Partnership for Safe Water

Annual Reporting Requirements
(Updated June 2010)

Prepared by:

American Water Works Association
U.S. Environmental Protection Agency
Water Research Foundation
Association of Metropolitan Water Agencies
Association of State Drinking Water Administrators
National Association of Water Companies
The Partnership for Safe Water is a self-evaluation program designed to assist in the optimization of treatment plant performance. The program uses the “Self-Assessment Guide for Surface Water Treatment Plant Optimization” (AWWA/AWWARF publication #90736) as the basis for the self-assessment (Phase III) portion of the program.

The program consists of four (4) phases:

**Phase I** is a commitment by the utility management to participate in the program at least through Phase III.

**Phase II** is data collection and reporting. Baseline turbidity results (raw and finished) are submitted (computer files using Partnership supplied software) for one year of plant performance within 180 days of signing the commitment in Phase 1. *Annual data reporting of plant raw and finished water is required every year for all plants regardless of the Phase that has been achieved.*

**Phase III** is a comprehensive self-assessment evaluation following the “Self-Assessment Guide for Surface Water Treatment Plant Optimization”. A completion report is submitted and reviewed by a team of utility peers. Satisfactory reports result in the plant receiving the Directors Award from the Partnership.

**Phase IV** is optional and includes a rigorous assessment to determine conformance with Partnership performance goals. A team of utility peers reviews the plant data and determines if optimized performance has been achieved. Successful reports result in the plant receiving the Excellence in Water Treatment Award from the Partnership.

All reports shall be submitted to (e-mail transmittals are encouraged):

**Partnership Coordinator**
AWWA
6666 W. Quincy Ave.
Denver, CO 80235
303-347-6169
partnership@awwa.org
Baseline Report Requirements

The baseline report shall be submitted for each treatment plant within 180 days of signing the commitment agreement. This data is reviewed by Partnership staff and is used to provide national trends that are presented in the Partnership annual report to participating utilities.

☐ **Cover Letter:** A short note that identifies this as the “baseline report” and identifies the contact person, telephone number, and e-mail address. Additional information may be included as communication to the Partnership.

☐ **Statement of Regulatory Compliance:** State in the cover letter that this plant has not received a Notice of Violation. If the plant received a Notice of Violation, send a copy and explain the circumstances.

☐ **Performance Assessment Data Collection Spreadsheets** (copies of the computer files from the Partnership supplied software): Twelve months of raw (settled water data is optional but strongly encouraged since you will need it for your Phase III self-assessment completion report, one value per day is adequate for raw and settled data) and finished (every four hour readings are preferred) for the time period prior to beginning the self-assessment evaluation. Explain the source of your turbidity values (maximum readings, taken at specific times during the day, or other method). Filtered turbidity readings must be when the filter is producing drinking water (not during backwash, meter calibration, or during filter-to-waste). Computer files must be in EXCEL format.
Annual Reporting Requirements

All plants must submit this report every year regardless of the Phase or award status of the plant. The report should be submitted by June 30 of each year and cover the plant performance for the one-year period ending May 31 (June 1-May 31). Phase III “Directors Award” plant reports are reviewed by Partnership staff. Phase IV “Excellence in Water Treatment Award” plant reports are reviewed by utility peers (PEAC). Data from these reports are used to construct national trends that are included in the Partnership annual report to participating utilities.

To be a member in “good standing” with the Partnership for Safe Water plants must be in compliance with applicable regulations. Annual reports must include a statement confirming that the plant has not received a notice of violation since the last report.

Requirements for All Plants

☐ Cover Letter: A short note (see baseline report cover letter example below) that identifies this as the “annual report” and identifies the contact person, telephone number, and e-mail address. Additional information may be included as communication to the Partnership.

☐ Statement of Regulatory Compliance: State that this plant has not received a Notice of Violation since the last annual report. If the plant received a Notice of Violation, send a copy and explain the circumstances.

☐ Performance Assessment Data Collection Spreadsheet (copies of the computer files from the Partnership supplied software): Twelve months of raw (settled water data is optional but strongly encouraged since you will need this to complete your Phase III self-assessment report, one value per day is adequate for both raw and settled data) and finished (every four hour readings are preferred) for the time period June 1-May 31. Explain the source of your turbidity values (maximum readings, taken at specific times during the day, or other method). Filtered turbidity readings must be when the filter is producing drinking water (not during backwash, meter calibration, or during filter-to-waste). Computer files must be in EXCEL format.

