

Report on Vocational Training Needs for Water Industry

Deliverable No. 7 Version 2.0

Title: eLEANOR
Creator: GISIG, IREN, ADN, SE, UNS.
Date: February 2011
Subject: WP2
Type: Report
Description: Jobs and BP descriptions
Contributor(s): GISIG, ADN, SE, IREN, UNS
Language: ENG
Status: 2.0

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1 Overview

This deliverable aims assessing the training needs, based upon results of the preliminary survey on training needs carried out in the proposal phase and in other initiatives.

The assessment of training needs is carried out at the level of eLEANOR partners and target groups, investigating about their requirements for training in water sector. The training needs will be assessed according to the considered categories of professionals in water industry and to the topics of interest dealing with the implementation of EU Directives on waste water management, water supply and storm water management.

Upon the results of the survey, this WP2 also aims drafting the Curricula (learning pathways) for all the 3 categories of water industry professionals considered by the project (technicians, engineers and managers) and at validating the outcomes with the help and contribution of industrial partners.

Curricula, moreover, need also to be updated over time and adapted to legislative and technological changes. This implies a continuous monitoring of the context, aspect that will be anyway analysed as a part of the Valorisation Plan.

Finally, transparency of training offer and compliancy with European Credit System for Vocational Training (ECVET) is also experimented in this WP.

1.1 Goals and Objectives

The main objectives of this WP are:

1. Assessment of vocational training needs: The assessment of needs of water sector at vocational training level is carried out through a questionnaire developed upon the basis of preliminary surveys and investigations performed in the proposal phase and in the framework of other initiatives in the specific sector. Target addressees of the questionnaire will be potential end users of eLEANOR training already addressed by other initiatives carried out by the Consortium, such as EuroAquae, Erasmus Mundus, Hydroeurope, WSSTP and WATER-GIS Network promoted by GISIG (P1) now being contacted for an ad-hoc focus on their training needs. Other important stakeholders will be also considered.
2. Curricula design: In this task, eLEANOR curricula are prepared covering topics for different vocational trainings identified. Learning pathways are drafted for Technicians, Engineers and Managers. They clearly define the path to be followed to get specific skills or to move from a level to another and, if possible, from a category to another. Learning paths are also documented through metadata to standardise their description and the available information on them.

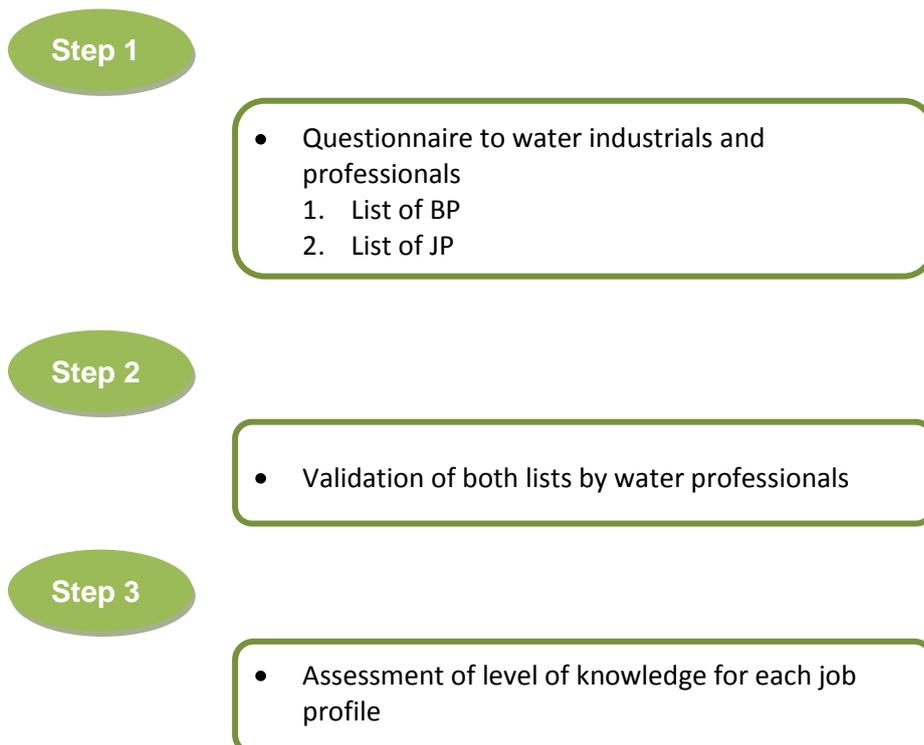
3. Introduction & Integration of ECVET: Articulation of the reference systems such as ECTS, ECVET and EQF (European Qualification Framework for lifelong learning) will be highlighted in the design of eLEANOR curricula, in order to describe qualifications in terms of knowledge modules and units of learning outcomes. Especially ECVET as a technical framework will be used by the certifiers and the training centres to ensure the best comparability and compatibility of units of recognition in different countries as well as to achieve the equivalence and conversion among them.

4. Curricula validation: Validated by actual and potential users during the project, to assess and evaluate their consistency with water sector needs for vocational training and their applicability to the labour market. The curricula are submitted for a validation to the industrial partners in the Consortium as well as presented to potential stakeholders and final users during the dissemination and the training workshops. Outcomes and results of these workshops will help to tune the curricula accordingly.

1.2 Methodology followed

The chosen methodology to assess this training need was through a matrix, where the jobs profiles are listed in rows and the business processes in columns and as a result of the previous deliverable, Deliverable No. 6, the cells of the matrix were filled in with the importance of each job profile for each business process, giving a suggestion of the ideal training for each job profile.

In synthetic overview, this WP is resumed in the following scheme:



Step 4

- Step 3 validation by water professionals

Step 5

- Identification of training needs

Step 6

- Validation of training needs

The first four steps were dealt within Deliverable 6 “Questionnaire on vocational training needs”, which had as a result the matrix between Job Profiles and Business Processes. With the results of the mentioned deliverable, the steps from 5 to 6 will be discussed in this deliverable.

