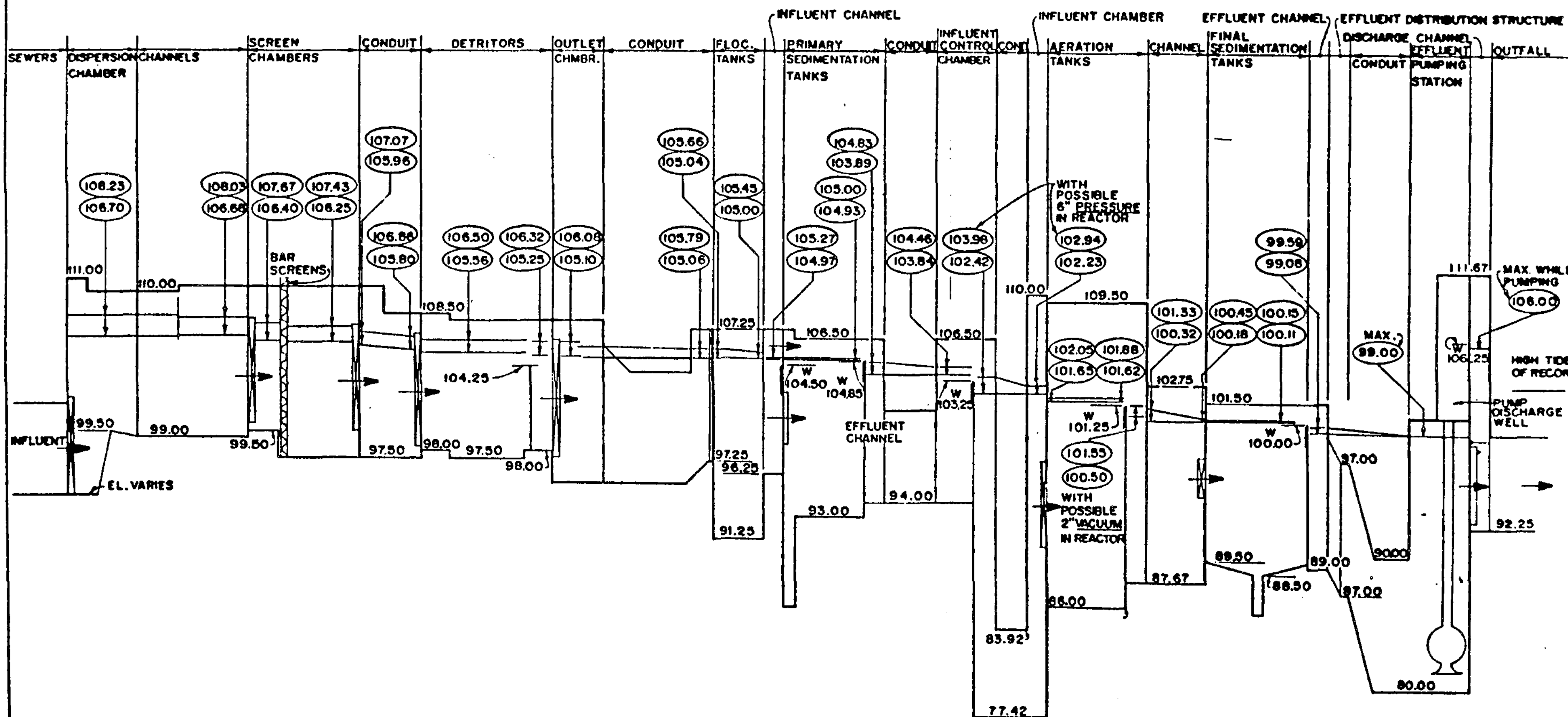
SOUTHWEST WATER POLLUTION CONTROL PLANT
OPERATION AND MAINTENANCE MANUAL

LEGEND

FIGURES SHOWN THUS - 107.25 - DENOTE ELEVATION

FIGURES SHOWN THUS - (103.57) - DENOTE WATER LEVEL AT MAX. FLOW OF 570 MGD
(102.30) - DENOTE WATER LEVEL AT AVER. FLOW OF 210 MGD

FIGURES SHOWN THUS - W 103.25 - DENOTE WEIR CREST ELEVATION



HYDRAULIC PROFILE THROUGH PLANT

CITY OF PHILADELPHIA
WATER DEPARTMENT

SOUTHWEST WATER POLLUTION CONTROL PLANT
OPERATION AND MAINTENANCE MANUAL

CITY OF PHILADELPHIA
WATER DEPARTMENT
WATER POLLUTION CONTROL PLANTS

Hydraulic Capacity - SWWPCP

Greeley and Hansen
January 1995

FACILITY: Southwest Water Pollution Control Plant

Unit Process	Hydraulic Capacity, MGD*
Influent Bar Screens	
All six (6) units in service	570
One unit out of service	475
Two units out of service	380
Grit Removal Tanks	
All four (4) units in service	570
One unit out of service	430
Two units out of service	285
Flocculation Channels	
Both units in service	570
One unit out of service	350
Primary Sedimentation Tanks	
All five (5) units in service	570
One unit out of service	460
Two units out of service	350
Aeration Tanks	
All ten (10) units in service	570
One unit out of service (east or west side)	510
Two units out of service (east or west side)	450
Final Sedimentation Tanks	
All twenty units in service	570
One unit out of service (east or west side)	540
Two units out of service (east or west side)	510
Effluent Pumping Station	
By gravity	340 - 450**
All five (5) pumps in service	575
One unit out of service	460
Two units out of service	345

* Flow through capacity without regard to process capacity
** Depends on tide elevation.

SWWPCP INFLUENT FLOW CONTROL STRATEGIES

Influent Pumping Station : This facility handles an average flow of nearly 20 mgd with a peak capacity of 48 mgd. The station pumps influent from two low level sewers using parallel two stage constant speed screw pumps. There are three pumps with a rated capacity of 32 mgd each. Normal operations require one pump in service except during high daily peak flows or rain/runoff events. When the low level flow exceeds 32 mgd a second pump is put in operation. No more than two pumps are needed to run at any time to maintain the IPS level below 88.0 feet (overflow to Eagle creek).

Plant Influent Gate Throttling : The high level interceptor influent gates could be throttled during prolonged high flows (above 400 mgd) to protect downstream equipment and personnel. This however is not a routine operational decision or strategy. The result of any such flow restriction may cause significant surcharges in the upstream sewers of the plant. Currently the plant cannot monitor upstream pressures or elevations.

Preliminary Treatment Diversion Channel : The use of this option to bypass the PTB is no longer considered viable because of the greater potential to destroy downstream equipment.

Catenary Bar Screens : The screens are put into service according to the total influent flow. Each screened channel is rated for 95 mgd. As the flow increases in multiples of 95 another channel is put into service. Six screened channels in service have a peak design flow capacity of 570 mgd

Grit Tanks : These tanks are capable of handling 140 mgd each, with two units in service at all times. When the plant flow reaches 285 mgd and 425 mgd the third and fourth tanks are utilized.

Flocculation and Primary Tanks : All units in these areas remain in service unless necessary planned or reactive maintenance is required.

Aeration and Final Sedimentation Tanks : The number of units in service depends on seasonal variations in loading and flow. From early winter to mid-spring (high flow period) the plant strives to maintain at least 19 of 20 final tanks in service (one down for maintenance) and all ten aeration tanks. During decreased flow seasons the plant runs with eighteen final tanks (9 per side) and eight aeration tanks (4 per side) to achieve complete treatment.

Effluent Pumping Station : The EPS consists of five four-hundred horsepower pumps. Two pumps are direct drive and three are variable speed. These pumps are designed to maintain an elevation of less than 99.4 feet (overflow to Eagle creek) in the effluent well against a river level of 102.8 feet (high tide) during peak flows into the plant. If maintenance is being performed on any of the pumps this peak output would be less. During normal operation the effluent well level is maintained between 96.5 and 98.5 feet. This can be managed using different combinations of pumps and is highly dependent on the plant flow and tidal elevation in the Delaware river.