Additional Requirements for “Directors Award” Plants

☐ Narrative Report: Outline (minimum requirement example and preferred example are on the following pages) the activities undertaken or continuing at each treatment plant during the year and a schedule/action implementation plan for the coming year. The report must include a review of the plant performance compared to the previous year.

Preferred Format Description

This report should consist of short narratives, which provide the status of ALL performance limiting factors (PLF’s) identified during the Phase III process. These include limiting factors, which were identified by the PEAC peer review committee AND by the water system itself. Discuss each PLF individually (see next paragraph for details). The PLF’s should be organized in priority order, starting with the most important first.

You may find it helpful to begin by addressing PLF’s, which were designated as “Areas for Improvement” during the Phase III process, followed by the items designated “Good Faith
Annual Reporting Requirements

Updated Nov. 28, 2012

Page 5

Discussion on EACH performance limiting factor should:

- **List the Performance Limiting Factor (PLF)** – one or two sentences are sufficient.
- **Briefly explain Prior Status** – PLF status at time of Phase III report submittal OR previous yearly narrative (whichever is most recent).
- **Provide a thorough update on the Current Status** – progress made within the past year. This section should contain the most detailed information. Be sure to include both the **Activities Performed** as well as **Benefits Gained** via implementing these activities (e.g. improved performance, greater understanding of plant operations). The **Individuals Involved** in the process should also be credited. **Note that only activities performed within the past year should be included. If no new activities have been performed, write “Same as previous year.”**
- **Briefly explain Future Plans** – list future plans & activities for addressing the PLF and provide a time estimate for beginning and/or completing. An orderly progression should occur within the above three bulleted categories. More specifically, items that are in the Current Status section for this year (e.g. 2000) should appear in the Prior Status section for the next year (e.g. 2001). More importantly, some items from the Future Plans section for this year (e.g. 2000) should be implemented throughout the following year and appear in the next Current Status section (e.g. 2001). In this respect, your yearly short narrative can become extremely valuable in that it acts as a yardstick to measure progress completed and a tool to plan future activities. This is the ultimate intent of the Partnership program’s requirement that members provide this yearly report.

**Additional Suggestions:**

Narratives should include any progress made, which has improved/could potentially improve performance of the water system. If, within the past year, new PLF’s have been discovered, their status should also be included in the yearly narrative. This type of item should be listed as “New PLF”. Follow the previously discussed format - provide a separate section for each new PLF and address all of the above bulleted items. From year to year, follow the same outline format and update each existing PLF section. As necessary, expand the outline to include additional sections for new PLF’s. Ultimately, after dedicating significant time/effort, you will determine that a PLF has been sufficiently remedied and should no longer be classified as such. At that time, you should include a narrative, in the Current Status section, that provides your reasoning. As always, be sure to include yearly data AND explain any significant performance deviations throughout the past calendar year.

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**Directors Award Plants considering Phase IV “Excellence in Water Treatment” should use the Preferred Format for annual reporting.**

This will document progress on optimization of performance limiting factors that is needed for Phase IV application.
Additional Requirements for “Excellence in Water Treatment” Award Plants

Performance Data Submittal and Interpretation: Provide a copy of the previous year performance data for comparison. A written interpretation report should examine plant performance trends and verify that optimized performance has been maintained. Explain any settled or finished water turbidity values that exceed Partnership goals and what steps you have taken to prevent these occurrences in the future. Please see the Phase IV Guidelines and Application Package (February 2003) for further explanation. The report must include all of the data required in the original application but for the most recent 12-month reporting period.
January 1, 2002

Partnership Coordinator
AWWA
6666 W. Quincy Ave.
Denver, CO 80235

Dear Partnership Coordinator,

Please accept this Baseline Report (or Annual Report) for the Midville Water Department, City Water Treatment Plant. The report covers the period June 1, 2000 - May 31, 2001. Enclosed (or attached if this is transmitted via e-mail) please find the performance assessment data collection spreadsheet files for this period for both raw and finished water.

