



USAID | JORDAN

FROM THE AMERICAN PEOPLE



FINAL REPORT

**USAID OPERATIONS AND MAINTENANCE TRAINING PROJECT
OCTOBER 2008-NOVEMBER 2012**

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COVER PHOTO: As this Miyahuna/Zai Water Treatment Plant operator demonstrates, the Jordan Water Operators Certification Program trains operators in correct methods of collecting and reporting daily plant performance.

SELECTED ABBREVIATIONS AND ACRONYMS

ABC	Association of Boards of Certification
ACWUA	Arab Countries Water Utility Association
AWC	Aqaba Water Company
BAU	Al Balqa' Applied University
CAQA	Center for Accreditation and Quality Assurance
CSUS	California State University/Sacramento
DTCC	Delaware Technical and Community College
E-TVET	Employment-Technical and Vocational Education and Training
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ; now GIZ)
IH	instructional hours
ISD	instructional systems development
JTM	Jordanian training marketer
JVA	Jordan Valley Association
KAP	knowledge, attitudes, and practices
KRAs	key result areas
M&E	monitoring and evaluation
MOU	memorandum of understanding
MENA	Middle East/North Africa
MENA NWC	MENA Network of Water Centers of Excellence
MWI	Ministry of Water and Irrigation
OMT	Operations and Maintenance Training program
O&M	operations and maintenance
OJ-PIP	on-the-job performance improvement plans training
OWP	Office of Water Programs

PIRs	program interim results
RTM	regional training marketer
SAP	sustainability action plan
SOMP	standard operations and maintenance procedures
TIA	Training Impact Assessment approach
TMIS	training management information system
TOT	training of trainers
UM	utility management
WAJ	Water Authority of Jordan
WD	water distribution
WTO	water treatment operation
WTP	water treatment plant
WWC	wastewater collection
WWISP	Water/Wastewater Institutional Support Project
WWTO	wastewater treatment operation
WWSST	Water and Wastewater Service Sector Team
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY

In Jordan, one of the driest countries in the world, demand for water exceeds available resources. Per capita, the country has one of the lowest levels of water use, with individual consumption at approximately 90 liters per day. Jordan's high birth rate, combined with periodic influxes of refugees — and demand for economic, commercial, and agricultural development — have exacerbated an already precarious water situation, where demand exceeds renewable supply. To address what could become a crisis, the government of Jordan and international donors are investing heavily in water infrastructure: rehabilitation and construction of new water and wastewater treatment plants; collection and distribution networks; and related smaller projects. Efficient water facility management, operation, and maintenance; control of non-revenue water and leakage reduction; and conservation and rationing are relatively economical ways of making the best use of Jordan's limited water supply.

Growing water demands and a finite fresh water supply require more efficient use of water sector infrastructure and personnel. In May 2008, USAID/Jordan launched the 55-month Operations and Maintenance Training (OMT) Program to enhance worker and organizational performance. Assessments had identified the need for improved operations and maintenance (O&M) practices, supported by job training regulated by a certification process. By improving operator knowledge and skills, expensive facilities can perform to expected standards and stay in service longer while protecting these large capital investments.

To achieve these objectives, OMT worked with Jordanian partners to establish the Jordan Water Operators Certification Program. This innovative program introduced a new approach to human resources development in Jordan's water sector, requiring operators to demonstrate job knowledge and skills by passing professional tests, and by granting them state-recognized certification. The program provides standardized training linked to best O&M practices for operator certifications in water treatment and distribution, wastewater treatment and collection, and utility management. A capacity building module offers certified courses in train-the-trainers (TOT), curricula and test development, and practical skills. The program addresses O&M knowledge and skills gaps that contribute to improved O&M performance at plants and network facilities. This sustainable regional program, the first of its kind to be legally recognized by the government of the Hashemite Kingdom of Jordan, operates on a commercial basis, generating the revenues necessary for continued delivery of operator certification, testing, and training services.



OMT improved O&M performance for organizations and workers, such as the Miyahuna/Zai water treatment plant operator trainee featured above.

Operator Certification

Water/wastewater operator: manager, engineer, or technician who has direct responsibility in a water/wastewater facility that safeguards public health, the environment, and infrastructure.

Operator certification: the legal process by which a duly constituted body establishes minimum professional standards for the O&M of public water/wastewater systems and assesses the qualifications (education, experience), and job knowledge (written examination results) of operators to determine if all specified requirements are satisfied.

Jordan – the ideal incubator. Excellent timing is a central theme of the OMT narrative and the program’s story. In Jordan, USAID found that conditions were ripe for operator certification after many years of promoting the approach in the Middle East/North Africa (MENA) region. New water utilities were searching for fresh ways to improve O&M and to optimize and motivate staff. The Ministry of Labour was formulating

Jordan’s National Water Strategy 2008-2022

“We will set regulations for ‘Utility Certification’ according to defined standards to ensure delivery of high quality services to customers. This will be linked to certification of technical staff from water and wastewater treatment plants, pumping stations and networks. Training will be based on national standards for operation and maintenance. Trained staff will ensure that water and wastewater facilities operate properly for their design lifetimes while delivering high-quality service.”

a new approach to stimulate employment that encouraged professional certification. The Arab Countries Water Utility Association (ACWUA) was emerging as the messenger to herald operator certification throughout the region. And the stage was set for OMT to present and promote operator certification in a highly receptive environment. The results framework below displays OMT’s activities and outputs linked to program results.

Exhibit 1. Jordan OMT Results Framework

Purpose: To Improve Operations and Maintenance (O&M) of Water and Wastewater Infrastructure
Goal: To Establish the Jordan Water Operators Certification Program

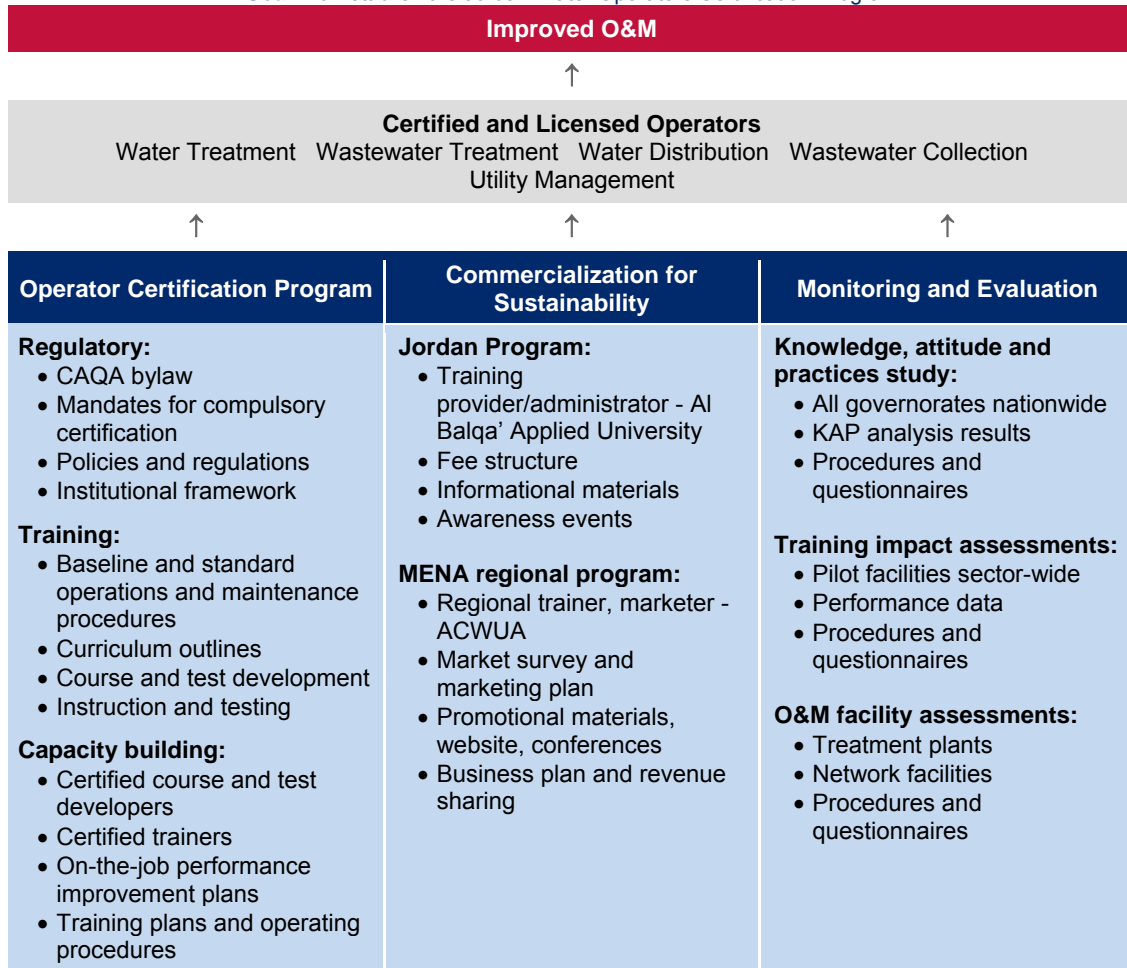
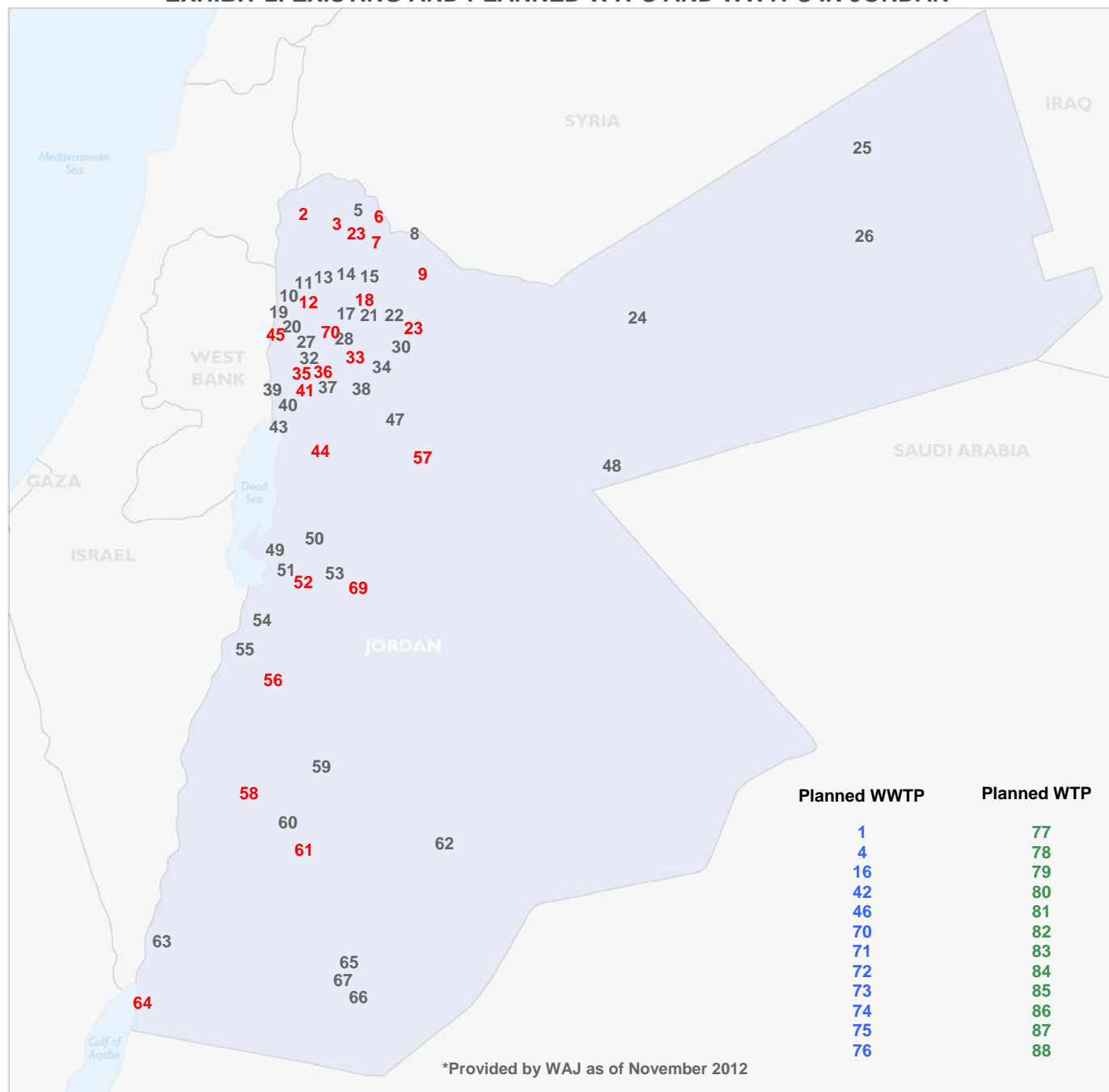


EXHIBIT 2. EXISTING AND PLANNED WTPS AND WWTPS IN JORDAN*



Key:	Existing WWTP	Existing WTP	Planned WWTP	Planned WTP
1. Shuna Ashshamaliyya	20. Abu Az Zighan	39. Shoneh Well 5	58. Wadi Mousa	77. Qunayah Zarqa Well
2. Wadi Arab	21. Qiniyyah	40. Kafrayn	59. Unayza	78. Bireen Well
3. Irbid	22. Znaya	41. Wadi As Sir	60. At Tahouna	79. Mashtal Faisal Wells
4. Wadi Shallaleh	23. As-Samra	42. Naur	61. Maan	80. Jaber Al Balad Well
5. Mahasi	24. As Safawi	43. Zara Ma'en	62. Al Jafr	81. Dabaat Well - Mafraq
6. Ramtha	25. Ar Reesha	44. Madaba	63. Qatar	82. Salaheyat Alnaeem
7. Wadi Hassan	26. Ar Rweyshid	45. Tall Al Mantah	64. Aqaba	83. Tabkat Fahel Wells
8. Jaber	27. Zay	46. South Amman	65. Regulating Tank	84. Urjan Well - Ajloun
9. Al Mafraq	28. Baqa'a	47. Muwaqqar	66. Pump Station 1	85. Qunayah Zarqa Well
10. Krayma	29. Al Ekeder	48. Omari	67. Pump Station 2	86. Zqaiq Wells
11. Qantara	30. Zarqa	49. Ghour El Al Mazraa	68. Al Lajjun	87. Habban Wells
12. Kufranja	31. Baqa'a	50. Shiham	69. Al Baqa'a	88. Thahrat Al Ramel
13. Suf Camp	32. Shuraia'a	51. Sara Spring	70. Moatah	
14. Shawahed	33. Abu-Nuseir	52. Karak	71. Kufranjeh Expansion	
15. Qairawan	34. Ar Rusayfa	53. Al Lajjun	72. Mafraq Expansion	
16. Jarash West	35. Salt	54. Ghour Safi	73. Tawaheen Al Udwan	
17. Al-Deik	36. Fuhays	55. Fifah	74. Azraq	
18. Jarash	37. Wadi As Sir	56. Tafila	75. Karak Expansion	
19. Dair Alla	38. Rass El-Ein	57. Ain Ghazal	76. Tafila Expansion	

Key Accomplishments

The OMT task order specified the results that the government of Jordan and USAID expected upon completion. The OMT team exceeded expectations, achieving all results and going beyond in regard to the number of:

- Certified operators, managers, trainers, developers, and coaches graduated
- Certification programs, courses and tests developed
- Training sessions conducted
- Legal measures and institutional actions enacted.

Benefits of the Jordan Water Operators Certification Program

Operator certification enhances operations, maintenance, and management of water and wastewater infrastructure by:

- Maximizing equipment life and sustaining infrastructure
- Improving water quality, protecting public health, and enhancing water resource management
- Reducing non-revenue water
- Optimizing water and wastewater treatment and network facility productivity and rationalizing costs
- Bridging the current skills gap and helping to implement best O&M practices
- Attracting and retaining skilled engineers and technicians due to clear career paths
- Providing employment options for youth, rural workers, and women
- Creating sustainable demand for high-quality training.

