

ISO 14001 Registration for Water Distribution Operation, Charleston SC Experience

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One of the most urgent missions this generation can undertake is the protection and improvement of the environment to reverse years of neglect, beginning at the dawn of the industrial revolution and continuing even today. Despite noteworthy attempts by many organizations to reverse the effects of pollution, the situation worsens. It is now time for industry, both public and private, to step forward, take responsibility and establish new methods to prevent pollution, and to improve our environment for present and future generations.

The Water Distribution Department of the Commissioners of Public Works (CPW), Charleston, SC has taken that step, and on June 16th, 1999 became the first public utility in the nation to achieve ISO 14001 Environmental Certification by passing a third party registration audit with no deficiencies.

What is ISO?

The International Standards Organization (ISO) is a federation of international standards for 120 member nations. It was founded in 1946 after World War II to provide consistency and continuity during the rebuilding processes of Europe. The initial purpose of the organization was to address technical and manufacturing processes for the production of goods and services. Later the organization expanded to include quality control and assurance, and has recently developed environmental standards to promote the prevention of pollution, continual environmental improvement, and good environmental stewardship.

Based in Geneva, Switzerland, ISO has promulgated more than 8,000 international standards for things as varied as paper sizes to automotive parts, and has set standards from quality assurance to business management. More than 120 countries belong to ISO as full voting members, with the United States as one of those members. Currently, more than 70,000 companies and firms have made ISO registration an important part of their business strategy.

ISO 14001 is a series of standards that promote and establish voluntary environmental management standards and guidelines, and encourage improvement to the environment that we all share. The general purpose of this international standard is to provide guidance to organizations implementing or improving an Environmental Management

System (EMS). It is consistent with the concept of sustainable development and is compatible with diverse cultural, social and organizational frameworks.

Following in the footsteps of the internationally accepted ISO 9000 (Quality Management and Quality Assurance Standard), ISO introduced in 1996 the Environmental Management Systems (EMS) standard (ISO 14001). Development of the ISO 14001 series involved hundreds of technical committees, with representation from the American National Standards Institute (ANSI), the American Society of Quality Control (ASQC), and the Environmental Protection Agency (EPA). The series is modeled after legislation from a number of European countries and the United States.

Developed outside conventional regulatory channels ISO 14001 has the potential to revolutionize both the way industrial and other organizations manage their environmental affairs. Although primarily established for industry to incorporate environmental management into their business plan, the Charleston CPW has discovered this standard is tailor-made for municipal utility organizations.

Benefits:

Application of the ISO 14001 environmental management principles increases cost effectiveness, environmental compliance, efficiency, reduces hazard liabilities, and promotes technological advances. Also, ISO 14001 certification demonstrates evidence to our customers, stakeholders and the community that we are committed to environmentally safe processes, environmental compliance, the prevention of pollution, and continual environmental improvement.

The goal of ISO 14001 is to make environmental management an integral part of an organizations overall management system. ISO 14001 guidelines also offer significant improvements to an existing management system -- providing enhanced competitiveness in today's market. The design of an EMS is an ongoing and interactive process which structures responsibilities, practices, procedures, processes and resources. This structure provides continuity for implementing environmental policies, objectives, and targets, which can be coordinated with continuing efforts in other areas (e.g., operations, finance, quality, occupational health and safety).

Through the implementation of an EMS, enhanced protection to human health and the environment is provided from an organization's activities, products and services. A structured opportunity is given to maintain and improve the environment, and to reduce operational costs. This is accomplished through in-depth examination of operational processes, and through the pursuit of technological advances. A positive public image is gained, along with customers' environmental expectations being met. The use of irreplaceable natural resources is curtailed, liabilities associated with environmental concerns are thwarted, and overall management systems are improved.

Getting started:

A CPW Steering Committee was formed and an EMS Manager was chosen to evaluate the international standard, to develop an EMS Policy, and to develop level-one procedures for implementation of an environmental management system. The policy and procedures were the driving forces behind and the foundation of the EMS program development.

From the start, a team effort was firmly incorporated into establishing an EMS. With this commitment comes education for the teams. The Steering Committee members, the EMS Manager and all those associated with development and implementation obtained extensive training in the appropriate methods required for implementation. Educational material was acquired, seminars were attended, and educators were brought in to train involved associates. Also, other organizations were visited to evaluate their methods and approach to EMS development and implementation.

Pilot Program:

The Water Distribution Department was chosen as the pilot department for EMS implementation. Our department had recently completed a successful "Re-engineering" of the department through the "team" approach. Through Re-engineering, the processes, organization and structure of the department had been evaluated, rethought and restructured to improve performance and the overall organization. This process had already yielded a 75% increase in productivity.

New departmental sections had been established as "teams", standard operating instructions had been written by several different teams, and paperwork and records had been restructured by a paperwork reduction team. Our department had many of the key elements in place to ensure success with implementation of an EMS.

