ABS Group | Asset Leadership Network

RISK AND RELIABILITY

ADOPTING THE ISO 55000 ASSET MANAGEMENT FRAMEWORK FOR THE WATER TREATMENT INDUSTRY

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Introduction

Since the origination of PAS 55 in 2004 and its evolution into ISO 55000 beginning in 2010, there has been a slow continuous process throughout industry to adopt and incorporate its principals into modern industrial organizations. Over the past ten years, much has been written about the benefits of ISO 55000 standards and how they should be applied to organizations. Here, we will continue that effort to provide additional clarity as to how the ISO 55000 standard applies to and is implemented in water treatment. The ISO 55000 standard provides guidance related to the development of documented information specifying how organizational objectives are transformed into asset management objectives. In addition to documentation, the standard outlines the overall role and requirements of an Asset Management System (AMS). Considerations related to the context of the organization are used in the development of an Asset Management Policy, organizational objectives, organizational risk identification, implementation of a Strategic Asset Management Plan (SAMP), Asset Management Plans (AMPs) and the creation and implementation of Standard Operating Procedures (SOPs). In the water treatment industry, the reliability and availability of water is of paramount consideration when developing an Asset Management System. This includes a systematic approach to optimize assets performance to achieve improved reliability. While this statement is simple in theory, success requires many more factors to be considered within the context of an organization. A sample of these include environmental, social and cultural considerations, internal and external stakeholders and regulatory requirements.

What is ISO 55000?

The ISO 55000 standard, generally referred to as “ISO 55000” (and referenced as such from here forward), is comprised of three key chapters:

1. ISO 55000 – Asset Management – Overview, Principles and Terminology
2. ISO 55001 – Asset Management – Management Systems – Requirements
3. ISO 55002 – Asset Management – Management Systems – Guidelines for the Application of ISO 55001

ISO 55000 is a set of international standards that provide requirements and specifications for an integrated, effective system for managing assets. Prior to the release of ISO 55000, the PAS 55 standard was published by the British Standards Institution in 2004 for physical assets. The ISO 55000 series of Asset Management Standards was established in 2010 and launched in February 2014.

The ISO 55000 standard outlines the minimal components of an AMS that are required for compliance. These are based on seven elements in the standard, including:

1. Context of the Organization

The organizational objectives provide context and direction to the organization’s asset management activities. The organizational objectives are generally produced from the organization’s strategic planning activities and are documented in an organizational plan.

2. Leadership

Asset management is demonstrated by leadership through the development, implementation, operation and continual improvement of an AMS. However, a key success factor is that ownership and accountability for asset management remains at the top management level.

3. Planning

The approach of managing risks associated with the AMS requires alignment with the organization’s risk management strategy including business continuity planning and contingency planning. The organization must integrate actions identified to address risk into the implementation plan for the AMS. The organizational

objectives are produced from the organization's strategic level planning activities and are documented in an organizational plan.

1. Support

Organizations must identify required resources and map available resources to planned activities to determine and address gaps. This gap analysis applies across all asset management activities and can require prioritization and program planning of many projects to close these gaps.

2. Operations

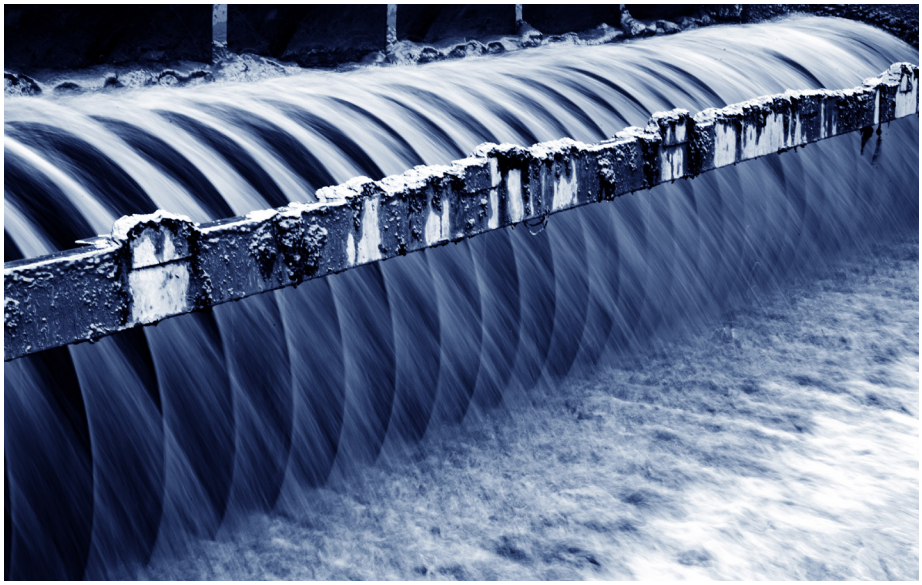
The AMS is managed by Operations who have defined roles and responsibilities for ensuring that the AMS is performing according to expectations. Operations utilizes the asset management tools implemented to ensure reliability, performance and quality.