2 BP and JP Descriptions

In order to assess the vocational training needs so as to design a curricula to fulfil the gaps in education of the water sector, it was required to define the profile of all the processes involved during waste water treatment and water supply.

This profile was done taking into account the matrix obtained in the previous deliverable. In fact, the scale given to each cell gave an qualitative idea of the need of the JP regarding each BP. Having an overall look at one JP and their engagement in each BP, the descriptions of the following point could be done.

The matrix than integrates Business Processes and the Jobs Profiles is shown in Annex 1. Their components are described in detail in the following point.

2.1 Business Processes

Asset Management

The aim of this BP is the definition of the best way of keeping the physical assets of a water company in the appropriate condition, enabling a permanent service, compliant with the contracts and the regulations.

In other words, the target of Asset Management is in finding the appropriate balance between two risks: the financial risk of spending too much and the technical (or contractual) risk of spending too little.

The core activity of the A/M BP is the design of the (annual or medium-term) policy of :

- capital investment;
- rules of maintenance;
- and, sometimes, principles of operation and/or purchase guidelines.

A/M BP also includes the checking of the application of the policy.

The main steps of the A/M BP are:

- knowledge of the "rules of the game" = contract, regulations, internal procedures, etc.
- knowledge of the assets and of their conditions
- follow-up of the performances of the assets (i.e. compliance with the "rules of the game") - "performances" are assessed on various levels : technical, financial, environmental, etc.
- assessment of the risks, i.e. performances in the future
- definition of the acceptable level of risk
- design of policy (capital investment, maintenance) ==>> definition of "projects"
- "sponsorship" of projects (incl. studies) - from launch to acceptance and commissioning

It must be noted that, even if the following tasks are clearly strongly related to the Asset Management business process, they are NOT INCLUDED in the BP strictly speaking:

- field / plant interventions -- for condition / performance assessment as well as for repairs
- projects / studies
- construction / rehabilitation works

Field interventions (DW&WW) management (incl. connections)

The aim of this BP is the day to day organization of interventions on the networks (mainly repairs - i.e. leaks, bursts, blockages - and new connections).

The requests come from various sources:

- customers / or customer department;
- operations;
- asset manager.

Main tasks of the BP:

- prioritization of requests (according to internal rules)
- allocation of resources (manpower, vehicles, special tools, subcontractors), leading to detailed schedule
- real-time adjustment of schedule and allocations, in accordance with difficulty of jobs, and unexpected incidents
- management of the sequence of unit actions in a complex job
- reports
- quotations (e.g. for new connections)

Field works (DW&WW) incl. Connections

This BP contains the physical works done on site: fixing leaks (and, before that, locating leaks !), building new connections, cleaning sewers, inspecting sewers, testing hydrants, operating networks, cleaning reservoirs etc.

Each task starts from a WO (work order - issued by the previous BP "field interventions management") and finished either by the completion of the job, or by a report explaining the reasons why it was not possible to complete the job.

In most water companies, this BP does not include digging and earthmoving (very often, these tasks are subcontracted), but the BP includes road safety actions such as signposting of worksite.

Use of GIS

Strictly speaking, this is not really a business process! But it in lights the fact that the use of GIS is absolutely widespread in all the other BPs, as most "objects" used in the BPs of a water utility are "geographically located". Each BP includes access to the data of these objects through a GIS interface.

A GIS database contains all these objects (that can be "technical" - such as valves or pumping stations - or not technical - such as customer premises, or city limits). The uniqueness of the GIS guarantees the consistency of information.

Maintenance of GIS

The aim of this BP is the guarantee of the relevance, consistency and quality of the data of the GIS; it contains two types of maintenance:

- technical IT maintenance (i.e. new versions of the GIS software, cleaning and backup of databases, etc.)
- maintenance of the data itself = update from different sources: site (description of jobs but also corrections of data mistakes in the DB), project office, external sources (e.g. cadastre)

Management of Plant Maintenance

The aim of this BP is the day to day organization of interventions in the "plants" (DWTP, WWTP, pumping stations, etc.). This interventions can be corrective maintenance (i.e. repairs), as well as preventive maintenance (that can be planned over long periods - semesters, years).

The requests come mainly from 2 sources:

- operators / managers of the plants,
- asset manager.

Main tasks of the BP:

- prioritization of requests (according to internal rules)
- allocation of resources (manpower, vehicles, special tools, subcontractors), leading to detailed schedule
- real-time adjustment of schedule and allocations, in accordance with difficulty of jobs, and unexpected incidents
- management of the sequence of unit actions in a complex job
- reports

Electromechanical maintenance in WTP, WWTP & PS

This BP contains the physical works done on site in the plants: pump / motor repair, cleaning of electric cabinets, repairs of electric failures, greasing - oiling, etc.

Each task starts from a WO (work order - issued by the previous BP "management of plant maintenance") and finished either by the completion of the job, or by a report explaining the reasons why it was not possible to complete the job.

Lab & QC for DW, WW and the Environment

This BP describes the tasks done in the laboratory. It starts with the arrival of samples in the lab (see specific BP about sampling) and ends with the production of reports about the values of the analysed parameters.

Each technology of analysis has its own detailed procedure / operating mode, depending on the equipments actually used in the lab.

There is also a procedure about the disposal of used samples after analyses.

Automation & Sensors (DW, WW and ENV)

The process of automation & sensors involves all the activities of plan, project, execute and maintain all the equipment of a telecontrol network: sensors/actuators, remote stations, communications, SCADA (supervisions system) and control centre. This process involves the supervision of all the phases in interlocution with the client (real time network manager) and the different subcontractors.

Real Time network management (DW, WW & SW)

The real time network management involves the operation and supervision of the process by a remote control. The operational tasks should be described in the exploitation procedure: process control, data validation, exploitation surveys, maintenance and so on. The supervisions tasks consist in the validation of surveys and reporting, the continuous improvement of the system or the crisis management.