Appendix C-3

Influent Flow Control Strategies

Philadelphia Southeast Water Water Pollution Control Plant

IPS OPERATING PARAMETERS 12/22/94

DRY WEATHER
WET WEATHER
LOSS OF ONE INCOMING FEEDER
IPS OPERATION ELEVATIONS

DO NOT REMOVE FROM OCS AREA
(copy can be found in OCC Office)

12-1-94

SOUTHEAST INFLUENT PUMPING STATION OPERATING PARAMETERS FOR DRY AND WET WEATHER FLOWS

- Maintain an elevation in the influent sewer in a band between eight (8) and ten (10) feet during dry weather flow and prior to a wet weather event by placing the appropriate number of influent pumps in service.
- Maintain the two (2) influent sluice gates in an open position. Make no attempt to control or restrict the influent flow into the plant by throttling the East and West sluice gates at the pumping station.
- Maintain or place in service various combinations of treatment plant equipment to provide the maximum hydraulic through put to the plant.
- As a guide, the following units should be placed in service as follows:

PLANT INFLUENT FLOW RANGE, MGD

#	DESCRIPTION	80-120	120-160	160-195	196-225
1.	Influent Pumps	2	3	3	4
2.	Grit Channels	3	4	5	5
3.	Floc Tanks	2	2	2	2
4.	Primary Tanks (Min.)	2	3	3	4
5.	Aeration Tanks	4	5	6	8
6.	Return Sludge Pumps	2	3	4	4
7.	Final Tanks (Min.)	10	10	10	10
8.	Process Air Blowers	1	1	1	1
9.	Effluent Pumps	0	0	0	3

The above is an operators guide only. The Operations Manager may decide due to seasonal influent variations, process considerations or PM or maintenance considerations to temporarily amend this listing of equipment.

SOUTHEAST INFLUENT PUMPING STATION OPERATING PARAMETERS FOR DRY AND WET WEATHER FLOWS

- If for any reason the wastewater level at the Southeast Pumping Station reaches the "action level" of 23 feet or the influent sluice gates are lowered this incident must be reported utilizing the "Combined Sewer Overflow - Gate Throttling Monitoring Report" form. The Southeast Influent Pumping Station Operator is responsible for filling out this form and directing it up the chain of command.

- The reaching of the action level or the lowering of the influent sluice gates will be reported up through Plant Management to the PA DER as detailed in Pumping Station Reporting Procedures - Gate Throttling (revised) 12/09/93 and required in the National Pollutant Discharge Elimination System (NPDES) Permit.

- The objective of maintaining an operating elevation of between eight (8) and ten (10) feet which is fifteen (15) to thirteen (13) feet below the "action level" of twenty three (23) feet called for in our NPDES Permit is to maximize the capacity of the combined sewer system for storage during a rain event, thereby preventing combined sewer overflows.

- Plant Management will provide maintenance on an emergency basis if any of the plant equipment is not available that will cause an exceedence of the action level.

- Maintenance and construction activities shall be scheduled so that plant equipment, conduits, tanks and auxiliary systems are removed from service in such a manner that the Southeast Water Pollution Control Plant's capacity is not reduced below the maximum design wastewater flow of 168 MGD (Maximum Daily Average) and 224 MGD (Peak) or causing the Influent Pumping Station to reach its action level of twenty-three (23) feet.

- Throttling of the influent flows to the plant resulting in available, premature sewer system overflows is prohibited.

- During a rain event, when the operator is placing the fourth pump in service (flows 195 MGD and above) the operator is attempting to maintain an elevation below 16 feet.

- The influent gates are maintained at 85% open (slightly dipped into the flows), to maintain a gas seal, at the eight (8) foot of sewer elevation. This is not an attempt to throttle flow, but to prevent dangerous gases from entering the coarse bar rack area and provide operator safety. Once past the ten (10) foot level, the gates should be open 100%.

MEMORANDUM

CITY OF PHILADELPHIA
SOUTHEAST WATER PCP

DATE: November 3, 1994

TO : To All Concerned.
FROM : Clive C. Evanson, Electrical Engineer, SEWPCP
SUBJECT : **Influent Pump Control Following Loss Of One Incoming Feeder**

In response to the power failure and subsequent CSO on Sunday, October 23, 1994 at approximately 6:45 pm, I conducted an investigation to identify the possible conditions responsible for the resulting CSO. My investigation included a simulation of a power failure to the same incoming feeder (line 410) and an evaluation of the pumping system control logic. I summarize my conclusion as follows:

1. Because the power loss simulation test uncovered no faults with the switchgear undervoltage transfer system, I conclude that the automatic transfer system was not placed in the automatic mode of operation following the recent switchgear preventive maintenance; the maintenance was conducted by the contractor 'Router Hanney'. This conclusion is the most probable since it correlates with the sequence of undesirable events that occurred following the power failure on 10/23/94.

2. The evaluation of the control logic also uncovered no faults. However, it should be known by all Operators, and Maintenance personnel alike, that the level control system selected for pumping operations (following a line power failure) must be the side corresponding to the non interrupted power line. e.g. In the case of the failure occurring on 10/23, the selected level system would be the west system since the east system is associated with line 410.

PROCUDURES

As a measure of precaution to avert future CSO violations caused by a loss of power to one incoming feeder, I have generated a list of procedures that should be followed. However, prior to any action taken, there are two initial conditions that the Station Operator needs to note. They are:

1. Identify the feeder that lost power and verify that a transfer of power was made. It will be typically apparent that a transfer was made since the station lights will exhibit a momentary flicker.

2. Note the influent channel level measuring system selected for pump control. i.e. East or West Influent channel.
   note: Both level indicating meter on the OCS panel will register **no level** if the current system selected corresponds to the feeder that loses power and the associated influent sluice gate closes consequently.

Once these two initial conditions are known, the Operator can then respond appropriately to maintain the IPS pumping operation. **Note**: The Influent Sluice Gate corresponding to the feeder with the loss of power condition will close. The following is a listing of possible conditions resulting from a loss of power to an IPS incoming feeder and the corresponding responses that should be followed by the Operator:

Condition: Power is loss on the Incoming Feeder Line #1 (410), the tie breaker restores power, the east influent sluice gate begins to close, and the **east** level sensing system is the selected system for pump control.
Response: Select the west level sensing system and stop and then open east sluice gate.
note: If the pump/s in service on the east side trips, only select the west level sensing system and call the OCC and request an electrician to reset pump breaker/s.

Condition: Power is loss on the Incoming Feeder Line #1 (410), the tie breaker restores power, the east influent sluice gate begins to close, and the **west** level sensing system is the selected system for pump control.
Response: Stop and then open east influent sluice gate and continue pumping operation.

