City of Charleston ISO Class 1 Certification

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Over the past three years the Commissioners of Public Works (CPW) has been working with the City of Charleston Fire Dept. and the Insurance Services Office, Inc. (ISO) to obtain a Public Protection Classification (PPC) of a Class 1 Rating for the City of Charleston. This rating was obtained and became effective June 1, 1998.

The achievement of this goal was accomplished through the firm commitment and cooperative efforts of CPW and the Charleston Fire Dept. Without teamwork, open communication and a common goal, this certification would not be possible. Of equal importance, a firm commitment form management must be present for the provision of resources required to attain this goal. Full management support must come from all entities involved.

It is the obligation of a water utility and a fire department to provide adequate fire protection to its customers. The significance of achieving a Class 1 Rating demonstrates to our customers that our operations, facilities and infrastructure is at the highest level regarding fire protection.

What is ISO?

The Insurance Services Office is an independent statistical rating and advisory organization serving the property and casualty insurance industry. ISO uses the National Fire Protection Association (NFPA) standards for survey evaluation of each fire department, and the American Water Works Association (AWWA) standards for the evaluation of the water system.

Upon survey completion, the ISO provides insurance companies with the most current Public Protection Classification (PPC) rating of the surveyed city. Protection Class 1 represents the best public protection possible, and Class 10 represents no recognized fire protection available.

The PPC rating is based on the following criteria:

- 40% of the grade is based on the water supply, distribution of fire hydrants, and capacity of the water supply for fire suppression above the maximum consumption;
- 50% of the grade is based on the fire department's facilities, equipment, maintenance, training and testing; and
- 10% of the grade is based on overall communications.

Currently there exists only 26 cities in the country that have attained a Class 1 rating, and Charleston is the only city in the state of South Carolina to be rated as a Class 1. Considering that there exist 88,000 fire departments in the country, this is quite a prestigious achievement, putting our city in an elite category within the nation.

Benefits:

Through this outstanding achievement, industry, property owners and residents of the City of Charleston may see significant property and casualty insurance savings. These savings will be an appealing consideration to industry and businesses evaluating Charleston as a facility location, and to property owners who are considering annexation into the City of Charleston.

Attaining a Class 1 rating displays the tremendous commitment the Commissioners of Public Works and the City of Charleston Fire Department has to our customers. The assurance of sufficient fire hydrants, fire flow availability and the availability of fire suppression equipment is paramount. Also, by providing this fire protection, insurance ratings are positively affected, further displaying our commitment to our customers.

Survey Preparation:

An ISO surveyor evaluates all components of the water system, which includes treatment, pumping, storage, distribution and fire hydrant locations. Extensive testing is performed throughout the survey area to determine fire suppression capacities of the system. Also considered are fire hydrant coverage, conditions, visibility, maintenance and record keeping.

Prior to the survey, records are sent to the surveyor for pre-evaluation. Water treatment reports, schematics, etc. are provided to the evaluator. Also, hydrant records are issued showing the number of nozzles, size of lead pipe to hydrant, and preventive maintenance history. This information was presented from hydrant database reports. Schematics or grids of the water distribution system were also provided for evaluation.

Points are gained when: hydrant coverage is within 1000 feet of prospective properties; 6" leads are feeding all hydrants; hydrants are equipped with pumper nozzles; hydrants have uniform operating nuts; and uniform hydrant operating directions. This evaluation is done prior to the surveyor's on-site visit.

The surveyor randomly chooses field test sites, putting an emphasis on industry, large businesses, schools, churches, etc. The surveyor calculates the fire flow requirements based on a residual pressure of 20 PSI. In fairness to the utility, areas requiring greater than 3500 GPM are not be penalized in points for not exceeding 3500 GPM; therefore, as long as the water system in the test area can achieve 3500 GPM it will get full point credit.

The Survey:

The overall water and fire department operations were reviewed, to include facilities tours, records, documentation, preventive maintenance programs, etc. With regard to water operations, no major deficiencies were observed in these areas. And with fire department operations, additional hydrant preventive maintenance was needed, and additional equipment was required.

As part of the survey forty-eight (48) fire-flow tests were conducted through the aid of the ISO surveyor, CPW personnel and fire department personnel. The ISO surveyor witnessed all of the tests. Prior to performing the tests, investigation was made into the status of water main repairs, pump station activities, tank levels, and other water distribution activities. This was done to ensure optimum test results would be obtained. Also, communications were maintained with dispatch for rapid notification of system changes.

Per the final ISO report, of the forty-eight tests, deficiencies were found at fifteen (15) fire-flow test locations. Concerned with these findings, CPW began investigation into the flow deficiencies. Also, the Charleston Fire Department took immediate steps to improve certain areas of operation, and to purchase required equipment.

Post-survey Investigation:

The first course of action was to evaluate and compare the surveyor's findings to our records. Detailed notes taken by water distribution personnel aided evaluation considerably, as miscalculations were discovered upon initial comparison between the report and the field notes. Re-testing the areas in question cleared up several discrepancies.

Secondly, the deficient test areas were hydraulically evaluated looking for evidence of incorrect flow test planning or the possibility of closed or "wrung" valves. Fire flow tests were conducted to the source to identify closed or wrung valves. As discovered, wrung valves were replaced, and re-tests were scheduled for the deficient areas.