Planning and design of new assets and plants

The process involves assessment and gap analysis of water and wastewater utility infrastructures; development of business strategies and business plans for utilities, managing of design-build

projects, including preparation of budgets, schedules, definition of project goals in accordance with guidelines supplied by water authorities/controllers.

This implies the construction, in cooperation with the institutions that govern water resources and in coordination with other utility departments, of various planning scenarios keeping into account uncertainties, possible investments, environmental sustainability, community needs, pollution prevention, sustainability, and watershed and ecosystem management.

Water resources management

This process involves comprehensive evaluation of all water supply and demand alternatives with the end result, in an attempt to minimize costs, of creating a flexible plan allowing for uncertainty and a changing economic environment and determining the most efficient method of meeting demand. The implications of a given resource mix on the utility, the environment, and the community, are evaluated along temporal (short- and long-term) and spatial dimensions, supplying inputs for planning and designing of new assets and plants.

Environmental monitoring

This process involves oversight and assistance for environmental compliance matters regarding facilities and activities related to the supplied water/wastewater service, and monitoring overall environmental compliance with regulations. Environmental related programs are developed and implemented and periodic reviews and audits of such programs are organised.

Tracking is made of all deviations from regulatory compliance with suggestions on appropriate corrective actions. Support investigations is provided on major environmental accidents and major equipment failures and support studies of problems encountered in plant operation or process control are carried out in an effort to mitigate chronic compliance problem.

Drinking water treatment plant management

The process aims at ensuring that the water purification process goes smoothly and efficiently. It involves operation and inspection of plant equipment, such as control pumps, valves, and computers that moves the water through the numerous treatment processes; Process control tests and routine lab analysis are made together with reading and of gauges and meters and corrective action are taken as necessary to keep facility equipment and processes functioning appropriately, such as to ensure compliance with drinking water regulations. Routine inspection and minor maintenance at treatment facilities and lift stations are made.

Water primary network management and water balance

Development plans for operation, maintenance and improvement of network efficiency. Network data management, monitoring and modelling using appropriate GIS and software, leakage reduction, implantation of consumption and demand strategies, aiming at exchanging water volumes among water districts. Leak detection, development of non revenue water initiatives, revaluation leak reduction plans, security plan, development of SCADA for measurement of major parameters.

This process involves maintenance of pipelines collection and pumping stations as needed. It includes preventative maintenance on collection system tools and equipment, monitoring, inspection and rehabilitation of pipelines, etc.

Water secondary network management

This process deals typically with distribution networks managed as water districts where leaks are detected, monitoring night flows and pressures. This approach implies installation and management of PRV valves and inverters connected to pumping stations, allowing when necessary, energy savings. New water connections are made upon verification of network technical conditions. Monitoring, preventative maintenance and repair works are carried out.

Leak detection

A detailed survey is undertaken to identify the type and location of water leakage. The process involves operation of various types of electronic equipment (correlator, pipe tracer, ground microphone and listening stick) used to detect and record leak sounds related to water loss from the water distribution system. Data are collected by technicians and submitted to management staff for analysis and appropriate action. Assistance can be given by providing leak detection services and/or investigating on particular issues and problems.

Meter reading (AMR and MMR)

MMR

The process involves travelling assigned routes and read meters at residences and businesses, recording the volume of water used over a certain time frame. The meter reader, can identify unusual consumption patterns and as well notify the customer of significantly higher consumptions, (that could indicate an unobserved water leak) and watch for signs of meter tampering in the presence of unusually low consumption at an occupied property.

Inspection of meters and connections is made to be sure everything is in working order. After inspection work requests are created, maintenance and reparation can be done whenever meters are damaged.

Information provided by measuring devices are recorded and returned to business office for billing purposes.

AMR

Automated meter reading involves testing, fixing and analyzing data for automated meters. This may include logging meter data and reporting statistics through a company's computer system, compiling data and analyzing reports to assure the accuracy and consistency of all automated meter reading operations. to ensure proper functioning of automated meters. The "consumption curve", telling the manager about the flowrate measured by each meter, can be defined. This information is useful for re-counting of billed water volumes following verification activities.

Public Service Contract Management

This process requires operating the public service according to the specifications included in the contracting procedure. Periodically may be detailed to the local authority how the contract is advancing, the different activities realized, and if there's any significant difference in costs between reality and the budget. This also comprises negotiating the investments necessary for improving the service infrastructures, and how these may be recovered during the concession period.

WW - Water and Wastewater Network Management

Submit and implement throughout a regional territory the organization and means needed to ensure the satisfactory operation of the water and/or sewer systems in respect of current and future requirements.

This process involves supervising the working group and organizing the workload, analysing a network's operation, and identifying and implementing means of improvement. All these activities may be done taking care of that which is required for the local authorities, and ensuring an excellent service and a high satisfaction of the customers.

SW - Stormwater Network Management

Submit and implement throughout a regional territory the organization and means needed to ensure the satisfactory operation of the stormwater system in respect of current and future requirements.

This process involves supervising the way how the stormwater network works, and identifying and implementing means of improvement. All these measures may be done taking care of that which is required for the local authorities, and ensuring an excellent service and a high satisfaction of the customers.

WWTP – Waste Water Treatment Plant

Submit and implement human and technical means appropriate to current and future for water production or wastewater treatment requirements in compliance with regulators.

This process involves supervising the working group and organizing the activities, analysing plant and works operations and identifying potential improvements, submitting means for improving the plant.

Sewer inspection and sewer cleaning

The process of inspection involves using a video camera to collect data on drain condition for maintenance purposes. The result of the inspection is a report accompanied with a video where it's detailed the state of the sewer inspected, with a list of the malfunctions detected, with its description and position in the sewer.

The process of cleaning involves using a hydrojet vehicle for undertaking remedial and preventive works: cleaning, draining, and pumping out sewerage systems. This process can also report abnormalities found in installations.