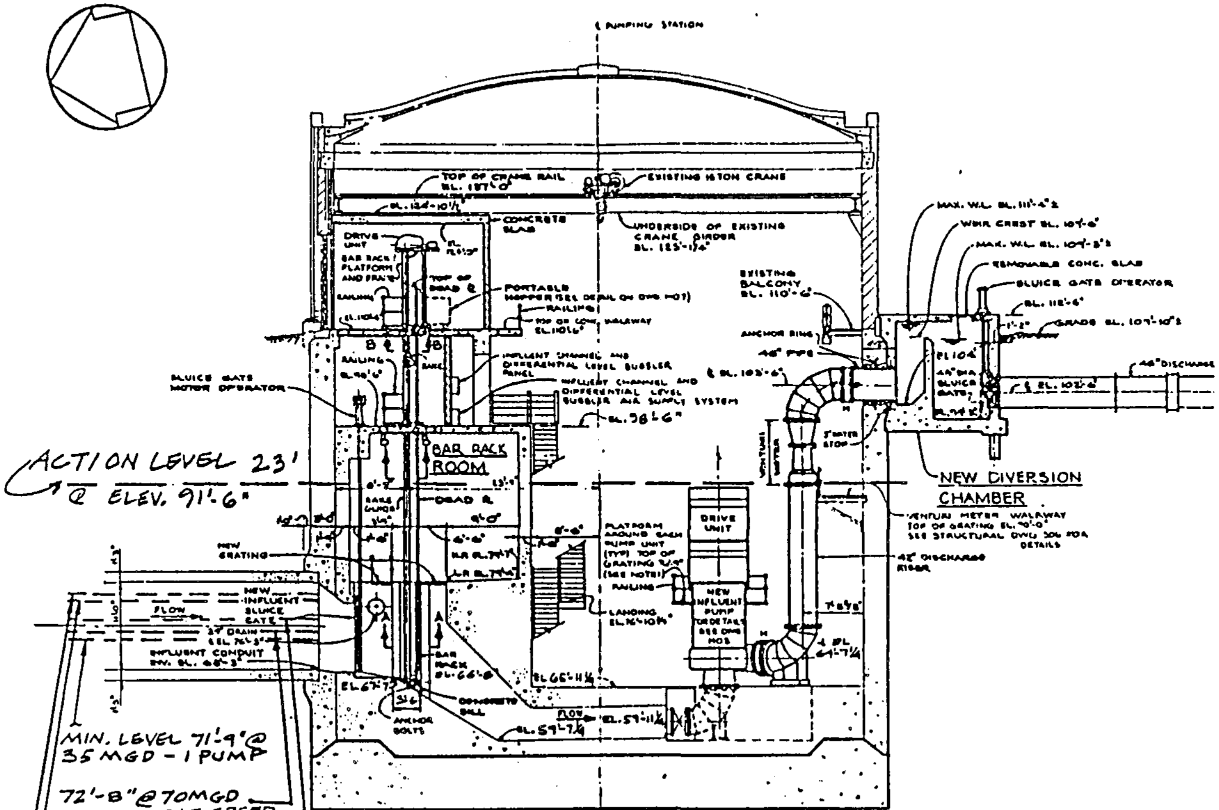
Condition: Power is loss on the Incoming Feeder Line #1 (410), the tie breaker **did not** restores power, the east influent sluice gate begins to close, and the east level sensing system is the selected system for pump control.
Response: Select the west level sensing system and call the OCC and request an electrician to restore power to pumps.

Condition: Power is loss on the Incoming Feeder Line #2 (416), the tie breaker restores power, the west influent sluice gate begins to close, and the west level sensing system is the selected system for pump control.
Response: Select the east level sensing system and stop and open west sluice gate.
note: If the pump/s in service on the west side trips, only select the east level sensing system and call the OCC and request an electrician to reset pump breaker/s.

Condition: Power is loss on the Incoming Feeder Line #2 (416), the tie breaker restores power, the west influent sluice gate begins to close, and the east level sensing system is the selected system for pump control.
Response: Stop and open west influent sluice gate and continue pumping operation.

Condition: Power is loss on the Incoming Feeder Line #2 (416), the tie breaker didn't restores power, the west influent sluice gate begins to close, and the west level sensing system is the selected system for pump control.
Response: Select the east level sensing system and call the OCC and request electrician to restore power to pumps.