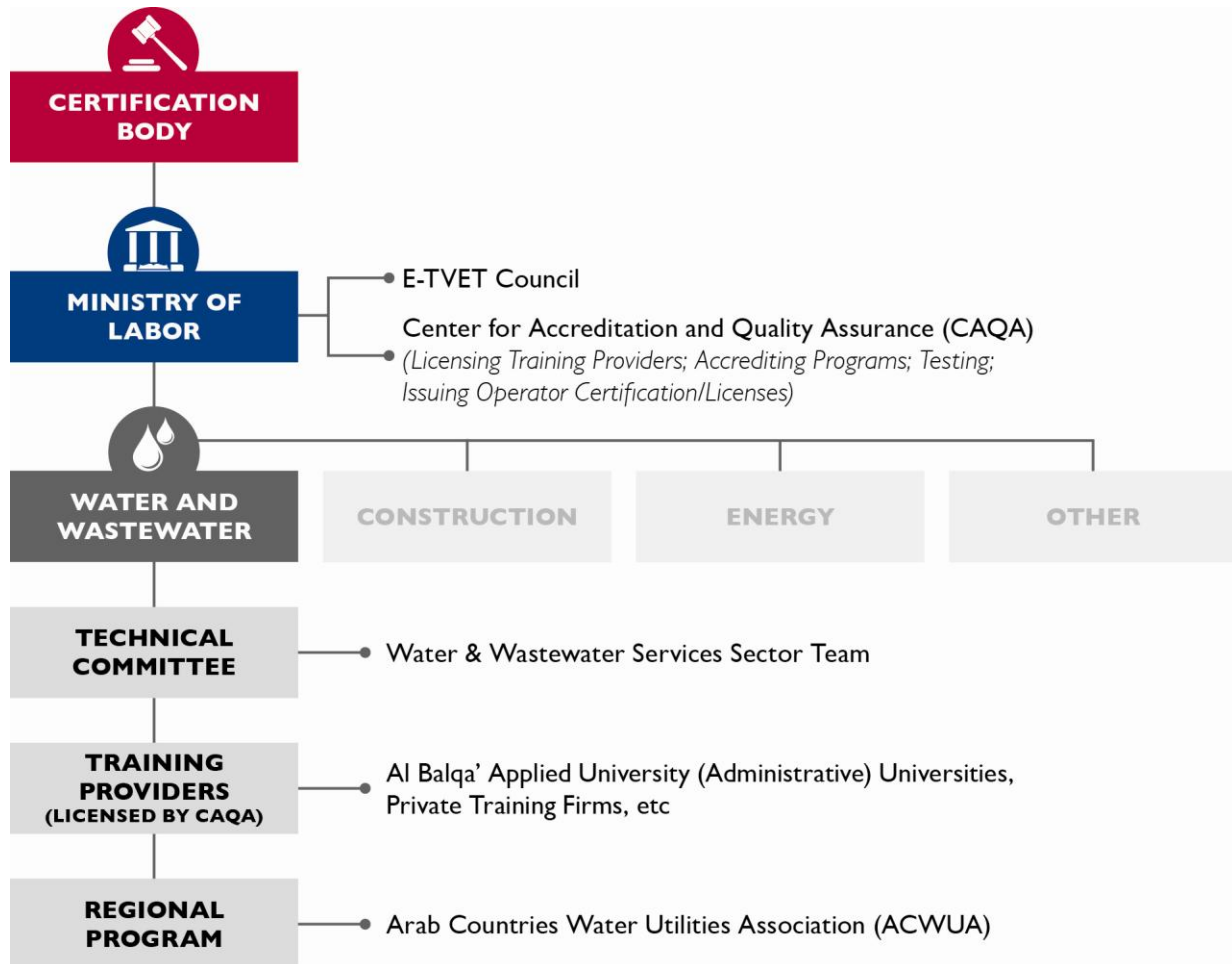
Certified operators. The program qualified 252 operators, managers, trainers, developers, and coaches for 324 legally recognized Jordanian certificates and licensing.

Exhibit 3. Operator Training Development and Implementation

Jordan Water Operators Certification Program								
Certification Program	ABC Trainees	Instructional Hours (IH)					Training Pilots + Repeats	All Trainees
		Level 1	Level 2	Level 3	Level 4	Total IH		
Water treatment	8	46	37	36	29	148	11	151
Wastewater treatment	8	44	35	33	46	158	13	156
Water distribution		31	47	40		118	2	32
Wastewater collection		31	38			69	2	27
Utility management		40				40	1	15
Training of trainers		28				28	4	37
Instructional systems development		37				37	2	23
On-job coaching for supervisors		21				21	1	16
Maintenance	4							
Water treatment lab	9							
Wastewater treatment lab	1							
Total	30					619	36	457

Certification policy and institutional framework. Jordan is the first country in the MENA region to legalize the licensing of water and wastewater operators. In mid-2012, the Center for Accreditation and Quality Assurance (CAQA) was created within the Ministry of Labour. The CAQA has authority to accredit certification programs, license training providers, conduct certification examinations, and issue professional certificates and licenses. The Jordan Water Operators Certification Program was the first certification program to be fully accredited by CAQA and serve as a model for other sectors. The board of certification known as the Water and Wastewater Services Sector Team (WWSST) developed the policies relevant to the program, based on the standards of the U.S. Association of Boards of Certification (ABC) and ISO 17024. CAQA then recognized Al Balqa' Applied University (BAU) as the initial training provider, accepted the results of OMT-developed and administered certification tests, and began certifying water and wastewater operators and issuing operator licenses in 2012. CAQA also took steps to acknowledge ACWUA as the regional training marketer responsible for expanding operator certification to its 19 member countries and more than 100 member utilities throughout MENA.

Exhibit 4. Institutional Framework



Mandatory certification. In 2011, the Secretary General of the Water Authority of Jordan (WAJ) issued an instruction directing mandatory compliance with the policies of the Jordan Water Operators Certification Program for all WAJ operators. As of this writing, an instruction to make operator certification mandatory at all government of Jordan-owned utilities and facilities was being finalized by the Ministry of Water and Irrigation (MWI) and WAJ. This instruction

Exhibit 5. Program Courses and Instructional Hours

Jordan Water Operator Certification Program					
Course	Instructional Hours (IH)				
	Level 1	Level 2	Level 3	Level 4	Total IH
Water treatment	46	37	36	29	148
Wastewater treatment	44	35	33	46	158
Water distribution	31	47	40		118
Wastewater collection	31	38			69
Utility management	40				40
Training of trainers	28				28
Instructional systems development	37				37
On-job performance improvement plans (coaching for supervisors)	21				21
Total					619

will require that operators at the three Jordanian water utilities comply with CAQA policies and the Jordan Water Operators Certification Program. The utilities are committed to voluntarily complying with the CAQA and policies of the program until a legal framework is in place that mandates compulsory certification.

Training program. While the wheels of the Jordanian legal process were turning, OMT prepared and piloted the tests and curriculum for the Jordan Water Operators Certification Program. Experts from the Delaware Technical and Community College (DTCC) led the process of matching training content to O&M needs in Jordan. The Office of Water Programs (OWP) at the California State University Sacramento (CSUS) generously provided operator training manuals at no cost. Local developers and subject matter experts, with assistance from the undisputed leader of U.S. operator training, Ken Kerri, adapted the OWP/CSUS manuals to the local context. The team developed two sets of tests for each course to ensure that there is a sufficient pool of questions to guarantee the validity and reliability of testing. All courses offer a fully illustrated Arabic trainee guide, a detailed trainer lesson plan guide, and a set of visual aids. OMT and its Jordanian partners conducted a series of local awareness events to raise understanding and interest among Jordan’s water sector personnel about the new certification requirements and training opportunities.

ABC regulatory membership. In 2012, ABC accepted the program and ACWUA as full regulatory members, acknowledging their compliance with the highest certification program policies and standards.

Capacity and readiness for sustainability. OMT effectively developed the capacity of local entities and organizations. The program is built on a solid foundation of systems, processes, and procedures to ensure quality and sustainability. OMT supported CAQA with computers and the specialized equipment needed to administer tests, issue certificates, and produce photo identification operator licenses. A sufficient number of Jordanians have been certified as trainers, developers, and coaches for the program to be sustainable. OMT supported BAU, the initial training provider, with information technology and training equipment and developed their capacity to efficiently manage the day-to-day operations of the program using proven procedures and a customized training management information system (TMIS). OMT provided regional training marketer ACWUA with extensive capacity building support in marketing and business planning, as well as upgrades to its website, print materials, and conference capabilities to promote operator certification throughout MENA. ACWUA will share revenues from fees for training and certification with the Jordan program, contributing to its financial sustainability. Finally, OMT's local partners in Jordan are using OMT-developed monitoring and evaluation (M&E) tools to assess the impact of training on O&M performance; measure public perceptions using knowledge, attitudes, and practices (KAP) methods; and assess the O&M condition of treatment plants and network facilities.

Measureable evidence-based training impacts on improved O&M. OMT designed and implemented an evidence-based performance monitoring system to be used by OMT and the Jordan program to monitor and evaluate the impacts of training on the O&M performance at the facilities where trainees work. The Training Impact Assessment (TIA) approach measures changes in key O&M performance indicators and includes trainee and supervisor interviews and surveys to further identify the effectiveness of the operator certification training on O&M performance.

Jordanian treatment plants have reported promising evidence-based performance results indicating reductions in unplanned shutdowns, accidents and operating costs since the advent of OMT. Although these improvements cannot be solely attributed to operator certification, supervisors and operators have consistently reported improvements in their performance attributed to the training. They also reported changes in the culture at their plants and facilities that promotes application of new skills, teamwork, and problem-solving.



The Jordan Water Operators Certification Program goes beyond typical training approaches by linking classroom instruction with practical job experience.

Implementing USAID Forward

principles. In addition to upgrading Jordanian partner and counterpart personnel, OMT optimized the use of local professionals in key staff positions. Jordanians comprised all of the full-time long-term staff positions, including the program director (chief of party) and component leaders, leading to considerable professional development and future benefits to the

program. The local team was backstopped by intermittent U.S. experts and home-office administrative personnel.

Sustainability of the Jordan Water Operators Certification Program. USAID first explored operator certification with USAID’s Egypt Water/Wastewater Institutional Support Project (WWISP) in the early 1990s, but conditions were not favorable for success. After 55 months of OMT support from USAID/Jordan and dedicated commitment and action from the government of Jordan and the water sector, operator certification in Jordan and the MENA region is now on a solid footing and poised to rapidly expand. OMT has helped to establish the regulatory, institutional, and commercial capacities required to continue the delivery of professional and ethical operator certification services, testing, and training, with proven results and measurable O&M performance improvements. Jordan is the first country in the MENA region with licensed water and wastewater operators and is sharing its certification program with neighboring countries. Jordan’s water sector leaders have expressed their appreciation for the improved O&M and associated benefits of this effective new approach in the career development of their managers, engineers, and technicians. They are fully committed to protecting and perpetuating the program as a safeguard for public health, the environment, scarce water resources, and the substantial investment in infrastructure.



One key to improved O&M is teaching best practices in record-keeping. These trained operators ensure that data is monitored and recorded at the Miyahuna/Zai Water Treatment Plant.

Lessons Learned and Recommended Actions

Legal process in Jordan. OMT supported the creation of the CAQA, as this option presented an acceptable and appropriate solution for OMT’s need to establish a legally recognized water operator certification. The complex Jordanian legal process to create the CAQA proved to be arduous and lengthy (three years), and was in force when OMT had just three months remaining to completion.

- *Lesson learned.* Whenever possible, project planning should include contingencies for the slow pace and unpredictable outcomes of local legal actions. Appreciating that progress in establishing a legally recognized certification program in Jordan could be a complex and uncertain process, OMT segregated regulatory activities from other OMT initiatives. This separation allowed other activities to progress independently without being delayed or negatively impacted.

Rigidity of new Jordanian government organizations. OMT and USAID were instrumental in the creation of the CAQA within the Ministry of Labour and spent substantial time and political capital to achieve this result. Once CAQA became an official department, as a newly established organization, the CAQA took a cautious approach, and previous agreements had to be revisited and renegotiated.

- *Lesson learned.* In all cases, but especially when dealing with acting or informal local offices of government, document agreements at the highest organization level possible. OMT had a memorandum of understanding (MOU) signed by the Minister of Labour that clearly defined the nature of cooperation and was honored by the CAQA. Had OMT not secured this MOU at the early stages of the project, progress toward a sustainable institutional framework and the issuance of operator certificates and licenses would have been in jeopardy due to the cautious approach adopted by the new CAQA.

Dynamic Jordan/MENA water sector. The water sector in Jordan is undergoing tremendous change driven by restructuring that has led to the creation of three water utilities divested from WAJ. This reform has spurred a thirst for improvement in all endeavors and a receptive leadership hungry for innovation and best practices.

- *Lesson learned.* Competition is good – cultivate it among partners to drive change. Find the champions who truly believe and hold them up as the example to be emulated. OMT was fortunate that a former CEO for the Aqaba Water Company was a tireless supporter who allowed OMT to begin pilot training at the Aqaba wastewater treatment plant and demonstrate the value of operator certification and training to the entire Jordanian water sector.

Importance of international and U.S. models and partnerships. Engaging ABC, OWP/CSUS, and DTCC proved invaluable to OMT’s success. In addition to serving as models of success for the water sector in Jordan and the region, they validated the concept of operator certification from the perspective of the shared experience of managers, engineers, and technicians who comprise the international water community.

- *Lesson learned.* OMT found that international associations and academic activities serving the water sector aim to improve the standard of water quality and environmental protection worldwide. This translated into unexpected levels of generosity and cooperation from which the Jordan program gained immeasurable benefit. OMT recommends that USAID encourage all water projects to engage these organizations at the earliest possible stages of the project.

OMT project design. OMT’s design created challenges regarding the regional intent of the operator certification program and the development and use of local trainers to instruct courses in Jordan.

- *Lesson learned.* Funding was allocated for Jordanians. To engage and inform potential stakeholders of neighboring countries, the project developed an approach to disseminating information that involved collaboration with ACWUA (e.g. its presence at regional conferences and events). Should USAID wish to support regional marketing of operator certification and training, the project team suggests that expenditures allow for the inclusion of third-country beneficiaries.
- *Lesson learned.* Employees of new utilities no longer work for the government of Jordan; they were required to leave government service and sign private employment contracts when the utilities were formed. To build local training capacity, OMT trained many of these utility employees as course/test developers and trainers. Because the government of Jordan continues to own 100 percent of the company stock and infrastructure, USAID still

considers them to be government employees and therefore not eligible for payment by a project. A policy enabling a USAID project to hire and pay staff with this employment status would be extremely valuable for program sustainability as a larger pool of experienced personnel would be available to lead the program.

Facility assessments. USAID requested that OMT assess the O&M of water and wastewater treatment plants throughout Jordan with emphasis on those facilities funded by USAID.

- *Lesson learned.* We suggest that USAID make such O&M facility assessments a routine standardized best practice and conduct them every five years to follow up on the condition and performance of USAID-funded infrastructure.

SECTION 1. OPERATOR CERTIFICATION AND O&M IN JORDAN AND THE MENA REGION – CONTEXT

USAID's infrastructure investment in Jordan and the region. Since the 1980s, USAID has maintained a robust investment program to develop water and wastewater services and infrastructure throughout the MENA region to meet the demands of growing populations and local economies. This investment, worth hundreds of millions of dollars, requires expert O&M to deliver its full benefit and to ensure its long-term sustainability. Along with ongoing plant construction, over the last decade in Jordan alone, USAID has upgraded and constructed new potable water and wastewater treatment plants to serve Wadi Sir, Qairawan, Qantara, Deek, Kafrein, Salt, Amman, Aqaba, and Wadi Musa at a cost of almost \$400 million. In addition, the government of Jordan has made an equally substantial financial investment in the water and wastewater sector. By the 1990s, USAID expanded its focus on water and wastewater infrastructure and began actively promoting the importance of water and wastewater operator certification in the MENA region, although no formal program had yet been established.

O&M training associated with the transition of new water/wastewater facilities from the construction contractor to the local utility has often been deficient in adequately preparing personnel to take over O&M of these complex and expensive facilities. This has resulted in a critical need to improve performance of these facilities by raising the professional and technical skill level of staff managing, operating, and maintaining this infrastructure. Qualified staff is essential to protect the very large investment made by the governments of Jordan and neighboring countries, and USAID and other donors to ensure that populations in Jordan and the region have safe reliable water systems in the future.



Many plants use state-of-the-art technology, such as these electro-mechanical installations at Miyahuna/Zai Water Treatment Plant. Operator certification training helps engineers and technicians to remain up-to-date in this dynamic industry.

Evolution of operator certification and training in the United States. In the 1970s and 1980s, the U.S. government took aggressive steps to establish standards for U.S. drinking water quality and preservation of water resources by controlling pollution. The Clean Water Act and the Water Quality Act required that all U.S. water and wastewater facilities have qualified operators or risk serious penalties. Engineers and technicians had to demonstrate knowledge of the new water and effluent quality standards and relevant O&M proficiency by passing standardized certification exams at various points during their careers. This federal certification mandate created demand for highly trained and qualified water treatment and distribution operators and wastewater collection and treatment operators. A framework of certification and standardized testing quickly emerged to support these new demands for certified staff in each state.

Over the next few decades, training models and materials evolved to provide educational opportunities to operators who sought to work in the water and wastewater industry in compliance with these standards. State certification boards quickly adopted the examinations sanctioned by the Association of Boards of Certifications and training manuals produced by the CSUS/OWP. International institutions seeking to establish rigorous certification standards, policies, and procedures have advocated for similar schemes and models; this has been the goal of the Jordan program.

Jordan – ideal regional incubator. When the project started in May 2008, the concept of operator certification was relatively new to Jordan — with the exception of the Aqaba Wastewater Treatment Plant and the Zara Ma'in Water Treatment Plant, where as the result of USAID infrastructure projects, local engineers and technicians received the same training and passed the same tests required of U.S. operators. The timing and atmosphere were right for operator certification. The government of Jordan was in



OMT piloted training courses and incorporated feedback from trainees and trainers. This group at Miyahuna/Zara-Ma'in provides feedback to improve the WTO training course.

the midst of restructuring the sector in a transition towards independent water utilities, inclusive of the Miyahuna Water Company in Greater Amman/Central Jordan, Aqaba Water Company in the Southern governorates, and Yarmouk Water Company in the Northern Governorate, though the government did not plan to divest itself completely.