Please note that our plant has not received any Notice of Violation for any drinking water maximum contaminant level (MCL) or treatment technique during the past year.

Please contact me if you have any questions.

Sincerely,

J. Doe
Plant Supervisor
Midville Water Department
Midville, KS 11111
555-555-5555
jdoe@midville.org

CDs enclosed.
Additional Annual Report Requirement
For Directors Award Plants

Example Narrative Report (minimum acceptable)

Narrative Report
Midville Water Department
City Water Treatment Plant

This report is part of the requirements for renewal of Partnership for Safe Water Directors Award. Please note that our plant has not received any Notice of Violation for any drinking water maximum contaminant level (MCL) or treatment technique during the past year.

Activities to Improve Plant Operation June 1, 2001- May 31, 2002

The following items were addressed during the last year to address the performance limiting factors found in the Partnership for Safe Water self-assessment or are other items that have been identified that could improve plant performance.

- Phase II of the flood protection wall was completed. This $3.5 million dollar capital project will protect the plant to the 500-year flood elevation.
- Automation of filters 7-18. Filters 7-18 were declining rate filters with manual controls. As a result of this $550 K project the filters are now operated via set point and PLC control. Also, the backwash of these filters is PLC controlled to achieve uniformity of backwash. These improvements allow the type of constant c0ntrol and monitoring that consistently produces superior quality water. This improvement was needed to address one of the performance limiting factors that was noted in our Phase III completion report.
- Enclosure of filters 31-36. Filters 31-36 were previously exposed to the elements as outdoor filters. This situation caused the surface wash to be turned off due to ice accumulation in the winter. This was noted as a performance limiting factor in our Phase III completion report.
- As a result of participation in an AWWARF Filter O&M Study, and the Partnership for Safe Water, individual filter performance was evaluated. The backwash rate was found to be deficient. Proper bed expansion is now being achieved and filter performance has improved. Individual filter performance was noted as a performance limiting factor in the Phase III completion report.
- Standard operating procedures were developed and implemented. More consistent operation has resulted.

Plant Optimization Activities Scheduled for Next Year

- Basin effluent valve rehabilitation. Electric PLC electric valves will ensure balanced flow distribution. This item was identified in our self-assessment but could not be accomplished until this year.
- Modification of the coagulant piping system. System improvements will provide the ability to add chemicals at many locations with very accurate dosage control. The need for this improvement was part of the self-assessment.
- Send supervisors to technical and regulatory training at local colleges.
- Implement all regulatory requirements of the IESWTR in plant goals.
Plant Performance Review

The current year performance spreadsheets indicate that the goals of the Partnership have not yet been fully achieved. The turbidity values included in the spreadsheets are taken from the combined plant filter effluent turbidity meter using our SCADA system at four-hour intervals (8am, 12noon, 4pm, 8pm, 12midnight, 4am). The annual 95 percentile value is 0.12 NTU. This is the same as last year’s result. On further inspection, you will note that the 95 percentile values for 9 months were below 0.1 NTU and the highest 95 percentile monthly value was 0.16 NTU in July. This corresponds to a time when unusually high plant production was encountered.

Our goal is to achieve 0.1 NTU or lower every month during the year. We are hopeful that the improvements noted above will allow us to achieve this goal. We are also committed to achieving 0.1 NTU from each filter.

Please accept this report and the enclosed (or attached) data for renewal of our Phase III Directors Award.

Contact me if you have any questions.

Sincerely,

J. Doe
Midville Water Department
Midville, KS 11111
555-555-5555
jdoe@midville.org
STATUS OF EFFORTS TO IMPROVE PLANT PERFORMANCE AS MEASURED BY Partnership’s PARAMETERS

THE WATER TREATMENT PLANT

Area of Strength

A. Attempt to Provide an Informative/Complete Package

B. Convincing/Understandable Description of Changes/Progress

Demonstrated Good Faith Effort

C. Acceptance of Optimization Goals – Administrative

PLF: Administration: – Policies and Procedures

Policies and operational procedures for achieving Partnership objectives are in place, including targets for turbidity and chlorine residual, notification action levels, and staff understanding of these policies. However, more aggressive procedures or measures, such as taking filters out of service, lowering flows, or shutting the plant down (i.e., response), are not included in plant policies. Operations staff had an adequate but varied knowledge of the Partnership. A strategic plan for CT and turbidity and a department wide commitment to that effort is needed.