2.2 Jobs Profiles

OPERATIONAL MANAGERS: Many points are common to the various positions of "operational" managers, among their typical duties as well as their core skills:

Main mission: Manages his/her unit within the framework of the policy defined by Senior Management, guaranteeing observance of contractual commitments and sales, economic, technical and human objectives

Duties:

- Operations / Technical:
- Oversees the optimization of the facilities he/she is in charge of
- Organizes and checks on the operation activities of the plants / facilities for which he/she is responsible

- Handles work, directly with teams or through sub-contracting
- Implements and ensures the efficiency of emergency services
- Commercial
- Management
- Budget

Expertise:

- Manage a budget and propose corrective actions
- Legal: know environmental laws and regulations, and legal and contractual elements of a commercial proposal
- Communication techniques: Public speaking, Public negotiations
- Safety: (incl. external companies / subcontractors)

Level of Training: Higher education level

Production manager

Duties: Management of DWTP and of resources (surface as well as underground)

Expertise:

- Water treatment
- Water chemistry
- Disinfection
- Calco-carbonic balance, scaling, aggressiveness, corrosion
- Clarification
- Management of the resource
- Polishing treatment: ozone, activated carbon, membranes
- Removal of iron and manganese

Distribution manager

Duties: Management of DW networks

Expertise:

- Non Revenue Water

- Managing the buried network
- Water quality within the networks
- Applied hydraulics for networks & simple projects
- Analysis and modelling of networks

Sewerage manager

Duties: Management of the sanitation network and of WWTPs

Expertise:

- Asset management of a sanitation network
- Wastewater treatment techniques
- Wastewater quality
- Asset management of a sanitation network
- Optimisation of sewer cleaning

OTHER MANAGERS: Please note the differences between "Customer Manager", "Marketing Manager", "Commercial Manager" and "Contract Manger".

Note also the differences between "Technical Manager", "Innovation Manager" and "Research Manager".

Customer manager

Duties: Organizing and managing customer (individual customers) services, handling the marketing and customer communications functions, guaranteeing customer satisfaction in the best economic conditions.

Duties:

- Customer:
- Management of customer portfolio and contract application
- Analysis of customer satisfaction in order to improve customer service (analysis of complaints, barometers, etc.)
- Communication towards customers

Expertise:

- Customer management: overseeing the customer process (metering, reading, invoicing, deposit, collections, disputes)
- Monitoring of sales of water and customer technical data
- Customer communications and relations: communicating with customers, elected officials, consumers, etc.
- Clientele marketing: knowing customer expectations, organizing promotion and communication operations, mastering marketing techniques (tests, inquiries, surveys)

Marketing manager

Duties: Definition of the products and services provided by the utility, and of the tariff policies.

Definition of advertising policies / actions.

Commercial manager

Duties: win new contracts (with local governments or industrial / professional customers).

Definition of commercial targets, co-ordination of contacts with prospects. Organization of the answers to RFPs.

Contract manager

Duties: follow-up of large contracts (with local governments or industrial / professional customers).

Includes regular reporting (technical and financial) on the progress of the contract, and possible renegotiations or endorsements of the contract.

Logistic manager

Duties: Supervising and optimising processes and material means within the company, in accordance with internal procedures. His/her typical duties are:

- Managing the logistics teams
- Keeping up-to-date with new technologies and methods within one's field
- Ensuring a high level of consistency between purchasing processes, logistics, pilot studies and service providers
- Developing logistics budgets (transport, accounting, insurance)
- Validating and directing tactical business choices

- Taking part in meetings to set objectives for the updating of logistics budgets and proposals for logistics strategies for each project
- In the project phase: Issuing calls for tender, analysing and comparing
- Developing transport contracts

Expertise:

- Stock management principles & software
- General technical knowledge of managed equipments
- Purchasing techniques
- Import / export laws and regulations

Quality , Prevention environmental & processes manager

Duties: Definition / writing of the procedures in terms of Quality Control (ISO 9xxx), Protection of the Environment (ISO 14xxx) and more generally definition of the Business Processes. Checking the enforcement of the procedures. Improvement of Business Processes.

Asset manager

Duties: Oversee the allocation and reliability of the managed assets throughout their life cycle. Propose policies for investment and for maintenance and replacement of assets. His/her typical duties are:

- Management of investments:
 - Develop the medium-term investment plan and propose long-term management of investments
 - Confirm investment line requests, periodically do expenditure reviews, confirm the closing of the investment lines for long-term assets
- Knowledge of assets:
 - Do an inventory of the contractual obligations, and contractual obligations of means and results for the assets (private, concessions)
 - Handle or coordinate the implementation of technical databases for the management of assets and take part in their evolution
- Project management
- Maintenance policies

Duties:

- Asset management in general (technical, legal, contractual, financial) -- focus on asset management of buried assets
- General knowledge of the Water Industry processes
- Investment projects: carrying out an investment project, identifying and selecting the project actors (client, project coordinator, etc.), scheduling, monitoring, alerting, communicating
- Legal: know environmental laws and regulations, and legal and contractual elements of a commercial proposal

Technical manager

Duties: guarantee the technical quality / compliance of the products / services provided by the utility. His/her typical duties are:

- Define the technical rules and procedures of the utility, and check their application
- Update these rules and procedures in accordance with technological evolutions or regulations
- Provide advice / technical support to business units, especially in case of crisis
- Co-ordination of the TSE (Technical Support Engineers)

Research manager

Duties: manage the research center(s) of the utility and coordinate the carrying out of the R&D projects according to the R&D programme decided by the Senior Management.

Innovation manager

Duties: transform the results of R&D into new products, new services, new markets, i.e. new sources of revenue.

The results of R&D can come from internal R&D as well as external (e.g. from patents bought from other entities).