Government officials and the dynamic new management overseeing this transformation were highly receptive to establishing state-of-the-art operator certification standards, career paths, and O&M training. Further, the favorable size of the publically operated portion of the water sector in Jordan with 48 water and 23 wastewater treatment plants employing 2,000 operators meant that concrete results could be demonstrated within the five-year duration of the OMT project. The internal conditions of the Jordan water sector were ideal to incubate water operator certification and training and to establish Jordan as the first successful working model for operator certification in the MENA region.

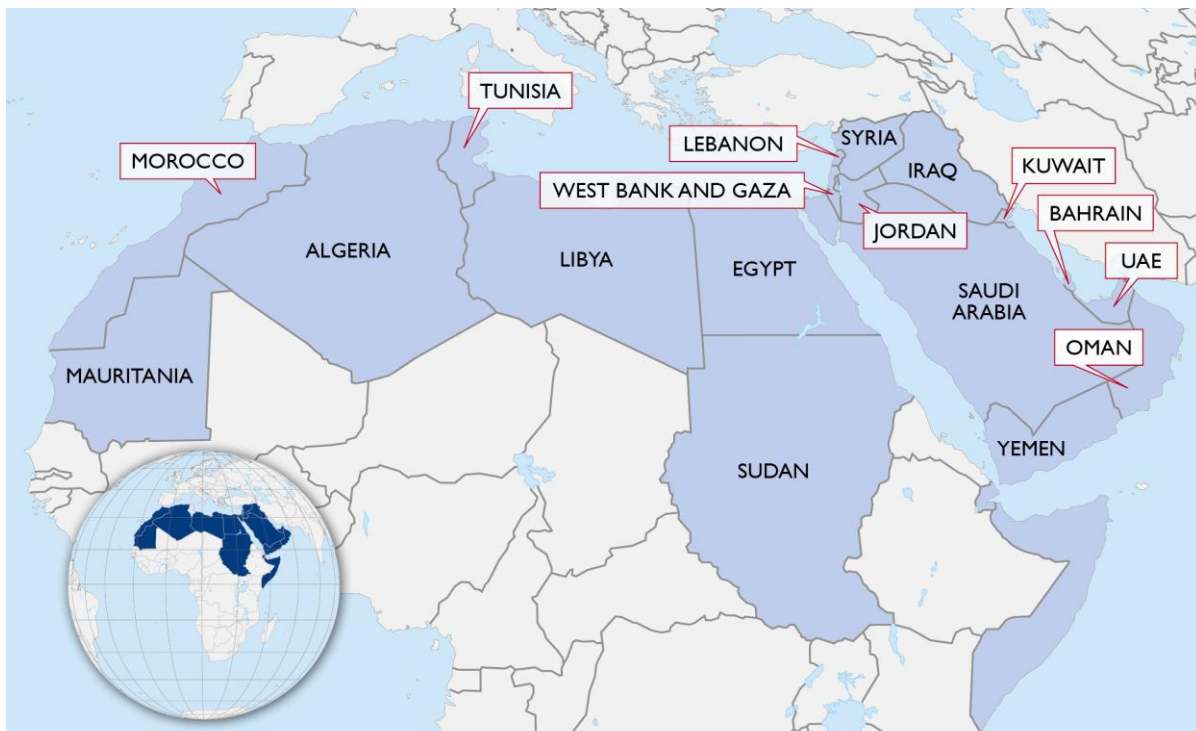
Enabling external environment. As the water sector in Jordan transitioned to independent management and operation with a structure more open to new human resources practices, Jordan's economy overall was experiencing a metamorphosis. At the Ministry of Labour, an Employment-Technical and Vocational Education and Training (E-TVET) initiative began in 2008 with support

*"Rarely has there been such a timely and conducive confluence of conditions, activities, personalities and resources as enjoyed by the burgeoning and much needed Jordan Water Operators Certification Program."
—former Minister of Water and Irrigation*

from the European Union. There was a plan under the E-TVET initiative to set up a new CAQA that would be legally empowered to set, oversee, and enforce certification standards and grant occupational certification (licenses) in selected sectors and vocations. Jordan's intention to implement E-TVET and pass the CAQA bylaw meant that the envisioned program could have the distinction of being the first legally constituted occupational certification in Jordan with operator qualifications recognized within this national framework.

ACWUA – the regional vehicle. While these dynamic changes were taking place in Jordan's water and labor sectors, ACWUA was established in 2007 with assistance from the German government and other donors. Its mission is to advance best practices and develop water sector personnel throughout the Arabic-speaking world. ACWUA has grown to include 19 member countries and more than 100 utilities in the MENA region. ACWUA is well-positioned to promote water and wastewater operator certification, testing, and training based on the successful model of the Jordan Water Operators Certification Program.

Exhibit 6. ACWUA Member Map



Snapshot: “It’s a Complete Professional Training Program”: An Interview with Aqaba Water Company Manager Eng. Mohammad Al-Mahameed

“During our engineering studies at university we cover water technologies and wastewater treatment in a general theoretical way. It wasn’t intended for people who would have a career in the water sector. It was just an introduction. Then we take a job, as I have, in the water sector where we find no systematic training approach. We learn what we can on the job, from projects if we are lucky, and what we study ourselves. Let’s be honest, we know there are gaps in our knowledge and skills.” said Eng. Mohammad Al-Mahameed, manager of the Wastewater Treatment Plant at the Aqaba Water Company.



Al-Mahameed views the program as transformational — improving not only job performance, but his self confidence.

“We need the Jordan Water Operators Certification Program – it’s a complete professional training package. Everything is there: Treatment Processes and Facilities, Microbiology, Disinfection, Reuse, Chemistry, Safety, and much more. The program is well organized and customized for our needs in Jordan. I have taken three levels of the wastewater treatment operator training.”

“I now approach my job in a new way — with greater self-confidence in my knowledge and my ability to solve the technical problems we face every day at the plant. We are using the correct terminology and following correct technical procedures. As manager, my staff brings their questions to me. The Jordan program is providing me with the answers. And soon, my operators will be certified as well. We are all being elevated to a new professional level – an international standard. This is producing a real enhancement in our performance and is of great value to our facility, company and the water sector in Jordan.”

“I was also fortunate to take all three of the capacity building courses. After passing the TOT course, I was selected to conduct the Wastewater Treatment Level 2 course at the Yarmouk Water Company,” Eng. Mohammed recounted. “That was such a good experience. Teaching is very gratifying, especially when you know that it will have an immediate positive impact.”

“The Utility Management training and the on-job coaching have helped me to communicate better with my team and implement performance improvement plans. The Jordan Water Operators Certification Program is having a big influence on how we do our jobs, view our careers and assess ourselves. It’s transformational – being certified operators is gaining us the respect of our colleagues, friends, family and neighbors while helping us safeguard water quality, protect the environment and preserve our facilities. Being a certified wastewater operator — Level 3 — is a source of great pride and admiration.”

SECTION 2. IMPROVING OPERATOR STANDARDS AND PERFORMANCE – CHALLENGES

Overcoming the challenges facing operator certification. Even with broad sectoral support for any initiative to help WAJ and the new water utilities to improve O&M performance, the concept



In operator certification, engineers and technicians study the same courses. Their career paths differ, with engineers advancing levels at a faster pace.

of job certification based on establishing standards and assessing qualifications using controlled written examinations seemed daunting for counterparts and stakeholders. They admired the concept of developing the knowledge and skills of managers, engineers, and technicians, but not all decision-makers, executives, and potential operators were in full support of the rigorous accountability of a standards-driven program that would establish a clear, hierarchical differentiation among personnel.

At the time, the sector wasn't aware of the success of the operator certification program at the Zara Ma'in Water Treatment Plant and the concept of licensing staff to work at water/wastewater facilities seemed unusual, even threatening. No similar examples of technical certification existed in other

Operator Certification

What is a water/wastewater operator? An operator is a manager, engineer, or technician with hands-on responsibility in a water/wastewater facility that safeguards public health, the environment, and the infrastructure.

What is operator certification? The goal of all operator certification programs is to ensure that skilled professionals are overseeing and taking action to treat and distribute safe drinking water and to protect the environment by collecting and treating wastewater.

Operator certification is the legal process by which a duly constituted body establishes minimum professional standards for the operation and maintenance of public water/wastewater systems and assesses the qualifications (education, experience) and job knowledge (written examination results) of operators to determine whether or not all specified requirements are satisfied.

What are the benefits of operator certification?

Employee benefits. Certification offers a mechanism for employees to receive recognition and credibility in their chosen career. The benefits of certification can include:

- Career advancement opportunities
- Higher wage earning opportunities
- Mechanism to demonstrate competency and professionalism
- Competitive advantage over non-certified individuals
- Enhanced professional reputation and prestige
- Demonstrated commitment to the field

Employer benefits. Employers use certification to:

- Screen potential new hires and select contractors
- Motivate employees to expand their knowledge and skills
- Increase competency level of employees
- Ensure ongoing continuing education for employees

fields or sectors to demonstrate the value and efficacy of operator certification. As with most development initiatives, OMT needed to determine why the program faced pockets of resistance and to develop ways to build awareness and acceptance of this innovative way of training and qualifying professionals. This section summarizes the main challenges facing the establishment of the Jordan Water Operators Certification Program.

Cultural status of water/wastewater workers. A basic tenet of the program is that any operator, whether engineer or technician, can eventually become a manager by progressing through the designated career path. Further, entry-level engineers and technicians receive the same training and can attend training together. Engineers receive more advanced instruction early in their careers; technicians who fulfill the educational requirement for higher certification will eventually receive this same training. This approach challenges the established hierarchy that exists within Jordan’s water sector and in Jordanian society where a ‘culture of shame’ has historically prevailed regarding certain jobs, particularly in wastewater facilities. In this respect, operator certification is more egalitarian, designed to teach workers from both water and wastewater facilities the requisite knowledge and skills, regardless of education or status. Creating an awareness of the various career paths available to accommodate employees with differing levels of education (high-school diploma or equivalent, associate level degree, bachelor’s degrees in engineering versus other academic disciplines) helped to overcome participants’ resistance, promoting full acceptance and leading to greater teamwork among workers who train together.



Operator certification is changing the culture at Jordan’s water facilities. Senior staff is motivated to train subordinates so that everyone earns licenses and the facility remains compliant. Here, Zara Ma’in operators demonstrate the impact of operator training as they conduct inspections.

Sample operator career path. Exhibit 7 details a sample career path for an employee who holds the first university degree.

Exhibit 7. Operator Career Path

Level	Academic Requirement	Experience Requirement	Years of Direct Supervision
Trainee Operator	First university degree	None	None
1	First university degree	None	None
2	First university degree	None	None
3	First university degree + 30 training hours	Two years at level 2	One year
4	First university degree + 50 training hours	Three years at level 3	Two years

Establishing personnel standards for the water sector. The proposition that engineers and technicians in the water sector would require mandatory certification for employment security and promotion was often met with initial question and opposition. Recognizing that occupational certification is generally new in Jordan, water/wastewater workers wanted to know why their jobs were being singled out for this requirement. They expressed further concern when they understood that their certifications would not be “for life” — credentials would require periodic renewal, usually entailing more training and testing. Required attendance of classroom instruction and passing written tests was threatening for many workers with minimal education who had already been working in the sector for many years. However, realizing that being designated for legal certification and licensing was a distinction that would bestow honor, professional recognition, respect, and potential opportunities for reward and career advancement, technicians and engineers generally accepted the situation. For those workers who were nearing the end of their careers, a grandfathering option was offered that created a provisional certification that required mandatory training attendance but waived the written test. Workers who opted for this option accepted that they could not progress unless they passed the written tests for their level. By building worker and management awareness of the attractive benefits of operator certification to the utility and the employee, and creating the flexible approach to accommodate workers with long service in the sector, OMT helped to generate advocacy for operator certification at the grassroots level.

High-impact pedagogy and language of instruction. Certification programs may offer training choices including traditional classroom instruction, self-study, and e-learning alternatives. To ensure a Jordan-relevant approach, consistent adherence to standards, equitable access to training, and individual attention for potential operators, stakeholders decided on a traditional classroom training approach. To maximize the impact of training and ensure universal participation, Jordanian partners designated Arabic as the primary language of instruction. Since much English water/wastewater terminology has no clear or commonly used Arabic equivalent, the Arabic terms selected by local subject-matter experts for use in the Jordan courses were supplemented with Arabic/English glossaries to complement the materials. Jordan has a diverse public and private training community. To ensure consistency among training materials, and training methods, OMT had to apply rigorous standards for a program serving thousands of trainees nationwide. The team developed all tests, trainee guides, trainer guides, and visual aids to conform to specific qualitative criteria in terms of technical content, effective training methodology, and presentation. Experts trained by OMT in Instructional Systems Development (ISD) — and certified by the Jordan program — prepared the materials and tests. Trainers completed a methods-of-instruction TOT course to build local capacity to reliably deliver training to the highest standard.

Legalization of operator certification. OMT and local stakeholders controlled the development and scheduling of pilot tests and courses for the Jordan program. This was not the case with the establishment of a legally recognized operator certification requirement in Jordan with approved policies and institutional framework. OMT and stakeholders were subjected to the slow process of creating new legislation amidst ever-changing governments and cabinet ministers. OMT acknowledged these legal hurdles at the start of the project and pursued a strategy to first conduct a legal review of current applicable water sector and Jordanian labor laws before committing to the arduous process of passing a law explicitly establishing mandatory operator certification. As

the executive summary mentions, the OMT legal review revealed that at the Ministry of Labour, an E-TVET initiative was just underway in 2008 with support from the European Union. As part of this approach, the E-TVET Council planned to launch a new CAQA in 2008 that would eventually be empowered to set, oversee, and enforce certification standards and grant occupational certification (licenses) in selected sectors and vocations.

The passage of the CAQA bylaw took three years and finally came into force in September 2012 at the end of OMT. Unfortunately, the final version of the law did not include the vital reform that would

empower CAQA to make certification mandatory for selected occupations and sectors in Jordan.

“I have been working in the water sector for 40 years. This program has the potential to overcome challenges, reduce deficiencies, and, improve chronic O&M performance problems in just a few short years.”

—WWSST Leader Abdelrahman Omari

Though without the provision which would have enabled CAQA to legally mandate operator certification, the bylaw did empower CAQA to license training providers and issue the operator certifications (licenses) required for the Jordan program. At this late stage of the project, within weeks of the originally scheduled contract end date, OMT had to seek other legal means to make operator certification mandatory, and determined that the provisions of the WAJ law and the agreements among MWI, WAJ, and the newly formed water utilities were conducive to making operator certification mandatory in the sector. As of this writing, an agreement among MWI, WAJ, and the water utilities was in process to make operator certification mandatory at WAJ facilities and those facilities operated by the three water utilities. The utilities as well as WAJ have agreed to participate in the program on a voluntary basis until the process of compulsory certification is finalized.

Complex and evolving institutional relationships. Those in the industry often misread “operator certification” to simply mean implementation of testing and training. Such programs require complex legal frameworks and clear institutional roles and responsibilities. Institutions must manage, administer, and sustain the certification processes and the program as a whole. In Jordan, these roles and responsibilities remained in a state of flux until late in OMT and only became concrete with the passage of the CAQA bylaw. Under the bylaw framework, CAQA became the certifying body and retains responsibility for testing and issuing worker (operator) licenses. The role of the board of certification is carried out by an advisory committee known as the WWSST under CAQA control; CAQA also licenses training providers and accredits their training programs. For the initial two years of the Jordan Water Operator Certification Program, BAU will serve as the training provider, hire certified trainers, and will collect fees to cover the operating cost of training from WAJ and the water utilities. Other public and private training providers may emerge, including WAJ and the water utilities being licensed to serve their own training needs. Due to the protracted period required to legalize certification in Jordan, the long-term capacity of institutional partners has remained largely untested at the end of OMT. All necessary systems to effectively manage, smoothly administer, and efficiently implement the Jordan Water Operator Certification Program and deliver improved O&M performance at water/wastewater facilities were in place and staff at CAQA, BAU, and the water utilities had been adequately trained.

Limited training budgets. Securing adequate and reliable financial resources contributes to the sustainability of development initiatives. Because the Jordan Water Operator Certification Program is fee-based and designed to function without government subsidy or extended donor support, it was critical that the value of the program be demonstrated with measurable improvements in water/wastewater facility O&M. The OMT project implemented a robust monitoring and evaluation system with a training impact assessment (TIA) as its centerpiece.

The TIA collected quantitative performance data from the utilities — and qualitative input from operator and supervisor surveys and interviews — to show improvements in O&M. Preliminary results demonstrated the return on investment justifying the costs of the training, testing, and licensing to be borne by the three utilities and WAJ after the end of OMT and led to agreement among these parties to pay the fees charged by the training provider and CAQA. Although financial resources are limited at Jordanian utilities, as Eng. Emad Zuriekat, former CEO of the Aqaba Water Company said, “A certified operator manages effectively and protects and assures the sustainability of expensive equipment. The costs of this program are hardly mentionable in comparison to the returns that we receive from the performance of highly qualified operators.”

Snapshot: Avenue to Job Growth for Jordan

“Like many countries affected by the slowdown in the global economy, Jordan is struggling with high unemployment, especially among our youth. As part of our government strategy, the Ministry of Labour has embarked on an Employment-Technical and Vocational Education and Training (E-TVET) initiative to satisfy the needs of the job market with candidates who have matching knowledge and skills. Professional certification is a major part of this approach and the USAID OMT has been a big help in the fulfillment of this vision,” explained Eng. Mohammed Irshaid, director of the CAQA.