FINAL STATUS: Individual plants have strengthened procedures and policies as plant performance has improved and Partnership goals were met. Procedures are in place for investigating filters, taking filters out of service, sending free chlorine into the distribution system, or shutting the plant down in the event of a chlorine or coagulant failure.

All operational employees have attended “operator training sessions” which have focused on disinfection, coagulation, flocculation, sedimentation, CT data, turbidity data, particle count data, filtration, cryptosporidium/giardia data, current and future regulations, Partnership reports, pilot plant research, and future treatment plans.

The Partnership turbidity goals have been incorporated into the City Water Department’s strategic plan. A Water Treatment Water Quality Communication Trigger spreadsheet or policy has been developed to identify water quality parameters and quality values, with internal levels of communication. For example; should filter effluent turbidity values exceed Partnership goals of 0.1 NTU, the on-site Plant Chemist is directed to initiate contact with the water plant technical staff to assist in assessment of plant operating conditions which contributed to the deteriorated performance. The Chemist is provided with the necessary guidance and resources to control water plant performance to reverse the trend of a less than satisfactory water quality. The communication trigger spreadsheet has become part of the Water Treatment Training Program for plant operators, chemists and technicians in fiscal year 2000.

D. Meet Optimization Goals – Performance
PLF: Operations: – Flexibility in Meeting CT
The Plant should evaluate the benefits of increased flexibility in meeting CT during worst case conditions such as in the winter or in a chlorine loss emergency. For example, baffling of the finished water basins to increase contact time, and the installation of additional ammonia feed lines to allow for more contact with free chlorine, and the use of free chlorine in post treatment storage.

FINAL STATUS: The plant provides increased disinfection, at the risk of increased DBP's to insure that adequate CT will be achieved in the event of a single chlorine feed failure. The Water Treatment Plant has the ability to shut down in the event of a disinfection feed failure. The use of online chlorine analyzers, with alarming, at each facility has increased the ability of Operations personnel to immediately detect, monitor, and respond to a problem. Lower pH's due to future enhanced coagulation practices will enhance CT. Winter procedures are in place which establish emergency notification if finished water storage (chloramine CT) drops below certain levels. Some of the capital suggestions mentioned by the Operations Team will be included in the capital plan. CT is calculated daily using a spreadsheet developed in house. This PLF is completed.

E. Involvement of All Parties in the Partnership Process – Administrative

PLF: Operations: - Sedimentation
The plants’ ability to manage sludge is hampered or made more difficult by discharge permits for sludge to the sewers. More frequent cleaning of sedimentation basins, more flexibility in drawing down basins for repairs and shorter out-of-service times for cleaning could potentially provide significant enhancements in each plant’s ability to maintain optimized processes.

FINAL STATUS: The final recommendation of the WTP Residuals Management study, conducted by a consultant for City Water Department, has been completed and submitted. The study recommends the practice of residuals discharge to the sewer in a controlled manner to include good communication between the residuals producing water plant and the receiving wastewater treatment facility. Based on actual data of solids discharged and wastewater treatment plant performance, a recommended upper discharge limit has been established. The report does not recommend that the water plants construct equalization facilities to control the residuals discharge rates for settling basin cleanings. Through reliable sedimentation equipment performance and routine seasonal basin cleanings, there has been a reduction in the quantity of residuals which accumulates and must be cleaned from the basins. Therefore, the peak loads to the wastewater treatment plants are lower and have less concern than previously thought.

The Water Treatment Plant residuals discharge permits have expired. However, a residuals discharge quality and quantity management report for all three WTPs is routinely produced. The data is compared to the performance data for the wastewater plants to assess the impact of residuals discharge on the performance of the wastewater treatment facilities and the Biosolids Recycle Center, the facility which receives, dewater and processes the organic and inorganic solids form all of the water and wastewater treatment facilities. Management information is routinely reviewed to continuously evaluate the impacts and the performance of the respective plants.
The recommendations described within this PLF have been addressed and will continue to be emphasized. Water treatment facility managers and operators continually strive to improve plant performance and to achieve treatment process reliability. This is a never ending process that will continue for as long as water plant staff have as a goal the production of a quality product, process reliability and optimized production costs. The intent of the PLF recommendations to put into place a continuing improvement process has been achieved.