cc S. Cameron, R. Lendszinski, A. Sherman, P. Franklin, E. Sutch



INFLUENT PUMP STATION - SECTION

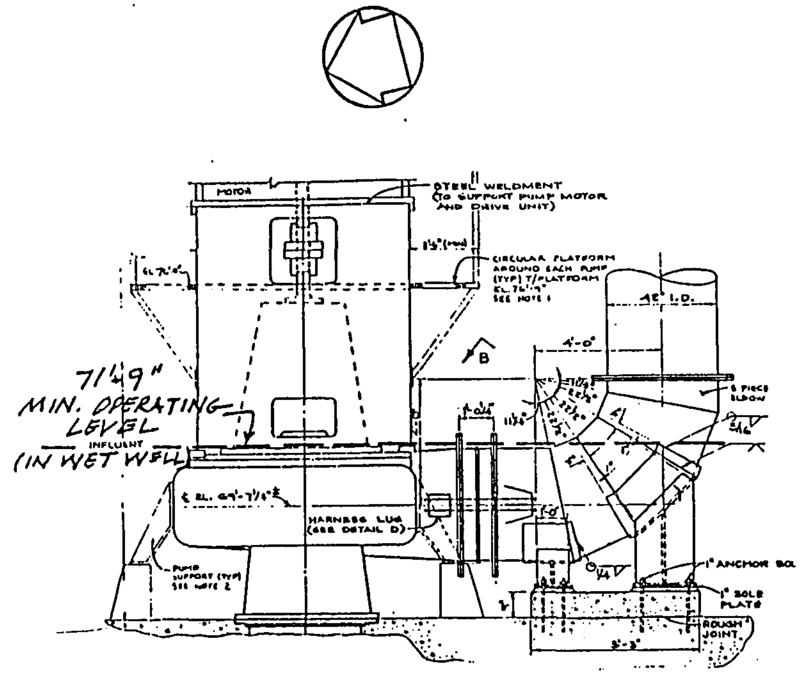
MIN. LEVEL 71'-9"@ 35 MGD - 1 PUMP

72'-8" @ 70MGD
2-VARIABLE SPEED PUMPS

74'-0" @ 140 MGD
2-VARIABLE SPEED PUMPS & 1 CONSTANT SPEED

75'-4" @ 210 MGD
2-VARIABLE SPEED PUMPS & 2 CONSTANT SPEED

76'-8" @ 280 MGD
2-VARIABLE SPEED PUMPS & 3 CONSTANT SPEED
OR 3 VARIABLE & 2 CONSTANT SPEED



IPS SECTION - M03

REV NO	DATE	DESCRIPTION	DESIGNED	CHK BY	APPR

CITY OF PHILADELPHIA
WATER DEPARTMENT
WATER POLLUTION CONTROL PROJECT
SOUTHEAST WATER POLLUTION CONTROL PLANT