3. Performance Evaluation

The organization evaluates the performance of its assets, its asset management and its AMS. Performance measures can be direct or indirect, financial or non-financial.

4. Continuous Improvement

Continuous Improvement goals are identified, assessed and implemented across the organization through a combination of monitoring and corrective actions for the assets, asset management or AMS. Continuous improvement should be regarded as an ongoing iterative activity, with the aim of delivering the organizational objectives.



Why ISO 55000?

Today, water treatment utilities face many challenges, including transformation to interconnected digital technologies, new public policies, additional regulatory requirements and climate change. Asset owners and operators are required to deliver greater stakeholder value, particularly to consumer and residential water customers while reducing risk and minimizing costs.

Water treatment utilities can benefit greatly from the implementation of an ISO 50000 base AMS. For example, the Flint water crisis began in 2014 when the city decided to take water from the Flint River without treating it properly, resulting in significant lead contamination. An ISO 55000 AMS requires a robust "Change Management" process that may have avoided the issues allowing the contaminated water. The fundamental requirements in a "Change Management" process consider all risks associated with making a change in the organization. Another benefit we see from a well-designed AMS is the "Roles and Responsibilities" (R&R) for individuals involved with asset management. Clearly defined R&R ensures that all asset management functions have assigned responsibilities to ensure responsibility and accountability. Finally, water treatment utilities can benefit from an ISO 55000 AMS by achieving recognition from regulators and the public that water facilities are being managed by a recognized asset management standard. Reputation can be very valuable to organizations and ISO 55000 provides comfort to the public that water treatment facilities are managed according to a recognized international standard while helping to confirm products are safe, reliable and of good quality.

Managing risk and performance through investments while working to optimize asset lifecycles is almost impossible in today's world without a modern AMS. It is a fundamental requirement of ISO 55000 that the overall program is driven by an AMS. Today, digital technologies, modern computerized maintenance management systems, artificial intelligence and other advanced applications are providing data and analytics that have never been as easily accessible to all individuals within an organization. Many organizations are deploying combinations of these tools that are well suited to facilitating process execution and conformance of defined asset management program standards based on the ISO 55000 standard.

With increasing acceptance of the standard as a best practice globally, there are many organizations that have adopted ISO 55000 as their foundational asset management approach and are currently employing the methods and practices without completing the certification process with ISO. Adopting an asset management framework based on the ISO 55000 standard demonstrates that the organization has an AMS to manage performance, risks, reliability and costs in a very effective and efficient manner.

How Water Treatment Utilities Can Apply the ISO 55000 Standard

When referring to water treatment utilities, we include drinking water and waste-water treatment with an operating context which includes a responsibility to provide quality drinking water to the public across the globe. In these modern times, clean water is essential to the production of goods and services, provides for public health and sanitation and touches almost all aspects of life; therefore, reliability of the assets required to produce clean and dependable water is of critical significance to the public (external stakeholders).

Applying ISO 55000 to water treatment utilities uses similar processes as power utilities, life sciences and manufacturing. However, certain considerations need be made for each type of organization; for example: in addition to the Asset Management Policy and SAMP, the asset framework will also list the asset management plans required for water treatment utilities. These include specific regulatory requirements, performance monitoring, quality management and risk management that may have a greater importance than other asset management plans. Communication plans will also have a prominent role in how water treatment utilities spread information to external stakeholders such as the communities and organizations they serve. Identifying the context of an organization assists in developing an AMS that specifically addresses risks associated with asset management challenges.

While not every incident can be predicted, when events do occur, ISO 55000 provides guidance in the form of Root Cause Analysis (RCA) to identify the root cause(s) and nonconformities associated with the failure. The SAMP should encompass protocols for incident investigation, planning and execution of avoidance strategies to mitigate or eliminate that specific failure point in the future. The governing Asset Management Policy and SAMP should apply to all departments throughout the water treatment utility as each department, or service area has unique challenges when it comes to asset management. Managing maintenance outages related to water provision is one of the most critical aspects of asset management. Water treatment utilities must pay particular attention to the execution of work during outages to ensure customer impacts are minimized.