Momentum:

To successfully implement any project you have to generate excitement and "buy-in" from those affected. The project must be worthwhile and carry a prospective value, and a personal desire for its success must be shared by all involved. To accomplish this, we broadcasted management's commitment to the success of the project, and further showed their commitment through extensive awareness and specific EMS training.

This colossal project was broken down into small, attainable goals as not to overwhelm our associates and those responsible for implementation. A large bulletin board was utilized to post progress of the implementation, and large progress charts were exhibited in many areas of the department informing our associated of the latest accomplishments. Also, framed EMS policy statements were displayed in various areas. All this was done

to generate urgency and excitement, and to endorse overall commitment by the organization to obtain ISO 14001 certification.

Teamwork:

As previously mentioned, a team effort was firmly incorporated into establishing an EMS. Those chosen were committed to the success of the project, and were available for the full duration of the project, or throughout their prospective roles. The roles and responsibilities of all team members, teams, managers, etc. were explicitly defined.

Associate "buy-in" was further achieved through the teamwork concept. By including as many people as possible on the teams, and by choosing those who were influential, experienced, knowledgeable, and prone to contribute, the project was sure to succeed. The team leader asked questions, encouraged "brainstorming", and listened intently to all associates' views and opinions. Through this approach a more inclusive and complete picture was drawn of the overall operations.

All meetings were structured through agendas, and reported upon through meeting minutes for tracking of implementation progress. Action items, responsibilities, due dates were included within the minutes for future reference and for accountability.

Multi-tasking:

Waiting for one team to complete their objectives before another agenda item is started will hinder the project's momentum. Several teams can and should be meeting simultaneously. Our department had anywhere from two to three implementation teams concurrently functioning. This maintained project thrust, kept associates continually involved, and provided a means of swift implementation.

The overall project coordinator was involved with all teams to ensure a smooth transition between goals, and to maintain communication between the teams. This will prevent duplication, and will promote continuity throughout the teams. This is the approach that was used, and tremendous success was experienced.

Communication:

To further improve internal and external communications, Web pages were created which has provided associates and other departments quick access to EMS implementation progress, legal requirements, manuals, reference materials, training schedules, presentations and reports. Also, links to all departmental forms are included in the Web pages to ensure associates are using the most current versions. Electronic Files were established on an internal WAN (Wide-area Network) system to properly maintain a filing structure, and to provide other departments access to our progress.

An Internet Web Site is maintained to render outside interested parties a means of gaining information regarding all aspects of our operations and environmental programs. Also, the results of recognition programs are posted on the internal system. This information sharing has been advantageous to all CPW departments seeking ISO 14001 certification, as other departments don't have to "recreate the wheel".

Contractors and vendors used by CPW required notification of the new EMS policy; therefore, letters were issued describing details of the policy and benefits of adopting this policy. Also, all purchase orders carry reference to our EMS policy. When a contractor is awarded a new project, they are informed of our EMS policy through documentation, during a Pre-construction Conference, and through random construction inspections. By improving our communications procedures, the importance of protecting the environment is further sustained.

Environmental Aspects and Significant Impacts:

Environmental Aspects are elements of an organization's operations, activities, products and/or services that can interact with the environment, and which can be adverse or beneficial. The Water Distribution Steering Committee's approach to identifying our aspects involved breaking down each area of the environment individually to focus in on how the department's operations impacted that area of the environment, either positively or negatively.

To evaluate the significance of these aspects we devised a grading method to prioritize or rank the aspects. Criteria used included: environmental areas, occurrence frequency, regulatory requirements, existing policies, industry standards, contractor activities, previous incidents, recent research, hazard/risk liabilities, waste minimization potentials, and aesthetics. All of the criteria items carried a weighting factor or multiplier based on importance. Upon grading completion a grade range was selected to identify which aspects were considered *significant*. The grade range was selected based upon the committee's experience and knowledge, and through much discussion. Also, any *Aspect* that has a regulatory requirement relating to it must be considered *significant*. This grading exercise showed us which aspects had the most significant impact on the environment, and gave us an objective view of which items to target for environmental improvements.

Once the department's *Significant Aspects* were identified, ISO 14001 requires that an organization control those aspects to prevent negative environmental impacts from occurring. Control methods were identified or initiated and delineated on a *Control Method Table*. Control methods may include approved procedures, specific Improvement Programs, specific training sessions, manuals, etc.

Legal Requirements:

Does your staff know the laws and regulations that mandate your operational activities? Do they know the details and requirements of other industry standards that you subscribe to? Often "front-line" representatives of an organization haven't a clue as to what these regulations consist of.