INFLUENT PUMP STATION OPERATION ELEVATIONS

SCALE N.T.S. DRAWN BY JAS CHECKED BY APPROV
DATE 11/94 PROJECT NO. DRAWING NO

SHEET 1 OF 1

Appendix D

Solids and Floatables Control Devices

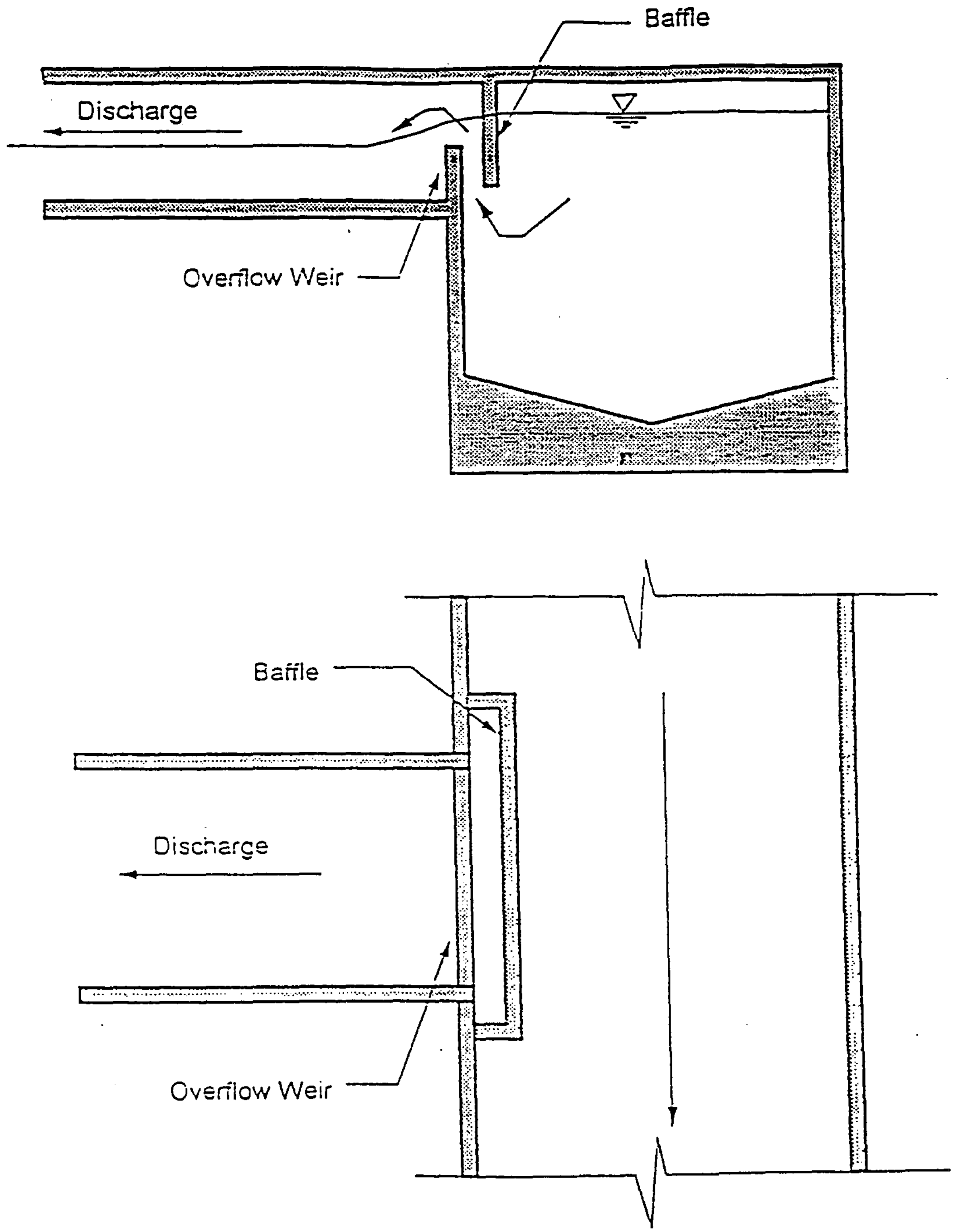


Figure D-1 Typical Baffle Installation

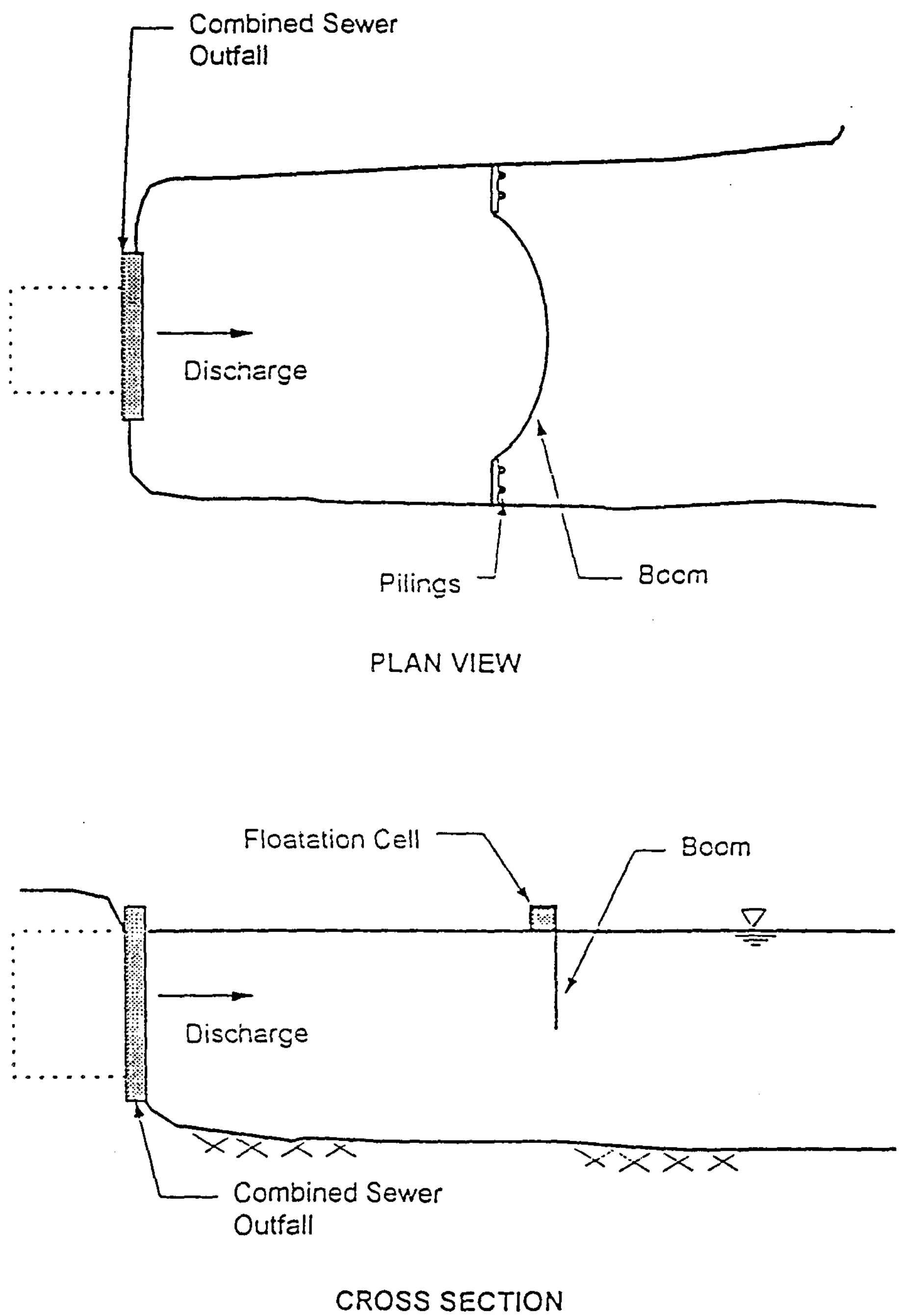


Figure D-2 Typical Boom Device

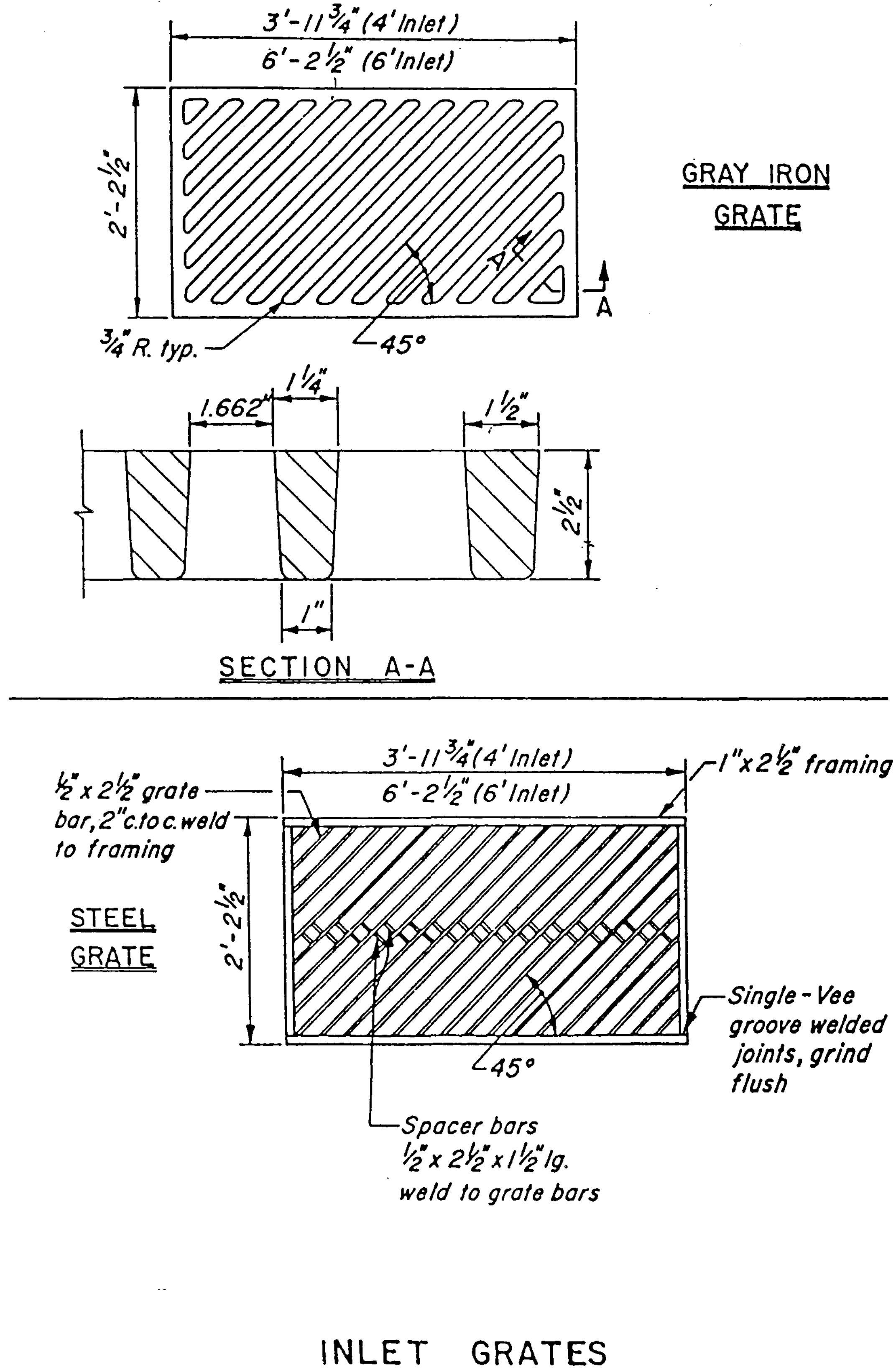


Figure D-3 Typical Detail of Inlet Grates Used in Philadelphia

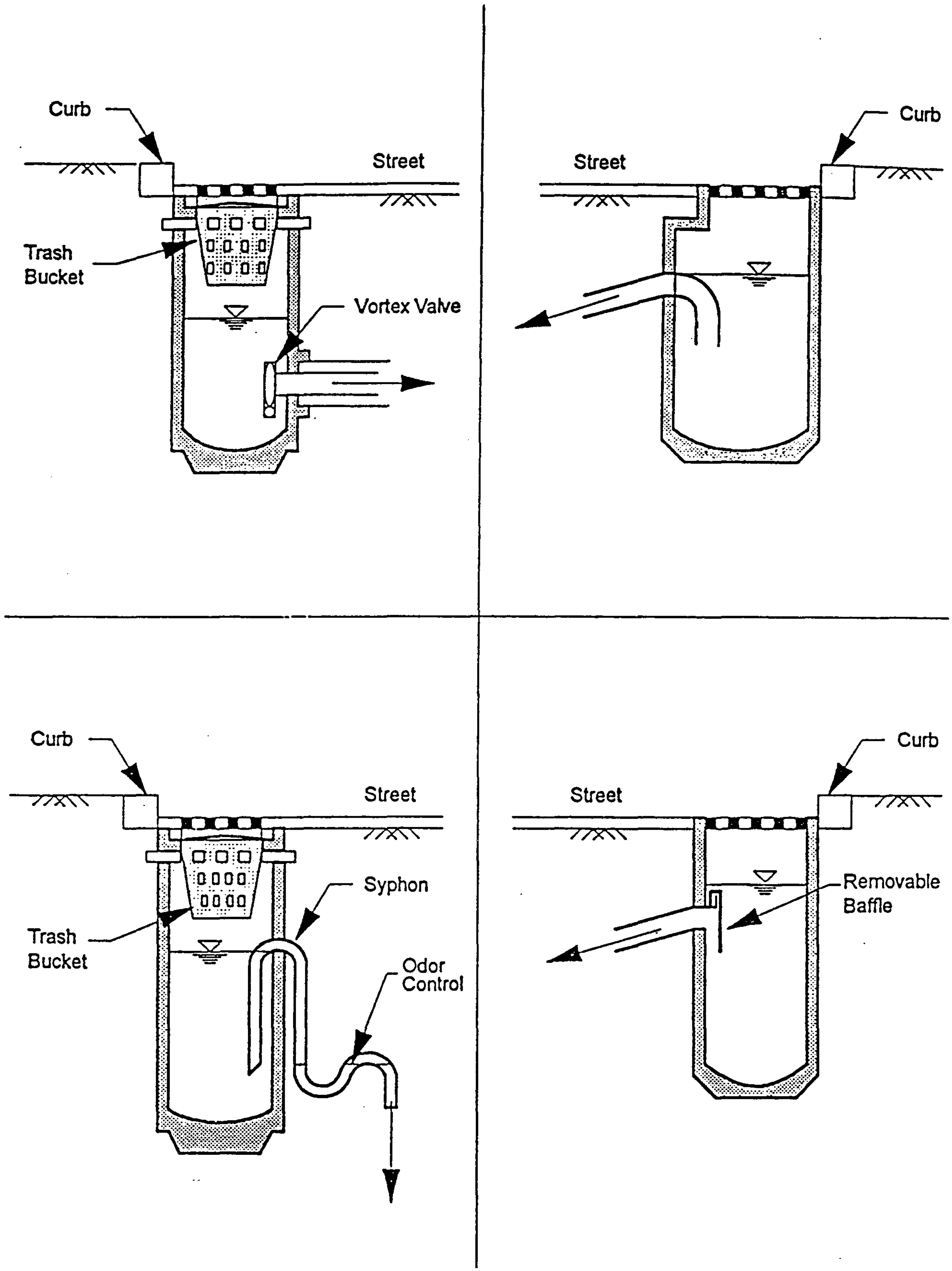
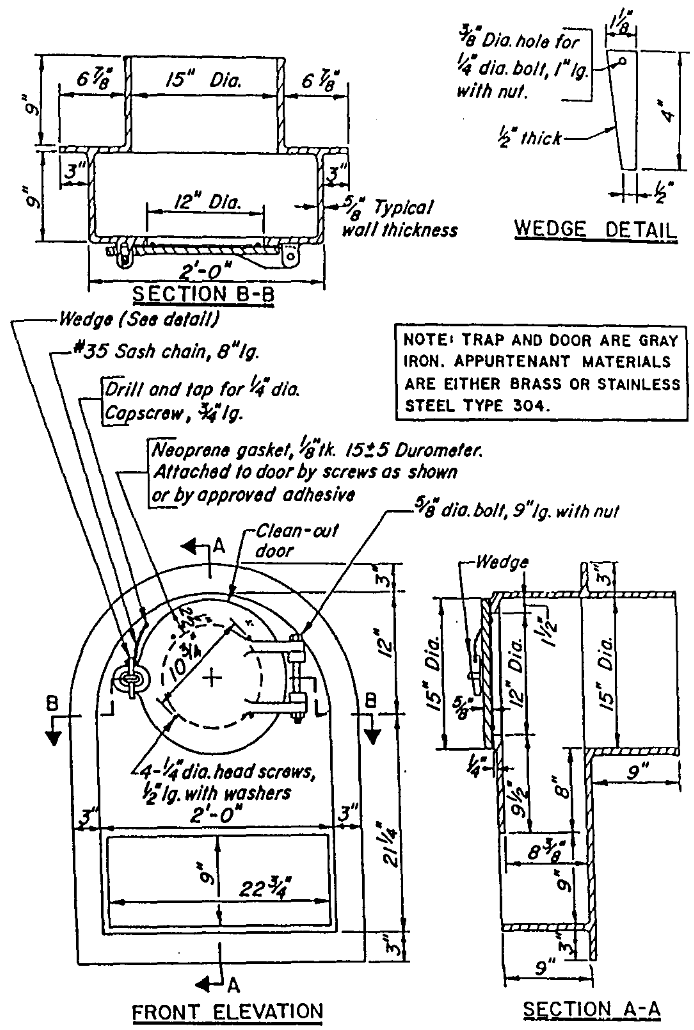
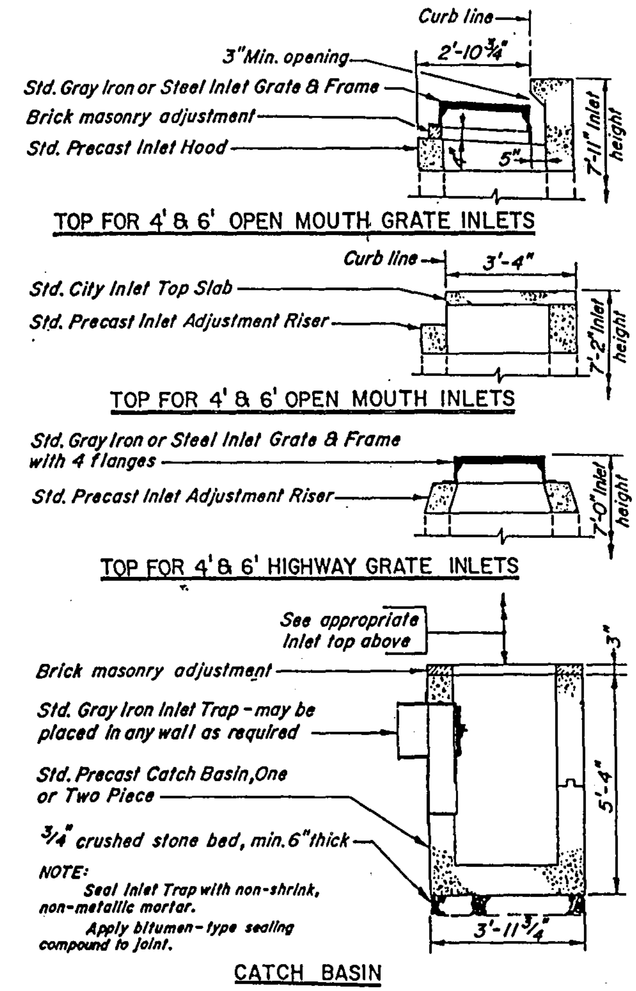