Utilizing Technology to Drive ISO 55000 Compliance

Typically, water treatment utilities have an established computerized maintenance management system (CMMS) to facilitate the management of assets. Modern best of breed CMMS applications provide robust functionality to monitor, plan, and schedule maintenance activities, serve as a database for documentation and archive of maintenance activities, monitor and provide analytical data of the performance and risk related to identified assets, drive review and approval processes, facilitate safety protocols, and provide evidence for regulatory and environmental audits.

Other technological tools can be strategically integrated with the core CMMS application to facilitate predictive and prescriptive maintenance activities based upon analytical analysis of asset data including real time sensor readings. Performance monitoring of assets generates information on how assets are performing and may provide alerts to intervene when assets are not performing according to expectations. One of the many benefits of a properly designed CMMS and associated tools includes visibility for reliability engineers to review data stored in the CMMS and identify “Bad Actors”, or nonconformities that can then be addressed by maintenance personnel or engineering. The implementation of a successful program requires a methodical approach to facilitate effective asset management. The foundational elements include the preparation and verification of a Master Asset List (MAL) using a naming convention for assets and prioritization of assets through an Asset Criticality Ranking (ACR). These are key elements required to build and execute a strategy to provide effective asset lifecycle management. The completed data set allows assets to be prioritized for maintenance optimization and spare parts analysis efforts and provides the ability to search for and act upon accurate information. Overall enhanced maintenance plans for assets can now be specifically developed based on the prioritized assets to ensure that the most important works gets performed first on the most critical assets.

Issues Encountered When Applying ISO 55000

Water treatment utilities have been around for more than 100 years and have experienced unimaginable transformation from rudimentary techniques to modern technologies that produce and deliver clean water at a scale that allows endless possibilities while protecting our natural resources. The challenge of implementing change is difficult. Executive leadership must work hard to get everyone involved and invested in asset management to embrace change. This can be accomplished by having one overarching Asset Management Policy and a single SAMP that applies to the organization.

With aging infrastructure such as lead pipes, US water utilities are implementing many asset improvement initiatives. Once funding challenges are addressed, a key component is having an AMS to implement improved infrastructure. This requires a systematic approach to capital investment. Having a robust AMS based on ISO 55000 can provide a structured approach to implementing new assets through lifecycle management. This enables the application of a risk-based approach to managing an asset throughout the different stages of its lifecycle beginning with the conception of the asset until the time of its disposal, including the managing of any potential post disposal liabilities. A well-designed capital program will ensure that all information, training, documentation, material, spare parts and software required by operations to operate and maintain new capital projects are turned over from engineering to operations. Additionally, the capital program promotes collaboration between the project managers and operations and maintenance (O&M) for new capital projects to ensure smooth transitions.

To facilitate desired levels of success, water treatment utilities must stress the importance of communications between internal departments, customers and stakeholders. ISO 55000 requires organizations to determine the appropriate level for internal and external communications relevant to assets, asset management and the AMS.

Benefits Realized by ISO 55000

Many existing water treatment utilities are challenged with aging infrastructure, aging workforce and a rapidly changing political and technological environment. The benefits of a successful ISO 55000 asset management implementation are well documented. These include better management of risk, the breakdown of organizational silos with increased alignment around asset lifecycle management, structured training and retention of key skills, and effective prioritization of investment. Organizations are seeking to improve management of physical assets due to issues associated with how their assets are currently managed and performing. These asset management improvements often consist of:

- Increased production capacity
- Lower cost of maintaining physical assets
- Reduced and/or eliminated risks associated with physical assets
- Improved financial outcomes

Figure 1 shows the spending of water facilities and the divergence between operational spending and capital spending. Increases in capital spending will continue to be required to sustain viability of the US water systems in the future.