Communication manager

Duties: Ensuring the external communication of the company and contribute to improve the image of the company. His/her typical duties are:

- Communication to institutional customers as well as to end-consumers
- Crisis communication:
- Managing relations with the media (national / local)
- Definition of communication policy
- Image of the company

Expertise:

- Knowledge of the regional / national context and the players involved: understanding external and internal players
- Communications campaign: creating and running an internal/external communications campaign
- Communication techniques: designing key messages, expressing yourself clearly, adapting to the target, running meetings
- Communications situations: communicating in a crisis situation, managing an 'event' type operation, creating a patronage/sponsorship project

Health & Safety manager

Duties: Guarantee the application of health and safety procedures within the company. His/her typical duties are:

- Run and develop the safety policy
- Run / update the safety management system
- Create documents relating to accident-prevention
- Contribute to continuous improvement dynamics
- Run the safety coordinator network
- Audits and industrial site training activities
- Crisis prevention

Expertise:

- General knowledge of the process of water industries
- Accident-analysis techniques
- Audits and assessments: using investigation techniques to achieve audit objectives

Crisis manager

Duties: prepare the utility to go through potential crisis with the best possible endings. In coordination with several other managers: communication, health & safety, technical, quality/prevention/processes. His/her typical duties

- Preparation of the procedures to be used during a potential crisis
- Running the crisis unit
- Crisis communication

Expertise:

- Crisis management: driving the crisis mechanism (procedures, tools)
- Foreseeing and managing a crisis or emergency situation

Finance manager

Job description not relevant in eLEANOR

HR manager

Job description not relevant in eLEANOR

Network operators

Duties: Doing upkeep and new work on networks, adapting to the various and specific situations: earthworks, repair of leaks, installation of pipes and connection and tubing. Preparing the equipment resources needed for carrying out the work: Synchronization within house services and sub-contractors, installation of signs on public roads/walkways. Noting equipment removals and making installation sketches. Dealing with unforeseen events and difficulties encountered with concessionaires: Marking of networks, analysis of traces and adaptations of installation plans, contacts with the concessionaires

Level of training: Basic education level

Drinking Water Plant Technician

Duties: Verification of operational settings for factory and making of adjustments: Tests, participation in treatment tests, data entry, updating of operations documents. Carrying out

reparation works: diagnostic of breakdowns, interventions of mechanics, general upkeep, updating of operations documents. Carrying out of standard operations: washing of filters, preparation of reagents.

Level of training: Basic education level

Drinking Water Treatment Supervisor

Duties: Carry out analyses on the raw water and at various treatment stages: calibration and upkeep of control devices use of data, participation in surveys in the event of pollution of the raw water. Determine the rates of treatment and implement the corrective measures (reagents, adjustments). Handles the monitoring of the plant and procurement of treatment products: verification of storage levels, orders and receives the products. Takes part in research for conditions and means to improve the treatment of the water.

Level of training: Basic education level

Plant Manager

Duties: Supervising the working group and organizing the activities: ensuring safety instructions are implanted, personnel management. Analysing plant / works operations and identifying potential improvements: complying with standards, budget preparation, creating and controlling management charts, identifying and costing means, monitoring works to ensure that they remain in budget. Submitting means for improving the plant (process, taking part in studies and in preparing the specifications). Responsible for relations with external partners (suppliers, inspection companies and customers) Providing training in core skills.

Level of training: Intermediate education level

Leak Detection Operator

Duties: He follows-up leak location schedules. Collects information on pipelines. Goes out in the field. Looks for and pinpoints leaks as accurately as possible. Assesses the type and extent of leaks. Completes job sheets. Complying with safety instructions. Informs neighbouring populations of work in progress.

Level of training: Basic education level

Meter Fitter

Duties: Carrying out works involved in fitting and removing meters, maintenance and modification works to the connection that is above ground. Implementing procedures relating to: brings back into service, disconnections, closing accounts. Undertaking investigations requested by the customer service. Based on closure orders, collecting sums due from customers in accordance with procedures.

Level of training: Basic education level

Meter Reader

Duties: Organizing rounds for index readings as a function of files assigned and time available. Readings: reading the indexes on the customer meters, entering the index in the database of the readings file, detecting and reporting anomalies to the hierarchy. Customer relations: alerting and informing customers in the event of anomalies, answering simple questions from customers and/or directing them to the appropriate service. Observation of safety rules.

Level of training: Basic education level

Meter Bench Specialist

Duties: Testing new meters received or a sample of these meters in order to ascertain their working order: At different flow rates, Based on age, Calibration, Depending on water properties. Preparing reports on compliance with constructor specifications. Helping the meter park manager to carry out any additional tests.

Level of training: Intermediate education level

Meter Park Manager

Duties: Supervising the testing of new meters received or a sample of these meters in order to ascertain their working order. He creates test procedures: At different flow rates, Based on age, Calibration, Depending on water properties. Checking and validating meter conformity reports. Validating meter conformity with the purchasing department. Ensuring that safety procedures are properly applied. Testing the meters in the event of litigation.

Level of training: Higher education level

Wastewater Treatment Plant Agent

Duties: Verifying the parameterization of the functioning of the plant (or plants) and making adjustments: Test, Participation in treatment test, Data entry, Updating of operation documents.

Carrying out repair works: Diagnostics for breakdowns, Interventions of mechanics, General upkeep, Observance of safety rules. Carrying out sludge dewatering operations: Preparation of polymers, Upkeep of cleaning equipment.

Level of training: Basic education level

Wastewater Treatment Plant Supervisor

Duties: Carrying out analyses on the incoming effluent, at various stages of the purification and on the sludge circuit: Calibration and upkeep of control devices, use of data, Participation in inquiries in the event of pollution on the effluent or on the sludge.

Determining the rates of treatment and implementing the corrective measures (reagents, adjustments).

Handling the monitoring of the plant procurement of treatment products: Verification of storage levels, Ordering and receiving of products.

Taking part in research for conditions and means to improve purification and sludge treatment.

Level of training: Intermediate education level

Wastewater Treatment Plant Manager

Duties: Supervising the working group and organizing the activities: Ensuring safety instructions are implemented, Personal management. Analysing plant / works operations and identifying potential improvements: Complying with standards, budget preparation, Creating and controlling management charts, Identifying and costing means, Monitoring works to ensure that they remain in budget. Submitting means for improving the plant (process, taking part in studies and in preparing the specifications). Responsible for relations with external partners (suppliers, inspection companies and customers). Providing training in core skills.