PLF: Operations: – Management of the Source Water
The emergency intake does not have sampling or monitoring capabilities. Use of the emergency intake would require more tenable operations, with unknown impacts on achieving Partnership goals.

FINAL STATUS: The Emergency Intake, renamed as the raw water basin bypass, and is utilized only conditionally and in accordance with a written agreement between Load Control and The Water Treatment Plant Management. Specific Conditions which merit consideration of Raw Water Basin Bypass utilization include, ice blockages at the main intake, interruption of flow at the main intake and wind tide disruption of intake flow. Communication & approval steps have been included in a written Emergency Raw Water Basin Bypass Protocol, along with an increased sampling water quality requirement whenever the bypass is opened. Raw water conditions which PROHIBIT opening of the Raw Water Basin Bypass include river spills or excessive algae counts and river turbidity in excess of 20 ntu. Limited, controlled and conditional use of the raw water bypass has not impacted partnership goals. This PLF has been completed.

F. Documentation/Demonstration of Addressing Complacency

PLF: Administration: – Redundancy
A number of chemical feed and monitoring systems do not have backups. City Water Department should formally identify critical areas and develop a plan to remedy them. All critical processes should be monitored continuously and alarmed.

FINAL STATUS: Of the systems identified by the assessment team that required redundancy, the installation of a backup magnetic flow meter for the WTP ammonia system and the provision for a backup applied chlorine feed line at the WTP, were recommended.

At the Water Plant, a spare magnetic flow meter for the ammonia feed system was purchased and installation was to be made during a scheduled plant shutdown. However, due to on-going capital work, the scheduled full plant shutdown could not be achieved during the reporting period. In the meantime, the plan has been adjusted to avoid the need for a full plant shutdown. Other capital work can be accommodated, as well. Dedicated magnetic flow meter will be installed for each of the four ammonia pumps. The additional meters will be ordered in the summer of 2001 and installation will be completed in the fall of 2001.

At the Water Plant, the north and south filter applied chlorination points now have redundant application piping. This PLF is considered complete.

G. Commitment to Resources (Staffing, Funding) – Administrative
**PLF: Administration: – Operation Certification**

Properly state certified water treatment plant operators would be required in each water plant in the near future. Furthermore, experience in other utilities has demonstrated that operators who become and maintain their certification are likely to have a higher skill level then those who do not. The City Water Department, together with the City’s Personnel Department needs to develop and implement a plan, which encourages our operators to become certified.

**PRIOR STATUS:** The Department of Environment has developed the draft regulation for review and vote by the State House. City Water Department was actively involved in commenting on the language of the regulation. Once this regulation is approved by the legislature and signed by the Governor, then the DEP rules can be created and approved. These rules are currently under development. City Water Department needs to clearly understand what is the specific language in the final rules, before changing The City Civil Service regulations. We are making every effort to stay abreast of the operator certification changes and will reflect those final changes.

**CURRENT STATUS:** The State has not yet signed into law the new rules regarding operator certification requirements and therefore we are not certain of our final obligations under the new law. Furthermore, the USEPA may offer comment or disagree with the state’s plan for compliance with the federal law, but, again, the state will not know this until the state finalizes its regulations. CITY WATER DEPARTMENT has developed a certification strategy that would comply with the draft rule. Basically, CITY WATER DEPARTMENT deploys its water treatment operating engineers to provide twenty-four hour/seven day oversight of its three drinking water plants. We intend to use these state certified engineers as the certified operator in charge of all process control decisions. Operators at each plant will follow approved procedures in the operation of the plant and, when, conditions are outside of normal, there will confer with the certified engineer for direction. CITY WATER DEPARTMENT intends to require state certification of its plant engineers as well as other managers and supervisors in the line of authority over the plant operators. We also plan to offer an incentive package to encourage plant operators and process control chemists to become certified.

However, since the implementation of our plan involves changes to the City’s Civil Services regulations, we must wait until the final language of the law is available before recommending changes to the city’s regulations.

**PLF: Maintenance: - Training Programs**

There is a lack of several types of training including trades training, cross training and process operations. Trades training include general craft training and more specific equipment training.