“The CAQA bylaw was fully approved in September 2012 after a long process. OMT was with us from the start and we cooperated closely to create the Jordan Water Operators Certification Program. An MOU was signed by the Ministry and OMT in 2008 to utilize the legal status of CAQA to establish the Jordan program and to use the program as a pilot to build the capacity of the CAQA. This fruitful relationship led to the Jordan program being the first that we accredited and the operators, trainers, developers and coaches were the first to receive our professional licenses in Jordan.”

In November 2012, at the certification ceremony to issue the first batch of operator licenses in the water utilities, Eng. Irshaid discussed the actions taken by CAQA to support and sustain the Jordan program. “CAQA is empowered to accredit programs, license training providers, administer certification exams and issue professional certificates and licenses. We have applied our authority and in addition to accrediting the Jordan program, we have recognized BAU as the training provider. We have also agreed to work with ACWUA as the regional training marketer for the Jordan program which will contribute to sustainability.”

“CAQA is still new and we need to grow and develop. OMT’s assistance in providing support and equipment has helped us move quickly to fulfill our mission in the service of our country. We are now in a position to facilitate new certification programs and foster employment opportunities in other essential sectors of our economy.”



USAID Mission Director Beth Paige (left) recognizes Eng. Mohammed Irshaid, CAQA director (right) at the Water Operator Certification Ceremony and OMT project closing activity.

SECTION 3. INTRODUCING OPERATOR CERTIFICATION TO JORDAN AND MENA — METHODOLOGY

Targeted beneficiaries. Water and wastewater facilities in Jordan and the MENA region are the targeted beneficiaries of OMT and the associated Jordan Water Operators Certification Program. The end-users of water and sanitation services — the public, business and industry of Jordan — are the ultimate beneficiaries.

Collaboration between USAID and the government of Jordan. Substantial collaboration occurred between USAID and the government of Jordan prior to OMT. In February 2006, USAID and the German aid agency Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ; now GIZ) briefed mid-level directors of the MWI, WAJ, and Jordan Valley Association (JVA) human resources development and training directorates and representatives from the current Aqaba, Amman, and Yarmouk water utilities on the concept of the upcoming USAID project. The reaction was largely positive: “long overdue,” “needed for sustainability,” and “has to be on a commercial basis or it won’t work.” Awareness of weaknesses in the sector led the former minister of MWI to request preparation of a comprehensive training plan for the water sector from which the concept for OMT grew.

Jordan’s Development Goals for Water Resources

As stated in the Jordan National Water Strategy for 2008-2022, Jordan's vision for a water strategy is one whereby, in 2022, Jordan has:

- Adequate, safe and secure drinking water supply
- Greater understanding and more effective management of groundwater and surface water
- Healthy aquatic ecosystems
- A sustainable use of water resources, and fair, affordable and cost-reflective water charges
- Adaptation to increased population growth and economic development across the water sector and among water users.

OMT supports Jordan’s development goals. Operator certification is included in the Jordan National Water Strategy 2008-2022 as follows: “We will set regulations for ‘Utility Certification’ according to defined standards to ensure delivery of high quality services to customers. This will be linked to certification of technical staff from water and wastewater treatment plants, pumping stations, and networks. Training will be based on national standards for operation and maintenance. Trained staff will ensure that water and wastewater facilities operate properly for their design lifetimes while delivering high-quality service.”

The Jordan OMT project’s timeline is graphically represented on the following page in Exhibit 8.

JORDAN OMT TIMELINE



OMT kick-off. At the start of the project, a WAJ Steering Committee comprising representatives from MWI, WAJ, and the water utilities, convened in August 2008. This committee agreed to the OMT work plan and performance monitoring plan (PMP) and later approved the draft policy framework for the Jordan Water Operators Certification and Training Program, which contains the organizational structure of the program and full descriptions of the responsibilities of all parties. Per the policy framework, in July 2010, the acting board of certification comprised of representatives from the government of Jordan, the water sector, NGOs, and private firms emerged and thereafter met regularly as the WWSST. Since the inception of the WWSST, they reviewed and made decisions on implementation for all plans associated with operator curriculum designs and training materials, sometimes with support from associated technical advisory committees. With an approved work plan and local counterparts aligned to actively participate, the OMT team was ready to design and implement the regulatory, training, and commercialization elements of the project and monitor, evaluate, follow-up, and report progress.

OMT approach and work plan. OMT had four main components, corresponding with the PMP's program interim results (PIRs) and key result areas (KRAs) (Annex II). Quarterly and annual reports detailing the project's activities are available on USAID's development experience clearinghouse website: <https://dec.usaid.gov/>

OMT Work Plan

Component 1: Policy and regulatory environment strengthened to support standardized training and certification (PIR 1)

Task 1.1: Knowledge/application of best practices for water/wastewater O&M increased (KRA 1.1)

Task 1.2: Improved policies/regulations establishing certification requirements (KRA 1.2)

Task 1.3: Capacity of local institutions involved in certification program strengthened (KRA 1.3)

Component 2: Quality of training provided for O&M of water/wastewater facilities optimized (PIR 2)

Task 2.1: Training materials improved to reflect best practices & certification requirements (KRA 2.1)

Task 2.2: Training skills of trainers improved (KRA 2.2)

Task 2.3: Training skills of training specialists improved (KRA 2.2)

Component 3: Water training sector strengthened to operate on commercial principles (PIR 3)

Task 3.1: Create demand for high quality training programs and certification services and assess supply (KRA 3.1)

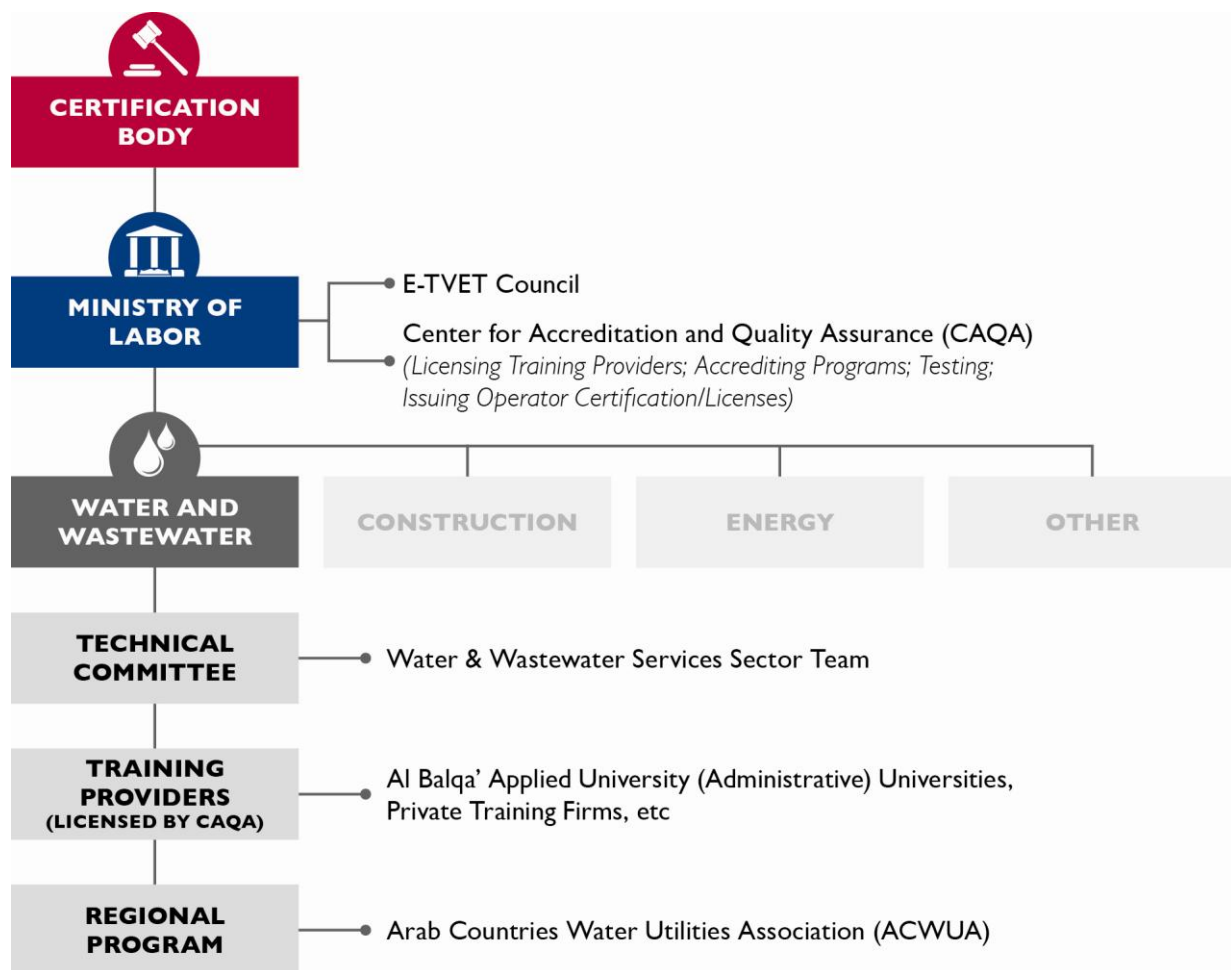
Task 3.2: Institutional capability for responding to local and regional training demand enhanced (KRA 3.2)

Component 1. Policy and Regulatory Environment Strengthened to Support Standardized Training and Certification

Component 1 focused on setting a solid regulatory foundation for the Jordan Water Operators Certification Program. Appreciating that progress in establishing a legally recognized certification program in Jordan could be an arduous and unpredictable process, OMT decided to segregate regulatory activities from other OMT initiatives. This separation would allow other activities to progress independently without being delayed or negatively impacted by any delays or obstructions in the local legal process. The vision and capacity building for the program emerged from this component. Upon completion of OMT, the following key Component 1 results were achieved in support of the legal establishment of the program:

A new certification bylaw. With substantial support and lobbying from OMT and USAID, the government of Jordan passed the certification bylaw in September 2012, providing a legal means to implement standardized operator certification testing and training and issue legally recognized operator certification licenses. To ensure smooth program implementation, OMT supported capacity building at CAQA with related technical assistance and equipment procurement.

Exhibit 9. Institutional Framework



Policy and institutional framework. OMT and partners developed a complete set of regulations and procedures for the Jordan Water Operators Certification Program based on the ABC model and ISO 17024 principles. OMT established an early relationship with the E-TVET, solidified by an MOU in 2009. In November 2011, E-TVET approved and adopted the policies and institutional framework of the Jordan program as a model for all certification programs in Jordan. This was approved by the newly created CAQA.

Board of operator certification. As a permanent technical committee within the framework of the CAQA structure WWSST is comprised of the stakeholders described in the text box at right.

Training provider and program administrator. In September 2012, CAQA recognized BAU as the first legally acknowledged training provider associated with a Jordanian certification program. As a government entity, BAU was exempt from the CAQA licensing process. BAU’s responsibilities include administration and training. OMT established an early cooperative relationship with BAU and concluded an MOU in 2009 whereby OMT would help to build the BAU capacity to perform the duties and responsibilities associated with training administration and delivery for the Jordan program with related technical assistance and equipment procurement. CAQA will retain BAU as the sole training provider for until other local training firms, universities, and water utilities can be licensed. OMT facilitated a familiarization session conducted by CAQA for representatives of local private training companies to inform them of the stipulations of the new CAQA bylaw and how to make application to become licensed training providers.

Mandatory certification at WAJ. In 2011, the secretary-general of the WAJ issued an instruction directing mandatory compliance with the policies of the Jordan Water Operators

- WWSST (Board of Certification) Composition**
- Representatives from environmental control agencies
 - Representatives from government/water and wastewater sector including a manager responsible for environmental control
 - Private sector managers of companies and industries required to employ certified operators
 - Representatives from educational institutions that conduct certification training
 - Certified operators holding active valid certificates
 - Members-at-large including but not limited to representatives from non-governmental organizations such as environmental organizations, public policy organizations, community action groups, and other interested/affected groups representing private citizens.
 - Secretary of the board (non-voting)

- About Al Balqa’ Applied University (BAU)**
- BAU is the only institution of higher learning in Jordan that operates on a kingdom-wide basis with campuses in all major urban areas plus numerous extension facilities. Through its national network of campuses and facilities, BAU is uniquely qualified to administer and provide training for the Jordan Water Operators Certification Program. BAU enjoys the following distinctions:
- A top ranked university in Jordan by the Ministry of Higher Education
 - The ‘community college’ for Jordan offering educational opportunities on a local basis and, in many cases, in close proximity to Jordan’s water and wastewater sites
 - An “applied” university that stresses curricula with strong job orientation. In addition to bachelor and graduate degree programs, BAU offers an extensive selection of diploma, certificate, and associate-level programs.
 - Experienced in career oriented programs, continuing education, on-line and distance-learning.
 - A recognized engineering faculty offering degrees in environmental studies.
 - Numerous regional programs for and in MENA countries.

Certification Program for all WAJ operators. Under the existing agreements at the time, WAJ could not apply this instruction to the operators at water utilities. MWI and WAJ authority regarding the agreements creating the water utilities would require a special instruction acceptable to all parties to make certification mandatory at all facilities owned by the government of Jordan.

Mandatory certification at the water utilities. In October 2012, an instruction to be issued by MWI and WAJ was in process to make operator certification mandatory at all facilities owned by the government of Jordan. This action requires that operators employed at the three Jordanian water utilities comply with the policies specified by the Jordan Water Operators Certification and Training Program.

ABC recognizes the Jordan program. In January 2012, the U.S. ABC granted full regulatory membership to the Jordan Water Operators Certification Program based on demonstrated compliance with the standards for such programs as set by ABC.

Preparing for ISO 17024. Readiness to receive ISO-17024 certification was ensured as the Jordan Water Operators Certification Program was designed in full compliance with the requirements of the ISO standard. The Jordan program is cooperating with ABC and will apply for the ISO 17024 when ABC completes its own ISO certification process.

Building partner capacity. OMT conducted extensive capacity building for the water utilities, WAJ, CAQA, WWSST, Al Balqa' University, and ACWUA. Two observational study tours to the United States were conducted. The first, in October 2009, was to DTCC where participants received first hand exposure to the day-to-day operations of a certification program and were introduced to key figures in the regional certification process. The second, in January 2012, included participation in the ABC conference at which ABC conferred membership on the Jordan program, and visits to the Office of Water Programs at OWP/CSUS. In all, 13 counterparts participated. Based on OST experiences and expert support, OMT assisted counterparts in development and implementation of a detailed program procedures manual of all managerial and administrative functions necessary for smooth operations. As discussed earlier, a TMIS with all data required was designed, implemented, and populated.

Implementing USAID Forward principles. OMT optimized the use of local professionals in key staff positions and complemented their roles with short-term support from U.S. experts and backstopping from the Chemonics home office. By design and with USAID approval, after the initial 18 months of the project, a Jordanian took over as OMT program director (chief of party). Jordanians on the team included the operations and administration manager and the finance specialist, who both served for the full term of the project, and the Component 1 and 2 leaders. Component 3 and 4 leaders were intermittent U.S. experts overseeing local teams. OMT's professional Jordanian staff benefitted greatly from this development and personal growth opportunity.

*"The Jordan Water Operators Certification Program is an outstanding model for professional and vocational certification programs that will help us match skilled personnel with the needs of the labor market."
—Mohammad Irshaid, CAQA director*

Jordan program sustainability. OMT developed a comprehensive sustainability action plan (SAP) with active participation from partners to ensure that the Jordan program would put in place organizational, financial, and administrative requirements to secure the effective and ongoing operation of the Jordan program after the completion of OMT. This SAP process secured full commitment and willingness to pay a fee structure for training deemed reasonable by management of WAJ and the water utilities.



Certified operators from the Aqaba Water Company proudly show awards received at the certification ceremony.

Planning future training. To further ensure sustainability and efficient coordination and operations, OMT encouraged BAU, WAJ, and the water utilities to develop a master training plan and schedule for 2012 and 2013 to specify all necessary program training. The plan, which will be updated quarterly and prepared annually, will also be coordinated with CAQA for test administration. Upon completion of OMT, partners will conduct training and testing in accordance with the plan.

Jordan operators licensed. In November 2012, at the operator certification and OMT program turnover ceremony, CAQA issued 324 legally recognized operator certificates/licenses for managers, engineers, and technicians who had completed operator certification training and passed standardized tests, and 76 certificates to personnel who had completed and passed TOT, instructional systems development (ISD), and OJ-PIP/coaching training.