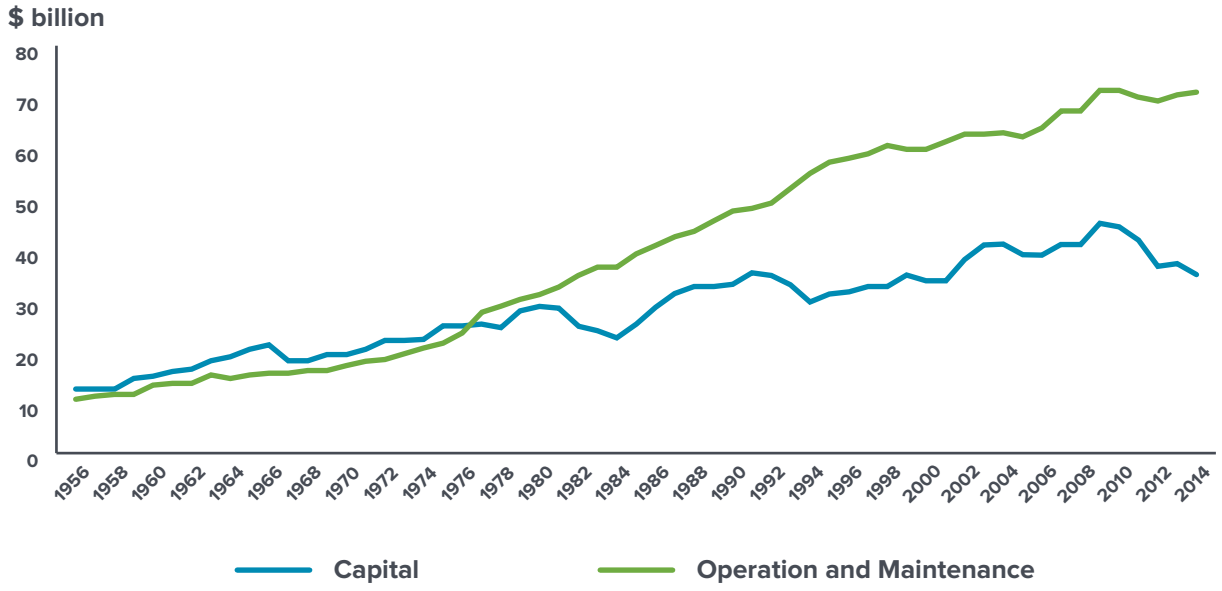


Figure 1 – Public Spending on Water Infrastructure

Source: Congressional Budget Office, "Public spending on transportation and water infrastructure, 1956 to 2014," table W-7 – https://www.cbo.gov/publication/49910

ISO 55000 Certification

To certify or not certify? That is the question. Geographical regions that have embraced certification and have the most certified organizations include Japan, Australia, UK and South America. At present, most North American organizations do not execute actual certification but do adopt much of the guidance from ISO 55000. For now, certifying or not certifying is not considered to be a critical element to most organizations. However, obtaining ISO 55000 certification does provide external stakeholders, regulators and customers with a level of comfort that an organization is using industry best practices when managing the reliability of their assets. Certifications are more common in the food and beverage, pharmaceuticals and life sciences, and water treatment organizations. In general, a larger body of corporations are acknowledging the benefits and impacts of conforming to ISO 55000, which is leading to a slow growth of certifications. Some government agencies are contemplating the development of possible mandates for certifications.