**FINAL STATUS:** Water Treatment management initiated a water treatment-training program for Operators, Chemical Technicians and Water Technology Assistants in 1995. The core modules include sessions on operator math and chemistry, disinfection, coagulation and filtration. Additional information about the watershed, finished water regulations, the Partnership for Safe Water, potable water storage and conveyance and the department’s distribution system water quality monitoring program are included to augment the core technical material presented. Water plant technical and management staff acts as the instructors for the various training program modules. Following
application to the DEP, the training program received approval for continuing education credits as required under the proposed Operator Certification program.

A three-year in-house Craft employee-training program was launched in December 2000 with an introduction to the overall craft-training program and a session on the department’s water quality goals. In early 2001, craft employees received information from the vendor supplying chlorine and sodium hypochlorite. In May and June 2001 there was a general session on blue print reading. Electronic technicians, electricians, mechanics, and laborers are the target trainee group. Future courses include an introduction to the department’s computerized maintenance management system, coagulant storage and application equipment, lime slaker use and maintenance, pump fundamentals, and industrial rigging. Towards the end of the third year, the program will be assessed for feedback, adjustments and the development of a list for future topics.

This PLF has been completed.

H. Priority Setting Capability – Operations

PLF: Operations: – Recycle of Backwash Water
The recycle of backwash water without any treatment continues to be a concern. It is nationally recognized as being undesirable in the control of protozoan cysts and oocysts.

FINAL STATUS: The new Backwash Recycle Regulation will not require the termination of backwash recycle, if the return stream is less than 10% of the plant flow and is returned to the head of the plant. The Water Treatment backwash recycle is typically under 4% of plant flow. Finished water quality and individual on-line turbidity data indicates that recycle impacts are negligible. Backwash particle count data has verified positive plant performance relative to recycle. The new reporting and record keeping requirements of the Backwash Recycle rule will be instituted by August 2002. This PLF is complete.

I. Training/Communications Capability – Operations

PLF: Operations: – SOPS For Notification
Notification procedures exist for all the plant. Treatment should consider the development of standard operating goals and standard notification criteria with periodic reviews and updates.

FINAL STATUS: The Operating goals and notification procedures at the facility were reviewed at a departmental level. While some minor differences exist in notification procedures, consistency was generally achieved and a document was produced and shared with water quality personnel and management throughout CITY WATER DEPARTMENT. A multilevel notification plan for water quality emergencies has been developed and is undergoing final revisions. This PLF has been completed.
J. Development of Action Plans to Improve Performance

PLF: Operations: – Flocculation
The lime feed system is unreliable and problematic. It is a dry feed system using pebble lime that requires high maintenance and gives inconsistent dosage control.

FINAL STATUS: The Hydrated Lime Conversion contract was bid in August 1999. Equipment start-up began in December 2001 and will finish in July 2001. The new hydrate system is based on a prototype system utilized at The Water Treatment from 1998 through 2000 to demonstrate the impact of enhanced coagulation on one-half of the plant. The half plant trial system, design and installed by plant personnel, was very reliable and provided consistent pH in the rapid mix and filter applied waters, using online pH control. With the completed installation of the new hydrate system in July 2001, this PLF is complete.

PLF: Operations: – Evaluate Filter Valves
An evaluation of the filter surface wash valves and filter effluent valve actuators should identify maintenance problems and the need for change.

FINAL STATUS: All 94 surface wash valves and effluent valve actuators have been replaced under a capital budget funded contract. This PLF has been completed.

PLF: Maintenance: – Filters
Sand in surface wash nozzles. Limitorque purchasing and parts availability.

FINAL STATUS: All surface wash valves have been installed and associated sweeps and nozzles inspected and replaced as necessary. The condition on the surface wash system will continue to be examined annually during filter inspections. Improvements in filter surfaces have been documented since September 1998 when the surface wash system became fully operational. This PLF has been completed.

K. Demonstrated Improvement – Performance

PLF: Operations: – Filtration Backwash Procedures
All plants are in the process of, or considering ways to, change filter backwashing procedures to control the post-backwash spikes. Systematic studies should be pursued to develop an understanding and documentation, with peer review, of the effects of backwashing variables.