Level of training: Intermediate education level

Camera Operator

Duties: Inspecting sewer drains using equipment fitted with a camera: In order to check their condition, Listing malfunctions, filling in software. Implementing means to ensure own safety as well as that of colleagues: Putting appropriate means in place, Strictly following instructions: danger of landslides, toxic gases, radio contact with other members of the team. Taking part in works carried out in drains.

Level of training: Basic education level

Network Inspection Technician

Duties: Inspecting sewer drains: In order to check their condition (using a camera for drains that cannot be physically inspected), Listing malfunctions, filling in software. Implementing means to ensure own safety as well as that of colleagues: Putting appropriate means in place, Strictly following instructions: danger of landslides, toxic gases, radio contact with other members of the team. Taking part in works carried out in drains. Undertaking conformity investigations: Collects and inputs data, entering clients.

Level of training: Basic education level

Cleaning Operative

Duties: Undertaking remedial and preventive works: cleaning, draining, pumping out sewerage systems (networks, units, plants). Responsible for operations relating to the operation of hydrojet vehicle equipment: First interview, Preparing and driving a vehicle, obeying safety instructions, installing security systems. Report abnormalities found in installations.

Level of training: Basic education level

Dispatcher/Control room technician

Duties: Monitors alarms generated by SCADA, identifying faults and related remedies. Evaluates operational needs and direct shift personnel as appropriate; generates and transmits daily work orders to/and for supervises of maintenance and service crews; receives customer complaints by telephone and dispatches crews to investigate and correct any service difficulty; evaluates complaints for assignment of crews; contacts mobile crews by means of regular phone or radio telephone and gives assignments to foreman; records work orders received by telephone and files completed work orders; advises crews of locations of curb boxes and water lines; generates valve detail sheets for water main shut downs; keeps records of crew assignments; maintains master file on all curb boxes and water lines; maintains and posts overtime lists and canvasses overtime list as required.

Expertise: Ability to provide effective customer service, ability to follow physical/geographic directions using maps; technical knowledge and concepts relevant to the operation of computers and associated peripheral equipment; ability to perform common office record keeping tasks; knowledge of the principles and practices involved in the operation of communication links in use. Ability to provide effective fault recognition.

Level of training: Basic: High school diploma

Electromechanical Technician

Duties: Assists in during operation, preventative and corrective maintenance, and trouble shooting of repairs and/or replacement of assigned water equipment (pumps, inverters, electric motors, gasoline and diesel engines, turbines, check and gate valves, compressors, blowers, generators, hoists, conveyors, gear assemblies, pulleys, heavy piping, pressure vessels, hydraulic units, chain drives, air conditioning and ventilating systems and other related machinery and equipment), inspecting facilities and pumping stations, identifying and repairing deficiencies, maintaining records and files according to time schedule.

Expertise: This includes calibrating assemblies to meet specifications and using test instruments, like electronic voltmeters, to gauge performance; knowledge on foundational topics like blueprints, standards for calibration, electrical circuits and machinery, as well as automation and industrial motor repair. Has familiarity with specific parts, functions and mechanics within assemblies and machines. Notions on soldering, welding and fabricating related to repair required for the job.

Level of training: Basic: High school diploma (specialization in electronics/mechanics)

Head of Maintenance Team

Duties: Provides site and electromechanical supervisory responsibilities: maintains the system plant integrity, supervises operational, maintenance, project activities and electromechanical matters; and provides overall supervision requirements for monitoring the completion of all maintenance activities scheduled.

Manages the activity and deliverables of the operational and maintenance support team; formulates maintenance and inspection strategies; lines supervision of technicians for all staff related matters; day-to-day ownership of site and overall condition of associated pipeline systems, compliance and performance; acts as the company representative with external clients

Expertise: Knowledge of electromechanical systems and various auxiliary plant equipments; ability to logically find faults to solve problems, experience in the management of personnel and with dealing with third party contractors; computer literacy, knowledge in site safety working practices

Level of training: Intermediate: 3-year degree (specialization in electronics/mechanics)

Automation Engineer

Duties: Designing, programming, simulating and testing automated processes and machinery (PLCs, RTUs, field bus, ladder codes for PLC programming) followed by creating detailed documentation or manuals for the fully functional projects.

Expertise: Problem-solving and analytical skills, technical leadership, solid understanding of software development and computer programming, proficiency in hardware and software development and troubleshooting; keeping up-to-date with industrial automation technology; assisting in setting up, operating and maintaining machines.

Level of training: Intermediate: 3-year degree (specialization in electronics/communications)

Instrumentalist (performance and ISO certification)

Duties: Instruments installation following adequate guidelines and datasheets, including gauges performance verification in compliance with ISO certification. Instrument troubleshooting/faults recognition and related repair by local labs or factory labs

Expertise: Ability to provide effective instrument performance verification and to correctly interpret factsheets. Ability to write concise maintenance/malfunction reports for third parties.

Level of training: Basic: High school diploma (specialization in electronics)

Water quality Technician

Duties: Under the direction of the Laboratory Supervisor and supervising staff, he/she performs chemical and bacteriological analyses on samples in accordance with standard methods. Records all findings for reference and reporting purposes and produces reports as necessary on a regular basis. Conducts all necessary control tests, interprets results and recommends corrective measures to treatment processes. Performs routine maintenance on equipment assigned, including the calibration, maintenance and service of laboratory and process control instrumentation. Provides limited supervision when placed in charge of a shift or crew. Assignments are received with general instructions and objectives. Work is reviewed by the designated supervisor for compliance with established policies and standards and evaluated on the basis of reports, discussions, observations and results obtained. Analytical data storage into the LIMS (Laboratory Information Management System); update and maintenance of the analytical instruments maintenance and calibration programme.

Expertise: Knowledge of water chemistry, bacteriology and related laboratory analysis procedures; knowledge quality assurance procedures; Use of microscopes and other sophisticated laboratory equipments to conduct tests; knowledge of effective sampling and monitoring procedures extensive knowledge of safe and effective laboratory practice and procedure; ability to understand and interpret laboratory test results.