Figure D-4 Typical Catch Basin Modifications

Figure D-5 Details of Typical Inlet Structure Used in Philadelphia Showing Inlet Trap

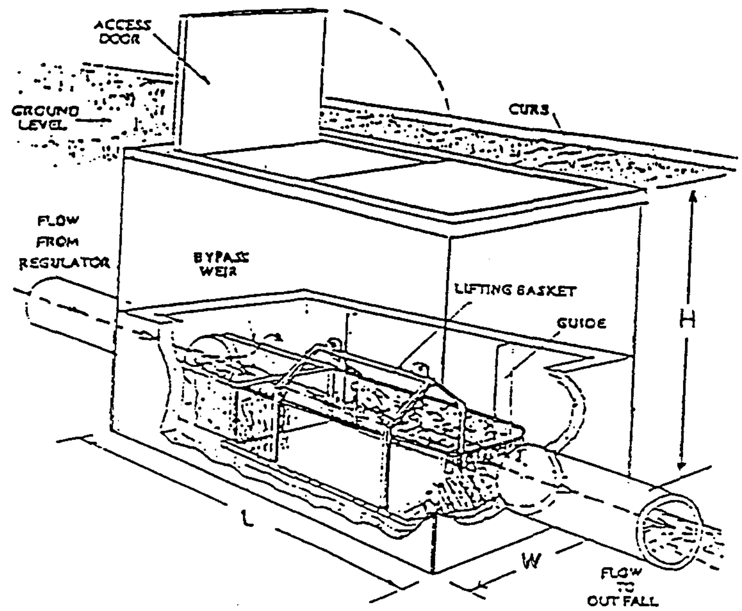


INLET TRAP

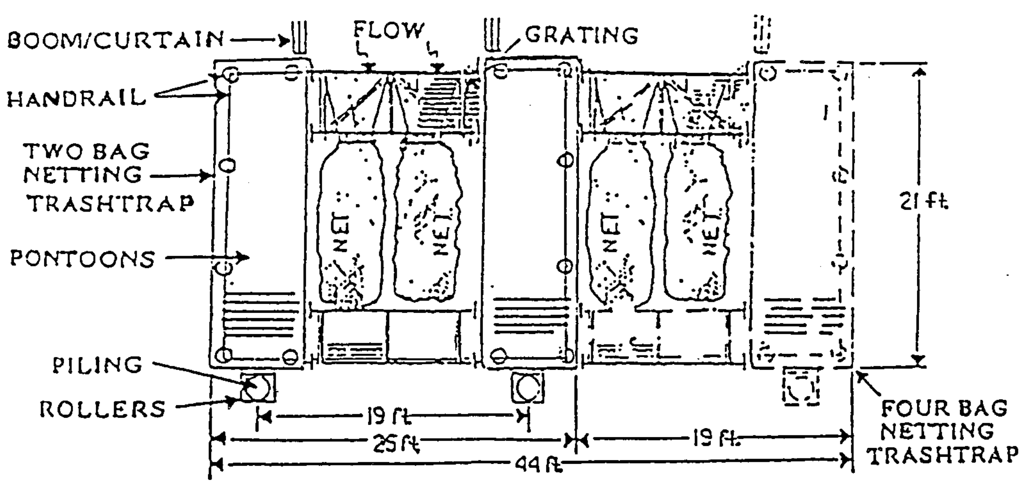


ASSEMBLY OF PRECAST INLETS

IN-LINE NETTING



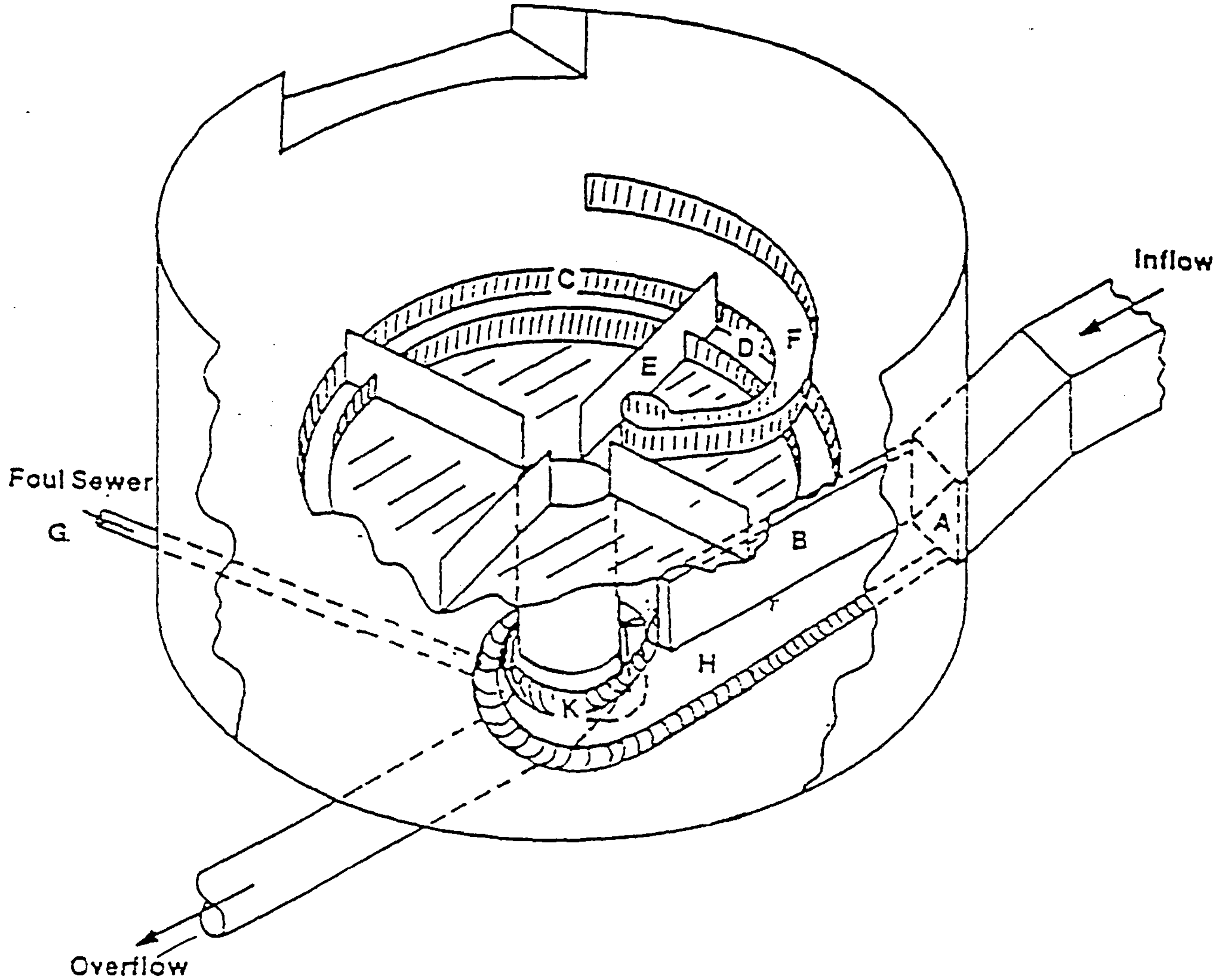
END-OF-PIPE NETTING



Source: Fresh Creek Technologies, Inc.