FINAL STATUS: An internal experts team meets on a quarterly schedule to report on filter performance experiences and to cooperatively review techniques and ideas to achieve state of the art filter performance. Work at the water plants will continue in cooperation with this team in an effort to meet PARTNERSHIP turbidity guidelines for post backwash peaks and time to consistently achieve a filter effluent quality below 0.1 NTU.

The Water Treatment Plant has adopted a step backwash procedure that includes the ramping of filter effluent valves. The adoption of this procedure has increased the number of filters that comply with the Partnership criteria. In addition, the backwash water supply systems have been evaluated and, where required, the department has
committed to improvements to the systems. An engineering study for the backwash system at the Plant has produced contract documents that were bid in the spring of 2000. At the Plant a consultant has completed the evaluation of the filter backwash system, including backwash water storage tanks, pumps, control valves, piping and other associated systems. Where recommended, the upgrade of equipment and systems are scheduled for FY2001.

The Water Treatment Plant operates 10 filters. Three quarters of the filters have been fully converted to a dual media design. The remaining are sand filters. The plant operators have determined that filter effluent post backwash spikes can be controlled if a two-hour wait period is employed before returning the filter to service, following a backwash. The post backwash spike can be kept to less than 0.3 NTU and filter effluent quality will return to less than 0.1 NTU, within fifteen minutes of placing the filter back into service. The design studies to modify the Water Treatment backwash towers, control valves and procedures have been completed. Contract documents were bid in calendar year 2001. This PLF has been completed.

L. System Modifications Based on Performance Needs – Design

**PLF: Operations: – Sample Lines**

Sample line issues are of concern at the plant. There is a need for reliable raw water effluent samples. Additional samples at key process control locations are needed, such as for coagulation, flocculation, and sedimentation. A sample line maintenance program with centralized documentation is recommended. Documentation on the chemical technician’s bench sheets is required when data are being disregarded or held in question due to sample line problems.

**FINAL STATUS:** Upgraded and replacement chemical dosing lines and process monitoring sample lines at the Water Treatment was completed in calendar year 2000. Plant staff restored the RWB effluent sample line to the lab by repairing the corroded underground line and installing a new pump. A new sample line with a backup was also installed.

The design contract to replace the WTP chemical dosing and water sampling lines for this multi-phase complex project was completed at the end of May 2001, after overcoming the challenge of relocating utilities beneath X Street. The estimated project completion date is now November 15, 2003. This PLF has been completed.

**PLF: Operations: – Washwater Rate Control**

The plant should consider ways to achieve better washwater rate control when direct pumping is used in lieu of the backwash towers.

**FINAL STATUS:** The evaluation of the wash water system has yielded the conclusions; 1. the existing wash water towers are safe for continued operation but will require extensive welding and routine inspections to extend the life cycle to 20 years, 2. the best option for flexibility and reliance is to continue to utilize the washwater towers and the pumps but use a common plant loop to allow multiple pump/tower combinations on any filter, 3. existing tower altitude valves, pressure relief valves, etc. will be replaced to address leakage and to assure system life, 4. pumps will be equipped with control valves to allow for rate control. These improvements will be accomplished using a capital
contract that was bid in May 2001. Contract improvements are expected to be complete by May 2002.

PLF: Operations: – Filter Conversion
The plant should consider the benefits in making more filter conversions from sand to dual media to increase its rated maximum capacity.

FINAL STATUS: Plant capacity is not an issue, at this time, because of effective hydrant abuse reduction programs and decreasing customer demands in the last decade. Water Treatment flows are approximately 59% of plant filtration capacity. Filters are identified for replacement based on routine inspection and identification of structural problems. Twenty-two sand filters were replaced with dual media filters in the year 2000. Longer filter runs and lower washwater rates on dual media filters make conversion from sand filters to dual media filters economically attractive. This PLF is complete.

M. Documented Application of Process Control Skills – Operations

The Water Treatment Plant may benefit from a systematic approach to reviewing and evaluating filter operations and backwashing to develop the critical operating factors and to standardize applications and procedures.