Component 2. Quality of Training Provided for O&M of Water/Wastewater Facilities Optimized

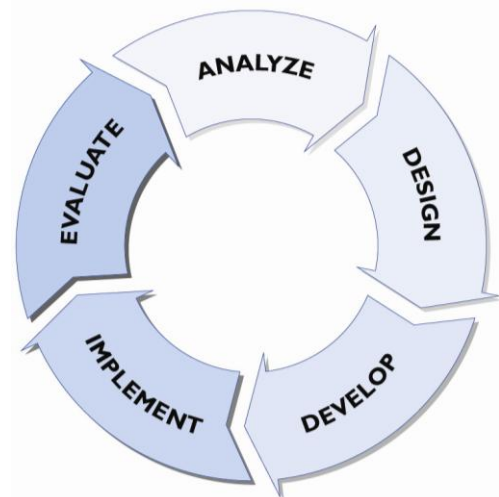
This component focused on training development using the ISD process. Exhibit 10. ISD Training Cycle

Assessing availability of training materials. OMT conducted an extensive review to determine the availability of appropriate certification training curricula in Arabic and English, using the most current ABC need-to-know criteria for operators. Although USAID and other donors had conducted many water and wastewater training workshops in support of the transfer of facilities throughout the MENA region, none met the stringent standards of a regulated operator certification program.

Assessing the O&M baseline needs of the water sector in Jordan. A clear understanding of the technical training requirements of Jordan's water/wastewater sector was an essential first step for OMT. Given the structure of the sector, no single comprehensive and current description of facilities and staffing fit. OMT filled this gap by completing a detailed facility baseline survey describing all major Jordanian water and wastewater systems with their treatment process, main equipment, organization structure, staffing levels, and personnel qualifications. This baseline provided OMT with a clear understanding of the O&M requirements and the characteristics of the managers, engineers, and technicians at each site. In coordination with a concurrent GTZ project, OMT searched for standard operating and maintenance procedures and documented best O&M practices to serve as technical references for the design and development of the operator training materials.

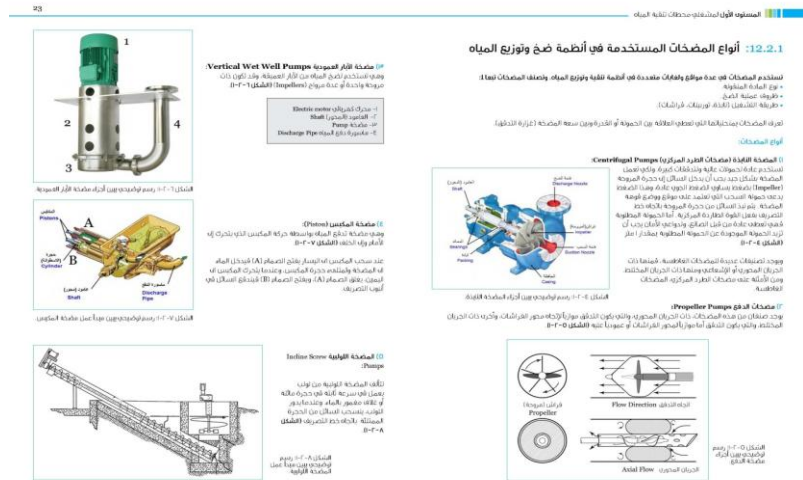
The critical OWP/CSUS contribution. Early in the project, OMT was fortunate to secure the consulting services of Dr. Kerri of OWP/CSUS, whose set of operator training manuals is the recognized industry standard. OMT was able to arrange to adapt and translate the OWP/CSUS materials at no cost.

DTCC assistance in course design. Simultaneously, representatives from the Environmental Training Center at DTCC assisted local Jordanian technical advisory teams in the design of curricula outlines specifying the training objectives, content, and instructional hours for all courses in each operator training program.



Standardized test and course development. Based on these outlines, knowledgeable and skilled local Jordanian OMT developers and subject matter experts produced a pilot version of the course and test for each certification level in Arabic with English glossaries. Course materials optimize classroom training effectiveness and adhere to standardized templates for trainee guides, trainer lesson plan guides, and visual aids. Test questions are multiple-choice and adhere to highest standards of validity and reliability.

Exhibit 11. Sample Training Material for the Jordan Water Operator Certification Program



Piloting new training courses and tests. OMT piloted course materials and tests in real classroom training, collecting feedback from the trainees, the trainer, observers, and often the developer. Training specialists then revised pilot versions to incorporate improvements. Publication specialists and graphic designers finalized the materials. BAU’s testing specialists and proctors conducted the test preparation, administration, grading, and reporting in accordance with strict evaluation procedures to ensure the credibility, security, and confidentiality of results. OMT conducted test quality control visits, often accompanied by representatives from CAQA, WWSST, and USAID. With a passing grade of 70 percent, the average passing rate was 87 percent. This rose to 91 percent after the Jordan program altered its policy to allow retesting.

Maximizing training. The original scope of OMT was limited to conducting pilots to revise the courses. OMT had not envisioned broader implementation; however, project resources proved adequate to maximize the impact of the Jordan program on improved O&M at water and wastewater facilities by conducting additional training at WAJ and the water utilities. Also attending the training were members of the Jordanian military and security services who were responsible for the O&M of water and wastewater infrastructure. In response to counterpart requests to support renewal of credentials, OMT restarted coordination of OWP/CSUS self-study courses and associated ABC testing for operators who had received U.S. certification initiated by earlier USAID projects.

Seeking equipment vendor support. To assist the Jordan program in acquiring hands-on training aids such as models, cutaways, and parts to be used to demonstrate best O&M practices, OMT conducted an orientation for local vendors who typically represent international equipment companies. Equipment donated by local vendors for use as training aids will be delivered to the WAJ Marka Training Center. A reference list linking equipment to specific operator lessons will allow trainers to effectively use the equipment for demonstrations during training.

USAID project cooperation. OMT shared its objectives with related USAID projects in Jordan and Egypt and freely exchanged plans, policies, and materials. In Jordan, OMT interacted with the Institutional Support and Strengthening Program that assisted OMT in legal issues related to mandatory certification. OMT shared its certification approach with the IDARA Project (Instituting Water Demand Management in Jordan) which was striving to establish certification for Jordanian plumbers. In Egypt, where USAID was also supporting water operator certification, the OMT certification policy was adapted for local conditions by the Water Policy and Regulatory Reform (WPRR) Project. OMT exchanged operator training materials and tests with WPRR and the Water and Wastewater Sector Support Project for the mutual benefit of the Jordanian and Egyptian water sectors.

Component 3. Water Training Sector Strengthened To Operate On Commercial Principles

Component 3 focused on the commercialization of the Jordan Water Operators Certification Program through local and regional marketing. This commercialization serves two distinct purposes:

- *Sustainability of the program.* A portion of the revenues generated through the regional sale of the training products and services prepared by OMT will be shared with the program. This revenue stream will supplement revenue generated from fees collected in Jordan from the employers of operators for training courses, tests, and licenses and ensure the financial stability of the program. These revenues will be reserved to fund the development of new operator certification training programs as needed and to periodically update the current courses and tests.
- *Operator certification expansion throughout the MENA region.* The O&M challenges facing the Jordanian water sector are common across Arabic-speaking countries. The thousands of managers, engineers, and technicians working in regional water and wastewater facilities can benefit from the training developed by OMT for the Jordan Water Operators Certification Program.

The OMT commercialization strategy involved progressively assessing regional demand, identifying an appropriate institution positioned to serve that demand, recognizing that institution as the regional training marketer (RTM), assisting the RTM in understanding the potential, and developing a business plan to effectively foster sales and build service delivery, while increasing the regional awareness of operator certification through promotional materials, conferences, and direct marketing of potential customers.

Once adequate progress had been made on Components 1 and 2 so that the program and products were available to support regional marketing efforts, Component 3's major activities took off. Key milestones achieved in Component 3 included:

Regional training marketer. In December 2011, ACWUA signed an MOU with OMT whereby the project would assist ACWUA in building its capacity as the RTM. At the same time, ACWUA became an official member of the WWSST, serving as the RTM within the CAQA institutional framework.

ACWUA — Exchange Platform for Water & Wastewater Utilities in the Arab World

ACWUA, a registered NGO with permanent Secretariat offices in Amman, Jordan, was founded in 2006 as a result of an initiative by key water sector representatives. ACWUA has 19 member countries and more than 100 member utilities in the MENA region. Since ACWUA was founded, it has obtained the support various donors including USAID, GIZ, and the UN. On July 30, 2009, ACWUA was officially launched as a Center of Excellence in the Arab water sector and in August 2012, was chosen to join the MENA Network of Water Centers of Excellence (MENA NWC) supported by USAID's Further Advancing the Blue Revolution Initiative (FABRI) project and to lead the water supply and sanitation thematic group.

ACWUA partners with water supply and wastewater utilities in Arab countries to provide best practice service delivery to its members. ACWUA endeavors to:

- Serve as regional platform for exchange of knowledge and best practice amongst member experts and professionals
- Develop resources, facilitate training programs, and advocate for professional certification to enable member utility staff to perform their duties in a professional, reliable and cost-effective manner
- Promote standards of performance for the governance, management, operation and maintenance of water supply and wastewater utilities
- Support the interests of ACWUA members including the provision of advice and consultation in water legislation, policies, and sector management and reform
- Develop, promote and disseminate publications and other knowledge products to meet the needs of members and other regional professionals. (<http://www.acwua.org/>)

ACWUA capacity building. OMT activities designed to assist ACWUA in fulfilling the RTM role centered on the joint development and OMT support in the implementation of the following capabilities:

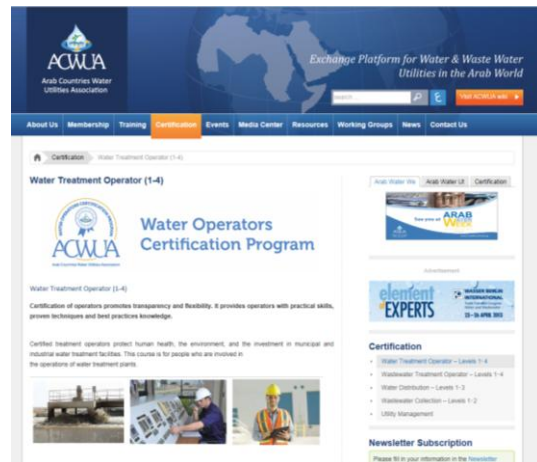
- *Market demand survey.* All ACWUA member countries were contacted to complete a survey to determine the level of interest in operator certification and the number of managers, engineers, and technicians in each country that needed to be trained. Ten of 19 countries responded indicating their interest in pursuing operator certification and training, reporting a combined 10,646 employees including managers, supervisors, and skilled workers to be certified and trained. This confirmed the enormous interest and demand for standardized operator certification, testing, and training in the MENA region. See next page for the market demand survey results.

Exhibit 12. Results of Market Survey to Determine Need for Training

Summary of Numbers of Regional Employees		
Water Employees		
Position Category	Total All Utilities	Total Less Egypt
Managers	1,442	186
Supervisors	8,826	1,193
Skilled Workers	18,253	7,773
Unskilled Workers	14,377	5,598
Total Water	42,898	14,750
Wastewater Employees		
Managers	457	62
Supervisors	1,772	165
Skilled Workers	7,666	1267
Unskilled Workers	10,040	4948
Total Wastewater	19,935	6,442
Water and Wastewater Combined		
Managers	1,899	248
Supervisors	10,598	1,358
Skilled Workers	25,919	9,040
Unskilled Workers	24,417	10,546
Total Water and Wastewater	62,833	21,192
Adjustment to Remove Unskilled Workers		
Total Water	28,521	9,152
Total Wastewater	9,895	1,494
Total Combined	38,416	10,646*

* Managers, supervisors, and skilled workers

- Marketing plan.* This activity further defined the potential regional markets for operator certification, testing, training products, and services, and recommended ways of attracting and retaining demand in the future. The team considered issues of product packaging and the best means of offering products as well as the promotional efforts and materials necessary for effective local and regional campaigns. OMT finalized and implemented action plans for ACWUA and CAQA/WSSST to market the operator certification and maintain a sustainable level of demand for products and services.
- Business plan.* In collaboration with ACWUA, OMT assisted in developing a preliminary pricing structure for regional operator certification training products and services. OMT clarified roles and responsibilities of the CAQA, BAU, and ACWUA to promote coordination and productive marketing initiatives. ACWUA will receive a complete set of the Jordan program tests and materials to promote



ACWUA's upgraded website featuring regional water operator certification program. www.acwua.org.

efficient regional marketing while BAU, operating locally, will work with CAQA to deliver training based on periodic updates to the program’s master training plan. During a business planning activity, the team reviewed options for making regional operator certification commercially viable and thus, sustainable. They considered ACWUA’s capacity to deliver certification services to its member countries and utilities and concluded that ACWUA would pursue the development of a long-term commercialization strategy to sustain the regional program. This strategy included seeking support from USAID and other donors associated with ACWUA and active in regional water issues. They agreed to target those member countries where USAID was active in the water sector: Morocco, Egypt, Lebanon, Palestine, Yemen, and Iraq, plus the emerging needs of Libya, Tunisia, and Syria.

- *Enhanced capabilities.* As the regional training marketer, ACWUA’s understanding of operator certification, testing, and training was enhanced through a workshop and an on-job-coaching program.

ACWUA’s website was upgraded to include chat and payment features for members, and adding an Operator Certification menu describing the benefits of the program and its products and services, including information about the certification policy and procedure, training programs, testing, and certificates of completion.

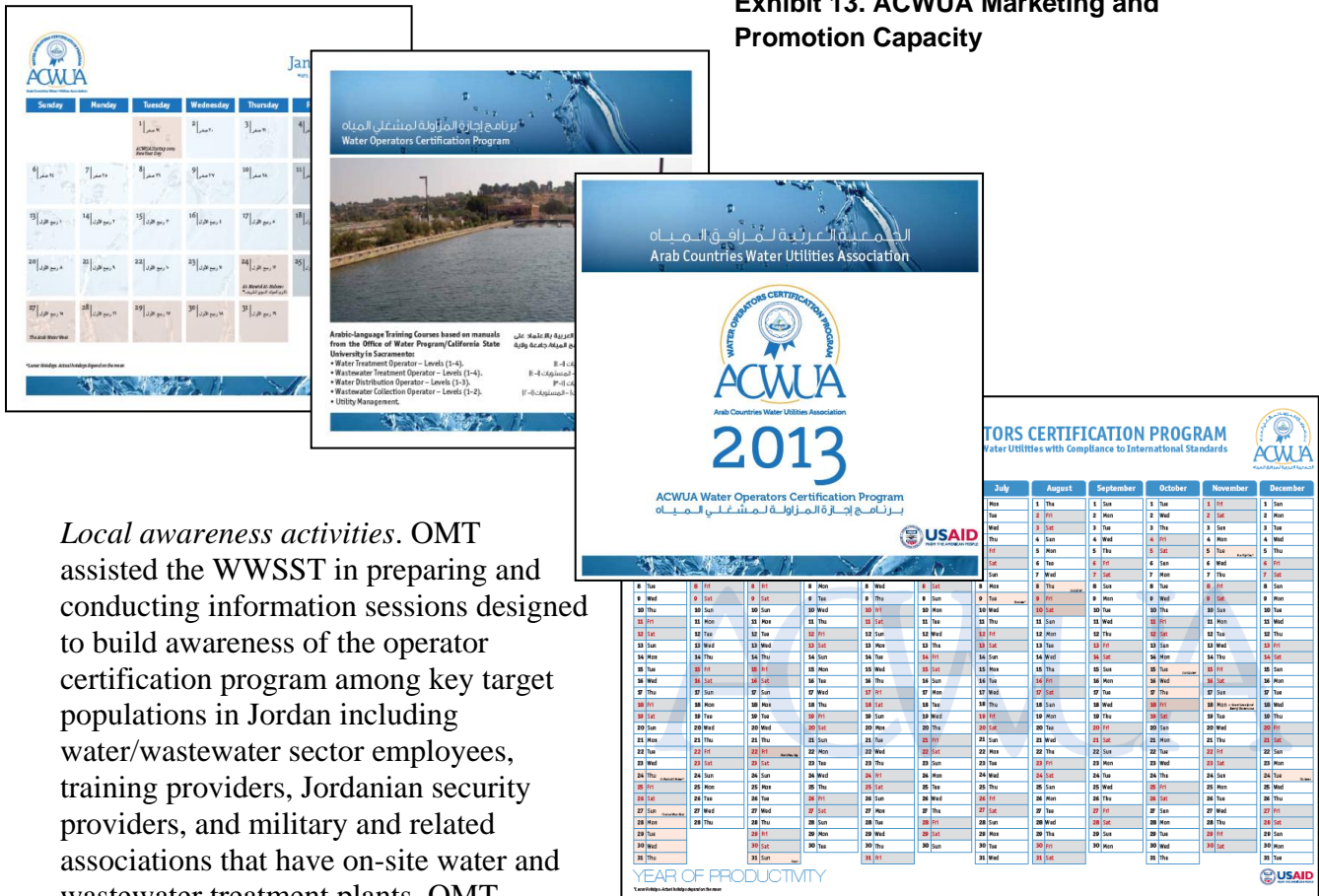


ACWUA rolled out operator certification to its members in Oman at a conference in June 2012.

- *ACWUA granted ABC membership.* In June 2012 at the ACWUA Best Practices Conference in Muscat, Oman, representatives from the ABC granted ACWUA with full membership based on ACWUA’s close association with the Jordan Water Operators Certification Program. Operator certification and training was a main theme of the ACWUA conference with Arabic and English banners and printed materials proclaiming, “ACWUA – Now Proudly Implementing Operator Certification.”