(Not to Scale)

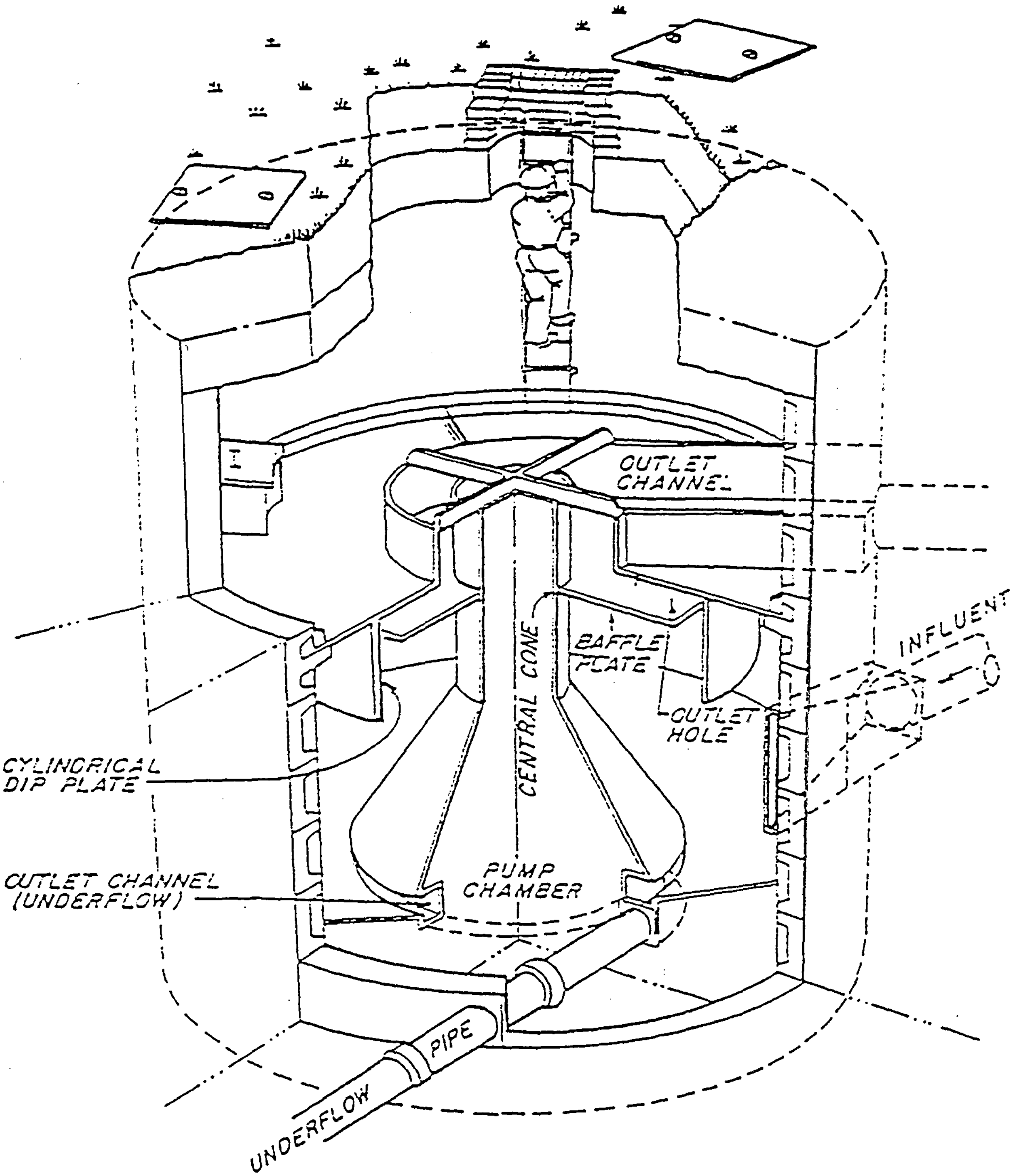
Figure D-6 Netting Device



A Inlet ramp
B Flow deflector
C Scum ring
D Overflow weir and weir plate
E Spoilers
F Floatables trap
G Foul sewer outlet
H Floor gutters
I Downshaft
J Secondary overflow weir
K Secondary gutter

SOURCE: EPA 7/82

Figure D-7 Typical EPA Swirl Concentrator



SOURCE: HIL TECHNOLOGIES INC.