FINAL STATUS: The CITY WATER DEPARTMENT internal experts team, represented by Water Treatment, Planning and the Labs, continues to meet to evaluate the performance of the filters. Techniques to improve filter operating practices, in order to achieve Partnership goals, are reviewed, discussed and debated. New ideas are developed, follow-up tasks or studies are assigned and deadlines are established by the team to report on the results of the studies. The team meets quarterly and will continue to until all filters meet the Partnership performance goals. This PLF has been completed.

PLF: Operations: – Rapid Mix
PLF: There needs to be an understanding of the adequacy of mixing at the points of chemical addition because the plants do not have operable rapid mixers.

FINAL STATUS: The issue of adequate mixing at the point of chemical addition has been emphasized to both the plant operators and the engineering design group within CITY WATER DEPARTMENT. Achieving sufficient mixing energy to fully diffuse treatment chemicals into the water at the point(s) of application has received significant attention. This was evidenced in the recent designs for the new acid and caustic feed points at the WTP, new mid-floc chlorine application points at all three plants and the new potassium permanganate feed points for the plants.

The Plant team report to re-engineer the rapid mix chamber for coagulant feed has included the importance of mixing. Engineering studies, utilizing a new computer modeling technique called CFD - Computational Fluid Dynamics, will be used to examine rapid mix chamber flow patterns, velocities and mixing energy in an effort to assure that treatment chemicals completely mix with the flow being treated, in the shortest practical time. This PLF is considered complete.
PLF: Operations: – Schedule of Filter Backwash

The scheduling of filter backwashing sometimes results in filters being in service beyond their head loss/run time goals.

FINAL STATUS: In calendar year 1996, the automated backwash cycle was revised to trigger at a run time limit of 40 hours or 5 feet of head loss. Previous to 1996, filters were automatically washed based on 5-foot head loss. The backwash duration was extended from 4 to 8 minutes in February 1996 and the tower wash programmed to include; a ramp to set point, 4 minute set point wash rate and 2 minute ramp down to zero, in order to further improve backwashing efficiencies. In February 1997, based on analysis of on-line turbidimeter and particle counting data for individual filter effluents, the 40-hour runtime limit was increased to 48 hours. Filters have been operating up to 48 hours with head losses below 1 foot. All filters in service produce effluents with turbidities below 0.10 NTU. Filter performance factors will continue to be studied to determine if adjustments in runtime limits are required. This PLF has been completed.

N. Understand/Explain Performance Deviations - Performance

PLF: Operations: – Evaluation of Flow Rate Change

Literature suggests that filter rates should be kept as consistent as possible and that large change in flow rates can cause water quality events. Flow rates should be changed gradually. Pumping can result in very significant changes in flow rates through the plant.

FINAL STATUS: The pumping rate situation applies to the Water Treatment Plant only, where a 50 to 60 MGD flow rate occurs when a pump from the raw water basin is turned on. WTP flow by gravity from the raw water basins. Communication procedures have been put into place to alert plant personnel of the need for additional treatment rates. The Water Quality & Supply Committee has developed guidelines for maximum floc/sed basin flow rates. The plants have put procedures into place to gradually increase filtration and floc/sed basin flow rates. For example, at WTP, filtration rates can increase by 0.3 MGD per filter per hour. This correlates to an increase of 12 MGD per hour across the floc/sed basins. This PLF has been completed.

PLF: Operations: – Load Control

Load Control greatly affects filtration rates through pump changes, which can impact finished water turbidity. Better communication and flow control may help minimize this impact.

FINAL STATUS: The Water Quality and Supply Committee continues as a valuable forum to address and understand competing goals. Committee members include Water Treatment, Load Control, Construction Unit, Planning & Research and Bureau of Laboratories personnel. Formal policies have been created and revised regarding peak treatment plant flows, minimum and maximum reservoirs & storage operating levels, communication protocols and use of emergency raw water bypass equipment. Long range capital projects are reviewed to understand impacts on demand and coordination and timing issues. Information about upcoming maintenance plant work is discussed with the Load Control Unit to identify impacts on finished water production rates and to minimize the impacts on system storage and delivery. The Committee and resultant communications protocols have been completed as the intended by the PLF stated above. Maintaining good communication is a never ending task and the Committee will
continue to be a useful tool. The concern addressed by the phase III review has been mitigated by decreased customer demands resulting in lower overall production rates and minimal swings in daily treatment rates. This PLF has been completed.