Water Distribution EMS Steering Committee using its knowledge and experience evaluated existing regulations and other requirements that we subscribe to. The most up-to-date hard copy versions or Internet Web Sites were obtained to further evaluate the regulations for application to our operations. Some requirements, originally thought to be applicable, were found to not apply to our organization. A master list was compiled to provide important details on each regulation.

Contact persons and phone numbers were identified to assist with keeping the regulations up-to-date each year, as ISO 14001 requires. Also, a Water Distribution Library was established to house these documents in a central location, and to provide full and immediate access for all associates.

Objectives and Targets:

Now, all of the previous exercises led us to this question: how can we do our part to improve the environment? A team was formed to evaluate the results of the *Significant Aspects Grading Worksheet* to decide on which items to target for future improvements. A point to be taken is that the grading results were *guidelines* for choosing improvement projects; budgetary constraints were also considered. Several main areas or categories were chosen for improvement projects, as follows: preventive maintenance (PM), utility locating, training, corrosion control, fire protection, pipe replacement, and leak surveying.

Out of these areas came several *Improvement Programs*, as follows:

- ◆ Unidirectional Flushing
- ◆ Transmission Valve PM
- ◆ Air Relief Valve Inspection
- ◆ Hydrant Painting and PM
- ◆ Utility Protection
- ◆ EMS Training
- ◆ Standard Operating Instruction (SOI) Training
- ◆ Skills-based Training
- ◆ Operator Certification
- ◆ Corrosion Control
- ◆ Valve Replacement
- ◆ Hydrant Replacement

- ◆ Insurance Service Office Survey (fire protection)
- ◆ Large Meter Replacement
- ◆ Water Main Extension / Replacement
- ◆ Water Main Repair
- ◆ Deficiency Tracking
- ◆ Watermain Rehabilitation
- ◆ Leak Survey and Detection
- ◆ Unaccounted-for Water

Each Improvement Program delineated the background and purpose of the project, the specific objectives of the project, and included measurable targets for accomplishing the project. Performance indicators for tracking the progress of each project were detailed in the project documentation, along with the allocation of resources to complete the project. A detailed action plan was included to "kick-start" the project. And related documents were identified and documented.

To monitor and ensure the success of each Improvement Program, details of each project are included in the department's *Water Distribution Monthly Report*. Fortunately, this report was in place prior to EMS implementation. The report provides senior management with critical information on the progress of our operations, and serves as a means of internal communication to educate our associates on the successes of the department.

Standard Operating Instructions (SOI's):

Is there more than one way to skin a cat? Of course! Do you want your associates to perform an activity in a variety of ways? Of course not! To prevent deviations from an organization's preferred operations methods and/or industry standards, well established, documented and approved procedures are needed on all activities or job responsibilities.

To our benefit *Standard Operating Instructions (SOI's)* where in place on most activities under the department's responsibility. To conform to the ISO standard the following items must be included within the SOI's:

- ◆ Revision levels
- ◆ Effective dates
- ◆ Prepared by
- ◆ Approved by
- ◆ Corresponding documentation (ISO clauses, EMS procedures, related activities, forms, regulations, etc.)
- ◆ Purpose
- ◆ Scope
- ◆ Specific responsibilities
- ◆ Regulatory requirements
- ◆ Emergency start-up and shut-down details

- ◆ Positive and negative impacts

An SOI Team was organized to evaluate the existing procedures for accuracy and EMS conformance, and to create additional activities as required. The final SOI's were approved by the Water Distribution EMS Steering Committee.

Training and Awareness:

Referenced many times is training. Without it, this project cannot succeed. One of the key issues in certification is evidence of employee commitment to the EMS. This only seems logical, as almost all of your associates will be affected by implementation, and all associates are needed for an organization to achieve certification.

An EMS training schedule was created to identify the training requirements, with due dates attached. A Standard Operating Instruction (SOI) training schedule was produced to educate associates on the proper steps to accomplish "EMS Sensitive" activities. To build a diverse work force, a Skills-based training program and schedule was established. All schedules included due dates, identified associates required to attend, and names of trainers responsible for conducting training sessions. Training also included the benefits of following the approved the procedures, and the adverse environmental effects of deviation from them.

Emergency Preparedness:

Chemical spills, natural disasters and severe process interruptions are all considered emergencies; thus, emergency preparedness plans are imperative. With any emergency time is not a luxury. Approved plans are required to effectively and rapidly respond during an emergency.

The Water Distribution Department had many emergency procedures in place; however, others needed identification based on ISO 14001 requirements. Additionally, our existing procedures required the same augmentations as the SOI's. The addition of post-incident reviews was also essential to the EMS program, and to continual procedural improvements. We discovered first-hand how important and beneficial these procedures were during a major transmission main failure, which occurred a few weeks after the emergency plan was approved.