Figure D-8 Typical Hydrodynamic Separator

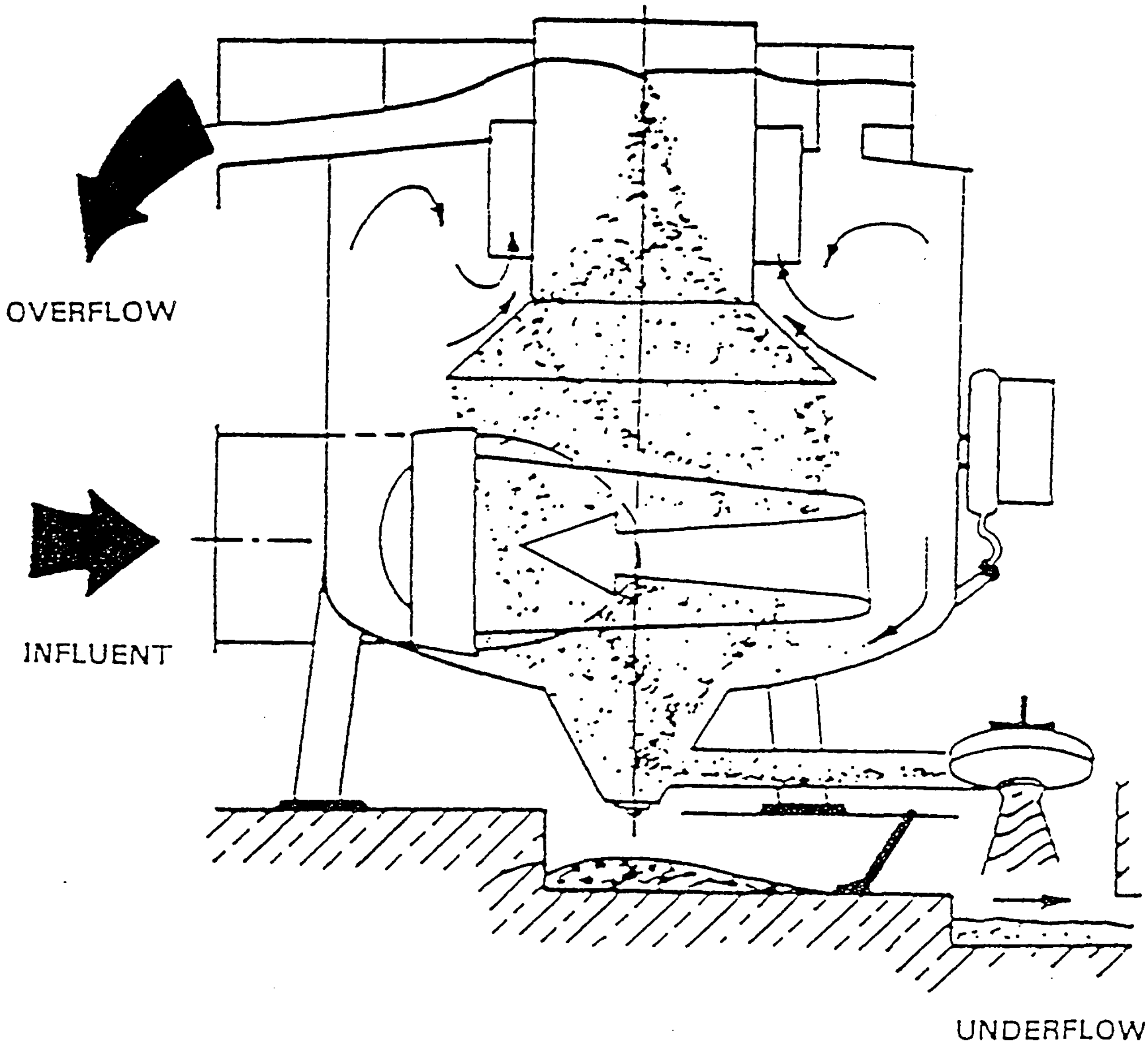


Figure D-9 Typical German Vortex Separator

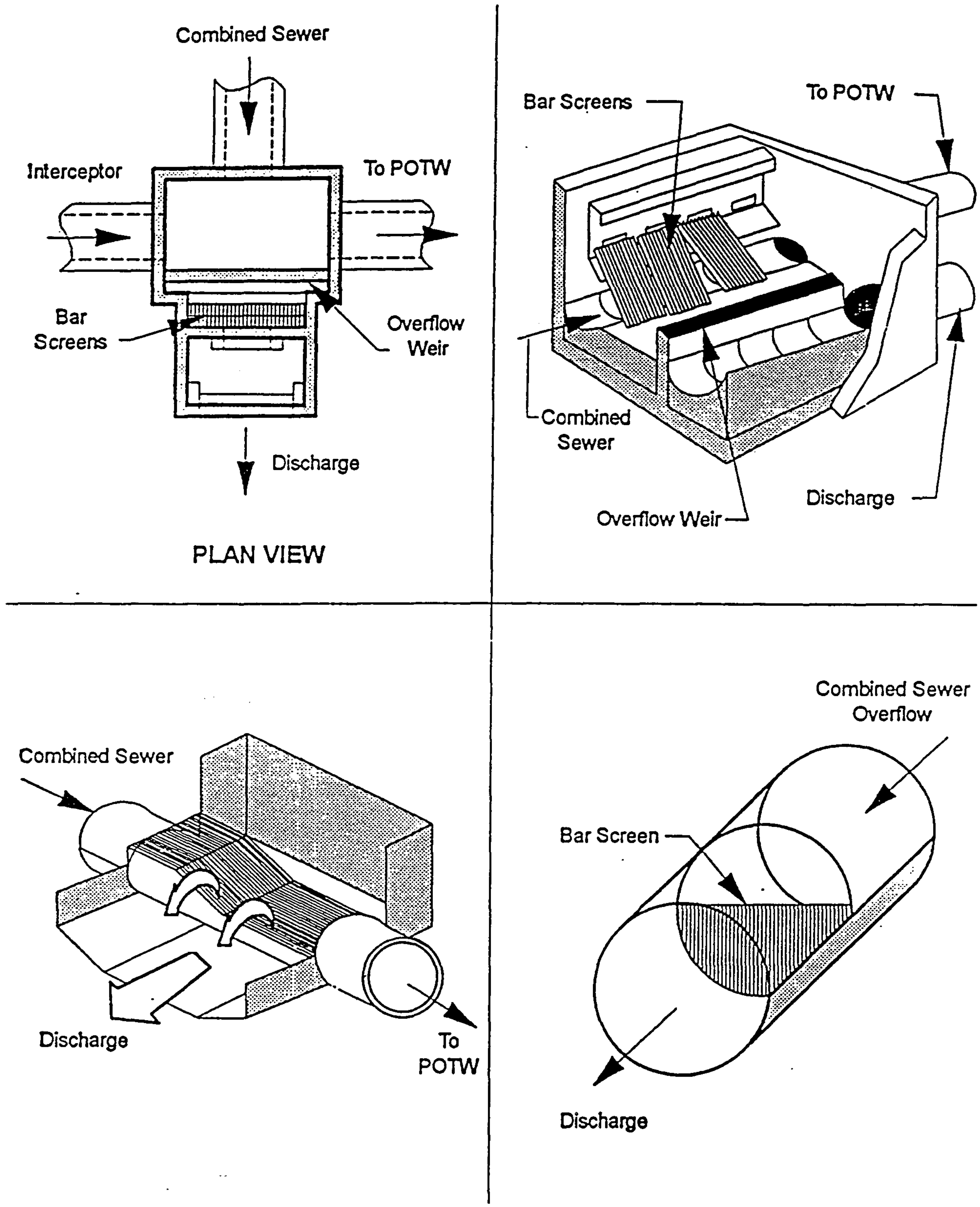
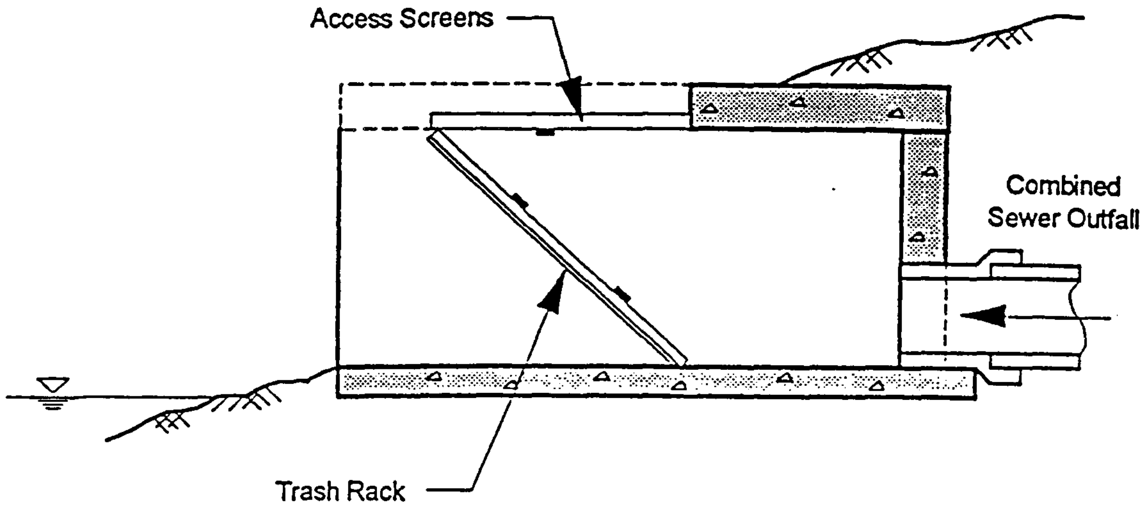
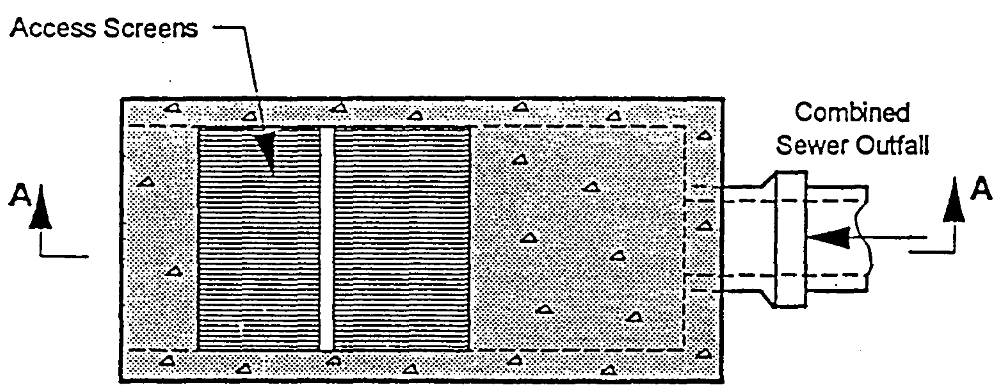


Figure D-10 Typical Static Screen Installations



SECTION A-A



PLAN

Figure D-11 Typical Trash Rack Device