Promotional material. OMT assisted the WWSST and ACWUA in the design and development of materials and tools to promote operator certification and training locally and regionally. These included a full color Arabic/English brochure with a general description and details of each operator certification program, an enhanced animated PowerPoint presentation, a seven-minute marketing video, an exhibition booth, and banners, roll-ups, calendars, flashdrives all clearly bearing operator certification promotional messages.

Exhibit 13. ACWUA Marketing and Promotion Capacity



Local awareness activities. OMT assisted the WWSST in preparing and conducting information sessions designed to build awareness of the operator certification program among key target populations in Jordan including water/wastewater sector employees, training providers, Jordanian security providers, and military and related associations that have on-site water and wastewater treatment plants. OMT assisted WWSST in planning media communications for radio programming, newspaper articles, and press releases.

Regional awareness and marketing activities. OMT assisted WWSST and ACWUA counterparts to participate in international conferences where WWSST partners had the opportunity to make presentations and deliver professional papers to promote the Jordan Water Operators Certification Program as listed below:

- Association of Boards of Certification (ABC); Florida, USA, January 2010
- ACWUA Non-Revenue Water; Rabat, Morocco, January 2010
- Sustainable Water Supply and Sanitation; Cairo, Egypt, July 2010
- ACWUA – Arab Water Week, Jordan, December 2010
- ABC Conference; Phoenix, Arizona, January 2011
- IWA Efficient Urban Water Management; Dead Sea, Jordan, March 2011
- ACWUA – Best Practices Conference, Egypt, December 2011
- ABC Conference; Tampa, Florida, January 2012 in conjunction with OST2
- ACWUA – Best Practices Conference, Oman, June 2012

Direct marketing. OMT introduced a pilot direct marketing approach in mid-2011, which included guidelines for planning visits to neighboring countries and a presentation that could be adapted for future road shows based on the marketing objectives of the trip. With extensive coordination and support from the USAID Infrastructure Needs Program 2, this approach was piloted for the water sector in the West Bank.

The trip included promotional meetings with local stakeholders, a presentation for the Minister of Water who is also head of the Palestinian Water Authority (PWA) and for the supervisor of the PWA training department, and a workshop for Palestinian water utility managers. The response was positive, and ACWUA will continue to coordinate with the Palestinian market to initiate operator certification and training when political conditions, logistics constraints, and financial resources are conducive. The direct marketing pilot achieved its full objectives of testing and perfecting the planning and presentations for marketing visits to countries expressing interest in moving ahead with operator certification and training based on the Jordan program model and materials.



Operator certification is new in Jordan and the MENA region. To raise awareness for the program, staff participated in events such as the IWA Efficient Urban Water Management Conference, held by USAID at the Dead Sea in March 2011.

ABC, OWP, and ACWUA partnership. At the project's end, OMT strengthened its mentoring relationship with ACWUA, which would continue to receive collaboration and cooperation to:

- Streamline use of the ABC certification program to assist ACWUA in certifying operators to an international standard
- Translate ABC's *Need to Know Criteria* into Arabic
- Support presentations at ABC's annual conference and offer reduced or free registration to assist ACWUA in connecting with certification programs worldwide

"The mission of ACWUA is to inform our members and promote their use of best practices in all aspects of the water industry across the MENA region. We face many difficulties in operating and maintaining of our facilities. Operator certification and training is clearly part of the solution and we will encourage our members to take advantage of the achievements of the Jordan program and the cooperation of ABC and OWP."
 –Khalid H. Khashman, Secretary General of ACWUA.

Similarly, OWP would help ACWUA to:

- Promote and present OWP training materials and courses. A certificate of completion with continuing education units could be issued by the College of Continuing Education at CSUS to qualified participants.
- Develop, promote, and present ACWUA training materials and courses.
- Share with ACWUA procedures for administering and monitoring OWP's training materials and courses.

Component 4. Performance Impact of Certification Program on Improved Operations and Maintenance Demonstrated

Component 4 focused primarily on the M&E of the impact of training on O&M performance. Section 4 summarizes results in the context of the OMT PMP. Below, we describe the objectives, measures, and methods implemented for the three elements of OMT's M&E approach.

Training impact assessment (TIA). For many international certification programs, ensuring that all eligible operators have current credentials is all that is needed for proper tracking. Monitoring the link between O&M performance and certification training is not a requirement. The primary concern is compliance with statutes demanding compulsory certification and avoiding penalty from enforcement agencies, such as the United States Environmental Protection Agency. In addition to operator test results and typical opinion surveys completed by trainees, trainers, and evaluators, OMT and the WWSST wanted to assess training impact on the job. OMT was proactive in designing and implementing an M&E approach that would rely on quantitative performance data and qualitative survey and interview methods to measure the impact of certification training on performance improvement. This approach would help to justify the cost of training by indicating a concrete return on investment as well as demonstrating the O&M improvements targeted by USAID with the creation of the OMT project. Annual performance data for sites where OMT conducted training and pre-/post-training data collected for all courses piloted by the project is documented in the OMT TIA reports.

KAP survey. OMT launched a national KAP survey to determine the degree and quality of awareness, positive opinion, and support for the program. OMT worked with counterparts and local experts to design and pilot KAP survey questionnaires for target populations including government, donors, public and private water suppliers, end-users and customers, associations, and the education sector. Skilled and reliable data collection teams conducted 1,375 interviews with respondents in all governorates of Jordan. The team shared results at the Sustainability Workshop in July 2012, where the project facilitated a stakeholder discussion concerning how the program would be preserved. WAJ and the water utilities will use the information to develop their own outreach programs. OMT provided the survey methodology tools developed for the KAP to the WWSST for conducting future surveys.

Treatment plants and networks O&M survey. Upon request from USAID, OMT added O&M surveys of three water treatment plants, eight wastewater treatment plants, 11 water distribution networks, and 11 wastewater collection networks to help USAID assess the current condition of these facilities and ascertain the causes for satisfactory or deficient performance. U.S. and Jordanian engineers collected, analyzed, and reported detailed descriptive technical data. They visited every site — selected geographically and by type (e.g. operated by new utility/WAJ/under contract) — and interviewed managers, engineers, and technicians. USAID had designed and constructed many of the sites. The team of engineers assessed all sites for quality compliance O&M condition, and sustainability based on adequacy of design and construction, budget and O&M funding, O&M programs, and staff. Included in the assessment was the degree of familiarity of staff at each site with the program.

Snapshot: Jordan's Champion of Operator Certification

One person is consistently acknowledged within Jordan's water sector as having played a pivotal role in supporting, organizing, developing, and promoting water operator certification and training in Jordan: Eng.

Abdelrahman Omari, the first leader of WWSST, subject matter expert for all water treatment and distribution tests and courses, and a key presenter at local Jordanian awareness events and international conferences promoting the Jordan program.

“As soon as I heard about the possibility of USAID implementing the OMT project, I was excited and wanted to get involved. We have made large investments in our infrastructure but the training of our people has not kept pace,” said Eng. Omari at an OMT awareness workshop. “The Jordan Water Operators Certification Program helps us close the gap. I'm very satisfied to be part of this important endeavor. As WWSST leader and a member of the OMT staff, I have been impressed by our professional testing and training which emphasizes the significance of local conditions and solving Jordanian problems.”

Eng. Omari has become the face of the Jordan Water Operators Certification Program and one of its most active advocates. The Jordan program owes Eng. Omari a debt of gratitude for his tireless dedication and personal contributions to the quality, relevance, and sustainability of operator certification and training in Jordan and the MENA region.

“I'm proud of what we have accomplished and intend to remain active in the Jordan program. We could not have achieved so much without the help we received from my new friend and colleague Dr. Kerri who taught all of us what it means to be a certified operator. His generous contributions to our standards, policies and training led to the Jordan program being accepted by the U.S. Association of Boards of Certification as a full regulatory member. This is a great achievement that motivates our managers, engineers and technicians to study hard and apply what they have learned on the job.”



Engineer Abdelrahman Omari (right) discusses the Water Operator Certification Program at the IWA Efficient Urban Water Management in March 2011.

SECTION 4. IMPROVED O&M AND OPERATOR PERFORMANCE — RESULTS/IMPACT

USAID's strategy. USAID started designing OMT in 2007 to support the Enhanced Integrated Water Resources Management Strategic Objective through:

- *Training staff for the operation and maintenance of Jordan wastewater and water treatment facilities.* Trained treatment plant operation technicians will consistently and reliably produce water and wastewater discharges complying with Jordanian standards, and be able to maintain equipment properly, thereby reducing potential for leaks/wastage of water resources and ensuring plants serve reliably for their full duration of their design.
- *Policy and regulations to require trained and certified water and wastewater treatment plant staff.* Certified staff will strengthen consumer confidence in the quality of water delivered. Provide standard-uniform training to technicians to ensure that best practices in water and wastewater plant operations and maintenance are followed.
- *Strengthening of the commercial training sector in Jordan.* A commercial training sector will put in place mechanisms wherein improvement of Jordanian trainers of technicians will be a continuous process. A strengthened sector will potentially offer increased employment opportunities for Jordanian youth entering the job market.

Expected results of the OMT task order. The OMT task order was explicit in defining successful results that both the government of Jordan and USAID expected upon completion. All six of the expected results from the OMT task order were fully achieved including the criterion for exceeding expectations (#6):

1. *Initiate a certification program.* Certificates issued are recognized within Jordan and regionally, and employers are willing to pay a fee to certify trainees.
2. *Link standard operating procedures.* Protocols/procedures developed for linking standard operating procedures to training material development.
3. *Develop and present new courses.* Courses developed for all SOPs at the appropriate technical grade and local training capacity to conduct new certification courses.
4. *Improve the training skills of local training providers.* Qualified trainers have at least 75 percent of their trainees pass the certification exam and new trainers can be developed without donor assistance.
5. *Establish a RTM.* RTM is self-sustaining through the marketing of certification, testing, and training services.
6. *Develop policy requiring certification.* Policy negotiated with WAJ and final accepted version presented to the government of Jordan for approval. **Exceeding expectations:** Regulation mandating certification of water treatment plant and network staff is approved and implementation phase is started.

Key OMT accomplishments. In addition to the achievement of expected results specified by USAID, OMT exceeded the USAID criteria for success in other important areas not envisioned in the original scope of the project.

- *Regulatory.* OMT was instrumental in the legal approval of the CAQA bylaw, which establishes the framework for certification in many sectors including energy, construction, IT, and tourism. The Jordan Water Operators Certification Program was the driver for professional certification and is being used by CAQA as a model for replication in other sectors. OMT assisted in the drafting of the CAQA legislation, lobbied for its passage, and provided capacity building for CAQA including organizational development, awareness building, automation, and licensing capacities. OMT managed to provide this support without increase in the project budget.
- *Mandatory program.* OMT managed to overcome significant challenges to help the water sector advance the process to make operator certification compulsory. WAJ issued an instruction for mandatory certification in 2011. OMT tried many approaches to extend mandatory certification to the water utilities. In coordination with the USAID Institutional Support and Strengthening Program for the water sector, OMT was able to prompt the issuance of an instruction from MWI and WAJ making operator certification mandatory at all facilities owned by the government of Jordan. The facilities operated by the three Jordanian water utilities are owned by the government of Jordan. Upon the completion of OMT, the issuance of this instruction was underway.
- *ABC memberships.* To link the legal, sectoral, training, and regional requirements, OMT facilitated the formation of a complex organizational relationship among Jordanian partners that rarely interact including the Ministry of Labour, MWI, WAJ, the water utilities, private water operators, BAU, and ACWUA. Each brings unique authorities and capabilities that make the Jordan program possible and compliant with internationally accepted best certification, testing and training practices. As a result, the Jordan program and ACWUA were welcomed by ABC as full regulatory members. This recognition is an emphatic stamp of approval acknowledging the legitimacy and achievement of the Jordan program.
- *Maximized operators.* OMT was conceived as a training development project with resources dedicated primarily to delivering training program courses and tests. Training implementation focused on conducting pilots. Within an increase to the OMT budget, the project was able to conduct 18 training courses in addition to the planned 11 pilots. This increase in training resulted in about 216 additional graduates returning to their jobs with improved knowledge and skills. By the end of OMT, 188 operators were eligible for licensing based on training and testing.
- *Optimized participation of local professionals.* OMT applied USAID Forward principles through extensive use of local professionals in key staff positions. The entire OMT field office long-term team was staffed by Jordanians supported by short-term U.S. experts. OMT's professional Jordanian staff benefitted greatly from this development and personal growth opportunity.

OMT PMP and work plan. OMT developed, monitored, and evaluated program results according to the expected results specified by USAID. The approved PMP tracked and reported progress in OMT quarterly and annual reports, reflected in the annual revision and update of the work plan. The organization of the OMT work plan directly linked components to the PMP and results were regularly reviewed with USAID and shared with WWSST counterparts as appropriate. As represented in the OMT PMP table below, all of the USAID expected results were successfully achieved. In fact, in addition to the establishment and implementation of a mandatory and legally recognized water operator certification in Jordan, many OMT results significantly exceeded USAID expectations.

“This program has changed the way we think and work. We approach problems logically. We are confident in our decisions. The improvements are obvious. It’s very gratifying for the whole O&M team.”
—Eng. Mohammed Al-Mahameed /AWC

Gender disaggregation. Jordan’s water/wastewater workforce has an overwhelming male majority. Women tend to occupy positions in labs and administration. All women in operator positions at sites where OMT conducted training were included and passed. The table below provides a gender breakdown.

Exhibit 14. Participation in Jordan Operations & Maintenance Training (OMT) Project Training by Gender				
Table displaying the breakdown in participation in OMT training by gender over the life of the OMT project				
Training/course	Men	Women	Total Trained	% Women
Water treatment (WTO) Level I	100	4	104	3.8%
WTO Level II	29	1	30	3.3%
WTO Level III	15	2	17	11.8%
Wastewater treatment (WWTO) Level I	103	4	107	3.7%
WWTO Level II	35	2	37	5.4%
WWTO Level III	11	1	12	8.3%
Utility management Level I	11	4	15	26.7%
Water distribution (WD) Level I	20	2	22	9.1%
WD Level II	8	2	10	20%
Wastewater collection (WWC) Level I	16	2	18	11.1%
WWC Level II	7	2	9	22.2%
Training of trainers	31	6	37	16.2%
Instructional systems development	20	3	23	13%
On-the-job performance improvement plans (coaching for supervisors)	16	0	16	0%

Measureable training impact on improved O&M. OMT designed and implemented a performance monitoring system for use by OMT and the Jordan Water Operators Certification Program to monitor and evaluate the impact of training on the O&M performance at the facilities where trainees work. This evaluation is different from the testing required upon completion of

training for each certification level which measures knowledge gained by the trainee or the PMP targets. The TIA approach developed and implemented by OMT for the Jordan program measures changes in key O&M performance indicators in particular compliance with established water and effluent standards, unplanned maintenance shutdowns, and O&M expenditures. In addition, OMT interviewed trainees and their supervisors to identify the effectiveness of the operator certification training on O&M performance. OMT conducted the TIA approach in conjunction with each pilot and reported results which are reviewed in the process of revising the training materials.

Treatment plants have reported promising quantitative performance results indicating reductions in unplanned shutdowns, accidents, and operating costs since the advent of OMT. Although these improvements are not solely attributable to operator certification and training, they are noteworthy. Supervisors and operators have consistently reported improvements in their performance attributed to the training. They also report changes in the culture at their plants and facilities that promotes application of new skills, teamwork, and problem-solving.

Snapshot: Measuring the Difference

“We operate with very tight budgets. We have to be prepared to handle emergencies as well as the routine O&M of our plant. If we are going to spend our limited funds on training, we need to see concrete results — a return on our investment. I’m happy to say that the Jordan Water Operators Certification Program is the first to make the effort to collect performance data at our plant that will help us determine the real cost-benefit of this training,” said Eng. Haithum Kilani, manager of the Zai Water Treatment plant.



Eng. Haithum Kilani believes strongly in measuring the benefits of the Jordan Water Operators Certification Program on O&M performance and operator confidence.

“The Jordan program is different. In addition to the usual training and testing, they conduct a training impact assessment and ask us to provide O&M, management, and financial data to see if there are changes that might be due to their program. They also come to our plant regularly and interview the operators and their supervisors about performance improvement. Every six months, their team conducts a survey and asks about the relevance of the training, changes in operator attitude and confidence, and most importantly, O&M performance improvements.”

Eng. Kilani explained, “I have to say that the results are interesting and encouraging. Since the program started to train our staff, we have reduced our maintenance costs. Can we say that this reduction is directly due to the training? Not yet — we know this result comes from a combination of things, but the training is definitely one of the key factors. The program is very popular and has many benefits, however, as the manager I need more proof that it is working.”

“The findings of the interviews and surveys have been convincing. Ninety-three percent of our operators who completed their courses reported that they are applying new knowledge and skills and see the results. Eighty percent of their supervisors agree that performance is improving. Plus, we all see more confidence, better problem solving and greater teamwork since the Jordan program started. It’s difficult to measure these effects, but all of this data makes us confident in our decision to continue to invest in this training. Over the coming years, the data will be stronger and we hope that it shows clear evidence that operator certification and training are really making a measurable improvement in our O&M.”

SECTION 5. CAPACITY BUILDING AND THE JORDAN WATER OPERATORS CERTIFICATION PROGRAM: LESSONS LEARNED

Establishing the innovative Jordan Water Operators Certification Program presented many challenges and constraints for the OMT team. This section presents the most significant lessons learned during implementation and how OMT and its Jordanian partners dealt with identified constraints.