Records Management:

Is your filing system busting-out at the seams? And I'm sure you can find any document within 60 seconds, or a file that you needed 5 minutes ago for an important meeting. Well, we needed little convincing with respect to records management. Most of our administrative staff could envision the benefits to a structured filing system. To venture

into this exciting group of tasks, we created a Document Control Team. Flow charts were created for all tasks, which included how a record was generated, the paths which it followed, and finally to where it was filed.

Through the use of these flow charts, paralleling the system used during our Re-engineering Project, we were able to "streamline" certain processes, eliminate forms, and alter filing systems. We unveiled multiple forms performing the same repetitive tasks, of which we eliminated. A Central Filing Area was created to accommodate the administrative staff. And a file index was compiled to provide a means of locating documents and files in "short order". Also, a Water Distribution Library was instituted to centralize documents and provide associates access to legal and other requirements, manuals, reference materials, training and operational videos, industry magazines, etc.

SOI's were produced and approved to further support these methods and ideas. Without teamwork and input from the entire administrative staff this process would not have succeeded. The benefits have been further proven on many occasions since the program's inception.

Document Control:

Go into any organization and see how many versions are readily available of the same policy, procedure or form. Staff members are usually working out of these different versions trying to do the same tasks! This is the reasoning behind document control. Revision levels and effective dates are needed on all EMS documents, SOI's, emergency plans, and especially forms.

Corrective and Preventive Action Requests:

A mechanism is needed to provide associates an opportunity for expressing environmental concerns and improvement ideas. Suggestions should carry rewards as an incentive for innovative ideas and potential corrections to reverse negative environmental impacts. CPW provides two opportunities for improvements: Corrective Action Request (CAR) and Preventive Action Request (PAR).

These requests can be initiated by associates, management, or through internal audits. Requests are tracked by the EMS Manager to ensure completion, and senior management is kept abreast of the current status.

Monitoring and Measurement:

How many times have you wondered, "When's the last time this gauge was calibrated?" Well, test equipment, including gauges, are an intrinsic part of an EMS. A strict regiment of when and how test equipment is checked, maintained and calibrated is required. First you must identify what equipment will require calibration. Venders were contacted to

learn if a certain piece of equipment needed checking, how often must it be calibrated, and how to properly perform the inspection.

SOI's were written for all of our test equipment to institute consistency and an approved method for calibration. Gauges were numbered, databases were created and schedules were formalized to ensure the program was maintained.

Regulatory Assessment:

To ensure we are following legal and other requirements that we subscribe to, a Regulatory Assessment Team/EMS Progress Team was created to evaluate the identified requirements on a quarterly basis. A bank of related questions was collated, and each question is assigned to a particular individual or group for the providing of supporting documentation. This accommodates the self-assessment requirements dictated by the EMS program. Therefore, we know and have documented evidence that we are following regulatory requirements.

Internal Audits:

A requirement of the ISO 14001 is self-assessments. It is required and also advantageous to perform internal audits, as objective views will be added to the implementation process. Non-conformances will be discovered internally rather than externally, providing an opportunity for correction prior to an external audit.

Internal Auditors are trained and teams are formed to perform these audits. To maintain objectivity, audit teams should not include trained auditors that are connected to the department being evaluated. Also, to accommodate this process a specific and detailed questionnaire was created to guide the auditors smoothly through the process.

External Audit:

To prepare for the ISO 14001 certification process, we interviewed several audit firms, looking for a firm that was knowledgeable in the operations of a public utility, and specifically a water and wastewater company.

In preparation for the audit, all electronic information was checked and double-checked for accuracy. Meeting rooms were set up and equipped to accommodate the auditors. Hard-copy evidence of our EMS was provided in an orderly and structured fashion. This preparation put the auditors at ease, provided a comfortable area to work, and presented a professional atmosphere.

On June 14-16, auditors from Advanced Waste Management (AWM) performed a third party, registration audit of our EMS program to verify conformance to the ISO 14001

standard. All EMS documentation was thoroughly evaluated, interviews were conducted with associates at all levels of the organization, field sites and projects were assessed for conformance, and sampling occurred on various records throughout the organization.

The auditors were very pleased with the implementation of our EMS, and discovered NO negative observations, deficiencies or nonconformances with our program. The auditors witnessed the commitment our associates, the department and management has to improving the environment -- key to the success of becoming certified. Due to the contributions of associates throughout the organization the CPW Water Distribution Department became the first public utility in the nation to become *ISO 14001 Certified*.

Conclusions:

To establish an EMS, management commitment must be prevalent, goals must be established and conveyed, and teamwork must be utilized. Acceptance must be embraced by all associates, and excitement must be shared by all involved. Communication should be placed at the forefront of implementation. Positive reinforcement must come from management and team members, and resources must be provided to accomplish your goals.

It is now our turn to put the thumbprint of our generation on the map of environmental improvement. We have in our hands that opportunity, provided through a flexible, innovative and internationally accepted certification program, *International Standards Organization - 14001 Standard*.

References:

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