Level of training: Basic: High school diploma (specialization in chemistry)

Head of the Lab

Duties: Supervises and coordinates the staffing and operational activities of the Water Quality Laboratory; participates in the development and implementation of goals, objectives, policies, and priorities; identifies resource needs and develops and implements policies and procedures. Sets targets and standards derived from complex legislation that aims to safeguard all aspects of water quality (with reference to: drinking water, surface water - rivers, lakes, estuaries-, groundwater, wastewater). Selects, trains, motivates and evaluates laboratory personnel; provides or coordinates staff training; works with employees to correct deficiencies. His/her role involves significant liaison with public and regulatory authorities. Investigates reasons for lapses in water quality, suggesting changes or solutions to these problems and providing advice on avoiding problems. Contributes to projects concerning water quality improvement. Conducts research related to water quality and sets up field surveys. Shares information with water quality professionals from other agencies. Assists current and future bench, pilot-scale water quality and treatment studies. Understands, implements and enforces appropriate safety and good laboratory practices. Implements and updates the laboratory's QA/QC program on sample collections, analyses and the management of analytical results by the laboratory information management systems (LIMS). Develops and administers laboratory program budget; exercises cost and budget controls. Oversees and monitors expenditures throughout the year.

Expertise: Knowledge of principles, practices, techniques, terminology, and procedures used in complex chemical and bacteriological analyses laboratory analyses of water as well as the current literature and research in related fields; knowledge of applicable rules and regulations affecting drinking water systems, including laboratory Certification requirements; Supervisory experience: ability to effectively and efficiently operate a water quality laboratory; effectively supervise and train assigned employees; interpret new and current regulations; develop effective implementation plans for new regulations.

Level of training: Higher: 5-year degree (specialization in Biology or Chemistry)

Works Foreman

Duties: Employee that reports to the assistant superintendent. He/she supervises assigned crew(s) in the maintenance and repair of the water distribution and/or wastewater systems; which includes water meters, water service lines, water mains, water valves, and fire hydrants. Submits paper work such as work orders, purchase orders and any other paper work that may be required. Coordinates all work with all appropriate personnel, perform related work as required, and perform duties of maintenance when required. Carries out any other duty as assigned.

Expertise: Ability to supervise a crew. Knowledge and proper use of standard safety equipment. Knowledge of the tools, equipment, and methods used for maintenance and repair of the water distribution system. Ability to perform physical work under varying operating conditions.

Level of training: Basic: High school diploma (qualified industrial technician/building surveyor)

Field work planner/coordinator/scheduler

Duties: Oversees the operation and maintenance of water and wastewater systems. Assists with the management of water/wastewater operations to achieve goals within available resources, plans and organizes workloads, reviews progress and initiates changes as needed. Provides work planning leadership and direction to employees. Helps prepare annual budget and assures effective and efficient use of funds. Plans, schedules and implements daily field operations. Liaises with technicians and service providers to efficiently complete work within tight time-lines. Cultivates client relationships with external and internal service providers.

Expertise: Knowledge of water and wastewater regulations, ability and experience in works and supervisory practices and procedures, experience in financial management, strategic analysis,, market analysis and professional development activities.

Level of training: Basic: High school diploma (qualified industrial technician/building surveyor)

GIS Technician

Duties: GIS technician works to implement data on water utility networks within geo-referred digital maps and update them.

Physical and geographical data of water utility networks are transmitted to the GIS technician from the network operators working in the field, through a template validated by team supervisor and reporting the name of streets subject to intervention.

Transmitted data are validated once again by the GIS technician and implemented into the GIS software used by the company to manage the utility networks. At first, the network is graphically represented within the SW and then associated to physical data (material, diameter, depth, installation, other useful pieces of information....).

An important activity for data maintenance and the access to the information is the reporting, useful to provide an analytic documentation, periodically issued, on the water utility network status.

Periodically, the GIS technician deals with the digital topological correction of the utility network, needed to prepare the GIS to more sophisticated elaborations such as the network modelling, selective queries to search for data or thematic maps of interest and also to comply with obligations related to the river basin district management.

Printing service for other company departments and upon request of external companies and offices.

Expertise: Computer knowledge: CAD systems, relational databases and GIS.

Geographical and Territorial Knowledge: reading maps. Urban and territorial planning.

Level of training: Basic: High school diploma (specialization in computer science)

Head of the GIS Team

Duties: Supervises and coordinates the staffing and operational activities of GIS technicians. Participates in the development and implementation of goals, objectives and priorities. Identifies resource needs and develops and implements policies and procedures.

Selects trains, motivates and evaluates the personnel, provides and coordinates staff training, works with employees to correct deficiencies. Manages contacts with SW technicians and schedules SW upgrading and maintenance and the solving of technical problems.

Keeps contacts with the data providers (supervisors of the network operators), and organizes meetings with them to discuss about data acquisition and transmission.

Participates in new projects and research activities related to the field of GIS for utility network management.

Understands, selects and implements appropriate practices for safety and quality control.

Develops and administers program budget, exercises costs and budget controls. Monitors expenditures through the year.

Expertise: Computer knowledge: CAD systems, relational databases and GIS.

Geographical and Territorial Knowledge: reading maps. Urban and territorial planning.

Other skills: team management, priorities identification, safety and quality procedures.

Level of training: Higher: 5-year degree (specialization in computer science)

Sample collectors (Field Sampling Technician)

Duties: Collects water, wastewater and seawater samples in accordance with the sampling schedules and internal procedures. On site analyses and associated QA/QC. Day to day organization and prioritization of sample workload. Supervises the receiving and checking of all samples submitted for testing. Day to day management of Laboratory Couriers. Uses the LIMS system to register samples with associated data, ensuring details and tests are entered correctly

and completely. Visits sites of concern: potential sources of pollution or contamination, and sources of complaints about drinking water quality.

Works closely with laboratory staff and managers to ensure sample requirements are understood and fully implemented. Participates in preparation of samplers' log and labels. Sample equipment fault reporting and remedy of minor faults.