Legal process. The requirement to establish legally recognized, mandatory operator certification in Jordan meant that new legislation would have to be developed and approved or that existing legislation would have to be reviewed and appropriately applied. OMT, after conducting a review the Jordanian legal environment, decided that reforms contemplated in the Ministry of Labour as part of the E-TVET initiative would include the creation of the CAQA, empowered to require mandatory certification in designated sectors and vocations and accredit related training programs, license training providers, and issue professional/occupational certificates (licenses) based on meeting qualifications and passing sanctioned examinations. This initiative presented an acceptable and appropriate solution for OMT's need to establish a legally recognized water operator certification. OMT signed an MOU with the Ministry of Labour to support the legal process, build capacity, and allow the Jordan program to be used as a model for future occupational certification.

The complex Jordanian legal process to create the CAQA proved to be arduous, lengthy (three years), and was in force when OMT had just three months remaining to completion. Furthermore, the approved version of the CAQA bylaw fell short of expectations and did not empower CAQA to make certification mandatory.

- *Lesson learned.* Whenever possible, project planning should include contingencies for the slow pace and unpredictable outcomes of local legal actions. Appreciating that progress in establishing a legally recognized certification program in Jordan could be a complex and uncertain process, OMT segregated regulatory activities from other OMT initiatives. This separation allowed other activities to progress independently without being delayed or negatively impacted. In addition, in collaboration with USAID, OMT was proactive in identifying alternative legal solutions within the framework of the Ministry of Water, WAJ, and water utility/company agreements that could make operator certification compulsory for operators at WAJ and the three Jordanian water utilities.

Rigidity of new Jordan government organizations. OMT and USAID were instrumental in the creation of the CAQA within the Ministry of Labour and spent substantial time and political capital to achieve this result. During the extended period when OMT was supporting the acting CAQA staff, OMT enjoyed a cordial, flexible, and cooperative relationship with staff who would ultimately become CAQA management. Once CAQA became an official department, as a newly established organization, the CAQA took a cautious approach and previous agreements had to be revisited and renegotiated.

- *Lesson learned.* In all cases, but especially when dealing with acting or informal local offices of government, document agreements at the highest organization level possible.

OMT had an MOU signed by the Minister of Labour which clearly defined the nature of cooperation and was honored by the CAQA. Had OMT not secured this MOU at the early stages of the project, progress toward a sustainable institutional framework and the issuance of operator certificates and licenses would have been in jeopardy due to the cautious approach adopted by the new CAQA.

Dynamic Jordan/MENA water sector. The water sector in Jordan is undergoing tremendous change driven by restructuring that has led to the creation of three water utilities from public utilities divested from WAJ. This reform has spurred a thirst for improvement in all endeavors of these new utilities and a receptive leadership hungry for innovation and best practices. OMT was able to leverage this positive, open-minded environment to secure the local buy-in required to implement the new and complex national Jordan Water Operators Certification Program.

- *Lesson learned.* Competition is good; cultivate it among partners to drive change. Find the champions who truly believe and hold them up as the example to be emulated. OMT was fortunate to work with Eng. Emad Zuriekat, former CEO for the Aqaba Water Company, whose tireless support, dedication, and cooperation allowed OMT to begin pilot training at the Aqaba wastewater treatment plant and demonstrate the value of operator certification and training to the entire Jordanian water sector.

Importance of international and U.S. models and partnerships. Engaging ABC, OWP/CSUS and DTCC proved invaluable to OMT's success. In addition to serving as models of success for the water sector in Jordan and the region, they validated the concept of operator certification from the perspective of the shared experience of managers, engineers and technicians who comprise the international water community.

- *Lesson learned.* OMT found that international associations and related academic activities serving the water sector, such as ABC, OWP/CSUS, and DTCC, aim to improve the standard of water quality and environmental protection worldwide. This translated into unexpected levels of generosity and cooperation from which the Jordan program gained immeasurable benefit. If the OMT experience is to be replicated, OMT recommends that USAID encourage all water projects to engage these international associations and academic institutions at the earliest possible stages of the project.

OMT project design. OMT's design created some challenges regarding the regional intent of the operator certification program and the development and use of local trainers to instruct courses in Jordan.

- *Lesson learned.* Funding was allocated for Jordanians. To engage and inform potential stakeholders of neighboring countries, the project developed an approach to disseminating information that involved collaboration with ACWUA (e.g. their presence at regional conferences and events). Should USAID wish to support regional marketing of operator certification and training, the project team suggests that expenditures allow for the inclusion of third-country beneficiaries. This approach would allow a project to bring people from the MENA region to Jordan to give them first-hand exposure to operator certification and training, or spend project funds in neighboring countries for awareness events.

- *Lesson learned.* USAID has been a strong supporter of the restructuring of Jordan's water sector and the creation of the three water utilities. Following the divestment of the utilities from the government, the employees of these utilities no longer work for the government of Jordan; they were required to leave government service and sign private employment contracts when the utilities were formed. To build local training capacity, OMT trained many of these utility employees as course/test developers and trainers. Because the government of Jordan continues to own 100 percent of the company stock and infrastructure, USAID still considers them as government employees and therefore not eligible for payment by a project. A policy enabling a USAID project to hire and pay staff with this employment status as trainers would be valuable for program sustainability, as a larger pool of experienced personnel would be available to lead the program.

Facility assessments. USAID requested that OMT assess the O&M of water and wastewater treatment plants throughout Jordan with emphasis on those facilities funded by USAID. The Water Resources and Environment group of the Jordan mission was satisfied with the comprehensive OMT assessment approach and execution.

- *Lesson learned.* We suggest that USAID make such O&M facility assessments a routine standardized best practice and conduct them every five years to follow up on the condition and performance of USAID-funded infrastructure. With this periodic evaluation, USAID can be responsive to preventive maintenance needs and potentially avoid costly replacement of major equipment, facility rehabilitation, and water losses.

Snapshot: A Career Path Offering Opportunities for Growth and Higher Self-Esteem

“Upon hearing about the certification program, I decided to study for and pass my high school equivalency on my own. I earned the Tawjeehi (general secondary education certificate) and this will enable me to have a career path that offers greater potential and self-esteem,” reports Bassam Khleifat, a WAJ operator. “I didn’t want to take the grandfathering option. The certification program motivated me.”

“We are all very proud of Bassam and the effects of the Jordan Water Operators Certification Program,” said Eng. Hanan Khouri, manager of the WAJ Training Department.

“We wanted to be sure that our operator certification program could accommodate all of our technical staff regardless of their educational level or age. The water sector is one of the first in Jordan and we have many older employees who do not have their Tawjeehi. We wanted the certification program to include these people as well as our graduates.”

“Our policy includes a grandfathering option that provides an exemption for people who were already employed as operators before the new certification requirements were implemented. Current operators, who do not have the education required for a particular certification level, are still obliged to complete the required training. Everyone gets the training. However, these operators are not required to pass the test. They can take the test but failure will not carry any penalty. We even have an alternative for employees with reading difficulties. CAQA grants ‘limited certification’ to employees who choose this option. They are restricted to working at their current job and cannot advance unless they get their education. So, it’s up to them. Everyone considers our grandfathering a fair policy.”

“When we announced the new mandatory operator certification and training requirement, we got a very positive response. The different career paths offer many systematic and transparent opportunities for advancement and promotion. It’s very popular. In the water sector, we’ve had trouble attracting and retaining staff and the certification program will help us overcome this problem too. We now look forward to seeing more of our staff continuing their education from community colleges, universities, and graduate schools. This will benefit the employees and the water sector. It’s win-win.”



Eng. Hanan Khouri (left), WAJ Training Department manager, presenting awards at the grandfathering training conducted for WAJ operators.

SECTION 6. LOOKING FORWARD — ESTABLISHING REGIONAL OPERATOR CERTIFICATION — FUTURE AND SUSTAINABILITY

Proactive sustainability approach.

Key legal, institutional, financial, and capacity building targets necessary for the long-term sustainability of the Jordan Water Operators Certification Program were identified, integrated, and emphasized in the OMT PMP and work plan from the outset of the project. OMT work plan activity components and project resources were aligned to ensure that these targets received thoughtful and dedicated attention. As described earlier, USAID effectively built awareness and garnered support for the concept of operator certification and training and the OMT project design prior to project award. The government of

Jordan's active support for OMT implementation was unfaltering throughout the 55-month project. Although the legal process was complex and time-consuming, government of Jordan and water sector cooperation was evident. OMT target results could not have been achieved without the dedicated and hands-on support of OMT's primary partners.

A capacity-building action plan to help ensure the readiness of these Jordanian institutions was driven by three key foundation elements of the Jordan program:

- *Policy and institutional framework.* A complete set of regulations and standards with related institutional responsibilities required to certify water/wastewater operators in Jordan in accordance with relevant laws.
- *Procedures manual for program operation.* A detailed set of processes, procedures, and forms covering all day-to-day administration, financial management, and record-keeping functions.
- *Local training development.* This element improved local training capacity by conducting training to certify trainers for classroom instruction and training specialists to develop courses and tests; and, on-job coaching for supervisors to ensure that operators (trainees) would receive adequate support at the work site to apply new O&M knowledge and skills. OMT's optimized development of Jordanian project staff in accordance with USAID Forward objectives further contributed to building local capacity.

Primary Sustainability Factors for Jordan Program

In developing a strategy for the sustainability of the Jordan Water Operators Certification Program, OMT applied relevant international development theories and took into account the following pertinent factors that are often cited as reasons why the benefits of projects fail to continue after project completion.

Impact. Are the benefits of the program making a difference and do beneficiaries support the program due to the value of the results? Will there be an ongoing demand for the services?

Ownership. Do beneficiaries have a real sense of ownership for the program and has stewardship been successfully transferred?

Financial and human resources. Are the real requirements known and have measures been taken to secure the staff and funds necessary to continue operations at an effective level?

Management and organization capacity. Can the local recipient managers effectively administer and smoothly deliver program benefits according to workable policies and procedures, roles and responsibilities?

Legal environment. Are enabling statutes and policies in place to support aggressive enforcement where necessary?

- *Sustainability action plan.* During OMT’s final year, partner attention was focused on sustainability and culminated in a two-day sustainability action plan workshop that laid out the potential vulnerabilities and risks to sustainability, outstanding actions to complete these critical final requirements, and the responsible actors, resources and schedules to ensure that all elements deemed crucial to the future of the Jordan program were addressed with adequate time for accomplishment.

The government of Jordan’s commitment to continuing program activities. The long-term sustainability of the Jordan Water Operators Certification Program hinges on three critical factors:

1. *Mandatory and enforced operator certification.* A strong legal imperative that makes operator certification compulsory for all technical managers, engineers, and technicians working in the Jordanian water sector as well as those working for private water enterprises such as bottling plants, hotels and resorts, and manufacturers that are pre-treating industrial discharges is the only concrete driver to ensure full compliance by employers and operators. Long-term sustainability of a voluntary program is doubtful even with proven O&M results and the human resources management benefits of certification.

Status at OMT Completion: The approved version of the CAQA bylaw fell short of expectations and did not empower CAQA to make certification mandatory. However, in 2012, the Ministry of Water, WAJ, and water utilities/companies were devising a framework to make operator certification compulsory for all operators in Jordan. WAJ and water utilities are complying with these mandates on a voluntary basis until finalized.

2. *Reasonable fee structure and willingness to pay.* The Jordan Water Operators Certification Program is fee-driven, with payment for operator training, testing, and licensing borne by the employer. By design, the Jordan program is financially self-sufficient and dependent on revenue generated by collection of designated fees. There are no government of Jordan subsidies or donor funds committed to the program. The fee for training was calculated to cover operating costs based on BAU experience and in comparison with tuitions charged by other public and private training providers for similar programs. The fees for testing and licensing are dictated by CAQA.

Status at OMT Completion: Employers expressed their willingness to include adequate resources in their budgets and to pay training fees to the training provider, BAU, and to CAQA for testing and licensing. To ensure long-term sustainability, the Jordan program seeks additional USAID and donor support during the transition to a self-sustaining commercial enterprise.

3. *Regional expansion and revenue generation.* ACWUA has been designated as the RTM with responsibility to promote operator certification throughout the MENA regional and share a portion of revenues collected with the Jordan program for the mutual benefit of both parties. By agreement, these funds will be used to periodically create new forms of the tests, update current courses, and develop new courses and tests for topics in regional demand but not covered in the Jordan program, such as: Wastewater Re-use, Desalination, Advanced Utility

Management and Water Quality Lab, and Maintenance Technicians.

Status at OMT Completion: The ACWUA board agreed to acknowledge operator certification as one of its key missions and approved collaboration with the Jordan Water Operators Certification Program. ACWUA is actively promoting operator certification on its enhanced website, with descriptive brochures and catalogs, and at its best practices conferences. ACWUA has established cooperative agreements with ABC and OWP to jointly foster operator certification in the MENA region. ACWUA is seeking additional USAID and donor support to assist in expanding operator certification and training throughout the MENA region.

Looking ahead: operator certification scenarios for Jordan. OMT expects that as the new CAQA bylaw is implemented, its application will evolve to accommodate the unique features of each certification program coming under the CAQA umbrella. The structure of the Jordan program will be responsive to changing needs and the progressive development of training capacity within the Jordanian water sector.

Initial program structure. CAQA wishes to retain the current structure of the Jordan program for two years or until additional training providers can be licensed. Within this structure, WWSST serves as a technical advisory committee for CAQA and BAU serves as the initial training provider directly fulfilling all administrative and training functions. CAQA will control training materials and make them available to newly licensed training providers as required. CAQA will be responsible for all aspects of testing.

A mature program assures greater sustainability. In the two years following OMT's completion, the players in the Jordan program will continue to build their capacities and move to the next stage in their institutional arrangement characterized by the following changes:

- The WWSST will assert greater independence and will be elevated to the status of Board of Certification for the Jordan program responsible for all technical curricula and further development and revision of courses and tests as well as administrative oversight.
- The training departments of WAJ, the three water utilities and other training organizations (public and private) will use the initial 24 months to fulfill the requirements for CAQA to license them as training providers.
- CAQA will determine whether to continue to rely on BAU to administer the program. CAQA may seek other options for the annual preparation of a consolidated national master training plan, testing schedule and operating budget.
- The newly licensed training providers will coordinate the training and the testing with CAQA. CAQA will provide the training materials to the training providers. As per the CAQA bylaw and the policies of the Jordan program, the new training providers will use certified trainers to conduct training for their operators.
- To the greatest extent possible, the WAJ and the water utilities will use in-house budgets and training resources to conduct operator training, which will significantly reduce the

employer payment of the training provider fee. CAQA will continue to collect testing and operator licensing fees however the licensing fee is expected to be waived for public entities.

- To further assure quality, it is expected that CAQA will outsource the testing function to a certified local testing agency that conducts standardized tests such as the SAT, TOEFL, and computer engineering exams (e.g. Microsoft or Cisco Systems).

Expansion of regional operator certification. ACWUA has demonstrated a commitment to build awareness of and create interest in water/wastewater operator certification and training among its 19 member countries and more than 100 member utilities. As this interest becomes demand, ACWUA is expected to change in the following ways:

- ACWUA’s capability to deliver products and services that satisfy the needs of member countries will require a staff to manage and administrate the regional program as well as coordinate a roster of training providers and professional trainers. With a potential of tens of thousands of operators in the region, ACWUA will quickly mature as a serious training provider.
- ACWUA’s burgeoning ABC and OWP partnerships will bring professionalism and ever-increasing status and credibility making operator certification attractive across the region but particularly in affluent oil-producing countries.
- ACWUA’s business relationships with Jordanian and regional training providers will expand to meet demand. ACWUA will become the clearinghouse that matches operator certification buyers with sellers.

Sustainability of the Jordan Water Operators Certification Program. USAID first explored operator certification with WWISP in the early 1990s. After 55 months of OMT support from USAID/Jordan and dedicated commitment and action from the government of Jordan and the water sector, operator certification in Jordan and the MENA region is on a solid footing and poised to rapidly expand. The regulatory, institutional, and commercial capacities required to continue the delivery of professional and ethical operator certification services, testing and training have been successfully established with proven results and measureable O&M performance improvements.

“We will succeed. We have the right experience, personnel and resources to implement the Jordan Water Operators Certification Program. Our record speaks for itself.”
- Nabil Shawagfeh, President of BAU

Jordan is the first country in the MENA region with licensed water and wastewater operators and is sharing its certification program with its neighbors. The leaders of Jordan’s water sector appreciate the improved O&M and associated benefits of this effective new approach in the career development of its managers, engineers and technicians. They are fully committed to protect and perpetuate the Jordan Water Operators Certification Program as a safeguard for public health, the environment, scarce water resources, and substantial investment in infrastructure.

Snapshot: Sustainability of Training Development and Instruction

“I was the developer for all of the wastewater treatment and collection tests and courses” said Jamal Radaideh, a professor at Al Balqa’ Applied University. “OMT introduced us to the Instructional Systems Development process that we used to plan the content of the training, develop and pilot the tests and courses, and revise them based on feedback from trainees, trainers, and observers. This was the first time that most of us had applied a detailed approach like ISD. All of the materials are standardized. Each course covers the needs of our operators in trainee materials appropriate to their learning level. There is also a detailed trainer’s guide with complete lesson plans and slides for each course. We adapted the manuals from California State University in Sacramento and are very pleased with the results. This is the first comprehensive Arabic curriculum for wastewater operators and we now have the capacity in Jordan to develop additional tests and courses in the future.”