Starting the Transition to ISO 55000 Conformance

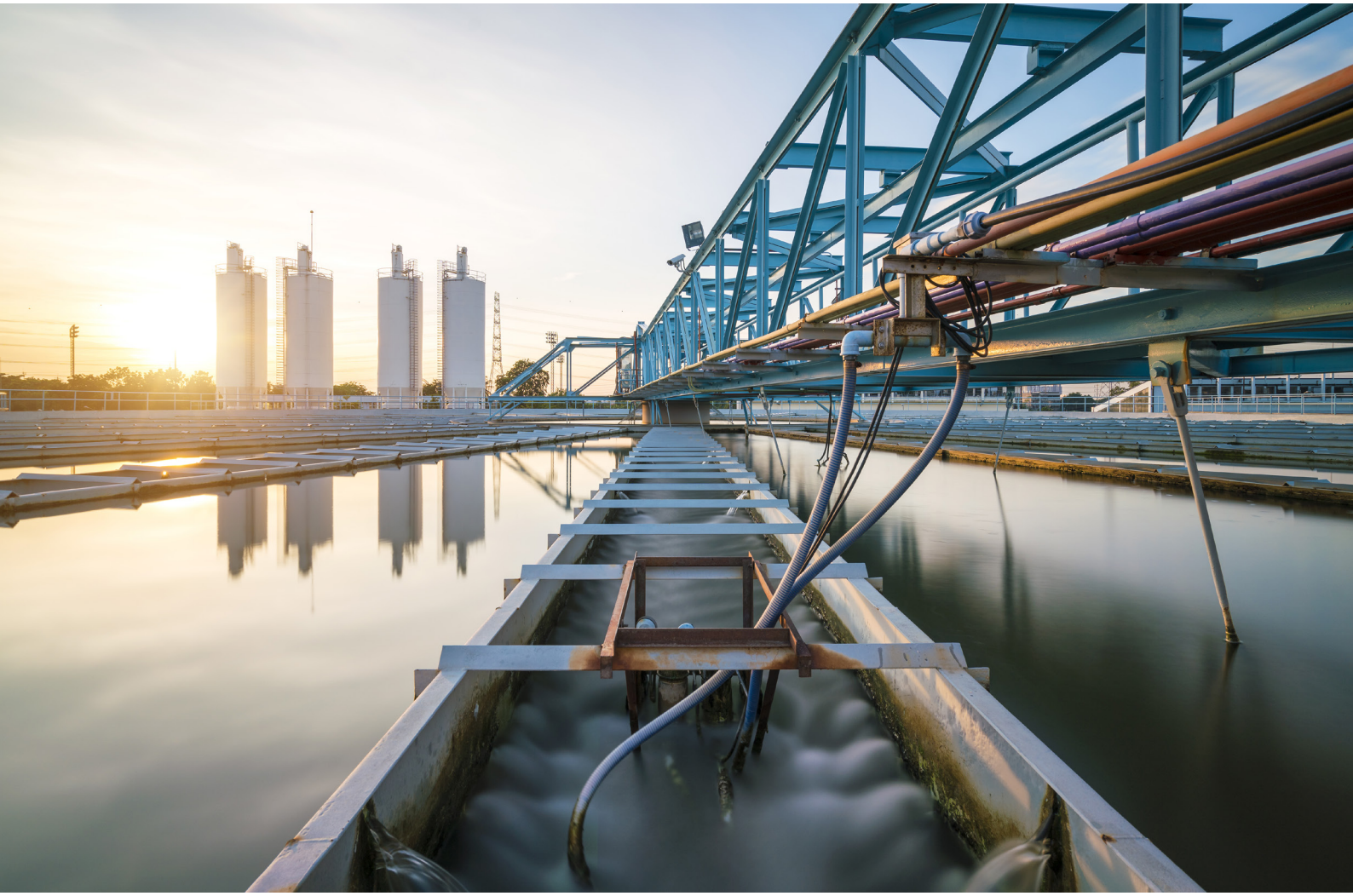
The process of implementing an ISO 55000 AMS begins with performing an in-depth gap analysis of the existing AMS. The gap analysis identifies asset management practices that currently exist and are aligned with the ISO 55000 standard. In addition, this process exposes gaps in the AMS allowing the development of an implementation plan to ultimately close those gaps and implement the practices necessary for conformance. Asset management assessments should be based on ISO 55000 standards, best practices from recognized reliability institutions and performed by resources or organizations with significant asset management experience.

Upon completion of the gap analysis, AMS findings can be developed into an organizational road map of scheduled tasks to be completed within an agreed timeframe. Recommendations are developed from the asset management assessment to identify the gap(s) between an organization and the ISO 55000 standard to assist in the development of an asset management framework. All the water treatment utilities asset management plans, and SAMP should be included in one organizational framework to provide more consistency in how assets are managed throughout the organization. The framework is used to identify the elements required to be developed including the policy, asset management plans, standard operating procedures and change management to name a few. The elements identified in the framework will be a combination of what already exists, as well as new items that were recommended to close the gap identified in the evaluation process that aligns the AMS with the ISO 55000 standard.

The road map and implementation plan should contain specific information regarding the tasks, milestones and dates that define the overall project implementation plan and objectives.

Conclusion

The water treatment utilities industry is an ideal candidate for ISO 55000 standard based asset management. It is comprised of complex, capital-intensive assets that require significant capital investment in equipment, maintenance and infrastructure. Additionally, the overall nature and criticality of the industry to our entire global sustainability makes the reliability of water essential to life. Therefore, the ISO 55000 framework provides a proven methodology to manage complex assets in an efficient, economic and environmentally friendly capacity.



About ABS Group

ABS Group of Companies, Inc. (www.abs-group.com), through its operating subsidiaries, provides data-driven risk and reliability solutions and technical services that help clients confirm the safety, integrity, quality and environmental efficiency of critical assets and operations. Headquartered in Spring, Texas, ABS Group operates with over 1,000 professionals in over 20 countries serving the marine and offshore, oil, gas and chemical, government and industrial sectors. ABS Group is a subsidiary of ABS (www.eagle.org), one of the world's leading marine and offshore classification societies.

About The Asset Leadership Network

The Asset Leadership Network is a non-profit industry association that advocates for the dramatic benefits available by using a structured approach to asset management, such as ISO 55000. Through our organizational members, close relationship with government executives, and leading experts, the Asset Leadership Network provides content that assists organizations in their path to improved mission success with a structured approach to asset management.

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