

Checklist for Developing a Quality Management System for a National Hydrological Service

Prepared by

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Introduction

This document identifies the basic steps required to establish a credible Quality Management System (QMS) as outlined by the International Organization for Standards (ISO). Some key documents have been identified that provide further details on the QMS process and a number of case studies have been prepared to help provide actual examples for the National Hydrological Service (NHS) to follow in developing their QMS. These **key documents** are:

- International Organization for Standardization, (2015). *ISO 9001:2015 Quality Management Systems - Requirements (Fifth Edition)*.
- World Meteorological Organization, (2013). *Guide to the Implementation of a Quality Management System for National Meteorological and Hydrological Services (2013 Edition)*.
- World Meteorological Organization, (2011). *A Practical Guide for the Implementation of a Quality Management System for National Meteorological and Hydrological Services (Version 10)*.

The **case studies** are:

- Yuzyk, T. R., Thomson, C., Cantin, J-F., (2016). *Case Study on the Development of Canada's National Hydrological Service's Quality Management System. (ISO certified)*
- Kabat, J., (2016). *Case Study on Quality Management System (QMS) in the Czech Hydrological Service. (ISO certified)*
- Fenwick, J., (2016). *Case Study Development of a Quality Management System for the Hydrological Service of the National Water and Atmospheric Research Ltd. (New Zealand) (ISO certified)*
- Lipscomb, S., (2016) *A Case Study on the Quality Management System for the U.S. Geological Survey's National Streamgaging Program. (Formal Internal QMS)*

The WMO has also compiled a significant amount of QMS documentation from the above countries and has made it available for all the NHSs through the CHy QMS website. It is hoped that NHSs will use this established documentation to help expedite moving forward with implementing a QMS for their organization.

QMS Checklist

The basic 12 steps are described below. The key take away message for each step has been underlined:

Step 1 - Read the documents identified above to develop a good understanding of what is involved in

developing a QMS and the level of effort that is required by the NHS in implementing a QMS. Consult with QMS experts in those countries that already have implemented a QMS. Undertake some basic QMS training to become more familiar with what is involved in implementing a QMS.

Step 2 - Discuss proceeding with a QMS with top management in your NHS and get their concurrence to move forward with implementation, preferably an ISO 9001 QMS. Get their agreement on identifying an individual to be the *quality manager or coordinator* for the NHS and the required human and financial resources for implementation. Depending on the size of the hydrological program and whether it is integrated with other programs, like weather, climate, etc., a Quality Management Office (QMO) may be required.

Step 3 - Work with top management to establish the *quality policy and quality objectives* for the NHS. Refer to quality policy and quality objectives outlined in the case studies and adopt/modify them to better reflect your NHS. Have top management share this information with the staff, partners and clients to show their commitment to developing a robust QMS.

Step 4 - Establish a small working group which may include an external QMS expert to undertake a *gap analysis*. A gap analysis involves evaluating the NHS's existing quality procedures and business processes against the ISO 9001 QMS framework to determine the amount of work and resources that will be required to fully adopt the framework. Develop a QMS work plan with a realistic timeframe and get top management's commitment to proceed and allocate the time and resources required. It is important to note that this will be a multi-year effort and the degree of difficulty in becoming ISO 9001 certified will be dependent on how advanced the NHS is with its QMS-related documentation when the decision is made to move forward.

Step 5 - Provide introductory QMS training to staff and present the proposed implementation work plans. Solicit their feedback and encourage developing a *culture of continuous improvement* in the NHS. Review the work plans based on their feedback.

Step 6 - Identify the *key QMS processes* required for delivering your hydrological products and services, which are well described in the case studies. Develop and document the procedures to follow to ensure the process is completed in a consistent and effective manner. Refer to the case studies and adopt/modify the documents to align with your program delivery. It is important to spend the time and effort to ensure that this is done well as these documents form the basis for future auditing of your QMS.

Step 7 - Other important documents you will need as part of your QMS are any *standard forms and standard operating procedures* you require to effectively perform your tasks. It will be important to update these documents to ensure that they are still pertinent as you move forward. Examples of such documents are provided in the case studies.

Step 8 - Develop *performance measures or metrics* to assess customer, partner and user satisfaction. Begin the process of monitoring and striving to achieve improvement. Again, contact the individuals identified in the case studies for guidance in this area.

Step 9 - The documents described in Steps 3, 6, 7, and 8 basically make up what ISO 9001 used to refer to as the quality manual, however in the 2015 edition this is now referred to as documented information. It is important that these documents are subjected to document control to ensure the latest document is being referred to and kept up-to-date with regards to any changes. The quality manager or QMO would be responsible for maintaining these documents. Many NHSs are using electronic document management systems, such as Microsoft Sharepoint, to effectively manage all the QMS electronic files.

Step 10 - Once the quality manual or documented information is well advanced it will be important to train staff in conducting an internal audit. This step will involve establishing a schedule for auditing all components of the program delivery. It is recommended that the NHS undertake an internal audit twice a year to promote continuous improvement. The focus of these audits is to identify "opportunities for improvement" and make incremental improvements. There may be opportunities to have a QMS expert from another NHS help with this step.

Step 11 - Review findings from these internal audits. Identify actions to rectify/address issues raised from the internal audits. Share findings and proposed actions to be taken with top management so that they are fully aware of how QMS implementation is proceeding and are actively involved. The cycle of plan-do-check-act is then repeated in an effort to strive for continuous improvement.

Step 12 - Finally, it is important to continuously raise awareness in the NHS on the QMS implementation. Regular communications with staff on the progress being made reinforces the importance of this effort.

If the above has been accomplished, the NHS will have an internal, mature QMS in place. The NHS may decide that it wants to be ISO 9001 certified. It is important to recognize that proceeding with certification will require a significant investment in time and resources. Should the NHS decide to proceed with certification, it will need to do the following:

- Engage an independent certifying agency to verify that your NHS is ISO 9001 compliant. There are many organizations set up around the world that can provide this independent audit service. These organizations have the authority to certify and register an organization as being ISO compliant. It is best to consult with ISO certified NHSs before proceeding to ensure your NHS is fully aware of the implications of embarking upon this journey.
- Arrange for external audits of the NHS's QMS once one of these certifying agencies has been contracted. The agency usually begins with a 3-year cycle of audits, involving two external audits per year. It will be important to prepare/train staff as to what will be involved in these external audits. Over time the audit frequency may be reduced if compliancy is continuously being met.
- Correct any non-conforming actions that were identified by initial external audits in order to obtain certification. If these are corrected to the satisfaction of the certifying agency, the NHS will then be registered as compliant for the current ISO 9001 QMS Standard.
- With each subsequent revision of ISO 9001 (so far it has occurred approximately every seven years), the NHS will probably need to improve elements of its QMS to comply with new or

revised provisions. The certifying agency will then need to undertake a re-certification audit against the new standard.

Should the NHS decide not to pursue official ISO certification, undertaking the second and third bullets above would still be advantageous. Consideration should be given to engaging an expert from another NHS to ensure independence of the audit. This will also help ensure ground truthing against the activities of an organization with a mature QMS in place.