Many of the re-tests involved performing the flow tests in the opposite direction, which proved to render a more desirable test in many cases by ensuring the "static" hydrants were situated between the primary water sources and the flow hydrants. It was found that assumptions were made on flow availabilities on sites close together. This was corrected by requesting the location of each surveyed building, and comparing the test location to the building location to ensure ideal tests were conducted.

Initially, CPW personnel were given little opportunity to evaluate the test areas, as the ISO surveyor chose the locations, and determined which hydrants would be the "static" and "flow" hydrants. We have learned that a competent person familiar with hydraulics and the distribution system they are evaluating should work with the surveyor to evaluate test areas prior to conducting flow tests. Also, main-line valves should be checked from transmission mains or feeder mains to the test areas prior to performing tests. This will expedite the testing phase and deter problems discovered within the distribution system during the testing.

Water Department Corrections:

Several deficiencies were discovered in historical areas where the water mains were installed in the 1880's to early 1900's. These mains were not manufactured with a cement interior lining, and had become tuberculated, restricting the flow capabilities significantly. In these areas, development had progressed, demanding more flow availability per area and structure. Hydrants spacing and positioning were evaluated. When possible, hydrants were relocated to mains of a larger size and/or to those that had cement lining. This proved very beneficial with achieving the required fire flow.

In certain areas where relocating hydrants would not benefit the results, new water mains were installed to replace old, undersized water mains. Also, in one area a large development was being fed from a dead-end main. A new main extension was installed to "loop" the area, providing dual feeds to the deficient area, which corrected the situation. Several CPW departments worked together in the coordination of these projects, providing the required fire flow and correcting the deficiencies.

New hydrants were installed in strategic locations in certain deficient areas to provide much more desirable flow test results. And in other areas, flow tests were "shifted" towards the source to reduce head-loss, and provide improved test results. The shifting still placed the flow hydrants at the buildings being surveyed.

An aggressive hydrant replacement program had been in effect for many years, resulting in 2-way hydrants being replaced with 3-way hydrants, and ensuring deficient hydrants were replaced promptly. This assisted in achieving higher points in the respective category. However, deficiencies were discovered and quickly corrected.

Hydrant coverage is also an important consideration in the evaluation and certification process. Points are lost in areas where coverage is insufficient. The fire department has become much more involved in coverage evaluation, which has greatly benefited the water department. When an area is suspect, the fire station discovering the potential deficiency will contact the water department to further evaluate and resolve.

Fire Department:

The City of Charleston Fire Department serves a population of 101,000 within 88 square miles. The department encompasses 18 fire stations with 14 pumper trucks, 3 arial ladder trucks, and approximately 200 fire fighting personnel.

A significant aspect of certification is training. 220 hours of training is required for each fire fighter, which includes day and night training. Training record maintenance and accuracy plays a key role in attaining credit in this category.

Fire Department Corrections:

Preventive maintenance and records are also a major part of certification. The fire department was depending on the water department for hydrant preventive maintenance execution. However, ISO requires fire hydrants to be checked two times per year, and this could not be accomplished without assistance from the fire department. So, the fire department implemented a PM program, which has proven to be a benefit to both departments. An elaborate fire department PM program is now in place, which is improving the fire fighter's knowledge of the water distribution system, and is significantly complimenting the water distribution's programs.

Preventive maintenance records on hydrants are kept in the Water Distribution Department's database, providing a central location for record maintenance. Reporting and retrieving of hydrant information through the aid of the database proved to be significant in achieving Class 1 certification.

In line with preventive maintenance was fire department pumper truck pump testing, hose testing and fire emergency preplanning, which requires intricate testing and stringent reporting. If records are not complete and accurate, points are lost in this area. Therefore, without a thorough testing and reporting system, optimum points cannot be obtained. Improvements were made to equipment testing procedures, eliminating testing discrepancies.

Another area addressed was fire-fighting vehicles and equipment. Items such as deluge nozzles, stack-tip nozzles, chemical foam, ladder extensions, etc. were purchased to conform to ISO requirements. Also, a ladder truck was purchased, displaying the tremendous commitment the fire department had to obtaining this significant goal.

Benefits from the survey:

We have seen many benefits arise from this survey: A cooperative effort and mutual concern to maintain system integrity and constant improvement has been established, hydrant preventive

maintenance has greatly improved, and a more in-depth concern and investigation of hydrant coverage has surfaced. Also, communication between the fire department and CPW has grown, and a more pro-active approach to fire flow requirements with regard to main extensions and replacements has been instituted.

Maintaining a Class 1 Rating:

To maintain a Class 1 Rating we must ensure records are maintained and accurate, training is performed, preventive maintenance is kept up, and the water system is constantly evaluated and improved.

ISO site evaluation criteria for determining the fire flow requirements for buildings is now used to ensure new or replacement water mains are designed and sized properly. Attention to these details will ensure that adequate test results are achieved during future surveys, and our customers and their properties are protected from fire outbreaks.

Conclusion:

Through a team effort, we have worked diligently together to provide the best fire protection available. By achieving an Insurance Service Office Class 1 Rating, we have displayed our commitment to our community, to our customers, their personal property, and their families.