Dr. Radaideh, primary developer of wastewater operator certification tests and courses, on a site visit during the OMT facility assessment.

“I can remember a meeting at the Zara Ma’in water plant in 2008 with staff from the new OMT project. They had heard that most of the engineers and technicians at our plant held US operator certification. As part of the operations transfer phase of the USAID construction of our sophisticated reverse osmosis plant, we got the chance to study for and take the exams given by ABC. Many of us passed,” explained Eng. Aziz Yassin, water production section head, Zara Ma’in Water Treatment Plant at the Miyahuna Water Company.



Eng. Aziz Yassin, Water Production Section Head, Zara Ma’in Water Treatment Plant is one of the first ABC-certified operators to complete the training-of-trainers course.

“It was still early in OMT, but they had the vision to train the certified operators at Zara Ma’in to teach the courses for the new Jordan Water Operators Certification Program. We were all very excited about this opportunity. The O&M at our plant benefited so much from having certified operators, we were sure that all of the plants in Jordan would also improve their performance when they were run by certified operators. Some months later, I was in the first group to take the OMT training of trainers course. It was great!” said Eng Aziz.

“I studied adult learning theory, methods of instruction, and, effective classroom techniques. So now I’m also a certified trainer and I have already taught two water courses for operators from many parts of Jordan. There are now more than 20 certified water and wastewater trainers. We’re looking forward to continuing to train our engineers and technicians and sustaining the Jordan Water Operators Certification Program. Thanks OMT.”

ANNEX 1. TRAINING STATISTICS

Table I. Collective Data for Jordan Water Operator Certification Pilots and Training by Trainees			
Course	Number of Trainees		
	Pilot	Repeat	All Trainees
Water treatment	39	112	151
Wastewater treatment	40	116	156
Water distribution	32	0	32
Wastewater collection	27	0	27
Utility management	15	0	15
Training of trainers	5	32	37
Instructional systems development	9	14	23
On-job performance improvement plans (on-job coaching for supervisors)	16	0	16
Total	183	274	457

Table II. Collective Data for Jordan Water Operator Certification Pilots and Training by Course

Training/Course	Recipient Organization	Start Date	End Date	Test Date	Successful Trainees	Unsuccessful Trainees	Total Trainees
WTO LI Pilot	Miyahuna	1/3/2011	1/20/2011		15	2	17
WTO LI	AWC	9/11/2011	9/22/2011	10/20/2011	12	1	13
WTO LI	WAJ	2/19/2012	3/1/2012	3/14/2012	8	5	13
WTO LI	YWC	3/18/2012	3/29/2012	4/19/2012	14	2	16
WTO LI	WAJ	4/8/2012	4/19/2012	4/30/2012	13	3	15
WTO LI	Armed Forces, Gen. Sec., Civil Defense & Janderma	7/1/2012	7/12/2012	7/19/2012	11	6	19
WTO LI (Grandfathering)	WAJ	9/11/2011	9/28/2011	N/A	N/A	N/A	11
WTO LII Pilot	AWC	1/8/2012	1/18/2012	2/5/2012	5	0	5
WTO LII	Miyahuna	4/22/2012	5/3/2012	5/10/2012	10	0	10
WTO LII	WAJ	6/17/2012	6/28/2012	7/8/2012	15	0	15
WTO LIII Pilot	mixed recipients	9/16/2012	9/26/2012	10/9/2012	17	0	17
WWTO LI Pilot	AWC	5/30/10 and 6/20/10	6/17/10 and 7/8/10		15	1	16
WWTO LI	YWC	9/11/2011	9/25/2011	10/19/2011	13	0	13
WWTO LI	WAJ	2/19/2012	2/29/2012	3/14/2012	8	1	9
WWTO LI (Grandfathering)	WAJ	11/20/2011	12/1/2011	N/A	N/A	N/A	11
WWTOLI	Miyahuna	11/22/2011	12/5/2011	12/28/2011	10	4	14
WWTOLI	As Samra WWTP	3/18/2012	3/29/2012	4/19/2012	16	0	16
WWTOLI	WAJ	5/6/2012	5/17/2012	5/31/2012	11	1	12
WWTOLI	AWC/Wadi Musa	11/27/2011	12/8/2011	12/29/2011	16	0	16
WWTO LII Pilot	AWC	12/26/2011	1/5/2012	2/9/2012	12	0	12
WWTO LII	AWC/Wadi Musa	3/18/2012	3/28/2012	4/18/2012	7	0	7
WWTO LII	WAJ	7/8/2012	7/19/2012	7/29/2012	8	1	9
WWTO LII	YWC	4/1/2012	4/12/2012	5/1/2012	9	0	9
WWTO LIII Pilot	AWC & Wadi Musa	6/10/2012	6/19/2012	6/30/2012	11	1	12
WWC LI Pilot	AWC	5/13/2012	5/21/2012	5/30/2012	17	1	18
WWC L II Pilot	AWC	9/2/2012	9/12/2012	9/22/2012	9	0	9

Table II (continued). Collective Data for Jordan Water Operator Certification Pilots & Training by Course

Training/Course	Recipient Organization	Start Date	End Date	Test Date	Successful Trainees	Unsuccessful Trainees	Total Trainees
WD LI pilot	mixed recipients	6/11/2012	6/19/2012	6/26/2012	21	0	22
WD LII pilot	mixed recipients	9/9/2012	9/18/2012	9/30/2012	10	0	10
UM pilot	mixed recipients	7/8/2012	7/17/2012	7/26/2012	6	9	15
ISD	mixed recipients	7/12/2009	7/13/2009	7/13/2009	9	0	9
ISD	mixed recipients	10/16/2011	10/20/2011	10/20/2012	14	0	14
TOT	mixed recipients	5/3/2010	5/5/2010	5/5/2010	5	0	5
TOT	mixed recipients	11/28/2010	12/210	12/2/2010	4	0	4
TOT	mixed recipients	5/22/2011	5/24/2011	5/24/2011	12	0	12
TOT	mixed recipients	6/3/2012	6/6/2012	6/6/2012	16	0	16
OJ-PIP	mixed recipients	4/16/2012	4/18/2012	4/18/2012	16	0	16

Table III. Collective Data for Jordan Water Operator Certification Pilots and Training by Recipient Organization

Recipient Organization	Training Course	Start Date	End Date	Test	Total Trainees	Number of Successful Trainees
Armed forces, Gen. Sec., civil defense & Janderma	WTO LI	7/1/2012	7/12/2012	7/19/2012	19	11
As Samra WWTP	WWTOLI	3/18/2012	3/29/2012	4/19/2012	16	16
AWC	WTO LI	9/11/2011	9/22/2011	10/20/2011	13	12
	WTO LII Pilot	1/8/2012	1/18/2012	2/5/2012	5	5
	WWTO LI Pilot	5/30/10 and 6/20/10	6/17/10 and 7/8/10		16	15
	WWTO LII Pilot	12/26/2011	1/5/2012	2/9/2012	12	12
	WWC L I Pilot	5/13/2012	5/21/2012	5/30/2012	18	17
	WWC L II Pilot	9/2/2012	9/12/2012	9/22/2012	9	9
AWC & Wadi Musa	WWTO LIII Pilot	6/10/2012	6/19/2012	6/30/2012	12	11
	WWTOLI	11/27/2011	12/8/2011	12/29/2011	16	16
	WWTO LII	3/18/2012	3/28/2012	4/18/2012	7	7
mixed recipients	WTO LIII Pilot	9/16/2012	9/26/2012	10/9/2012	17	17
	WD L I Pilot	6/11/2012	6/19/2012	6/26/2012	22	21
	WD LII Pilot	9/9/2012	9/18/2012	9/30/2012	10	10
	UM Pilot	7/8/2012	7/17/2012	7/26/2012	15	6
	ISD	7/12/2009	7/13/2009	7/13/2009	9	9
	ISD	10/16/2011	10/20/2011	10/20/2012	14	14
	TOT	5/3/2010	5/5/2010	5/5/2010	5	5
	TOT	11/28/2010	Dec.2, 10	12/2/2010	4	4
	TOT	5/22/2011	5/24/2011	5/24/2011	12	12
	TOT	6/3/2012	6/6/2012	6/6/2012	16	16
	OJ-PIP	4/16/2012	4/18/2012	4/18/2012	16	16
Miyahuna	WTO LI Pilot	1/3/2011	1/20/2011		17	15
	WTO LII	4/22/2012	5/3/2012	5/10/2012	10	10
	WWTOLI	11/22/2011	12/5/2011	12/28/2011	14	10
WAJ	WTO LI	2/19/2012	3/1/2012	3/14/2012	13	8

Table III (continued). Collective Data for Jordan Water Operator Certification Pilots & Training by Recipient Organization

Recipient Organization	Training Course	Start Date	End Date	Test	Total Trainees	Number of Successful Trainees
WAJ (continued)	WTO LI	4/8/2012	4/19/2012	4/30/2012	15	13
	WTO LI (grandfathering)	9/11/2011	9/28/2011	N/A	11	N/A
	WTO LII	6/17/2012	6/28/2012	7/8/2012	15	15
	WWTO LI	2/19/2012	2/29/2012	3/14/2012	9	8
	WWTO LI (grandfathering)	11/20/2011	12/1/2011	N/A	11	N/A
	WWTO LI	5/6/2012	5/17/2012	5/31/2012	12	11
	WWTO LII	7/8/2012	7/19/2012	7/29/2012	9	8
YWC	WTO LI	3/18/2012	3/29/2012	4/19/2012	16	14
	WWTO LI	9/11/2011	9/25/2011	10/19/2011	13	13
	WWTO LII	4/1/2012	4/12/2012	5/1/2012	9	9

ANNEX 2. PMP

OMT Performance Monitoring Plan (PMP) — Final Report: Cumulative through November 2012

SO 8: Enhanced Integrated Water Resources Management

↑
Program Goal (PG): Improved performance of water/wastewater facilities O&M through establishment of a sustainable certification and training system for sector employees in Jordan

↑	↑	↑	↑
PIR 1: Policy/regulatory environment strengthened to support standardized training and certification — OMT Component 1	PIR 2: Quality of Training Provided for O&M of Water and Wastewater Facilities Optimized — OMT Component 2	PIR 3: Water sector training strengthened by operating on sustainable commercial principles — OMT Component 3	PIR 4: Water and wastewater treatment facilities performance enhanced — OMT Component 4
KRA 1.1: Knowledge and application of best practices for water and wastewater facilities O&M increased KRA 1.2: Improved policies and regulations establishing certification requirements KRA 1.3: Capacity of local institutions involved in certification program strengthened	KRA 2.1: Training materials improved to reflect best practices and certification requirements KRA 2.2: Training skills of local trainers improved	KRA 3.1: Revenues collected to sustain program operations KRA 3.2: Expanded availability of high quality training programs KRA 3.3: Institutional capability to respond to regional training demand enhanced	KRA 4.1: Institutional and sectoral capacities to measure training impacts improved

PIR 1: Policy/Regulatory Environment Strengthened to Support Standardized Training and Certification — OMT Component 1

Indicator Title	Definition	OMT Project Target	OMT Project Final Result
KRA 1.1: Knowledge and application of best practices for water and wastewater facilities O&M increased			
Indicator 1.1: Protocol linking standard O&M procedures to training	Procedure	Procedure applied	Procedure implemented to link standard O&M/best practices and training
KRA 1.2: Improved policies and regulations establishing certification requirements			
Milestone 1.1: Final version of certification policy presented to decision-makers for approval	Certification policy approved	Approval	Certification policy approved by CAQA and E-TVET Council/Ministry of Labour
Milestone 1.2: Jordan program formalized	Jordan Program legally recognized	Accreditation	Jordan Water Operators Certification Program accredited by CAQA
Indicator 1.2: Certified and Licensed Water/Wastewater Operators	Number of Certified and Licensed Operators	Task Order - 4 Pilots x 12 Trainees = 48 Operators Amended - 7 Pilots x 12 Trainees = 84 Operators 132 Total Certified and Licensed Operators (14 total operator courses = 11 pilots + 3 expert review)	188 Certified and Licensed Operators holding 324 certificates

KRA 1.3: Capacity of local institutions involved in certification program strengthened			
KRA 1.3: Capacity of local institutions involved in certification program strengthened	BOC defined and established	BOC approved, staffed and functioning	Water/Wastewater Sector Services Team (WWSST) with responsibilities of BOC formed as technical committee within CAQA.
Milestone 1.4: Local training provider(s) qualified	Training provider(s) demonstrates capacity	BAU performing as Training Provider and Administrator	BAU recognized as Training Provider by CAQA
Indicator 1.3: Water/wastewater sector employees passing certification tests	Percentage of trainees passing certification tests	75%	91%

PIR 2: Quality of Training Provided for O&M of Water and Wastewater Facilities Optimized — OMT Component 2

Indicator Title	Definition	OMT Project Target	OMT Project Final Result
KRA 2.1: Training materials improved to reflect best practices and certification requirements			
Indicator 2.1: Number of certification programs designed	Curriculum outline for each program	Task Order — 2 Curriculum Outlines: WT, WWT Amended — 4: WD, WWC, UM, CB Total: 6 Certification Programs	6 certification program curriculum outlines
Indicator 2.2: Number of certification courses and tests developed as per curriculum outlines	Courses	Task Order — 4: 2 WT, 2 WWT; Amended — 13: 2 WT, 2 WWT, 3 WD, 2 WWC, 1 UM, 3 CB; Total: 17 Courses/Levels	Total: 17 Courses/levels training materials
	Tests	Task Order — 4: 1 per course; Amended — 27 (2 per Technical course; 1 per CB course) Total: 31 Tests	Total: 31 Tests; 1300 Test Questions Each Test: 100 Multiple Choice Questions
KRA 2.2: Training skills of local trainers improved			
Indicator 2.3: Number of qualified trainers	Graduates of TOT course	10 TOT Graduates	37 certified trainers (tot graduates; 4 TOT sessions)
Indicator 2.4: Number of qualified course/test developers	Graduates of ISD course	10 ISD Graduates	23 certified course/test developers (ISD graduates; 2 ISD sessions)
Indicator 2.5: Number of qualified on-job coaches	Graduates of OJ-PIP course	10 OJ-PIP	16 qualified on-job coaches (OJ-PIP and O&M supervisor graduates; 1 OJ-PIP training)

PIR 3: Water Sector Training Strengthened by Operating on Sustainable Commercial Principles — OMT Component 3

Indicator Title	Definition	OMT Project Target	OMT Project Final Result
KRA 3.1: Revenues collected to sustain program operations			
Indicator 3.1: Revenue collected by the licensed training provider	Total amount of certification-related training fees collected by Al Balqa' Applied University (BAU)	Unspecified	BAU did not conduct sessions that generated certification-related fees during the duration of the OMT project
Milestone 3.1: RTM marketing and business plans	Plans	Market survey; business plan	ACWUA plans completed and implemented: Market Survey; Marketing Plan; Promotional/Events Plan; Business Plan
KRA 3.2: Expanded availability of high quality training programs			
Indicator 3.1: Number of operator training offered in Jordan	Total number of operator training (pilots and repeats)	Task order - 4 training (pilots); Amended - 11 Trainings (pilots; 3 expert review)	29 operator training sessions (11 pilots and 18 repeats)
Indicator 3.2: Number of Jordanian trainees completing operator training	Total number of operators trainees attending courses.	Task order - 48 (12 per pilot; 4 pilots); Amended - 132 (12 per pilot; 11 pilots)	381 Total Operators
KRA 3.3: Institutional capability to respond to regional training demand enhanced			
Milestone 3.1: Regional training Marketer (RTM) identified	Qualified organization identified	Qualified RTM recognized	ACWUA recognized as RTM by CAQA
Milestone 3.2: Jordanian training marketer (JTM) identified	Qualified organization identified	Qualified JTM recognized	BAU recognized as RTM by CAQA

PIR 4: Water and Wastewater Treatment Facilities Performance Enhanced — OMT Component 4

Indicator Title	Definition	OMT Project Target	OMT Project Final Result
KRA 4.1: Institutional and sectoral capacities to measure training impacts improved			
Milestone 4.1: Training Impact Assessment (TIA) established	TIA system and procedures	TIA implemented	TIA Final Report — 11 pilots
Milestone 4.2: Knowledge, Attitude and Practices (KAP) Survey established	KAP system and procedures	KAP implemented	KAP Report; 1375 interviews nation-wide
Milestone 4.3: O&M Facility Survey established	O&M Facility Survey system and procedures	O&M Facility Survey implemented	O&M Facility Survey Reports Treatment — 9 Plants; Networks — 22 Facilities

ANNEX 3. OMT FINAL COMPLETION REPORT — ELECTRONIC VERSION AND REFERENCES

Final Report (Electronic Version)

Marketing Video

Success Stories

Reference Materials by Component:

Component 1. Policy & Institutional Framework

Policy Framework for Certification of Operations in the Water and Wastewater Sector

Component 2. Training

Jordan Water Operator Certification Program Training Course Outlines

Component 3. Commercialization

Market Research Report

Component 4. Monitoring & Evaluation

Training Impact Assessment Reports