Expertise: Knowledge of the water/wastewater sector. Knowledge of water chemistry and bacteriology. Familiarity with water related regulations and sampling procedures. Experience in water testing and monitoring. Knowledge of measurement instruments.

Level of training: Basic: High school diploma (specialization in chemistry)

Remote sensors technicians (Remote sensing technicians)

Duties: Collects and analyses data gathered from integrated platforms using advanced software and GIS; implements suitable software and hardware requirements according to the system functionality. Operates computer remote sensing interpretive equipment (i.e.: SCADA interface) to prepare images, graphic and alphanumeric reports, maps and charts. Customizes specialized computer software specific routines to integrate further acquired measures. Verifies the integrity and accuracy of data.

Expertise: Ability to install remote sensing instruments integrated into sensors architectures and IT infrastructures. Knowledge of measurement validation techniques and general data handling procedures.

Level of training: Basic: High school diploma (specialization in electronics)

Project technician

Duties: Activities related to assistance to project development and optimisation in technical and economic sectors for extensions, strengthening and maintenance of plants and networks; provides drafting and other technical services in support of network design projects; gathers and analyses data, determines production standards, and reviews drawings and plans for accuracy, completeness, and project feasibility; designs, plans, assigns and reviews network projects; defines quotations for new pipelines within new urbanisation infrastructures; operates in compliance with the schedule and budget established for the engineering projects, establishes timetables for completion of work; performs complex detailing work, making appropriate mathematical calculations; resolves problems arising in design or investigations; prepares detailed plans, diagrams, drawings and specifications to ensure quality of work and determine feasibility with regard to locations, dimensions, grade and existing structures; prepares reports, plans,

layouts, specifications and cost estimation for a rehabilitation, alteration, construction, or maintenance project involving field or office investigations;

Expertise: Experience at the full performance level providing technical support for design projects and applying established engineering principles, practices and higher mathematics in the completion of assigned projects.

Level of training: Intermediate: 3-year degree (specialization in civil/hydraulic engineering)

Project engineer

Duties: Reviews and approves engineering drawings of water/wastewater plants and networks to ensure conformity with project specifications, company guidelines, customer requirements and engineering practices. Develops goals and establish project standards, review calculations and accuracy of work.

Plans and implements engineering program, including defining the project philosophy, activities, milestones, and staff requirements; defines the annual budget plan; provides long term trend analysis for asset management; provides reports on the status of project milestones and adjusts schedules accordingly.

Controls expenditures within limitations of project budget. Identifies project staff requirements and coordinates staff with supporting organization managers. Assigns and oversees project personnel to specific phases or aspects of projects. Coordinates activities concerned with technical developments, scheduling, and resolving engineering design and test problems. Maintains close client relationship to ensure workload opportunities are maximized; advises construction managers/engineers on specific engineering solutions; ensures that solutions are provided as efficiently and as effectively as possible whilst providing the Company with the best technical solution.

Expertise: Project management: capability of managing multiple project tasks within a team environment; ability to work with contractors and lead a team with expert technical advice; ability to interpret and meet customers' needs; experience in design of drinking water supply and distribution networks, wastewater, storm water collection systems, Water and Wastewater Treatment Plants (WWTPs); knowledge of associated disciplines required to deliver water engineering projects; extensive knowledge of standards, specifications and water design solutions; experience in hydraulic networking modelling.

Level of training: Higher: 5-year degree (specialization in civil/hydraulic engineering)

TECHNICAL SUPPORT ENGINEERS

Common points: The following six jobs (i.e. the 6 different Technical Support Engineers) have many points in common.

Main duties: Analyzes problems of quality and functioning of facilities, proposes corrective actions. Works for local Business Units, under the coordination of the Technical Manager of the company.

Typical Duties:

- In plants: identification and resolution of water quality and/or sewerage problems:
- Identifies and anticipates quality problems, proposes appropriate solutions
- Checks on the proper functioning of plants and the results of analyses
- Has an advising role in terms of processes and self-monitoring scheduling
- Defines with the personnel involved the equipment and procedures adapted to process monitoring
- Oversees the application of regulations
- In networks: Optimization of the performances of water and/or sewerage networks:
- Checks on network operation costs
- Handles technical audits for networks, defines the work to be done for the investments planned and oversees the proper realization of the technical interventions

Expertise:

- Investment projects: carrying out an investment project, identifying and selecting project actors (client, project coordinator, etc.), planning, monitoring, alerting, communicating
- Safety

Level of training: Higher education level

Resource & Env't TSE

Expertise:

- Management of the resource
- Hydrogeology
- Hydrology
- Chemistry and Biology of the Environment
- Management of Water catchments/ wells.

DW Quality TSE

Expertise:

- Resource and production
- Water chemistry
- Disinfection
- Calco-carbonic balance, scaling, aggressiveness, corrosion
- Clarification
- Polishing treatments: ozone, activated carbon, membranes
- Removal of iron and manganese

DW Network TSE

Expertise:

- NRW: The circle of lost water
- Managing the buried network
- Water quality within the networks
- Applied hydraulics for networks & simple projects
- Analysis and modelling of networks

WW treatment TSE

Expertise:

- Purification and sludge treatment
- Wastewater quality
- Estimating network and treatment operating costs
- The recycling of sludge and waste - and the future uses thereof
- Managing wastewater treatment
- Technical diagnosis and optimization of treatments

WW network TSE

Expertise:

- Networks for collection of waste and rain water:
- Optimization of sewer cleaning
- Asset management of a sanitation network

SW (storm water) TSE

Specific skills: same as for Wastewater plus a specific skill in SCADA and real time management of Storm Water

3 CONCLUSIONS

This compound of water business industry gives a more detailed idea of the needs on the training of each JP. These descriptions, together with Training Modules that are being collected will be the basis for the Training Catalogue.

These descriptions, besides giving an idea of the knowledge that each JP has to have, it allows to conclude which training modules should be taken in order to move from a JP to another

ANNEX I: MATRIX ON VOCATIONAL TRAINING NEEDS